Barratt David Wilson Homes & Hopkins Homes

Land off Humber Doucy Lane, Ipswich

Flood Risk Assessment and Drainage Strategy

681058-R1(0)-FRA
February 2024

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RSK GENERAL NOTES

Project No.: 681058-R1(0)-FRA

Site: Land off Humber Doucy Lane, Ipswich

Title: Flood Risk Assessment and Drainage Strategy

Client: Barratt David Wilson Homes & Hopkins Homes

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1 INTRODUCTION

RSK Land and Development Engineering Ltd were commissioned by Barratt David Wilson Homes & Hopkins Homes (the client) to provide a Flood Risk Assessment (FRA) to support the outline planning application at land north-east of Humber Doucy Lane, Ipswich (the site).

Development proposals include the development of a large residential development consisting of 660 dwellings and all associated infrastructure including access roads, open green space, and drainage features.

The purpose of the FRA is to establish the risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the flood risk to a more acceptable level. The FRA must demonstrate that the development will be safe for its lifetime (in this case assumed to be 100 years taking account of the vulnerability of its users), without increasing flood risk elsewhere.

This document has been produced to assess the flood risk from tidal, fluvial, surface water, groundwater, sewers, reservoirs, and artificial sources in line with the National Planning Policy Framework (NPPF)[1] and its corresponding Planning Practice Guidance (PPG)[2]. It includes a summary of the proposed surface water drainage strategy, showing how Sustainable Drainage Systems (SuDS) have been used to demonstrate surface water is appropriately managed on-site, with the aim that there is no increased risk of flooding on-site or elsewhere as a result of the development.

This assessment has been undertaken in consultation with the relevant authorities, and with reference to data, documents and guidance published by the Environment Agency (EA), the Lead Local Flood Authority (LLFA) (East Suffolk District Council / Ipswich Borough Council), the Local Planning Authority (LPA) (East Suffolk District Council – Formal Lead), and the Water Authority (Anglian Water).

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

[1] Communities and Local Government, 'National Planning Policy Framework', published March 2012 and last updated December 2023.

[2] Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', published March 2014 and last updated August 2022.

2 SITE DESCRIPTION & PROPOSALS

2.1 Existing site

2.1.1 Site description

The site is located to the north-east of Humber Doucy Lane, Rushmere, Ipswich in the county districts of East Suffolk and can be located at National Grid Reference 618817, 246661 and postcode IP4 3PZ. A site location plan is included as **Figure 2.1**.

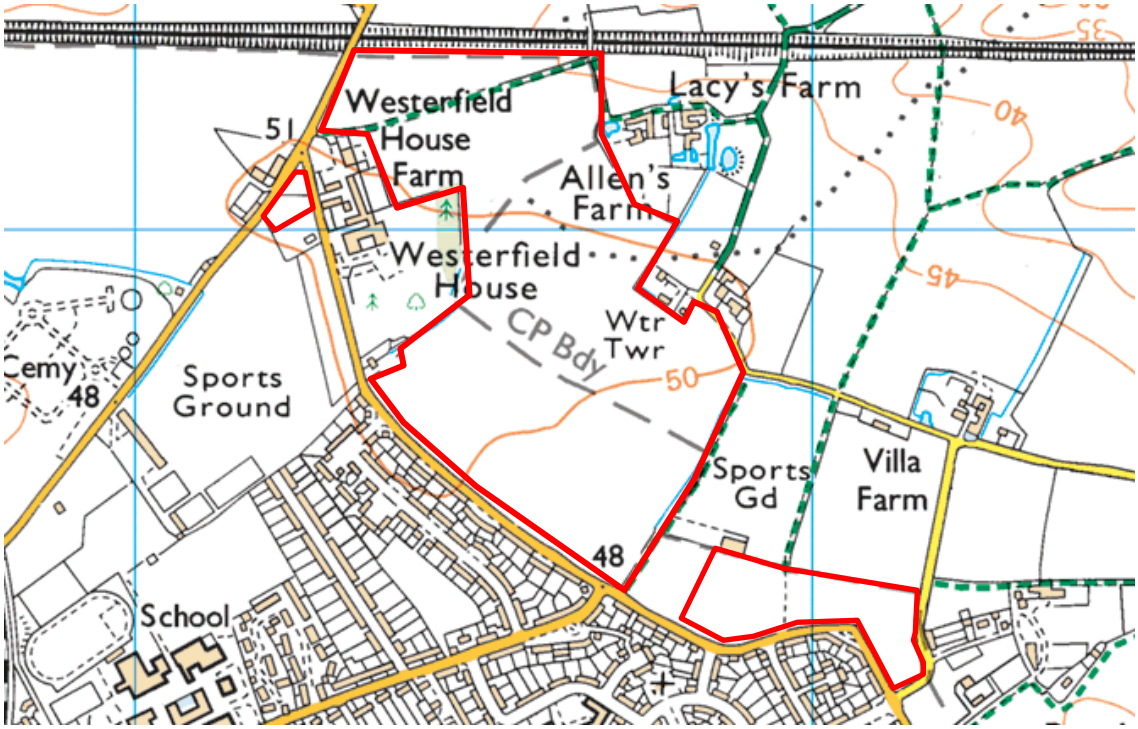


Figure 2.1: Site location plan

The site is divided into two parcels each with their own development components, access, and drainage strategy.: -

