1 INTRODUCTION

1.1 This Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) (2021) and the associated Planning Practice Guidance and regional/local policy and guidance This FRA has been produced on behalf of Albion Land Limited in respect of areview of the Flood Risk and Drainage matters of land north of Junction 10 of the M40and West of the A43, Baynard's Green, Bicester.

Table 1.1 – Site Summary

Site Name	Land at Junction 10, M40. (Name subject to change)
Location	J10 M40, A43, Baynard's Green Roundabout, Bicester
NGR (approx.)	454583, 229025
Development Type	The site is divided into two parts: the eastern parcel north of Junction 10 of the M40 and western parcel north of Moto Cherwell Valley Services. The current site proposals are for a total of five separate B8-use buildings with associated, access roads, delivery yards, external storage, car parking, SuDS & Wastewater infrastructure, and soft landscaping.
NFFP Vulnerability	Less Vulnerable
EA Flood Zone	Flood Zone 1
EA Office	North Thames – Banbury
LPA	Cherwell District Council
LLFA	Oxfordshire County Council

1.2 This Flood This report is based on the following sources of information:

(i) Proposed Masterplan Layout;
(ii) Topographical Survey Data;
(iii) Ordnance Survey Mapping Data;
(iv) Cherwell Level 1 Strategic Flood Risk Assessment (SFRA);
(v) Environment Agency Flood Map for Planning (Rivers and Sea);
(vi) Geotechnical and Environmental Desk Study
(vii) Ground Investigation and Soil Testing Report
(viii) Sewerage Undertaker Asset Location Plans
(ix) Standing Advise for Flood Risk Assessments

Note: This list could be updated in future issues of this report.

SITE DESCRIPTION

1.3 The site is located adjacent to the north of Junction 10 of the M40, approximately 1km north of the centre of Ardley in Oxfordshire. The Ordnance Survey grid reference for the centre of site is 454583 229025 as shown on the Site Location Plan in **Appendix A**.

1.4 The site refers to two parcels of agricultural arable land on the east and west sides of the A43, immediately north of its junction with the M40 motorway (J10) and Cherwell Valley Services and extending north as far as the B4100. The larger western parcel extends to 43.45Ha and the smaller eastern parcel extends to 23.18Ha. The site is irregular shape and overall covers a total of 66.7Ha.

1.5 The land is not allocated for any form of development in the adopted Cherwell Local Plan 2011-2031 but instead comprises 'white land'. The site is however mentioned in the Cherwell Level 1 Strategic Flood Risk Assessment 2017 as a potential development site under reference SFRA56.

Western Section of the Site

1.6 The two most northerly fields in the western section of the site are cropped, with the remaining four fields in the western section recently seeded with crops starting to sprout. A disused stone barn was present in the middle of the western section of the site which was previously used to store hay bales. An electric substation and phone mast were also present in the west corner of the western section of the site. The fields are separated with internal hedgerows and the odd mature and semi-mature trees.

Figure 1.1 – Western Site Photographs

1.7 To the south-west of the site is the M40 motorway with a small field ditch separating the site from the road. The north-west of the site is bounded by dense hedges and further agricultural fields. The north of the site is bounded by the single lane B4100 with farmers gate entrance from the top of the site. To the north-east of the site there is an existing farmhouse and associated landscaping known as Baynard House. In close proximity is also a couple of small cottages. To the east of the site is the A43 dual carriageway with verge and trees separating the site from the road.

1.8 From the Topographical survey it can be seen that the highest level recorded was on the north-western corner of the site at 128.0m AOD. The site generally falls in a south-easterly direction with varying falls of between 1 in 150 to 1 in 25 at the steepest point, with an average fall across the site of 1 in 70. The lowest point recorded was on the south-eastern corner of the site at 111.5m AOD.

Eastern Part of the Site

1.9 The eastern part of the site is split into three cropped fields separated by mature hedgerows. A drainage ditch runs along the hedge forming the northern & western site boundary filed with nettles and weeds. An approximately 1.0m deep depression was observed just north of the centre filled with nettles and surrounded by trees. The depression may represent a former pond.

Figure 1.2 – Eastern Site Photographs

1.10 To the east of the site is the A43 dual carriageway with verge separating the site from the road. The north of the site is bounded by the single lane B4100 with a small farmer's gate entrance from the road. To the west the site is bounded by further agricultural fields. Finally on the southern boundary is a significant number of trees on a slightly elevated mound which then slopes down to a watercourse and Moto Cherwell Valley services.

1.11 From the Topographical survey it can be seen that the highest level recorded was on the north-western edge of the site at 117.0m AOD. The site generally falls in a south-easterly direction with varying falls of between 1 in 200 to 1 in 20 at the steepest point, with an average fall across the site of 1 in 65. The lowest point recorded was on the south-eastern corner of the site at 109.0m AOD. The topographical survey is presented in **Appendix B**.

SITE HISTORY

1.12 Historical maps were obtained as part of the desk study by Applied Geology in order to determine any significant past activity or land usage. No significant changes have taken place on the site other than the inclusion of a pump marked in 1900 and then removed on the 1980 map. In the vicinity of the site the construction of the M40 in the early 1990's, construction of Baynard's Green services and Moto Cherwell Valley in the early 2000's and widening of the A43 carried out in the early 2010's remain the only significant works.

PROPOSED DEVELOPMENT

1.13 The applications seek outline planning permission (all matters reserved except for access) for the erection of buildings comprising Storage and Distribution (Use Class B8) and ancillary Office (Use Class Eg(i) floorspace; associated infrastructure including electricity substation(s) and noise attenuation measures; construction of new site accesses from the B4100; creation of internal roads and access routes; hard and soft landscaping; and the diversion of an existing public right of way.

The Development will be arranged across five Development Zones; please refer to the Illustrative Master Plan in Figure 1.3. The first three buildings are all proposed on the west side of the A43, in the fields alongside the east of the M40. The other two buildings are proposed on the east side of the A43, just north of the motorway service station. Parameter Plans of the proposals are presented in **Appendix C**.

Figure 1.3 – Illustrative Site Layout

1.14 In addition to the 265,542m2 GIA of warehouse buildings, 1117 car parking spaces are proposed including disabled spaces and EV charging, delivery yards, dock levellers, soft landscaping, amenity space, SuDS features, and wastewater infrastructure is proposed. Currently there are no phasing plans for the development.

1.15 Alterations to the B4100 are proposed to the east and west of the A43 roundabout to allow access into the new development(s). Two new roundabouts are proposed as part of a S278 agreement and therefore will be owned and maintained by the local highway authority. Drainage relating to existing or proposed alterations to public highways are therefore scoped out of this assessment.

2 HYDROLOGY, HYDROGEOLOGY AND DRAINAGE

EXISTING WATERCOURSES

Main Rivers

2.1 According to the online Environment Agency (EA) Main River Map accessed in August 2021, the closest main river is the River Cherwell which is located 5.0km west of the site. The River Cherwell is a tributary of the River Thames. It rises near Hellidon, Northamptonshire and flows southwards for 64km to meet the Thames at Oxford in Oxfordshire.

2.2 The site is located within the Anglian River Basin District. The management catchment for the site is within the Ouse Upper and Bedford region. The operational catchment is within the Great Ouse Upper area.

Ordinary Watercourses

2.3 From the Environment Agency (EA) Catchment Data Explorer it can be seen that the site is located within the Padbury Brook catchment area. The Padbury Brook is located approximately 500m from the centre of the site. It reaches its closest point with the southern boundary of the eastern parcel of land where it passes parallel 35m south of the site. The Padbury Brook is a small tributary of the River Great Ouse. It rises near Fringford, Oxfordshire and flows eastwards for 26km to meet the River Great Ouse near Buckingham.

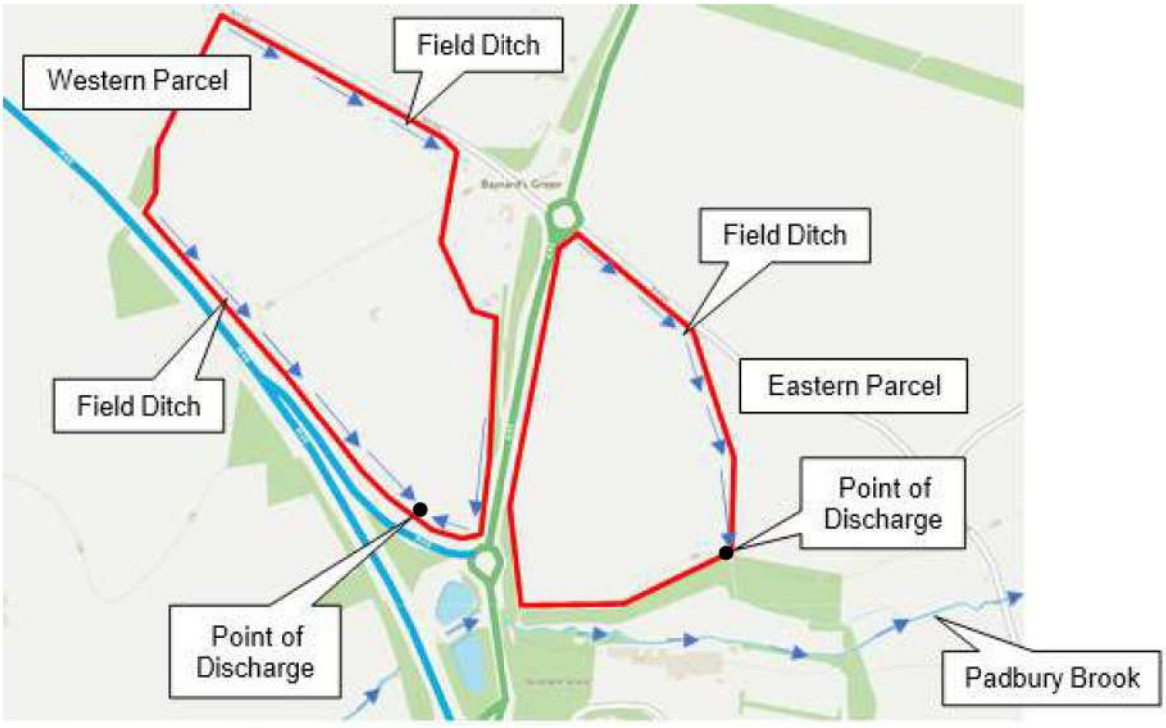


Figure 2.1 – Existing Watercourses

2.4 Given that there are no main rivers, ordinary watercourses or tributaries that flow through the site it is likely that most surface water is discharged through infiltration into anticipated underlaying White Limestone Formation or Alluvium over the whole site. In heavy rainfall events, surface runoff flows in the direction of the natural slope of the land, in a south-easterly direction, to the potential outfall locations. See **Figure 2.1** for the existing drainage routes & overland flows on site.

HYDROLOGY

2.5 The nearest surface watercourse is the Padbury Brook which is located approximately 35m south of the site and flows to the east. The Environment Agency Chemical Quality Grade for this watercourse is 'A' (excellent).

According to the GroundSure report there are no surface water abstractions within 2km of the site. There are many licensed discharges within 500m of the site, the nearest one being 30m south of the site of emergency discharges from Cherwell Valley Services into the Padbury Brook. The majority of the other licensed discharges are for storm overflow. The Environment Agency web site indicates that the site lies outside of any flood zone.

HYDROGEOLOGY

2.6 According to the Environment Agency, the Alluvium is classified as a Secondary A Aquifer and the Head deposits as a secondary (undifferentiated) Aquifer. The White Limestone Formation is classified as a Principal Aquifer.

There are three groundwater abstractions within 500m of the centre of the site, the nearest being 146m northwest of the site for household (potable) use and for general farming use. The site is not located within a groundwater Source Protection Zone. The BGS suggest that there is potential for groundwater flooding at surface within 50m of the site. It is expected this relates to the Padbury Brook to the south of the site. Groundwater flooding at surface is considered unlikely across the main site area away from the Brook given existing levels.

GEOLOGY

2.7 An extensive physical examination of the ground was carried out in by Applied Geology in August 2021. The following fieldwork was undertaken:

- 156 No Machine Excavated Trial Pits to depths of between 0.50m and 2.90m bgl.
- 5 No Soakaway infiltration tests.

An initial layer of topsoil was generally encountered across the entire site with localised areas of underlying subsoil, all underlain in turn by the White Limestone Formation, which was found to be weathered in the upper horizons of the stratum. Limited Made Ground and Possible Made Ground was encountered in a couple of localised locations.

GROUNDWATER AND SOAKAWAY TESTS

2.8 Groundwater was encountered in just 15 of the 156 trial pits during excavations. The groundwater occurrence was sometimes observed as discrete seepages or inflows emanating from the sides or base of trial pits or sometimes simply as standing water in the base of the pits. The water table is closest to the surface in the southern most point on the western site where groundwater was encountered at 0.9m – 2.0m bgl.

3 No. Soakaway tests were undertaken on the western site and 2 No. on the eastern site as recorded in Table 2.1 and in **Appendix D**. There are some substantial variations due to the high degree of variability within the weathered rock horizons. The groundwater occurrence and soakaway test suggest variable ground infiltration rates and also some relatively shallow groundwater within the topographically lower areas of the site.

Table 2.1 – Summary of Soakaway Results

Soakaway Test Location	Invert level of Trial Pit (m AOD)	Soil Infiltration Rate (m/s)
North-Central of the Western Parcel	120.0	1.18E-04
South-Central of the Western Parcel	116.0	7.76E-04
South of the Western Parcel	111.5	7.00E-06
South of the Eastern Parcel	109.5	1.12E-03
East-Central of the Eastern Parcel	112.0	2.60E-05

EXISTING DRAINAGE

2.9 A detailed search was conducted to locate existing services using; the topographical survey data, Anglian Water Asset Location maps and Thames Water Asset Location maps. Details of the asset location maps are presented in **Appendix E**.

There are no known existing public storm, foul or effluent connections located on the site. A water main runs northwards under the A43 between the two parcels of land serving the current McDonalds's/Esso Garage at Baynard's Green Roundabout. All mains water services in this area are undertaken by Thames Water.

Two storm water balancing ponds bisect the Padbury Brook to the south of the site at Junction 10 of the M40. These are assumed to be owned and operated by either Highways England or the Oxford County Council and are likely used for storm water drainage attenuation and conveyance for the nearby road network.

The nearest Anglian Water adopted foul water pumping station is located 60m south of the eastern parcel at the Moto Cherwell Service station. Foul water is pumped from the service station approx. 650m, via a 100mm diameter pipe, directly to a wastewater treatment facility in Ardley. There is also a gravity foul system which serves the village of Ardley which is eventually pumped approx. 200m to the wastewater treatment facility.

3 FLOOD RISK ASSESSMENT

3.1 The table below identifies the potential sources of flood risk to the site, and the impacts which the development could have in the wider catchment prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 4**.