- Central – The primary development parcel is a large (26.6ha) open area comprising two agricultural fields. The majority of the central parcel is a large irregularly shaped field between Humber Doucy Lane to the south, Westerfield House Farm to the west, and Allen's Farm/Lacy's Farm to the northeast.
- East – The smaller eastern parcel (3.61ha) comprises open ground on the land north of Humber Doucy Lane and west of Seven Cottages Lane.
- A smaller (0.45ha) third parcel in the west is also included within the redline boundary, however it has no access, development area, or drainage component.

2.1.2 Topography

A site-specific topographic survey has been carried out by Survey Solutions in July 2022. The topographic survey is included in **Appendix B** along with an existing contour plan in **Appendix C**. Each parcel has its own topography and is described below: -

- West – The parcel is mostly overgrown but slopes to the north from 51.25m AOD along the south boundary down to 50.99m AOD at the junction between the roads.
- Central – The parcel falls in two separate directions to the north and south from a central ridge. The highest point of the ridge is at 51.06m AOD. To the north it falls to 44.72m AOD in the junction between the railway and the access track. To the south it falls to 48.17m AOD close to Humber Doucy Lane.
- East – The parcel consists of level playing fields and falls from 48.80m AOD in its north-west corner falling to 46.63m AOD along the southern corner at the junction with Seven Cottages Lane.

2.1.3 Existing drainage

Anglian Water sewer plans have been obtained for the site and are included in **Appendix D**. These plans indicate the following network of sewers in the vicinity of the site:

- There are no public surface or foul water sewers within the site boundaries.
- The closest surface water sewer is a 150mm increasing to a 300mm sewer running along the course of Humber Doucy Lane, but only in the eastern end of the site closest to the Rugby Club.
- A single 150mm foul water sewer runs west along the course of Seven Cottages Lane at the site's eastern corner. This eventually joins a 300mm sewer running parallel to the surface water sewer but through the gardens south of Humber Doucy Lane.
- A pair of combined sewers run along the course of Humber Doucy Lane. A 300mm combined sewer runs south-east along Humber Doucy Lane before diverting south along Sidegate Lane. A second 225mm combined sewer runs along Humber Doucy Lane beside the Rugby Club before diverting south along Ayr Steet.

2.2 Development proposals

Official development description is as follows:

"Hybrid Application - Full Planning Permission for the means of external access/egress to and from the site. Outline planning application (all matters reserved) for a mixed use development for up to 660 dwellings (Use Class C3), up to 400 sq m (net) of non-residential floorspace falling within Use Class E and/or Use Class F2(b), an Early Years facility, and associated vehicular access and highway works, formal and informal open spaces, play areas, provision of infrastructure (including internal highways, parking, servicing, cycle and pedestrian routes, utilities and sustainable drainage systems), and all associated landscaping and engineering works."

The current proposed site plans are included as **Appendix E**.

3 ENVIRONMENTAL SETTING

3.1 Hydrology

Reference to Ordnance Survey (OS) mapping and the EA's web-based mapping indicates that the nearest EA Main River is the River Fynn which is located approximately 1km to the north-east on the north side of the Greater Anglia Railway line cutting and so is hydraulically separated from the site.

Other notable surface water features in the vicinity of the site include a series of surface water drainage ditches running along the boundary of the largest central parcel. There are also several ponds around Lacy's Farm to the northeast of the site. Most of the ditches have sections that run both north and south due to the topographical slopes along the central ridge.

There is also a drainage ditch running along the southern boundary of the site located under the existing hedgerow, this is also culverted through a 300mm pipe under an overgrown and disused field access near the south-east corner.

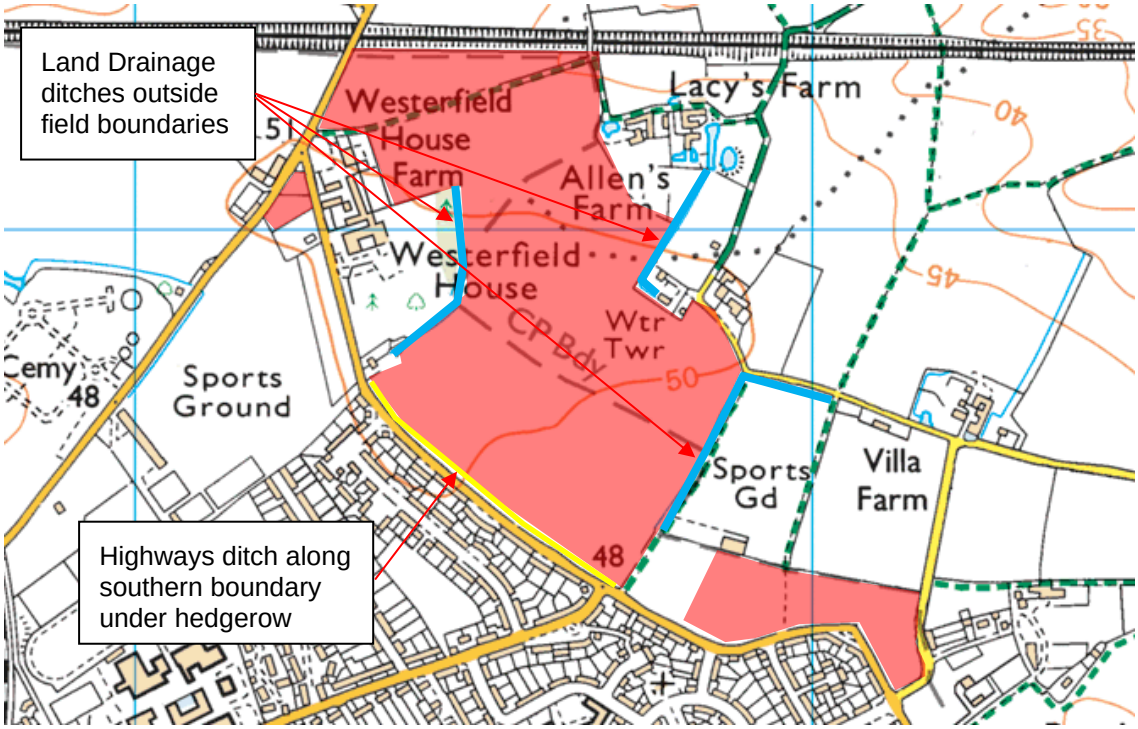


Figure 3.1: Land Drainage watercourses

3.2 Geology

Based on published geological records for the area (British Geological Survey online mapping), the site exhibits the following geology:

- Superficial Geology: Lowestoft Formation - Diamicton
- Bedrock Geology: Red Crag Formation - Sand

There are no publicly available borehole records on site; the closest borehole (TM14NE31) was listed approximately 80m to the west of the site and records Glacial Till to a depth of 21.6m with the underlying Red Crag formation located 24.4m below ground level (bgl). A second off site borehole (TM14NE50) located 310m to the west confirmed a similar geological column, with the presence of London Clay, Lambeth Group and Upper Chalk beneath the Red Crag. This borehole recorded the presence of groundwater at approximately 40m bgl.

Site-specific geotechnical investigations have been undertaken by RSA Geotechnics Ltd carried out in August 2022 (report reference 16118SI)[3]. The report details the existing geology and hydrogeology, groundwater levels, permeability, and contamination and are summarised in **Table 3.1** below: -

Table 3.1: Summary of Ground Conditions (extract from 16118SI Table 5.2)

Stratum	Min/Max depth of top of stratum (m)	Min/Max depth of base of stratum (m)	Min/Max thickness of stratum (m)
Topsoil/Subsoil	G.L	0.25 – 0.70	0.25 – 0.70
Possible Made Ground/Made Ground	0.40 - 0.50	0.75 - 1.30	0.35 - 0.80
Lowestoft Formation (Cohesive)	0.25 – 1.30	0.75 – 5.95	0.35 – 5.40
Lowestoft Formation (Granular)	0.75 – 5.95	>15.00*	>13.50*
Groundwater	No groundwater encountered during drilling		
	Perched Groundwater in WS5 at 2.43 to 2.86 mbgl during monitoring.		
*Not fully penetrated			

Soakage Testing was also carried out in a number of trial pits across the site and the infiltration rates summarised in **Table 3.2** (overleaf) were calculated.

[3] Communities and Local Government, 'National Planning Policy Framework', published March 2012 and last updated September 2023.