Table 3.1 – Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial/River/Sea				X	Located within Environment Agency River Flood Zone 1.
Groundwater			X		No recorded history of Groundwater flooding.
Canals				X	None present on or adjacent to site.
Reservoirs				X	The site is outside the zone of reservoir failure risk.
Sewers				X	None present on or adjacent to site.
Surface Water Runoff / Flows			X		Levels locally are shallow falls, significant exceedance runoff unlikely with infiltration
Effect of development on wider catchment			X		Increase in the number of impermeable surfaces such as roofs and yards

3.2 According to the Environment Agency Flood Map for Planning found in **Appendix F**, the site is located entirely within Flood Zone 1. The closest watercourse is the Padbury Brook which is located circa 30m away from the site. The existing levels of both parcels slope moderately away from the watercourse making it virtually impossible to flood. The sea is located significantly away from the site and does not pose a risk to flooding.

The Environment Agency describes areas deemed to be in Flood Zone 1 as shown to be at less than 0.1% chance of flooding in any year, this is sometimes known as having a 1:1000-year chance. There are no recorded instances of the flooding from nearby rivers or watercourses. Therefore, the overall risk from fluvial flooding is very low to negligible.

FLOOD RISK FROM GROUNDWATER

3.3 Flooding from groundwater can happen when the level of water within the rock or soil underground – known as the water table – rises. Flooding from groundwater is most common in areas where the underlying bed rock is chalk, but it can also happen in locations with sand and gravel such as in river valleys.

From the trial pits conducted on the site, generally the ground water table is significantly below the topographical levels except on the southern boundary. The BGS suggest that there is potential for groundwater flooding at surface within 50m of the site. It is expected this relates to the Padbury Brook to the south of the site. Given that the site slopes away from the river and there are no records of flooding, groundwater flooding at surface is considered unlikely. Therefore, the overall risk from groundwater flooding is low.

FLOOD RISK FROM CANALS

3.4 The nearest canal is the Oxford Canal which runs adjacent to the River Cherwell approximately 5.0km west of the site. Due to the local topography and distance away from the overall risk from canal flooding is very low to negligible.

FLOOD RISK FROM RESERVOIRS AND WATERBODIES

3.5 Using the Environment Agency's online map for 'Flood Risk from Reservoirs – Flood Extents' it shows that the whole site is not within reservoir flooding extents. The nearest body of water approximately 200m(L) x 100m(W) is on Park Farm grounds, 1.25km north-east from the centre of the site. The lake outlets in a southern direction via a stream before eventual discharge into the Padbury Brook. Overall, the risk from reservoir flooding is very low to negligible.

FLOOD RISK FROM SEWERS

3.6 The local undertaker for foul drainage assets in the area is Anglian Water. Thames Water are responsible for mains water supply. There are no known public sewers located on or adjacent to the site. The B4100 is drained via ditches on either side of the road and does not have sewers in the road. There are some storm drains on the A43 Baynard's Green Roundabout between the sites. These sewers are well connected to local drainage infrastructure and overland flows would be naturally directed away from the site. Therefore, the overall risk from sewer flooding is very low to negligible.

FLOOD RISK FROM SURFACE WATER

3.7 Risk of flooding from surface water mapping has been assessed by the Environment Agency as shown in Figure 3.1. This shows existing flood potential which could occur when rainwater does not drain away through the normal drainage systems, discharge into rivers or soak into the ground. This can be problematic when water stands on the ground rather than flowing away.

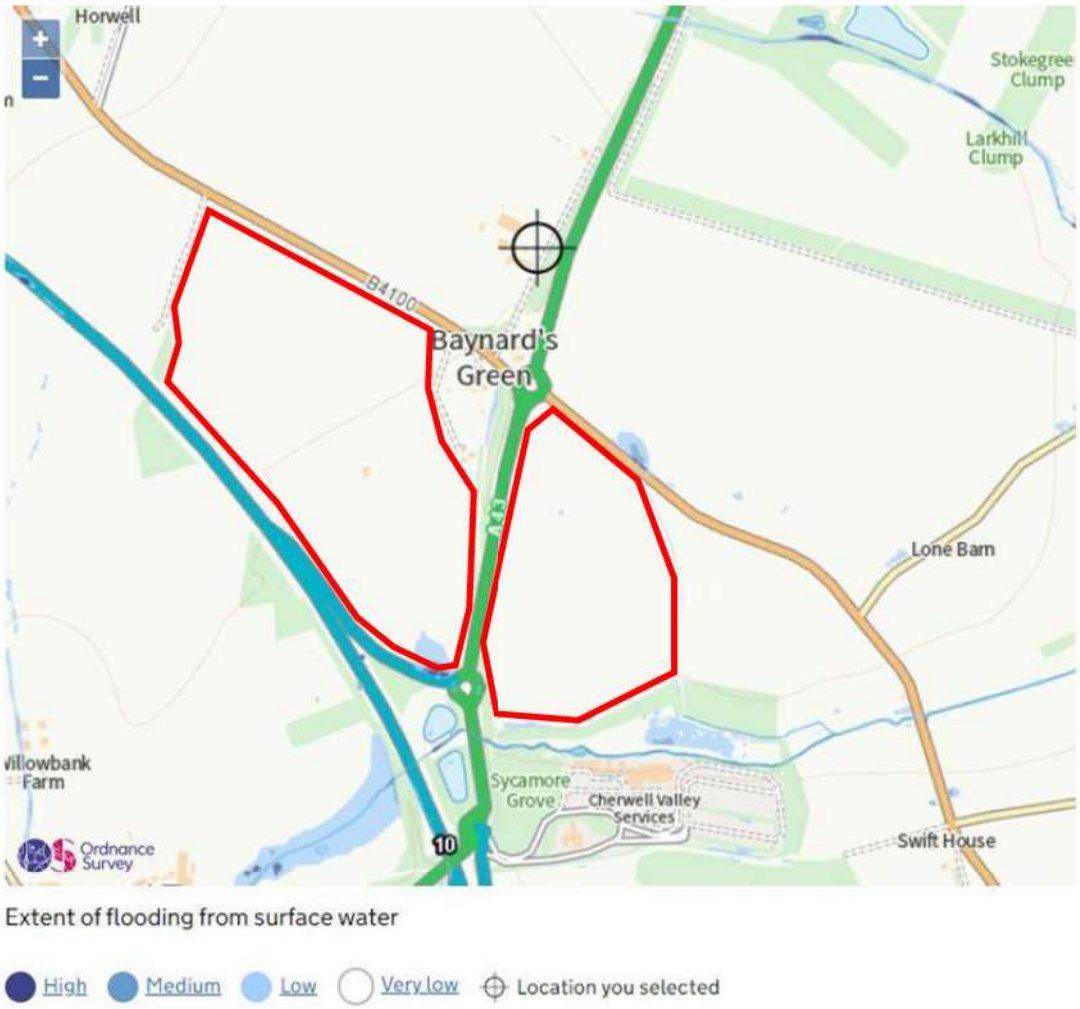


Figure 3.1 – Extent of flooding from Surface Water

Generally, there is very low risk throughout both parcels of land of surface water flooding as shown on the Environment Agency map. There are two 'hot spots' at the natural low points of both parcels of land on the southern boundaries. These highlight some generally low risk flooding with a very small area of medium-high risk in the western parcel. Therefore, the overall risk from surface water flooding is low.

FLOOD RISK TO THE WIDER CATCHMENT

3.8 From the FEH catchment data it can be seen that the wider catchment all currently drains naturally into Padbury Brook. There have been no recorded instances of flooding in the local area. As the site is currently fairly close to the Padbury Brook the effect of the site on the wider catchment is minimal as overland flows could occur on a small section of the exit to Junction 10 M40 before eventual natural discharge. Cherwell Valley is also well protected due to its significant elevation over the Padbury Brook. Downstream of the brook are agricultural fields which would not be sensitive to variations in flood levels. Overall, the risk to the wider catchment is low.

4 FLOOD RISK MITIGATION

4.1 This section of the FRA & Drainage Assessment provides an overview of the potential mitigation measures available to address flood risk issues at the development site. The measures listed below are suggested items which could reduce flood risk but are not limited to just these measures. Further measures may come to light later as different stages of the project proceed and flood risk changes over time.

RAISED THRESOLDS

4.2 One method of reducing flood risk is to raise the floor level of buildings and thresholds to above predicted water levels. Generally, car parking and utility areas should be located at lower levels so that failure of storm water systems can store water first. It is current good practice that thresholds to buildings are located at a minimum freeboard of 300-600mm above the 100-year + climate change (CC) design water level in all storm water and river flooding events.

SAFE ACCESS AND EGRESS

4.3 Access roads must remain operational during times of flood. This is to allow occupants of buildings to be able to escape and for maintenance vehicles to access the site. As part of a potential evacuation procedure, alternative locations where cars & HGV's can be parked during a flood event should be identified.

OVERLAND FLOWS

4.4 The drainage system must be designed to accommodate overland flow from adjacent land if this is likely to be intercepted or affected by the development. All development must clearly identify surface water from adjacent land has been considered appropriately and mitigation measures employed to prevent flood risk.

IMPLEMENTATION OF SUDS

4.5 Within true SuDS, rainwater is dealt with close to where it falls (at source), allowing as much water as possible to either evaporate or soak into the ground. The majority of SuDS components provide larger storage volumes than traditional drainage systems. Therefore, these systems will only become overloaded by events occurring over a longer duration, which generally means that "failure" results in less impact.

Flood risk is managed by SuDS reducing the volume, frequency, and flow rate of surface water runoff during extreme events. Exceedance can be managed, with components and schemes "failing gracefully" and in many circumstances they can be visually monitored. The benefits of SuDS on flooding include; better flood water management, easier to maintain, groundwater recharge, treating wastewater and biodiversity and ecology gain.

POLLUTION PREVENTION

4.6 Developments involving industrial processes which involve the use of potentially polluting substances (fuels, chemicals etc) should be designed in a way that these substances will not enter the water environment during a flood, preferably though designing the development such that these chemicals are stored and used outside the flood zone risk. The use of petrol interceptors for all the car parks and delivery yards is recommended to mitigate the risk of accidental spillage which damages water quality.

TREE PLANTING

4.7 Trees reduce flood risk from the top to bottom. Rain droplets that land on leaves evaporate straight into the air- so less water reaches the ground. Leaves intercept rainfall, slowing the rate that water flows into rivers and reducing the risk it'll burst its banks.
The roots of a tree are also important. They create small drainage paths in the soil as they grow, so when it rains water flows into those instead of flowing straight into the river.

The roots also act as a net to hold the soil in place and stop it washing into a river. That can be a problem because the more soil on a riverbed, the less space for water, which means the river is more likely to flood in heavy rainfall. In addition, allocating space for trees and soft landscaping reduces the impermeable area on the site, therefore reducing runoff volume and surface water flooding potential.

MANAGEMENT AND MAINTENANCE

4.8 One of the biggest causes of flooding is incorrect management and maintenance of drainage features and infrastructure. Effective and sustainable surface water runoff management should be considered from the outset and integrated throughout the development. Although specific development information may be limited at outline planning stage, the proposals will still need to consider, and make a commitment to, the requirements outlined by Oxfordshire County Council SuDS guidance.

RESIDUAL RISK AND EXCEEDANCE

4.9 Residual risk is the risk that remains after mitigation actions have been taken. As well as the consideration of the hydraulic modelled events undertaken in the drainage assessment, there should be a qualitative examination of what would happen if any part of the system fails, demonstrate that flood water will have flow routes through the site without endangering property and where possible maintaining emergency access/egress routes.

5 SURFACE WATER DRAINAGE ASSESSMENT

5.1 This assessment has been carried out in compliance with, Cherwell Local Plan 2011-2031, Oxfordshire County Council SuDS design guidance, the SuDS Manual C753 and NPPF. The site is considered a major development as the development exceeds over a hectare in size. The site is not within a critical drainage area and is within Flood Zone 1.

5.2 A Drainage Assessment is a specific requirement set by the LLFA for all major applications in Oxfordshire. This Drainage Assessment will ensure industry best practice is applied to the drainage strategy for the major development and includes information on the outline design, management, and maintenance of surface water management systems. The development is not currently expected to be phased.

STRATEGIC AIMS & OBJECTIVES (SWM)

5.3 The first stage of the SuDS design process is setting of the strategic surface water management (SWM) objectives for the development. Consultation with relevant stakeholders such as Cherwell District Council, Oxfordshire County Council, Sewage undertakers and local residents has been established to inform the design. The relevant Policies of Stakeholders are followed in an Approach.

5.3.1 Flood Risk Management Objectives

Some of the site-specific strategic flood risk management objectives, with reference to Policy ESD6 – Sustainable Flood Risk Management, are as follows:

- Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding.

- Site specific flood risk assessments will be required to accompany development proposals where the proposals are of 1 hectare or more located in flood zone 1. Flood risk assessments should assess all sources of flood risk and demonstrate:

    - There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100-year storm event with an allowance for climate change (the design storm event).
    - Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30-year storm event, up to and including the design storm event will be safely contained on site.

- Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged.

SUDS MANAGEMENT TRAIN

5.4 The SuDS management train has been adopted in the outline design process as follows:

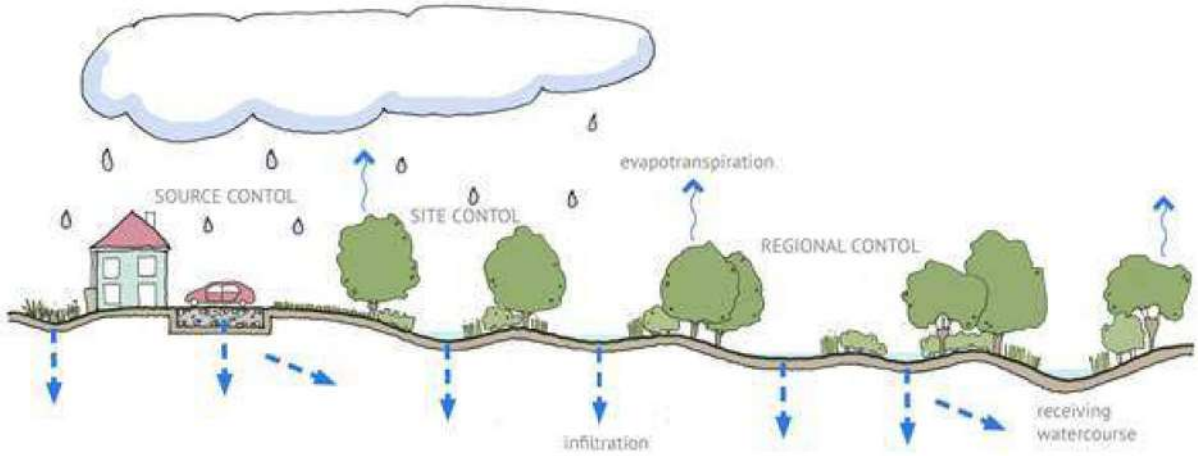


Figure 5.1 – Susdrain SUDS Management Train

1) **Prevention** - Prevention of runoff by good site design, reduction of impermeable areas and good housekeeping measures for reducing pollution.

2) **Source Control** - Dealing with water where and when it falls at source. By dealing with runoff at source the volume of water and the potential amount of contamination is less, which requires smaller SuDS components further downstream (e.g., infiltration techniques).

3) **Site Control** - The management train concept promotes division of the area to be drained into sub-catchments with different drainage characteristics and appropriate SuDS features (e.g., soakaways, swales, basins)

4) **Regional Control** - Management of runoff for the region with consideration of the whole hydrological cycle (e.g., balancing ponds, wetlands).

SITE AND DEVELOPMENT CHARATERISTICS

5.5 The second stage of the SuDS design process is conceptual design. The key outcome of this stage is to identify and assess potential SuDS components and linkages, in developing management trains for each area of the site. This step has two elements:

- Developing an understanding of the existing features on site that could influence SuDS design such as, topography, discharge points, flow routes etc…
- Developing an understanding of relevant features of the proposed development that could influence SuDS design criteria and design options.

Site Topography, Existing Flow Paths and Discharge Points

5.5.1 Site contours from the topographical survey indicate that flow paths have naturally occurred on the site, possibly during heavy rainfall in the form of overland flows across some of the site. These have been outlined below in light blue on **Figure 5.2**.

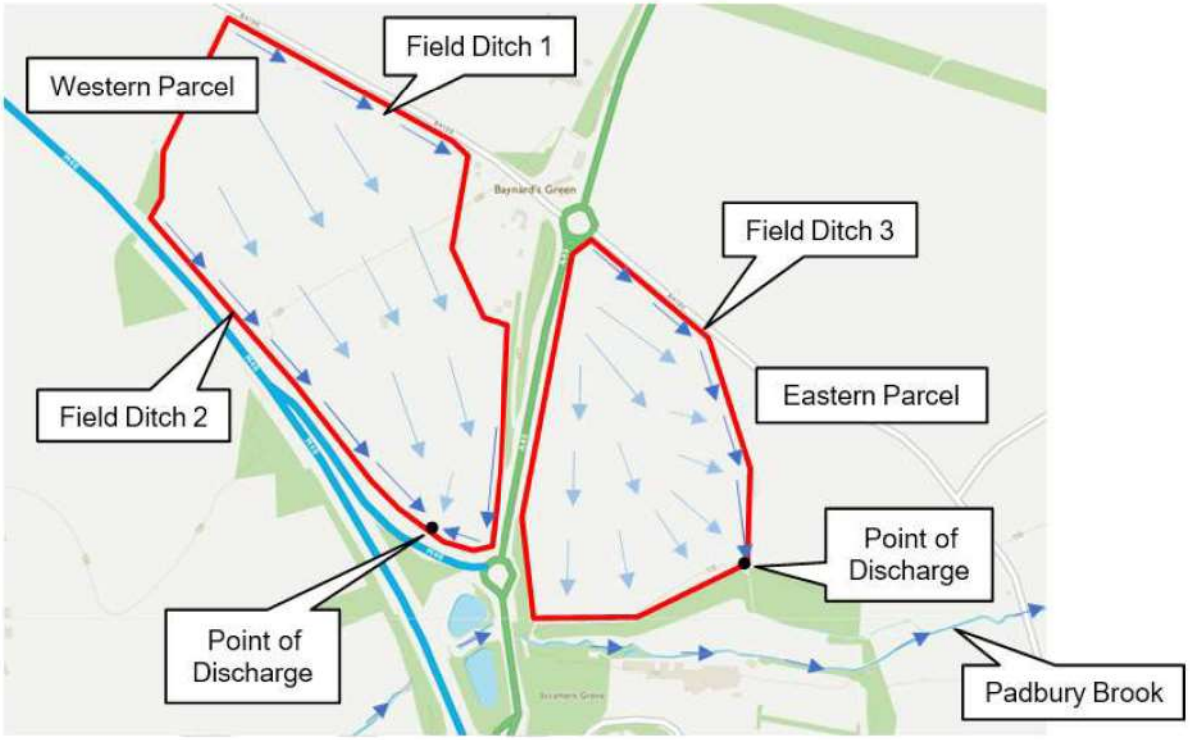


Figure 5.2 – Existing Drainage Flow Paths

5.5.2 There are some natural low points, identified previously, on the southern boundaries of both the western and eastern parcels of land. These may be good locations for siting storage areas. Falls across the site are modest with the steepest falls of circa 1 in 20 falls meaning embankments generally will not be necessary on site.

5.5.3 According to local geology it is likely that infiltration is the primary discharge location throughout both parcels due to underlaying White Limestone Formation or Alluvium over the whole site. Secondary field ditches have been identified and numbered one to three. These ditches are generally 0.5m to 1.0m deep and are not known to carry significant flows. They usually drain small areas of adjacent field or highways. It is recommended that these ditches remain undisturbed in order to prevent disturbance to hedgerows and maintain existing flow paths. These may make up part of landscape buffers between the development.

5.5.3 Naturally the western parcel slopes towards a discharge point identified on southern boundary. It is likely that flows from this location eventually discharge into the Padbury Brook locally either through ditch, culvert or via subterranean flows. Similarly on the eastern parcel, a ditch is identified which runs the full length of the eastern boundary before its assumed discharge into the Padbury Brook in the same way.

Potential for Infiltration and Surface Water Discharge

5.5.4 The soil and the groundwater are not known to be contaminated. Groundwater is located at a significant depth where infiltration would be possible. The environment agency recommends at least 1m between the groundwater table and the bottom of any infiltration feature. Infiltration testing has been undertaken to establish permeability rates on site. Due to the inherently large amount of impermeable area, it would be unwise to discharge water into the ground in one location. Where infiltration is considered it should be spread across the development where possible to mimic existing drainage paths.

5.5.5 There are existing field ditches on the southern boundaries of both parcels of land which provide a second means of discharge on the site. If a formalised connection to the Padbury Brook can be established then discharge from the site could be limited to greenfield rates and discharge from the site at no more than the QBAR rate. Further investigation at detailed designs stage will be required to establish a formal connection.

Local Habitats and Biodiversity

5.5.6 Due to the large size of the site, a biodiversity assessment is currently being undertaken to establish areas of that site that are to be protect. It is expected that around the perimeter of the sites where large trees, bushes and hedgerows exist, these areas will need to be protected. Potential SuDS features will need to be located to minimise disturbance in the local area. Existing ditches are to be retained where possible.

Green buffer zones for new trees are expected in order to provide more local wildlife and to screen the development from the adjacent A43 and M40 roads. Full details of the proposals will be reflected at detailed design stage.

Maintenance and Management

5.5.7 The site is currently the sole responsibility of the owner of the site. During the construction phase, management & maintenance of the partially developed site will be passed over to the appointed contractor. They will complete their own temporary surface water drainage strategy before construction begins.

5.5.8 At handover of the project the owner of the site is intending to appoint a managing agent for maintenance of all drainage infrastructure and landscaping. They will provide all future tenants or owners with details of the appointment management company and maintenance regimes. All drainage on site is to remain private and currently not seeking adoption. Specific requirements for maintenance of SuDS features are to be outlined in the reserved matters application at detailed design stage.

5.5.9 Any alterations to the highways to provide better access to the site will be dealt with separately and is scoped out of this assessment. All alterations to the public highway will be done via section 278 agreements where the developer will contribute commuted sums in order to facilitate future maintenance of the road network.

ASSESSMENT OF SUDS FEATURES

5.6 Given that the site is to be predominantly developed by warehouse type buildings, delivery yards, car parks, footpaths and soft landscaping, the following features, in paragraphs 5.6.1 to 5.6.9 have been considered in concept design:

5.6.1 It is desirable on all sites in the UK, in the first instance that SuDS infiltration systems are considered, to reduce impermeable hard standing and treat run-off at source. Given that the site is underlain White Limestone Formation and that the groundwater table is expected to be of significant depth below ground level then infiltration features have been considered.

Infiltration Basins are flat bottomed, shallow landscape depressions which provide a vegetated channel for the conveyance and storage of surface water. A typical infiltration basin is provided in Figure 5.3. Shallow and variable side slopes to suit landscape design (typically 1:3 max) will encourage growth of grass and increase biodiversity locally.

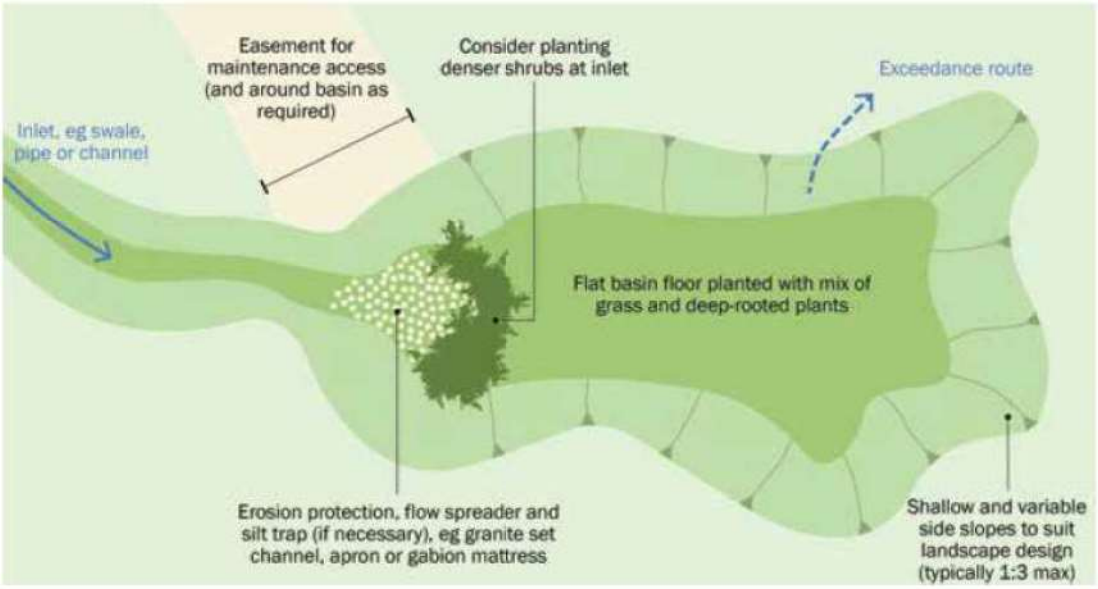


Figure 5.3 – Plan View of Infiltration Basin

5.6.2 At headwall inlet and outlet positions it is suggested erosion protection such as stones set into concrete are introduced to reduce flows and lessen topsoil erosion. Alternatively, swales can be fitted with an underdrain to convey water out of the feature without the need for headwalls. These can be harder to maintain and often become blocked. Exceedance overflow pipes or routes should be provided ideally to a nearby watercourse.

5.6.3 Swales come in two forms either, 'Dry Swales' or 'Wet Swales'. Dry swales could be used on this site to filter runoff to an acceptable level and improving water quality. The top layer of topsoil works like a treatment layer to remove contamination from water. Wet swales can be used to further increase biodiversity offering marshy conditions for a variety of different species. Underdrains can provide additional treatment and conveyance capacity beneath the bases of swales. Nominal longitudinal falls within the swales will prevent ponding of water resulting in reduced maintenance costs and increased performance.

5.6.4 Pervious Pavement systems have been considered for this site in order to reduce impermeable area in line with the SuDS management train. Permeable paving is not considered appropriate in yards which regularly traffic HGV's however, there is an opportunity in car park areas.

Where infiltration is possible a 'Type A' system is to be utilised. This reflects a system where all the rainfall passes into the substructure (where it may be stored temporarily) from where it infiltrates into the soil beneath. Normally, there will be no discharge from the system to a sewer or watercourse. However, an emergency overflow may be required to cater for events in excess of the design event.

5.6.5 Heavy duty line drains with catchpits inspection chambers are recommended in the yards to meet the load requirements of HGV wheels and for easy maintenance. These features can easily be maintained to keep them free of silt and other potential contaminates over the design life. As only light contamination is expected, a class 1 by-pass petrol interceptor is recommended for flows generated in the yards to increase water quality to acceptable levels before discharge into the site and wider-site drainage systems.

5.6.6 Efforts have been made to reduce impermeable area on the site, using permeable paving systems where possible as well significant soft landscaping and ecological buffers. Petrol interceptors are advised to all yards to improve water quality discharge into the wider site. We believe that the SuDS components presented above meet the criteria set out by Oxfordshire County Council (LLFA) and Cherwell District Council (LPA). A landscaping strategy has been developed to increase biodiversity within the Soft Landscaping Zones of this site.

5.6.7 The use of Filter Strips or Filter Drains is not considered appropriate for this site due to the likelihood of HGV's regularly trafficking the yards. The run-off generated from this site is to be collected by a heavy-duty line drain and treated by petrol interceptors before discharge. The construction of gently sloping landscaped areas to drain run-off was not considered practical on this site. If spillages did occur, they could cause contamination issues in surrounding areas.

5.6.8 This site is to be used predominantly for industrial storage facilities. Rainwater Harvesting Systems were not considered on this site due to the buildings low water demand and significant increase in maintenance cost. The height to the roof ridge could be up to 20m in most some cases. Green Roofs are deemed to present an unacceptable risk to those maintaining the SuDS feature for this site. Access to the roof is to be provided for emergency roof maintenance only.

5.6.9 Attenuation Tanks should be avoided on this site where possible. There are multiple suitable alternatives presented above to putting additional plastic in the ground. Geocellular tanks especially can be hard to maintain and do not provide any ecological value on this site. The only reason they might be necessary is if poor infiltration is identified in a sub catchment and additional storage volume is necessary.

WATER QUALITY ASSESSMENT

5.7 A Water Quality Assessment (WQA) has been undertaken below to assess the potential hazards from the site and the appropriateness of the SuDS features considered. The 'Simple Index Approach' from The SuDS Manual is used as follows:

Step 1 – Define Pollution Hazard Indices

5.7.1 An assessment has been undertaken in Table 5.1 to define the potential level of hazard from different drained surfaces within the proposed development.

Table 5.1 – Pollution Hazard indices for different drained areas

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Typical Industrial Roof	Low	0.3	0.3	0.05
Non-residential car parking e.g. offices	Low	0.5	0.4	0.4
Commercial Yard and Delivery Area with Parking	Medium	0.7	0.6	0.7
Sites with lorry parks and approaches to industrial estates	High	0.8	0.8	0.9

Note: The indices range from 0 (no pollution hazard) to 1 (high pollution hazard).

Step 2 – Determine SuDS Pollution Mitigation Indices

5.7.2 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type):

Total SuDS mitigation index ≥ *Pollution Hazard Index*
(for each contaminant type) (for each contaminant type)

Where the only destination of the runoff is to surface water – that is there is no infiltration from the SuDS to the groundwater – the surface water indices should be used. Where the principal destination of the runoff is to groundwater, but discharges to surface waters may occur once the infiltration capacity is exceeded, the groundwater indices should be used. The risk to surface waters will be low, as dilution will be high for large events, so treatment is not required. Table 5.2 below indicates the mitigation indices of SuDS features used to discharge groundwater.