Table 3.2: Trial pit ref and average infiltration rate (extract from 16118SI Table 6.6)

Location	Depth (m)	Strata	Infiltration rate (m/s)		
			Test 1	Test 2	Test 3
TP195	3.00	Lowestoft Fm – Clay with sand at 2.85m	5.1×10^{-6}	10×10^{-6} (Ex)	4.7×10^{-6} (Ex)
TP205	3.00	Lowestoft Fm – Sand from 2 m	6.5×10^{-5} (Ex)	6.7×10^{-5}	6.4×10^{-5}
TP215	3.00	Lowestoft Fm - Clay	6.3×10^{-8} (Ex)	Subsequent Tests Not Undertaken Following Poor Infiltration of First Test Run	
TP225	2.50	Lowestoft Fm - Clay	3.9×10^{-8} (Ex)		
TP235	2.50	Lowestoft Fm - Clay	2.1×10^{-8} (Ex)		
TP245	2.50	Lowestoft Fm - Clay	1.9×10^{-7}		
BH1	4.50	Lowestoft Fm - Gravel	1.6×10^{-4}	6.5×10^{-5}	5.6×10^{-5}
BH2	7.00	Lowestoft Fm – Sand/Gravel	1.1×10^{-4}	1.2×10^{-4}	1.1×10^{-4}
BH3	6.00	Lowestoft Fm – Sand/Gravel	6.7×10^{-5}	5.7×10^{-5}	6.1×10^{-5}
NB: (Ex) = Extrapolated Result					

According to the report, the use of shallow (surface) soakaway drainage is not considered suitable for most of the site due to the generally cohesive nature of the shallow site soils, as shown in TP215 - 245. However deeper soakaway drainage is considered feasible, due to the generally granular nature of the deeper site soils. Better infiltration rates have been calculated from borehole records and trial pits run in granular soils (TP195 & TP205).

Following the initial development of the drainage strategy additional infiltration testing was undertaken by RSA Geotechnics in February 2024 specifically targeted at the granular deeper site soils to further inform the design. The results from the testing have been summarised in **Table 3.3** below.

The additional site investigation work undertaken can be found in **Appendix F**.

Table 3.3 Trial pit ref and average infiltration rate (complied from 16118GI – Soakage tests)

Location	Depth (m)	Strata	Peak flow (m/s)		
			Test 1	Test 2	Test 3
BHSA01	8.00	Lowestoft Fm - Gravel	8.6×10^{-5}	1.3×10^{-4}	1.3×10^{-4}
BHSA02	8.00	Lowestoft Fm – Sand	1.5×10^{-5}	8.4×10^{-6}	1.5×10^{-5}
BHSA03	8.00	Lowestoft Fm - Sand	1.4×10^{-4}	1.2×10^{-4}	8.2×10^{-5}
BHSA04	8.00	Lowestoft Fm - Gravel	2.6×10^{-5}	3.6×10^{-5}	3.1×10^{-5}
BHSA05	-	-	-	-	-
BHSA06	8.00	Lowestoft Fm - Gravel	5.0×10^{-5}	4.9×10^{-5}	3.6×10^{-5}
BHSA07	8.00	Lowestoft Fm - Sand	2.4×10^{-5}	3.4×10^{-5}	2.4×10^{-5}

3.3 Hydrogeology

Hydrogeological information was obtained from the online Magic Maps service. These maps indicate that the site is underlain by a Secondary Undifferentiated superficial aquifer. The maps also indicate that the site is underlain by a Principal bedrock aquifer due to the high permeability of the underlying Red Crag Sand Formation.

The site is located within a Zone III – Total Catchment Groundwater Source Protection Zone which surrounds a series of Zone I and Zone II (Inner and Outer) areas north of the railway. The closest to the site is centred on the Fynn Valley Pond.

During the site investigation by RSA Geotechnics in August 2022 no groundwater was recorded in any of the exploratory boreholes. During the subsequent work in February 2024 ground water was identified in the Lowestoft formation at a depth of 21.6mbgl (refer to BHSA05 borehole log). This is considered to be the principal bedrock aquifer. Groundwater was also identified in the glacial gravels at depths listed in the table below.

Additional water was recorded within the cohesive materials at shallow depths. This coincided with waterlogging at ground level permeating at a slow rate through largely impermeable cohesive materials.

Groundwater monitoring was originally undertaken in September and October 2022. To further inform the drainage strategy seasonal groundwater monitoring started in December 2023 and will continue into the summer months of 2024.

It is anticipated that the results below will constitute the peak seasonal values and are expected to fall as testing moves into the summer months.

The latest groundwater monitoring results can be seen in **Table 3.4** below.

Table 3.4 Trial pit ref and groundwater monitoring results (extract from 16118GI – Groundwater Monitoring)