Table 5.2 – Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlaying the proposed infiltration surface, through which the runoff percolates	TSS	Metals	Hydrocarbons
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
A layer of dense vegetation underlain by a soil with a good contaminant attenuation potential of at least 300mm in depth	0.6	0.5	0.6
Constructed permeable pavement (where suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7
Proprietary treatment systems	To be assessed on the individual merit for compliance with individual contributing drainage areas up to the 1 in 1-year return period.		

Note: The indices range from 0 (no pollution treatment) to 1 (high pollution treatment).

Step 3 – Conclusions and Recommendations

5.7.3 For roof water drainage it is suggested that flows from this surface type are directed to any of the SuDS options available. Generally, low contamination is expected from the roof and therefore all proposed SuDS solutions satisfy the water quality requirements. It would be preferential to outlet into an open feature so that if any small wildlife became trapped in the system they would be able to escape more easily.

5.7.4 Permeable paving is an option within the car parking areas. In terms of water quality, it is completely satisfied for water quality indices due to the nature of runoff filtering through the open graded stone. Thereafter, it gets a second layer of filtration as it moves into the appropriate soil. Permeable paving would be highly recommended in the car parks as it would also reduce the impermeable area of the site and mimic existing drainage.

5.7.5 Surface water generated by yards and delivery areas is considered a 'Medium' water pollution hazard from Table 5.1. Runoff generated in these areas would not be adequately treated by infiltration basins or swales alone. As a result, a petrol interceptor has been specified to treat runoff to acceptable EA standard levels for each unit. This approach is considered adequate to treat runoff, subject to implementation of a certified petrol interceptors.

5.7.6 As proposals are at outline stage and details or end user requirements remain unclear an assessment has been made based on moderate industrial use at the development. Multiple features benefiting water quality like Permeable paving, Swales and Infiltration Basins have been considered for this site. If these SuDS features were adopted in detailed design then water quality would be discharged at an acceptable quality.

SURFACE WATER DRAINAGE PROPOSALS

5.8 The concept surface water drainage strategy has been prepared based on the Illustrative Scheme in line with Oxfordshire County Council's (LLFA) guidance for Surface Water Drainage, together with national guidance and industry best practice. The drainage strategy is summarised below based on this and explanation is provided for sub-catchments allocation, impermeable drained areas, potential discharge strategy, greenfield runoff rates, infiltration rates for design, storage volume estimates and SuDS features application.

The proposed concept drainage & external works schemes are presented by Bailey Johnson Hayes in **Appendix G**. The following SuDS features shown on **Figure 5.4**:

- Swales
- Infiltration Basins
- Permeable Paving
- Petrol Interceptors
- Catchpits, Gullies and Line Drains
- Flows control devices

Figure 5.4 – Extract of Concept Drainage Scheme

Sub-Catchments and Impermeable Areas

5.10 The site has been split into three defined sub-catchments with the amount of impermeable area for each sub-catchment defined in **Table 5.3** below and illustrated in Figure 5.4 above. All car parks are proposed in permeable paving and therefore have been excluded. Impermeable areas have been calculated from the Illustrative Scheme assuming the buildings, yards and roads will be 100% impermeable. An allowance of 10% for an increase in urban growth has not been included as this site is not residentialand further expansion is highly unlikely. There are no areas of public open space.

Table 5.3 – Summary of Impermeable Areas

Sub-Catchment Area	Impervious Area Prior to Development	Impervious Area Post Development
Unit 2&3 – Including buildings, yards & roads	0 m²	155,000 m²
Unit 1 – Including buildings, yards & roads	0 m²	155,000 m²
Unit 4&5 – Including buildings, yards & roads	0 m²	170,000 m²
Total	0 m²	465,000 m²

Proposed Discharge Hierarchy

5.11 Given the variation in ground conditions and particularly permeability in the upper strata we have prepared a 'Hybrid' approach for the surface water drainage system. Our concept design is to use large retention swales/soakaways in order to reduce any outflow to below the existing greenfield flow rates. Also, to assist with this regime all car park areas will be of permeable paving construction.

5.11.1 In the sub-catchment for Units 2 & 3, buildings are located to the highest part of the western plot. See BJH proposed drainage concept plan S1299-Ext-05C The SW flows from the roofs/yards will be taken into large swales/soakaways to reduce outflow from this area to below greenfield flows of 35 l/s; which will be taken to the much lower swale system in the east section of the Unit 1 catchment.

5.11.2 In the sub-catchment for Unit 1, buildings are located at the lower part of the western plot close to the A43. Again, a system of large swales/soakaways which will cater for the whole of the Unit 1, as well as greenfield flows from Units 2 & 3. Final runoff to local ditches will be limited to the greenfield flow for the whole of the western site i.e., 70 l/s.

5.11.3 In the sub-catchment for Units 4 & 5, ground conditions across this plot remain similar with variable potential for pure soakaways. Again, a 'Hybrid' approach is proposed with a system of large swales/soakaways to reduce outflows to below greenfield runoff rates. The runoff in the heaviest storms will discharge to local ditches and then to the Padbury Brook.

5.11.4 The S278 roadwork areas on both sites will be drained into a large soakaway or local diches at restricted greenfield rates in a separate system. The site has not previously been developed so there are no brownfield flows to be considered on this site. It is suggested that all greenfield flows are limited to QBAR rather than installing a complex discharge control system which reflects the original discharge run-off rates from the site across the range of storm events.

Proposed External Finishes

5.12 The yards are to be constructed from normal reinforced concrete and therefore are considered non-porous hard standing. These are drained traditionally via slotted ACO Qmax Line Drains or similar approved product. Each line-drain will drain via a catch pit and petrol interceptor before discharge into the wider site drainage system to ensure the satisfactory water quality is achieved.

All dedicated car parking areas are to be drained by a permeable paving solution. This could take the form of block paving over a permeable stone subgrade constructed on suitable competent formation. This would then allow all flows to drain naturally into the underlaying groundwater table. The commercial building roofs are to be drained via traditional roof gutters or syphonic drain into gravity rainwater pipes. These then feed into larger underground surface water sewers before discharge into the wider drainage system.

Greenfield Runoff Estimates & Discharge

5.13 An assessment of the QBAR greenfield discharge rate for each sub-catchment has been carried out using the Institute of Hydrology IoH124 method. Given that permeability throughout the site is variable and topographically there are moderate falls, an average SOIL class of 2 has been used for both sections of the site. Full inputs and results can be found in **Appendix H** and are summarised as follows:

- Unit 2&3 Sub-catchment shall be limited to a maximum QBAR = 33.47 l/s
- Unit 1 Sub-catchment shall be limited to a maximum of QBAR = 40.96 l/s

Western Site Total = 74.43 l/s

- Unit 4&5 Sub-catchment shall be limited to a maximum QBAR = 39.57 l/s

Eastern Site Total = 39.57 l/s

Receiving ditches on both sections of the site are currently in good condition and are between 0.5 – 1.0m deep. The ditches are surrounded by moderate hedgerows which are to be trimmed back and maintained throughout the developments life to ensure flows are not disrupted. Given that the greenfield flows are modest, replicating flows generated in a 225-300mm pipe running full, our initial inspection would indicate that there is sufficient capacity for the modified drainage arrangements. At detailed design a construction method will be prepared to ensure that flows do not adversely affect the ditches during the whole life of the development.

Preliminary Sizing and Storage Volume Estimates

5.14 In line with the current best practice, all calculations undertaken for preliminary sizing of drainage attenuation and infiltration features has been undertaken using the latest FEH 2013 datasets for rainfall for critical storms up to 60 mins. Where critical duration of storms is less than 60 mins then FSR rainfall data shall be used.

Preliminary sizing of storage features for both parcels of land has been completed up to the 1% (1 in 100-year) event + 40% climate change. Calculations have been carried out using a conservative infiltration rate for both sides in the MircoDrainage Quick Storage Estimate tool. The following assumptions have been made in order to calculate the storage volume estimates, full inputs and results can be found in **Appendix J**:

5.15 Unit 2&3 Sub-Catchment – Quick Storage Estimate

Return Period + CC	= 100-year + 40% Climate Change
Impermeable Area	= 155,000m^2
Allowable Discharge Rate	= 35 l/s
Infiltration Coefficient	= 6.0x10^{-5} m/s (0.216 m/hr) *50% of the lowest rate
Area of SuDS feature	= 8,000m^2

Results with no infiltration	= 12,821 - 16,143m^3 (Water level of 1.6 - 2.0m deep)
Results with only infiltration	= 2,817 – 9,338m^3 (Water level of 0.35 - 1.15m deep)
Results with hybrid discharge	= **2,796 – 9,179m^3** (Water level of 0.35 - 1.15m deep)

Given that the results for infiltration and hybrid discharge are very similar it would be preferable to use the hybrid solution as this gives two means of escape for discharge. Overall, the proposed basins and swales shown on the concept drainage plans will not exceed 1.15m depth of water in all storm events. At detailed design the area of for SuDS features can be tweaked to get the most efficient use of land.

5.16 Unit 1 Sub-Catchment – Quick Storage Estimate

Return Period + CC	= 100-year + 40% Climate Change
Impermeable Area	= 155,000m^2
Allowable Discharge Rate	= 35 l/s
Infiltration Coefficient	= 3.5x10^{-6} m/s* (0.0125 m/hr) *50% of the lowest rate

Area for SuDS features = 15,000m^2

Results with no infiltration = 13,269 - 16,736m^3 (Water level of 0.9 - 1.1m deep)
Results with only infiltration = 7,461 - 15,616m^3 (Water level of 0.5 - 1.0m deep)
Results with hybrid discharge = **7,245 - 14,212m^3** (Water level of 0.5 - 1.0m deep)

Given that the results for infiltration and hybrid discharge are very similar it would be preferable to use the hybrid solution as this gives two means of escape for discharge. Overall, the proposed basins and swales shown on the concept drainage plans will not exceed 1.0m depth of water in all storm events. At detailed design the area of for SuDS features can be tweaked to get the most efficient use of land.

5.17 Unit 4&5 Sub-Catchment – Quick Storage Estimate

Return Period + CC = 100-year + 40% Climate Change
Impermeable Area = 170,000m^2
Allowable Discharge Rate = 30 l/s
Infiltration Coefficient = 1.3x10^{-5} m/s (0.047m/hr) based on 50% of the mean rate
Area of SuDS feature = 13,000m^2

Results with no infiltration = 15,062 - 19,026m^3 (Water level of 1.15 - 1.45m deep)
Results with only infiltration = 5,560 – 13,939m^3 (Water level of 0.40 - 1.05m deep)
Results with hybrid discharge = **5,503 – 13,553m^3** (Water level of 0.40 - 1.05m deep)

Given that the results for infiltration and hybrid discharge are very similar it would be preferable to use the hybrid solution as this gives two means of escape for discharge. Overall, the proposed basins and swales shown on the concept drainage plans will not exceed 1.05m depth of water in all storm events. At detailed design the area of for SuDS features can be tweaked to get the most efficient use of land.

5.18 Overall the current proposals would generate a maximum water level of between 1.0 - 1.15m in all infiltration features. This level is satisfactory and from inspection more than enough space has been allocated for SuDS features. We recommend this design be carried forward to detailed design where the final design can be refined.

6 FOUL WATER DRAINAGE ASSESSMENT

EXISTING LOCAL DRAINAGE

6.1 There are no known existing public foul or effluent connections located on the site. The nearest Anglian Water adopted foul water pumping station is located 60m south of the eastern parcel at the Moto Cherwell Service station. Foul water is pumped from the service station approx. 650m east, via a 100mm diameter pipe, directly to a wastewater treatment facility in Ardley. There is also a gravity foul system which serves the village of Ardley which is eventually pumped approx. 200m to the wastewater treatment facility.

FOUL WATER DRAINAGE OPTIONS

6.2 There remains a number of viable options which will need detailed and extensive discussions and assessments to find the final solution. Outlined below are some of the preliminary viable options for discharge of foul flows generated on the site. An assessment of anticipated foul flows will be provided at detailed design stage.

Option 1 – Pumping to Public Wastewater Treatment Works

6.2.1 The eastern and western parcels of land would need their own private or adopted foul pumping station. All domestic fouls would be conveyed on site using a gravity system to the new pumping station. Flows would then be pumped to the nearby treatment works 500-750m away under the M40 motorway near Ardley. Flows would discharge into a receiving manhole before final gravity connection into the treatment works. This option would be subject to agreement from Anglian Water subject to sufficient capacity.

Option 2 – Off-Mains Private Wastewater Treatment Works

6.2.2 The eastern and western parcel of land would need their own private waste treatment tank. All foul flows would be conveyed on site using a gravity system to the new treatment tank on-site. Sludge is built up and needs to be emptied regularly but this system has the benefit of potential discharge of acceptable treated effluent which can outlet into a soakaway type water system, reducing maintenance costs.

Option 3 – Upgrade of Local Public Wastewater Infrastructure

6.2.3 Given that there could be significant development in the near future in the Baynard's Green area, it is possible that a purpose-built facility for the local area could be constructed, or upgrades provided to the existing Ardley treatment works, that could 'unlock' this area for future development. A potential gravity foul outlet could be provided to each of the potential development sites. This option would be subject to discussions with Anglian Water and local developers to ensure funding would be available in the near future for this type of expansion.

7 CONCLUSIONS AND RECOMMENDATIONS

Flood Zone

7.1 The Environment Agency mapping shows that the whole site is within Flood Zone 1 which is shown to be at less than 0.1% chance of flooding in any year, otherwise known as having a 1:1000-year chance. There are no recorded instances of the flooding from nearby rivers or watercourses.

Fluvial Flooding

7.2 The risk from Fluvial flooding is Very Low to Negligible as described in Section 3.2.

Groundwater Flooding

7.3 The risk from Groundwater flooding is Low as described in Section 3.3.

Canal Flooding

7.4 The risk from Canal flooding is Very Low to Negligible as described in Section 3.4.

Reservoir & Waterbody Flooding

7.5 The risk from Reservoir and Waterbody flooding is Very Low to Negligible as described in Section 3.5.

Sewer Flooding

7.6 The risk from Sewer flooding is Very Low to Negligible as described in Section 3.6.

Surface Water Flooding

7.7 The risk from Surface Water flooding is Low as described in Section 3.7.

Flood Risk to the Wider Catchment

7.8 The flood risk to the wider catchment flooding is Low as described in Section 3.8.

Proposed Flood Mitigation

7.9 An overview of the potential mitigation measures available to address flood risk issues at the development site is provided in Section 4. More measures may become available as the scheme moves into detailed design phase.

Some of the proposals included are; Raising thresholds and building levels outside of design flood levels, providing safe access and egress around the development, directing overland flows towards areas of low risk, implementation of SuDS to manage runoff at sources thus reducing flood volume, installation of pollution prevention features to prevent contamination at discharge locations, tree planting to increase biodiversity and absorption of water, management and maintenance to ensure correct operation of all drainage systems and managing residual risks post development.

Discharge Hierarchy

7.10 The drainage discharge hierarchy has been followed where a hybrid scheme of discharge is proposed to firstly, into the ground via infiltration basins, swales, and pervious pavements. In addition, flows will be limited to greenfield rates discharging into local ditches at no greater than QBAR. There are no sewers available on site so discharge to sewers was not considered. Pumping of storm water is not necessary on this site.

Proposed SuDS Features

7.11 The following SuDS features are recommended from the SuDS and Water Quality Assessment:

- Swales
- Infiltration Basins
- Permeable Paving
- Petrol Interceptors
- Catchpits, Gullies and Line Drains
- Flows control devices

It is confirmed that our Drainage Strategy will achieve greenfield runoff rates.

Proposed Foul Drainage

7.12 There remains a number of viable options which will need detailed and extensive discussions and assessments to find the final solution, outside the scope of this assessment. Three viable options for discharge have been described such as; pumping to a local treatment works, on-site treatment, and discharge to new or upgraded foul wastewater infrastructure.

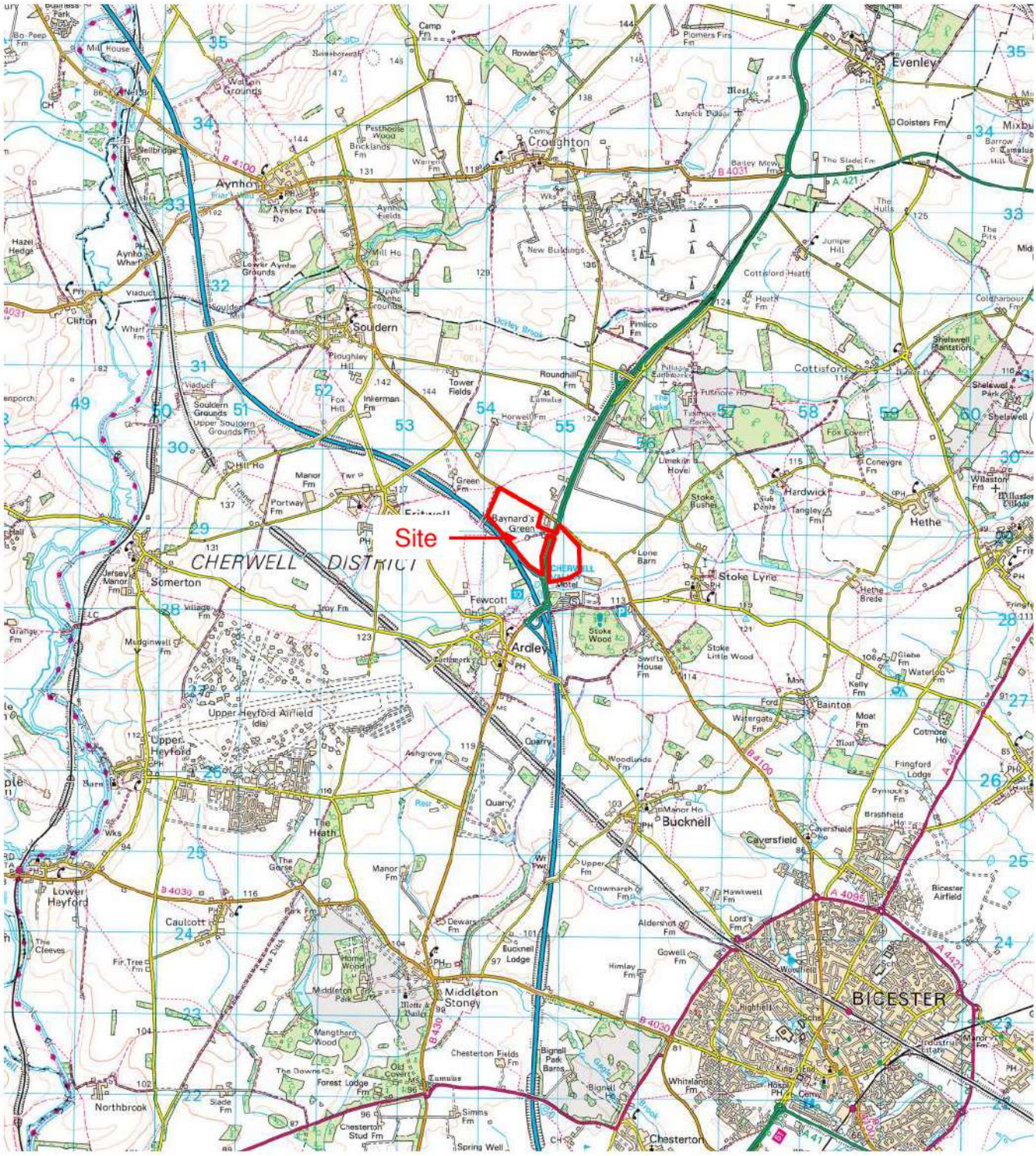
Recommendations

7.13 It is recommended that during detailed design that flood mitigation measures are implemented, and drainage design is carried out using the philosophy established in this report. Further design will be required to establish the entire drainage network and to ensure no flooding is created on the site during the 30-year event and flooding is contained on site safely during the 100-year + 40% event.

APPENDIX A

Site Location Plan

By Applied Geology (August 2021)



APPLiED GEOLOGY

Unit 23
Abbey Park
Stareton
Kenilworth
CV8 2LY

Tel: 02476 511822
email: admin@appliedgeology.co.uk

Client: ALBION LAND LTD

Project: LAND ADJACENT TO JUNCTION 10, M40, ARDLEY

Drawn By:	Checked By:	Paper Size:
FD	AS	A4

Scale:	Date:	NGR:
NTS	13.08.2021	454583 229025

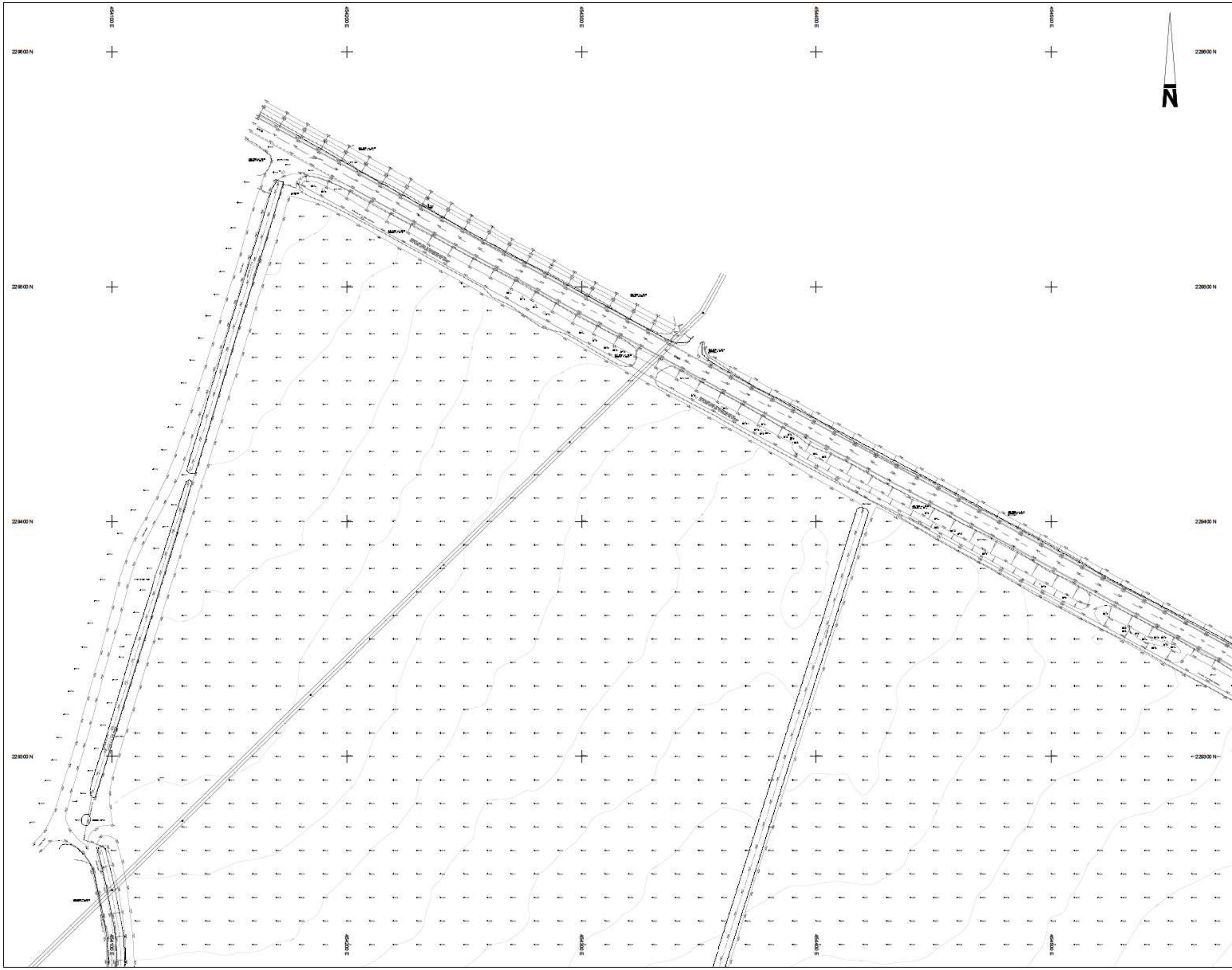
Drawing No:	Revision:
AG3268-21-01	0

Title: SITE LOCATION PLAN

APPENDIX B

Topographical Survey

By MK Surveys (June 2021)

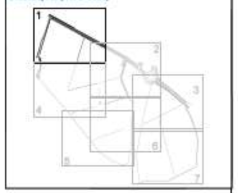


Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR OF [illegible] APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. SIGNIFICANT TREES WITHIN THE SITE BOUNDARY HAVE BEEN LOCATED WHERE POSSIBLE. WE RECOMMEND VEGETATION CLEARANCE AND A RETURN TO VERIFY ANY ADDITIONAL TREE LOCATIONS.

TOPOGRAPHICAL KEY

Sheet Layout (Not to Scale)



0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client

ALBION LAND

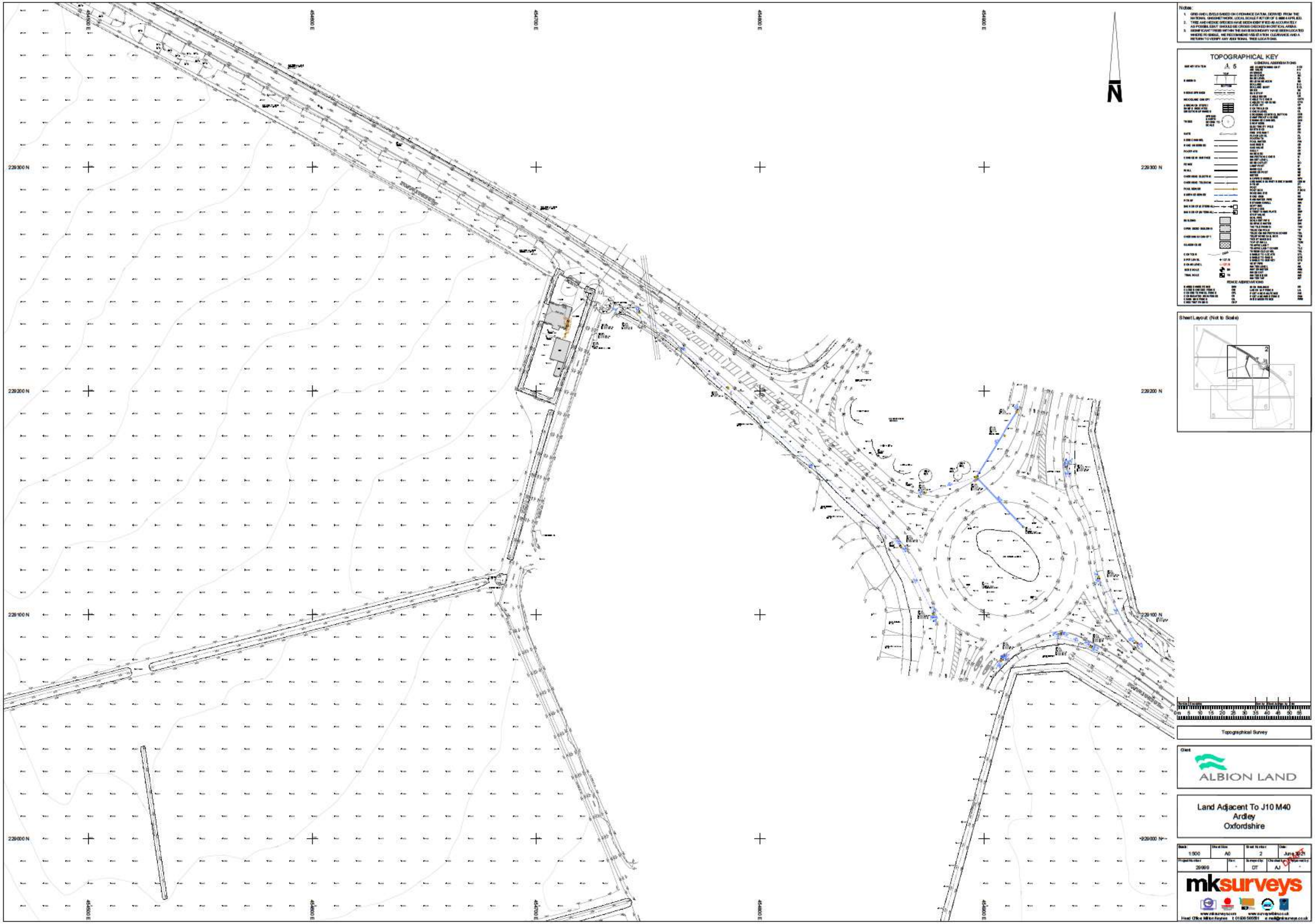
Land Adjacent To J10 M40
Ardley
Oxfordshire