Monitored depths to groundwater												
Location	Depth to groundwater (mbgl)											
	BHSA01	BHSA02	BHSA03	BHSA04	BHSA05	BHSA06	BHSA07	WS4	WS5	BH1	BH2	BH3
Depth of Well (m)	8.00	8.00	8.00	8.00	27.00	8.00	8.00	4.00	4.00	3.50	3.50	3.50
Date												
30-09-22	NOT DRILLED (ND)							DRY	2.70	DRY	DRY	DRY
11-10-22								DRY	2.76	DRY	DRY	DRY
17-10-22								DRY	2.78	DRY	DRY	DRY
20-10-22								DRY	2.43	DRY	DRY	DRY
24-10-22								DRY	2.46	DRY	DRY	DRY
28-10-22								DRY	2.86	DRY	DRY	DRY
15-12-23	(ND)	(NM)	(ND)	(ND)	22.87	(ND)	(NM)	NOT MONITORED (NM)				
09-01-24	(ND)	7.87	(ND)	(ND)	22.86	(ND)	7.80	1.16	1.01	2.95	2.93	DRY
19-01-24	(ND)	7.84	(ND)	(ND)	22.84	(ND)	7.78	2.70	1.04	2.95	2.94	DRY
24-01-24	(ND)	7.85	(ND)	(ND)	22.84	(ND)	7.78	2.72	1.03	2.95	2.94	DRY
09-02-24	7.46	7.83	6.42	7.45	22.29	(ND)	7.85	0.21	0.55	3.58	3.62	DRY
22-02-24	7.71	7.82	7.28	7.37	22.84	7.26	7.78	2.69	1.01	2.95	2.93	DRY

4 SOURCES OF FLOOD RISK

4.1 Criteria

In accordance with the NPPF and advice from the EA, an assessment of the risk associated with various flooding sources is required along with consideration of the effects of climate change over the design life of the development (in this case assumed to be 100 years).

The EA's most recent climate change guidance, published in May 2022[4], should be referenced in order to identify the appropriate peak river flow and rainfall intensity allowances for the scheme. The appropriate allowance for peak river flow is based on the location of the site in the country, the lifetime of development, the relevant flood zone, and the vulnerability of the proposed end use.

The flood risk elements that need to be considered for any site are defined in BS 8533 'Assessing and managing flood risk in development Code of practice'[5] as the "Forms of Flooding" and are listed as:

- Flooding from rivers (fluvial flood risk);
- Flooding from the sea (tidal flood risk);
- Flooding from the land;
- Flooding from groundwater;
- Flooding from sewers (sewer and drain exceedance, pumping station failure etc); and
- Flooding from reservoirs, canals, and other artificial structures.

The following section reviews each of these in respect of the subject site.

4.2 Flooding from rivers (fluvial flood risk)

The EA Flood Zone mapping study for England is available on their website at: https://flood-map-for-planning.service.gov.uk.

The latest EA published flood zone map (**Figure 4.1**) shows that the site lies within Flood Zone 1, representing a 1 in 1000 year or less annual probability of flooding from fluvial or tidal sources. The closest fluvial flood extents are confined to the course of the River Fynn located 1km to the north-east on the north side of the Greater Anglia Railway line cutting.

[4] Environment Agency, 'Guidance: Flood Risk Assessments: Climate Change Allowances'. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances, last updated May 2022.

[5] BSI, 'BS 8533-2017 Assessing and managing flood risk in development Code of practice', December 2017.

Figure 4.1: Environment Agency 'Flood map for planning'

Fluvial flooding is likely to increase as a result of climate change. A greater intensity and frequency of precipitation is likely to raise river levels and increase the likelihood of a river overtopping its banks. Climate change guidance for river modelling was updated by the EA in May 2022.

No model re-runs have been undertaken as part of this site-specific FRA, and the supplied EA data therefore represents the best available and up-to-date data when considering the flood risk to the site. The impact upon the site should be negligible given its location within Flood Zone 1.

4.3 Flooding from the sea (tidal flood risk)

The site is not considered to be at risk from tidal flooding due to its inland location.

4.4 Flooding from the land (surface water flood risk)

If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff can occur. Excess surface water flows from the site are believed to drain naturally to the local water features, either by overland flow or through infiltration.

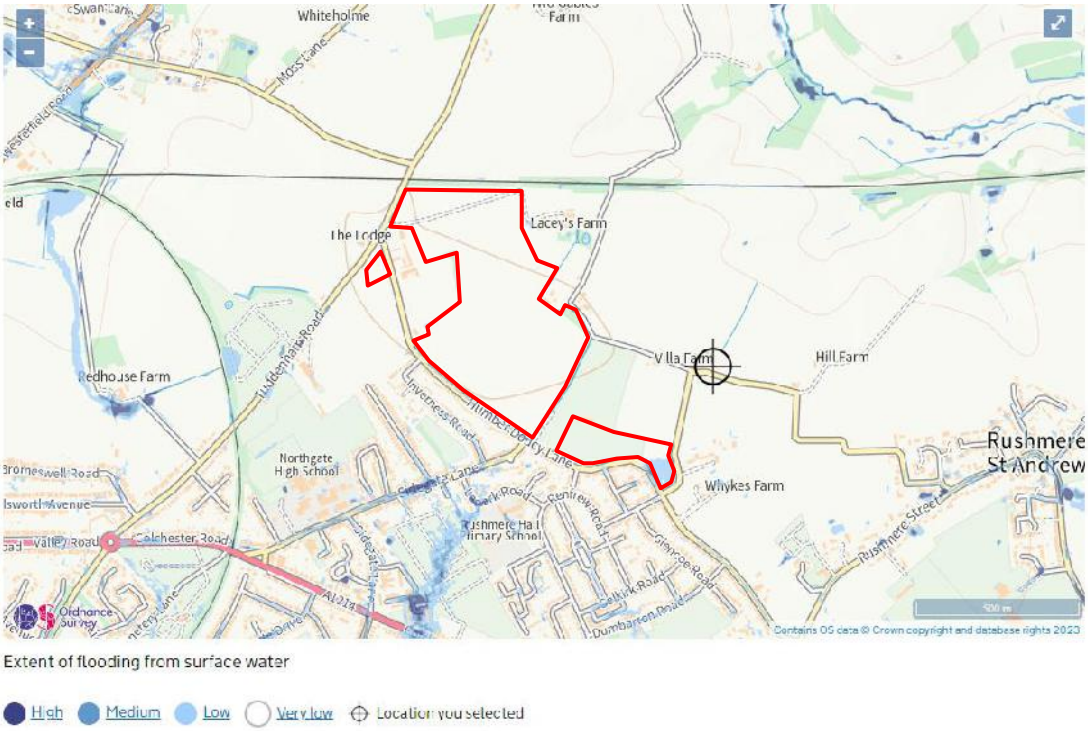


Figure 4.2: Environment Agency 'Flood risk from surface water' map

Figure 4.3: Environment Agency 'velocity in a low risk scenario' map

The EA's surface water flood mapping (**Figures 4.2 - 4.3**) shows that the only area of the site impacted by surface water flooding is a topographical depression located within the easternmost corner of the site in the junction between Humber Doucy Lane and Severn Cottages Lane. This is a low risk area and appears to originate from runoff from Humber Doucy Lane and other nearby roads due to a slope in either direction (from north and south) spilling over into the site. This however only show in a low risk scenario parallel to a 1 in 1000yr surface water flooding incident and results in a low flood velocity at <0.25m/s.

The topography on site shows the site falls away to the north and south in the central parcel and south in the east parcel, therefore any surface water runoff will likely fall away in this direction. Runoff generated by the proposed development will need to be controlled to prevent surface water flooding elsewhere. This is discussed further in Section 7.

Surface water flooding is likely to increase as a result of climate change in a similar ratio to fluvial flooding. Increased intensity and frequency of precipitation is likely to lead to reduced infiltration and increased overland flow. Climate change guidance was updated by the EA in May 2022. Revised allowances for climate change have been included in the indicative drainage strategy.

The overall risk of surface water flooding at the site is considered to be **low**.

4.5 Flooding from groundwater

Groundwater flooding tends to occur after long periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

During the site investigation by RSA Geotechnics in August 2022 no groundwater was recorded in any of the exploratory boreholes. During the subsequent work in February 2024 ground water was identified in the Lowestoft formation at a depth of 21.6mbgl (refer to BHSA05 borehole log). This is considered to be the principal bedrock aquifer. Groundwater was also identified in the glacial gravels at depths listed in **Table 3.4**.

Climate change could increase the risk of groundwater flooding as a result of increased precipitation filtering into the groundwater body. This is less likely to cause a significant change to flood risk than from other sources since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk as a result of climate change is likely to be low.

The overall groundwater flood risk is considered to be **very low**.

4.6 Flooding from sewers

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its conveyance capacity, the system becomes blocked, or it cannot discharge due to a high water level in the receiving watercourse. When exceeded, the surcharged pipe work could lead to flooding from backed up manholes and gully connections.

Sewer details have been referenced from sewer record plans obtained from Anglian Water (see **Appendix D**). The plans indicate that no public surface water sewers are present within the site's boundaries. Several existing public sewers (surface/foul/combined) lie within or close to Humber Doucy Lane to the south of the site.

Based on the local topography, any surcharged water would be confined to the course of Humber Doucy Lane and would not impact the site since the road is topographically lower than any nearby part of the site. Road levels range from 50.75 - 48.21m AOD along this area, with all parallel parts of the site being at least 0.2m higher than the road.

Climate change is likely to result in an increase in flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of local sewer flooding but would not be significant in terms of the proposed development.

The overall sewer flood risk to the site is considered to be **low**.

4.7 Flooding from reservoirs

Flood events can occur from a sudden release of large volumes of water from reservoirs. The EA reservoir flood map (reproduced as **Figure 4.4**) shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is unlikely that any actual flood would be this large. The map shows that the site is not in a location at risk of reservoir flooding.

The EA mapping was updated in 2021 to demonstrate the potential maximum extent of flooding for two scenarios - a "dry day scenario" in which river levels are "normal", and a "wet day scenario" where the flooding from the reservoir coincides with flooding from rivers.

Reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. Since then, reservoir safety legislation has been introduced to ensure reservoirs are maintained.