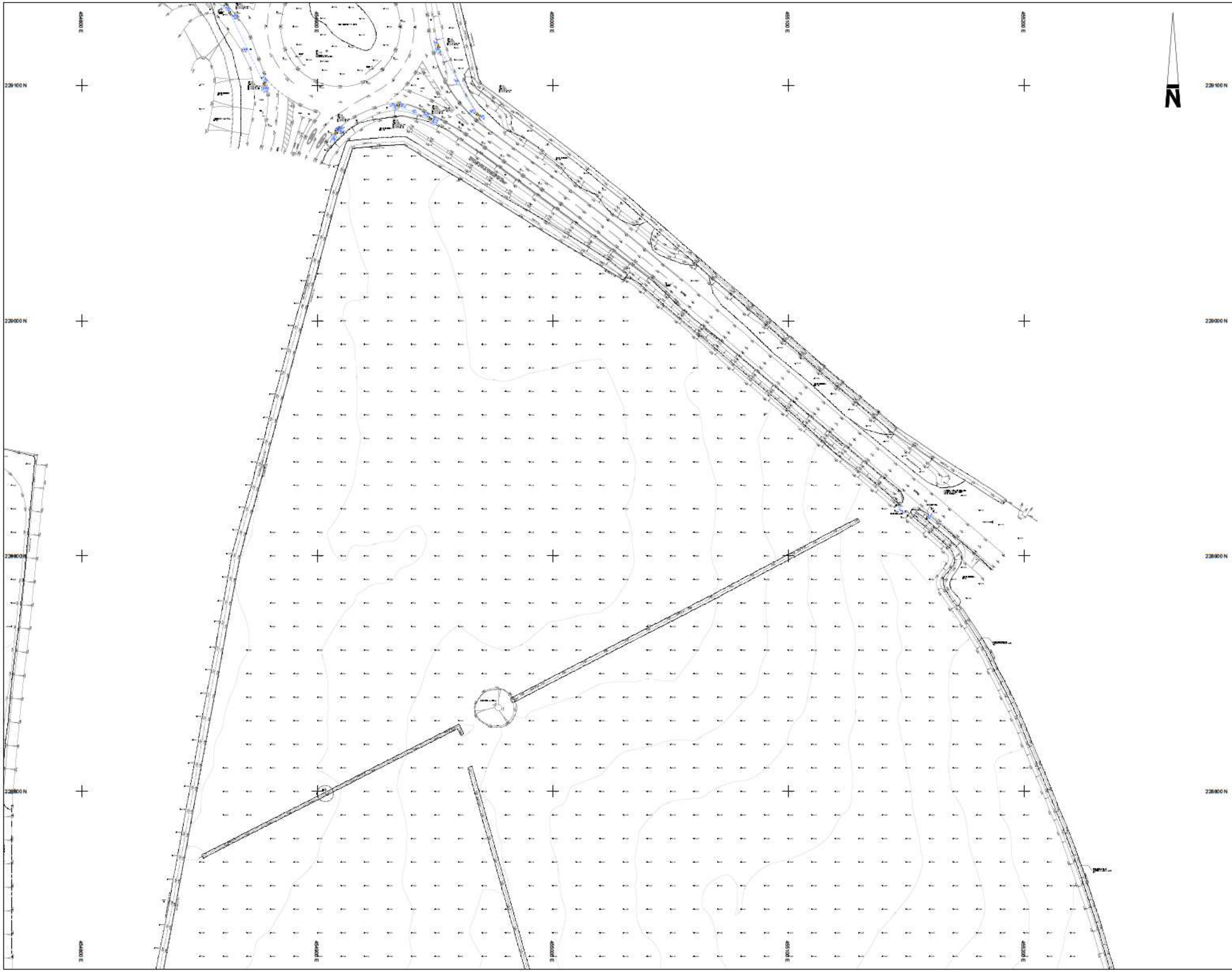
Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	1	June 2021
Project Number:	Rev:	Surveyed by:	Checked by:
29989	-	DT	AJ

DRAFT

mksurveys

www.mksurveys.com www.surveyadmin.co.uk
Head Office Milton Keynes t: 01908 566581 e: mail@mksurveys.co.uk


Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR OF 0.9996 APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. SIGNIFICANT TREES WITHIN THE SITE BOUNDARY HAVE BEEN LOCATED WHERE POSSIBLE. WE RECOMMEND VEGETATION CLEARANCE AND A RETURN TO VERIFY ANY ADDITIONAL TREE LOCATIONS.
TOPOGRAPHICAL KEY
GENERAL ABBREVIATIONS
FENCE ABBREVIATIONS
Sheet Layout: (Not to Scale)
229300 N
229200 N
229100 N
229000 N
454500 E
454600 E
454700 E
454800 E
454900 E
Topographical Survey
Client
ALBION LAND
Land Adjacent To J10 M40
Ardley
Oxfordshire
Scale: 1:500
Sheet Size: A0
Sheet Number: 2
Date: June 2021
Project Number: 29969
Rev: -
Surveyed by: DT
Checked by: AJ
Approved by: -
DRAFT
mksurveys
www.mksurveys.com
Head Office Milton Keynes
t 01908 565581
e mail@mksurveys.co.uk



Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR OF 0.9998 APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. SIGNIFICANT TREES WITHIN THE SITE BOUNDARY HAVE BEEN LOCATED WHERE POSSIBLE. WE RECOMMEND VEGETATION CLEARANCE AND A RETURN TO VERIFY ANY ADDITIONAL TREE LOCATIONS.

TOPOGRAPHICAL KEY

GENERAL ABBREVIATIONS

FENCE ABBREVIATIONS

Sheet Layout: (Not to Scale)

0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client

ALBION LAND

Land Adjacent To J10 M40
Ardley
Oxfordshire

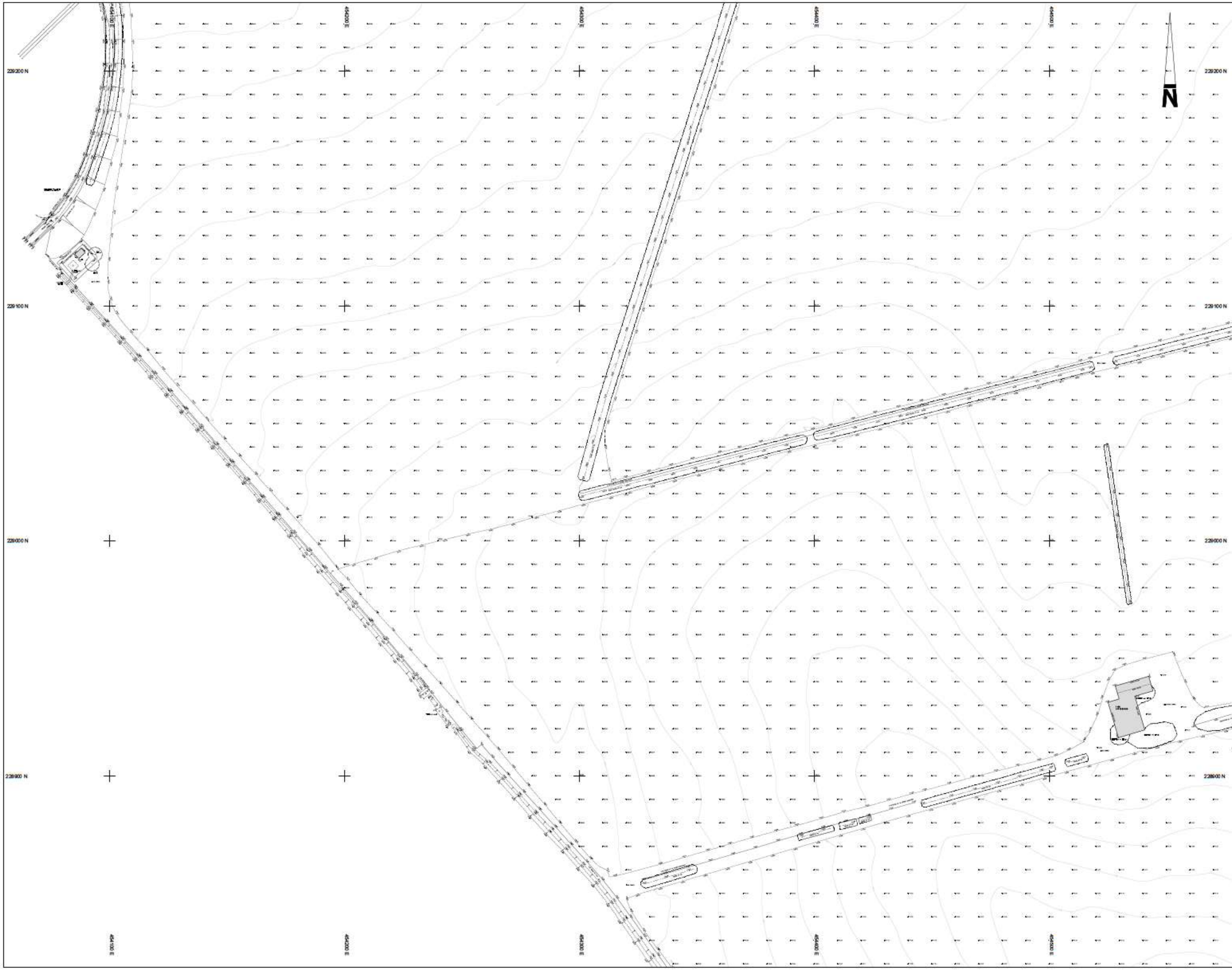
Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	3	June 2021

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
29969	-	DT	AJ	-

DRAFT

mksurveys

www.mksurveys.com www.surveyatbim.co.uk
Head Office Milton Keynes t: 01908 565551 e: mail@mksurveys.co.uk



Notes:

TOPOGRAPHICAL KEY

Sheet Layout: (Not to Scale)

0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client: ALBION LAND

Land Adjacent To J10 M40
Ardley
Oxfordshire

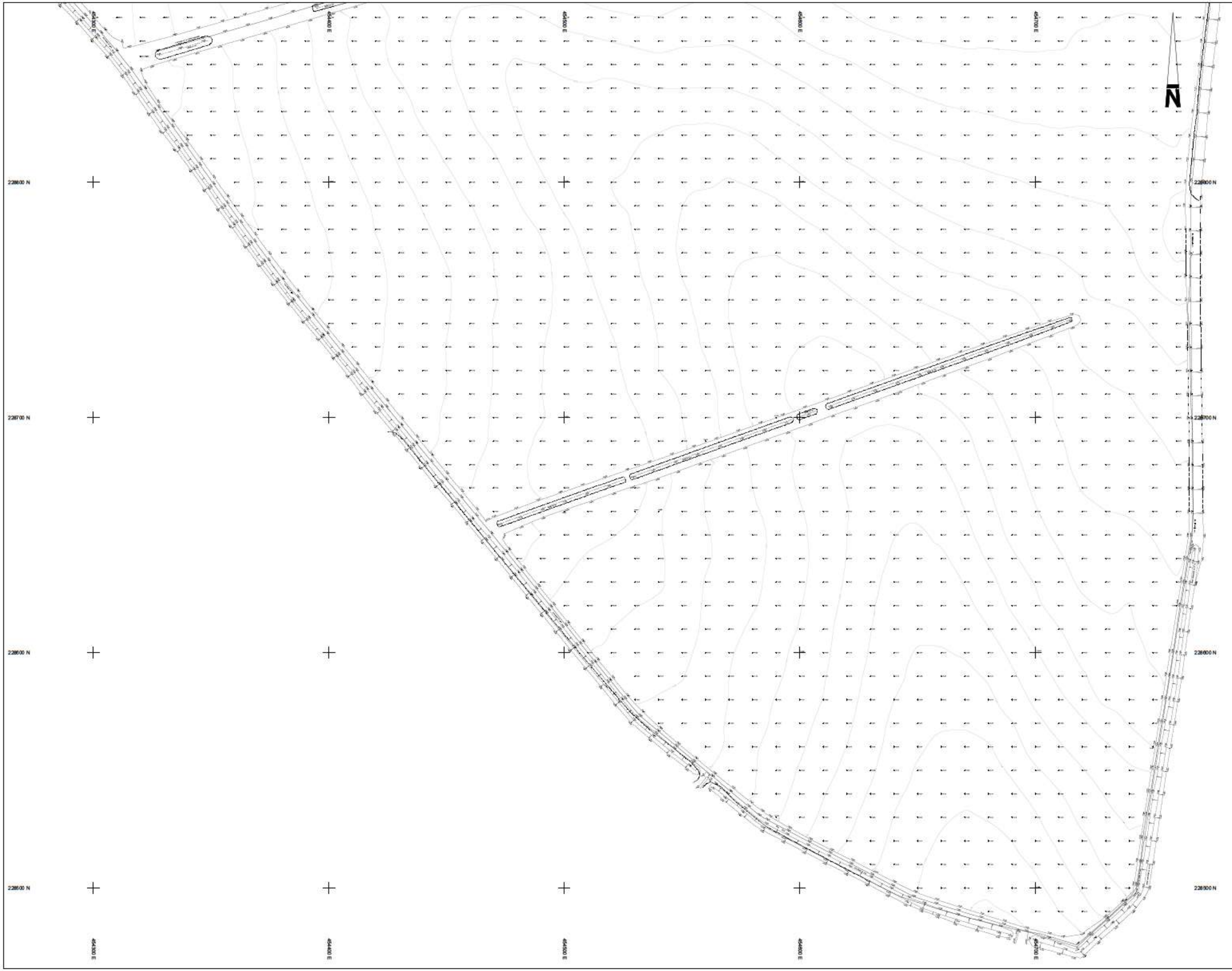
Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	4	June 2021

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
29969	-	DT	AJ	-

DRAFT

mksurveys

Head Office Milton Keynes

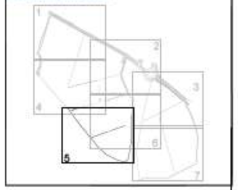


Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR OF [illegible] APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. SIGNIFICANT TREES WITHIN THE [illegible] BOUNDARY HAVE BEEN LOCATED WHERE POSSIBLE. WE RECOMMEND VEGETATION CLEARANCE AND A RETURN TO VERIFY ANY ADDITIONAL TREE LOCATIONS.

TOPOGRAPHICAL KEY

Sheet Layout: (Not to Scale)



Topographical Survey

Client: ALBION LAND

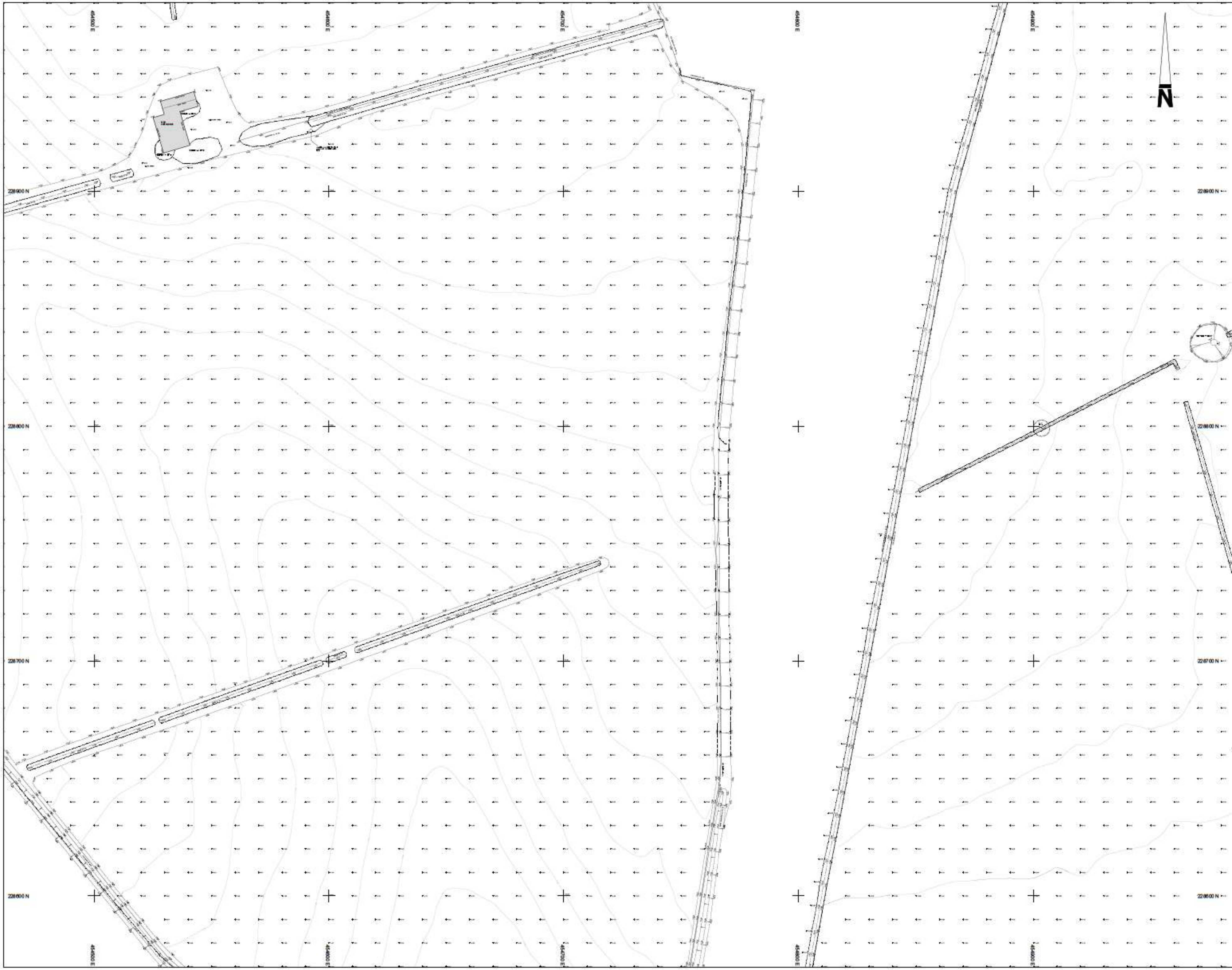
Land Adjacent To J10 M40
Ardley
Oxfordshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	5	June 2021

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
29969	-	DT	AJ	-

mksurveys

www.mksurveys.com www.surveyrebim.co.uk
Head Office Milton Keynes t: 01908 565551 e: mail@mksurveys.co.uk



Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR OF 0.9996 APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. SIGNIFICANT TREES WITHIN THE SITE BOUNDARY HAVE BEEN LOCATED WHERE POSSIBLE. WE RECOMMEND VEGETATION CLEARANCE AND A RETURN TO VERIFY ANY ADDITIONAL TREE LOCATIONS.

TOPOGRAPHICAL KEY

GENERAL ABBREVIATIONS

FENCE ABBREVIATIONS

Sheet Layout: (Not to Scale)

0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client

ALBION LAND

Land Adjacent To J10 M40
Ardley
Oxfordshire

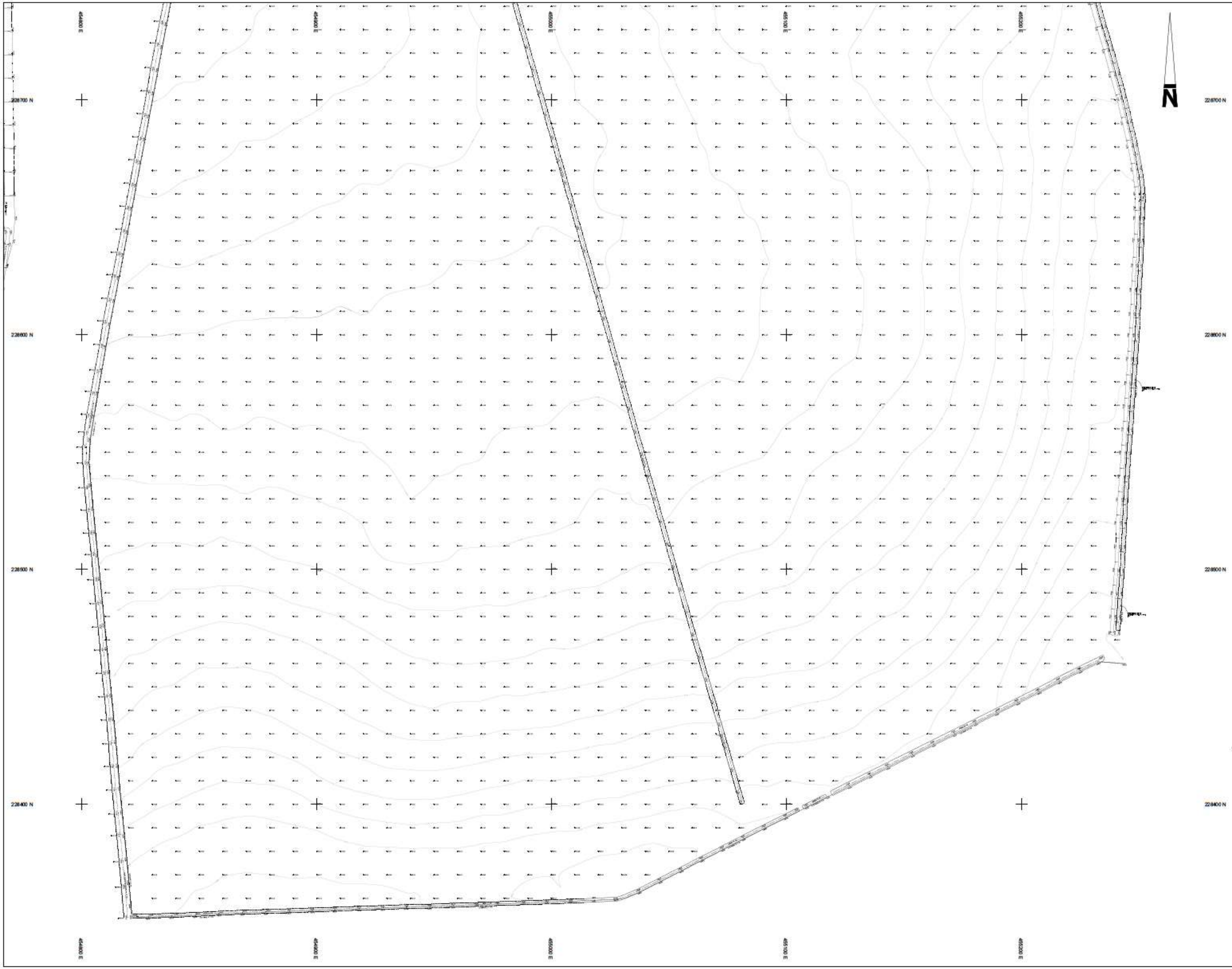
Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	6	June 2021

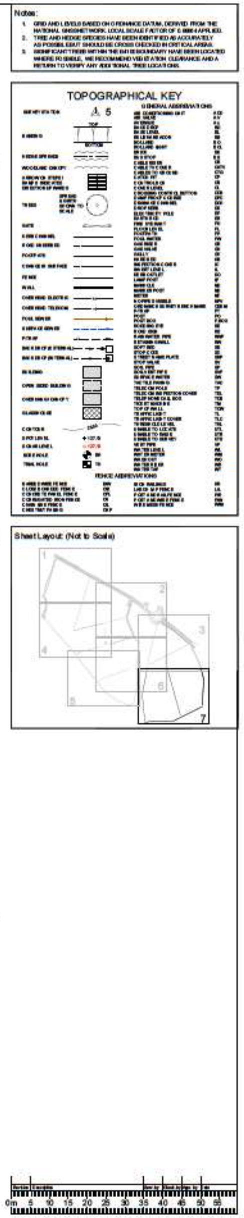
Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
29999	-	DT	AJ	-

DRAFT

mksurveys

www.mksurveys.com www.surveyorsbim.co.uk
Head Office Milton Keynes t 01908 565551 e mail@mksurveys.co.uk





Topographical Survey

Client: ALBION LAND

Land Adjacent To J10 M40
Ardley
Oxfordshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	7	June 2021

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
29999	-	DT	AJ	-

DRAFT

mksurveys

www.mksurveys.com www.surveyorsbim.co.uk
Head Office Milton Keynes t: 01908 565581 e: mail@mksurveys.co.uk

APPENDIX C

Proposed Site Masterplan & Parameter Plans

By Cornish Architects (August 2021)

NOTES

Reproduced from the Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright.

C A Cornish & Associates Ltd Licence no LIG0908.

Do not scale. Work only to figured dimensions.

Subject to Statutory Approvals.

Subject to survey.

Subject to design development.

Where applicable this drawing is to be read in conjunction with other consultants drawings and with the specification.

Subject to fire engineering

Rev	Description	Chk	Date
B	Access layout updated	AS	18/08/2021
A	PRoW updated	AS	17/08/2021

Peer House
8-14 Verulam Street
London WC1X 8LZ

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

RIBA Chartered Practice

cornisharchitects

Project Title.
JUNCTION 10 M40

Drawing Title.
PROPOSED SITE PLAN
OPTION 9

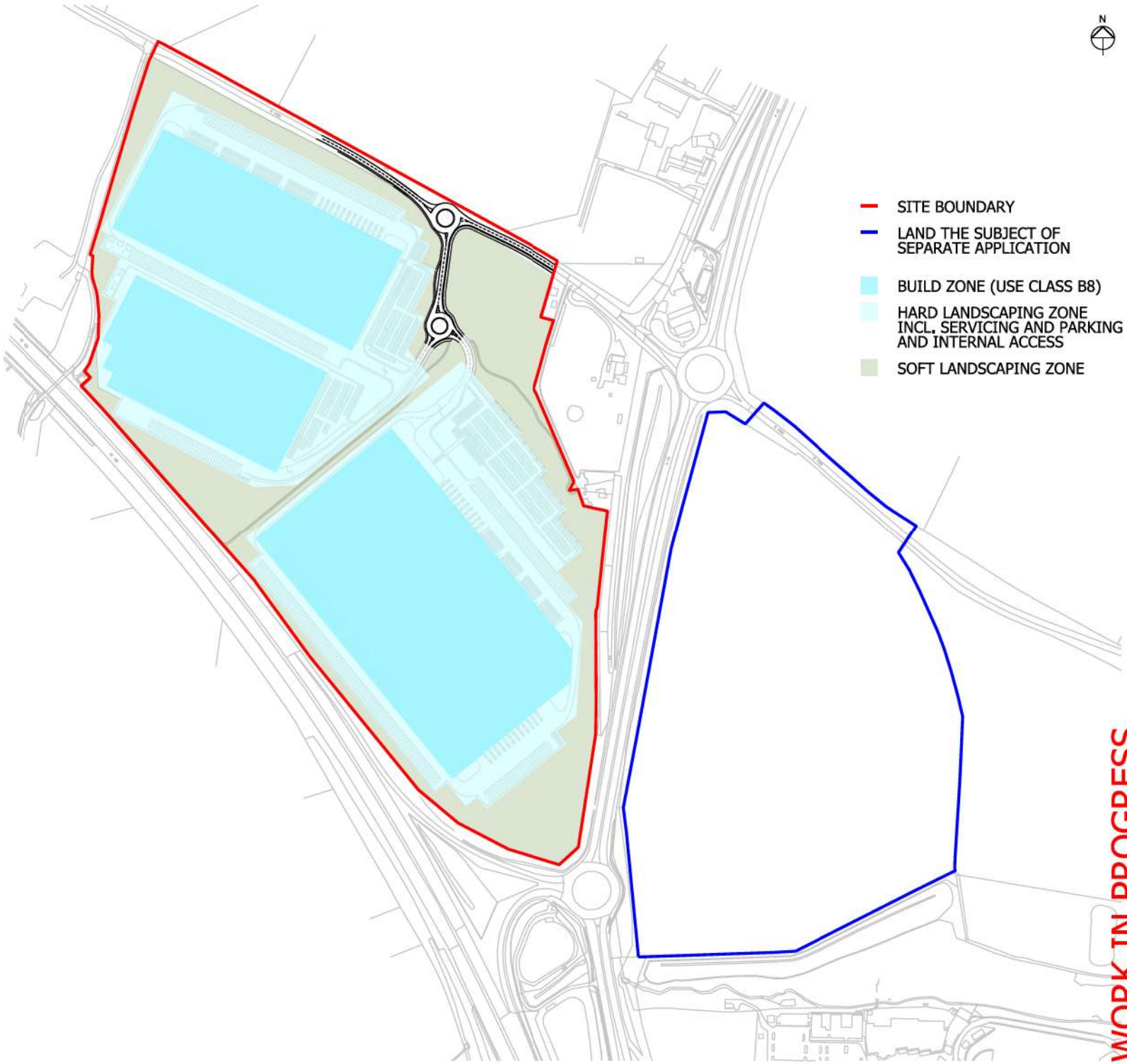
Drawing Status.
PRELIMINARY

Scale. 0 20 metres 200

Drawn By.	Scale.	Date.	Chkd By.
A S	1:2500 @ A1	16/08/2021	C S

ALBION LAND

Drawing No. 20005 - SK - 034 | Rev. B



N

NOTES

Subject to Statutory Approvals.

Subject to survey.

Subject to design development.

Where applicable this drawing is to be read in conjunction with other consultants drawings and with the specification.

All dimensions to be checked on site prior to commencement of work.

Subject to Rights of Light Approval.