Reservoirs can be managed over time, controlling inflow/outflow of water and therefore there is the capacity to control the effects of climate change. Increased rainfall has the potential to increase base flow, but this should be minimal. It is unlikely that there will be a substantial change to the risk of flooding for this site as a result of climate change.

The resultant flood risk is considered to be **very low**.

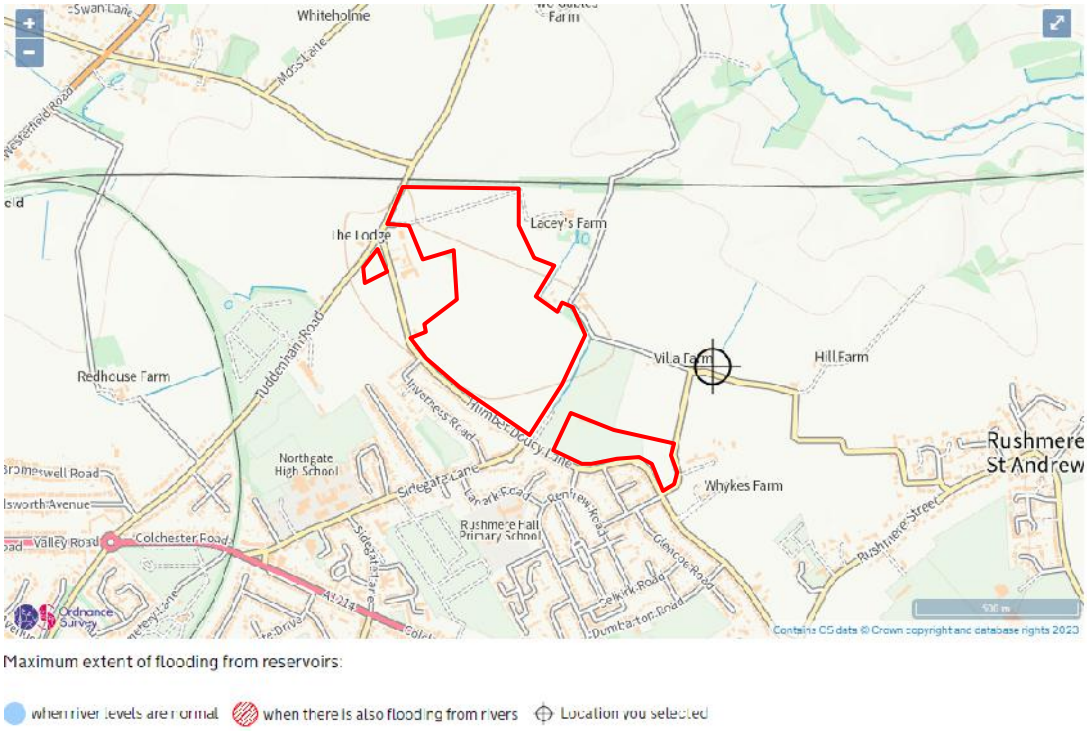


Figure 4.4: Environment Agency 'Flood risk from reservoirs' map

4.8 Other sources of flooding

4.8.1 Canals

There are no Canal & River Trust owned canals within the vicinity of the site.

4.8.2 Other artificial features

No other artificial features with the potential to result in a flood risk to the site have been identified.

5 MITIGATION MEASURES AND RESIDUAL RISK

5.1 Sequential approach within application boundary

No parts of the site have been identified as being at a significant risk of flooding from any source other than the surface risk flooding area in the eastern corner, which only occurs during extreme events. Therefore, there is no requirement to apply the sequential approach to the location of more vulnerable elements of the scheme to the lowest risk parts of the site.

5.2 Overland flood flow

No overland flow routes have been identified across the site from any source of flooding. All surface water runoff up to the 1 in 100 year climate change storm generated on site will be stored on site and discharged via infiltration into the ground as detailed in Section 7. Surface flows may be generated on site due to drainage capacity exceedance, which can be conveyed into the SuDS features via surface flows along the new roads.

5.3 Finished floor levels

As this site is unlikely to be affected by fluvial, surface water or any other sources of flooding there is no need to incorporate any raised finished floor levels into the design. Low lying areas that could lead to ponding of surface flows will be avoided by careful design of finished levels.

5.4 Flood compensation

The site is shown to be outside the 1 in 100 year climate change floodplain, so floodplain compensatory measures are not deemed necessary.

5.5 Safe access/egress

As the site is lies outside of the 1 in 100 year plus climate change fluvial flood extent and is not identified as being at significant risk of flooding from other sources, safe access and egress will be available for the design flood event.

5.6 Basements

The proposed development does not include any basement proposals. Therefore, aside from shallow foundations works, the proposals will have no material impact on the risk of groundwater flooding both to and from the development.