Subject to fire engineering

Rev	Description	Chk	Date
D	Updated to reflect planning con comments / Site Layout updated	AS	17/08/2021
C	Site layout updated	AS	02/08/2021
B	Site layout updated	AS	26/07/2021
A	Zone area amended	AS	29/06/2021

WORK IN PROGRESS

Peer House
8-14 Verulam Street
London WC1X 8LZ

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

RIBA Chartered Practice

cornisharchitects

Project Title.
JUNCTION 10 M40

Drawing Title.
PARAMETER PLAN 01
LAND USE

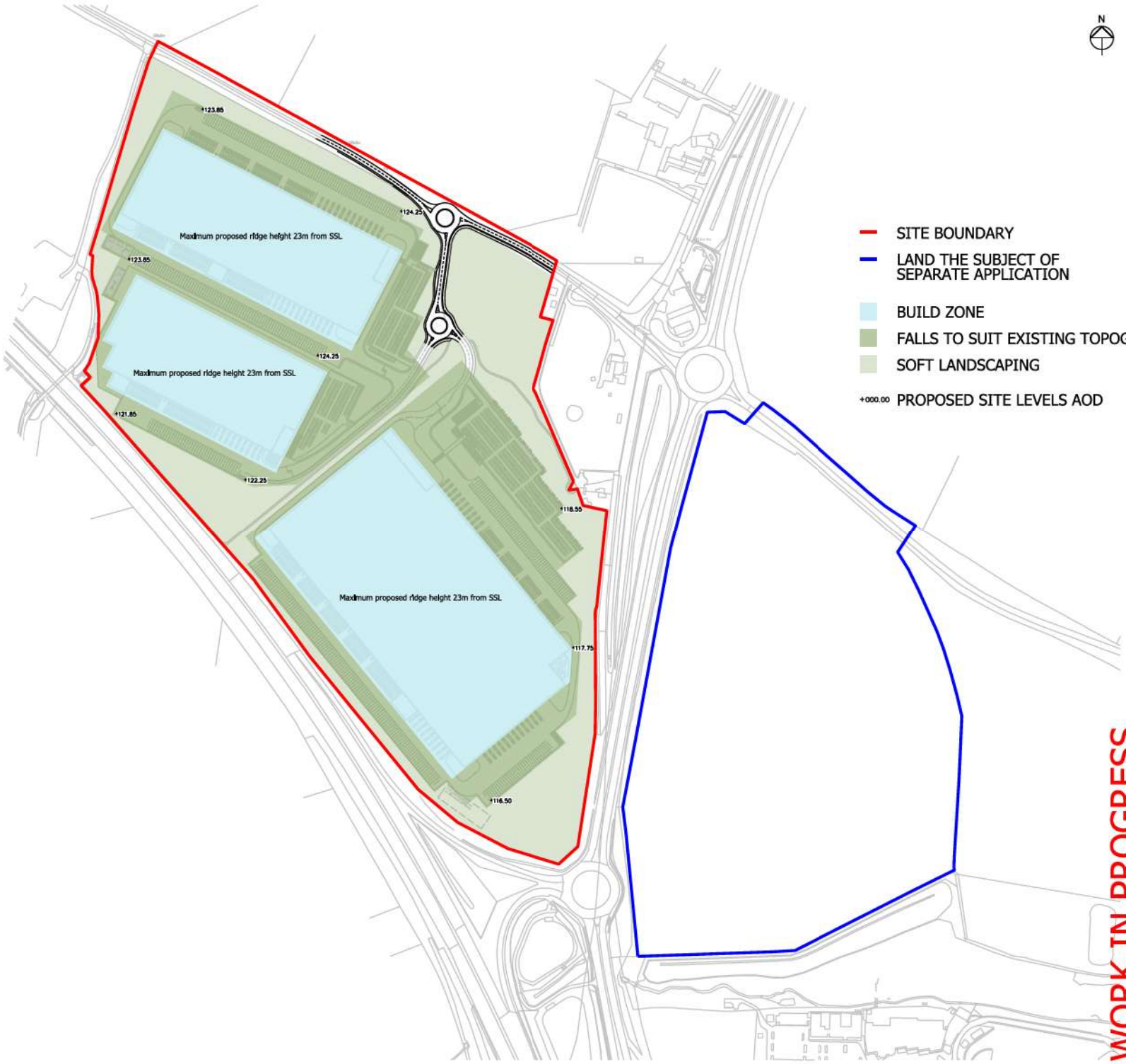
Drawing Status.
PRELIMINARY

Scale.
0 20 metres 200

Drawn By.	Scale.	Date.	Chkd By.
A S	1:2500 @ A1	22/06/2021	S M

ALBION LAND

Drawing No. 20005 - SK - 017 Rev. D



N

NOTES

Reproduced from the Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright.

C A Cornish & Associates Ltd Licence no LIG0908.

Subject to Statutory Approvals.

Subject to survey.

Subject to design development.

Where applicable this drawing is to be read in conjunction with other consultants drawings and with the specification.

All dimensions to be checked on site prior to commencement of work.

Subject to Rights of Light Approval.

Subject to fire engineering

SITE BOUNDARY

LAND THE SUBJECT OF SEPARATE APPLICATION

BUILD ZONE

FALLS TO SUIT EXISTING TOPOGRAPHY

SOFT LANDSCAPING

+000.00 PROPOSED SITE LEVELS AOD

Rev	Description	Chk	Date
D	Updated to reflect planning con comments / Site Plan updated	AS	17/08/2021
C	Site layout updated	AS	02/08/2021
B	Site layout updated	AS	26/07/2021
A	Slab level 2 added	AS	29/06/2021

Peer House
8-14 Verulam Street
London WC1X 8LZ

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

cornisharchitects

RIBA Chartered Practice

WORK IN PROGRESS

Project Title.
JUNCTION 10 M40

Drawing Title.
PARAMETER PLAN 02
BUILDING HEIGHTS

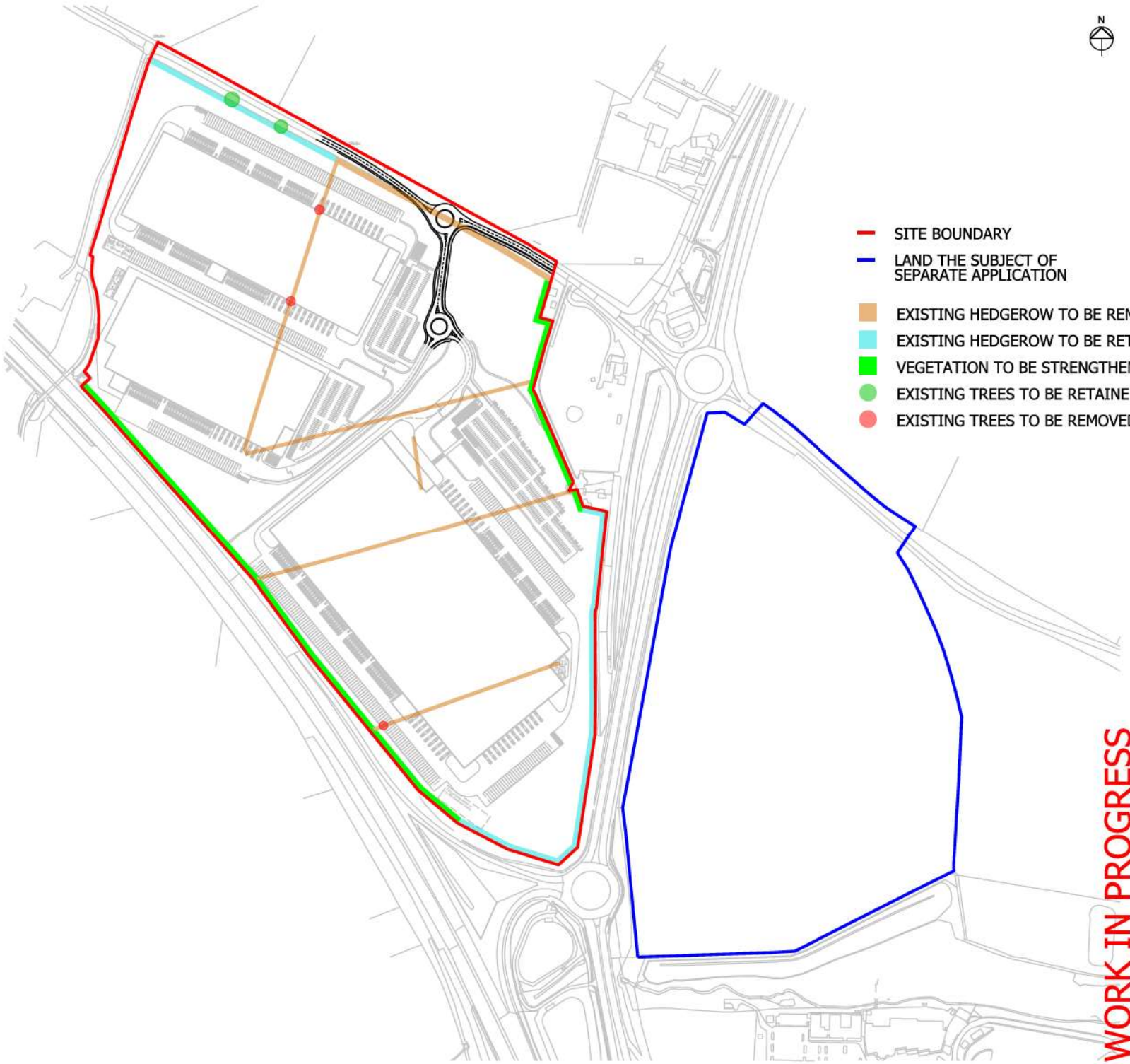
Drawing Status.
PRELIMINARY

Scale.
0 20 metres 200

Drawn By.	Scale.	Date.	Chkd By.
A S	1:2500 @ A1	22/06/2021	S M

ALBION LAND

Drawing No. 20005 - SK - 018 Rev. D



N

NOTES

Subject to Statutory Approvals.

Subject to survey.

Subject to design development.

Where applicable this drawing is to be read in conjunction with other consultants drawings and with the specification.

All dimensions to be checked on site prior to commencement of work.

Subject to Rights of Light Approval.

Subject to fire engineering

Rev	Description	Chk	Date
D	Updated to reflect planning con comments / Site Plan updated	AS	18/08/2021
C	Site layout updated	AS	02/08/2021
B	Site layout updated	AS	27/07/2021
A	Existing hedgerow updated	AS	29/06/2021

Peer House
8-14 Verulam Street
London WC1X 8LZ

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

RIBA Chartered Practice

cornisharchitects

WORK IN PROGRESS

Project Title.
JUNCTION 10 M40

Drawing Title.
PARAMETER PLAN 03
VEGETATION RETENTION
& REMOVAL

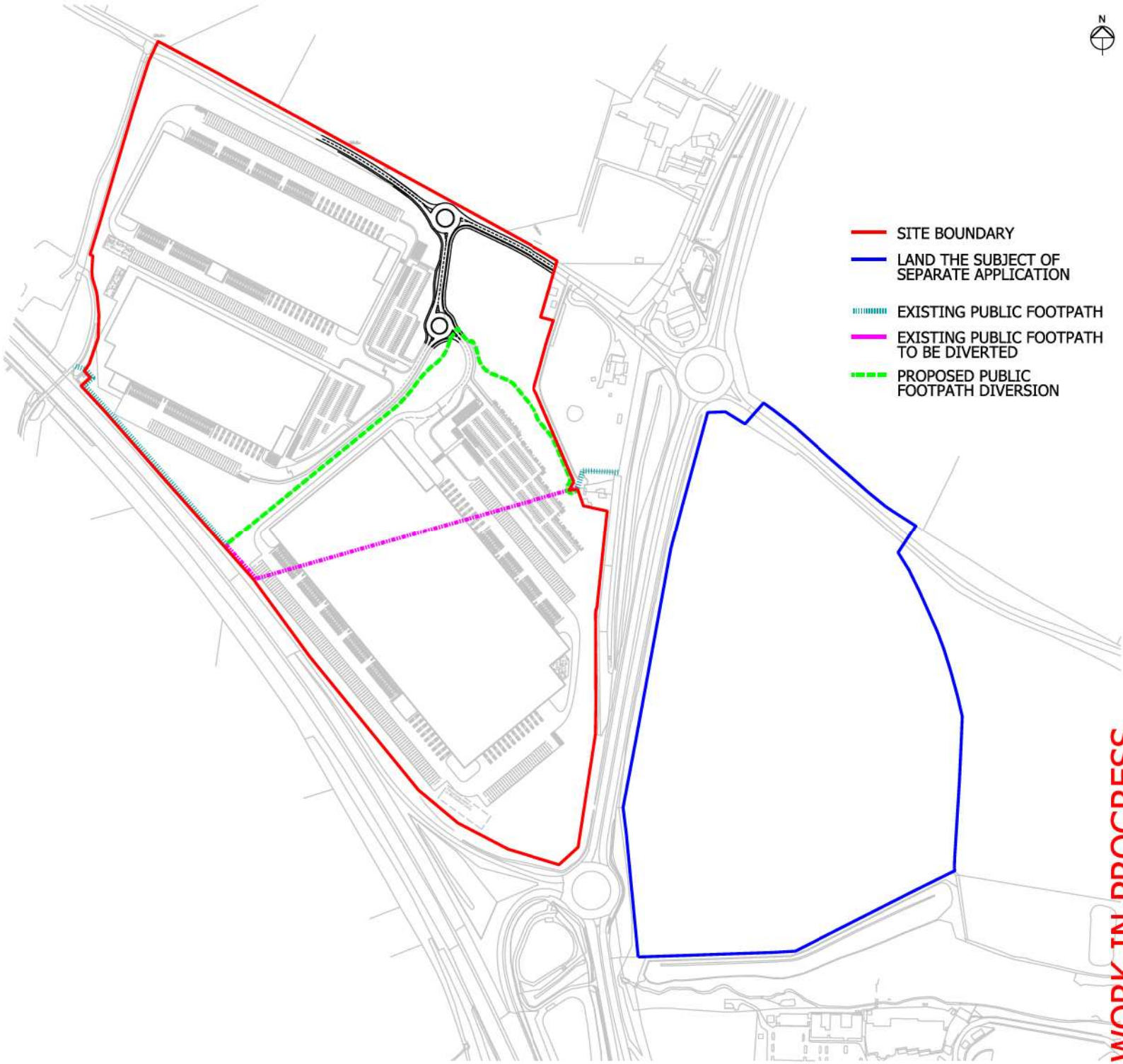
Drawing Status.
PRELIMINARY

Scale.
0 20 metres 200

Drawn By.	Scale.	Date.	Chkd By.
A S	1:2500 @ A1	22/06/2021	S M

ALBION LAND

Drawing No. 20005 - SK - 019 Rev. D



N

NOTES

Reproduced from the Ordinance Survey map with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright.

C A Cornish & Associates Ltd Licence no LIG0908.

Subject to Statutory Approvals.

Subject to survey.

Subject to design development.

Where applicable this drawing is to be read in conjunction with other consultants drawings and with the specification.

All dimensions to be checked on site prior to commencement of work.

Subject to Rights of Light Approval.

Subject to fire engineering

Rev	Description	Chk	Date
D	Updated to reflect planning con comments / Site Plan updated	AS	18/08/2021
C	Site layout updated	AS	02/08/2021
B	Site layout updated	AS	27/07/2021
A	Boundary amended	AS	29/06/2021

WORK IN PROGRESS

Peer House
8-14 Verulam Street
London WC1X 8LZ

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

cornisharchitects

RIBA Chartered Practice

Project Title.
JUNCTION 10 M40

Drawing Title.
PARAMETER PLAN 05
PUBLIC RIGHT OF WAY

Drawing Status.
PRELIMINARY

Scale.
0 20 metres 200

Drawn By.	Scale.	Date.	Chkd By.
A S	1:2500 @ A1	23/06/2021	S M

ALBION LAND

Drawing No. 20005 - SK - 021 Rev. D