It is considered likely that perched groundwater may be encountered during the groundworks phase, and therefore could present a risk to the site at the construction stage. During the operational phase, the absence of basement features within the proposals minimises the potential hazards posed by groundwater flooding.

6 PLANNING POLICY CONTEXT

6.1 National planning policy

Section 14 of the NPPF details the overarching requirements relating to flood risk for any development. The key message is 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.

In areas at risk of flooding, the NPPF requires that the following criteria are met:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

The PPG supports the NPPF and provides further advice regarding the assessment of flood risk and the application of the Sequential and Exception Tests.

6.1.1 Land use vulnerability

Table 2 of the PPG indicates the compatibility of various land uses in each flood zone, dependent on their vulnerability to flooding. **Table 6.1** below is reproduced from Table 2 of PPG.

Table 6.1: Flood risk vulnerability and flood zone 'compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to Annex 3 of the NPPF, the proposed development, based on its residential use, is classed as 'more vulnerable'. This classification of development is appropriate for areas within Flood Zone 1 and therefore appropriate for the subject site.

6.1.2 Sequential Test

The Sequential Test aims to direct new development to areas with the lowest probability of flooding. The site has been identified as located within Flood Zone 1 with no other significant flooding issues from other sources.

6.1.3 Exception Test

In accordance with Table 6.1, there is no requirement to apply the Exception Test for a 'more vulnerable' development within Flood Zone 1.

6.2 Local planning policy

Current planning policy relating to flood risk and drainage for the East Suffolk District Council area (as formal planning lead) is detailed within Appendix C of the Suffolk Flood Risk Management Strategy[6].

Key policies of relevance to the proposed development are reproduced below:

- Suffolk Council will be involved prior to public consultation to ensure LPA policies reflect relevant National Planning policies, Planning Practise Guidance, the Suffolk Flood Risk Management Strategy and Suffolk surface water drainage (SuDS) Guidance.
- The preferred form of sustainable drainage techniques should be open above-ground SuDS close to source.
- Sufficient appropriate open spaces are to be allocated for open SuDS at source. Spatial requirements will vary from site to site and also depend overall layout and topographical constraints.
- Where ground conditions are suitable infiltration type drainage is preferred.
- To accommodate underground domestic soakaways, residential gardens usually need to be a minimum of 9m long to provide the normal 5m clearance between soakaways and buildings. Achievable densities depend greatly on the floor area and number of storeys.
- For attenuation type SuDS typically 10 - 12% of site area may be required for open SuDS close to source and this area should be multifunctional (i.e. swales or ponds / parks and gardens / open spaces / amenity areas). Ideally roads and SuDS which store water should follow contours.

[6] Appendix C to Suffolk Flood Risk Management Strategy - https://www.greensuffolk.org/app/uploads/2021/05/2018-10-01-Protocol-for-Local-Planning-Appendix-C-v3-LR.pdf

7 SURFACE WATER DRAINAGE ASSESSMENT

7.1 Scope

This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that could be incorporated as part of the masterplan. The NPPF states that SuDS should be considered wherever practical. The use of SuDS is also encouraged by regional and local policy. In accordance with the relevant guidance the surface water drainage strategy should seek to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates to Qbar greenfield rates.

In addition, Building Regulations Part H[7] requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

This assessment includes an overview of the existing greenfield scenario and proposed development. The site is divided into three distinct parcels for a total area of approximately 31.52ha. However, combined with the site's split topography and varying infiltration capacity means the new development will need to be divided into multiple catchments (many with their own sub-catchments) each with their own drainage systems and attenuation features.

7.2 Pre-development situation

The existing site area is 31.52ha and 0% impermeable. The Flood Estimation Handbook Method[8] been used to estimate the Greenfield surface water runoff for the site for both total site area and developable space, using the HR Wallingford Greenfield runoff rate estimation tool. Calculations are contained in **Appendix G**.

[7] HM Government (2010 with 2013 amendments), 'The Building Regulations 2010: Approved Document H - Drainage and Waste Disposal (2002 Edition incorporating 2010 amendments)'.

[8] Flood Estimation Handbook – WINFAP 5 and ReFH 2.

Table 7.1: FEH surface water runoff (greenfield)

Return Period	Peak flow (l/s)	
	Development Area (18.86ha)	Total Site Area (31.25ha)
Q_{BAR}	8.83	14.64
1 in 1 year	7.68	12.73
1 in 30 year	21.64	35.86
1 in 100 year	31.45	52.10

7.3 Post-development situation

The proposed development is for a residential end use. This will result in an increase in impermeable area and surface water runoff across the site. It will therefore be necessary to manage surface water on-site through conveyance towards the proposed point of discharge, whilst providing sufficient attenuation for all events up to the 1 in 100 year event inclusive of 45% climate change (based on latest climate change guidance).

7.3.1 Point of discharge

Discharge options from the site have been considered in line with the SuDS hierarchy, as follows.

Infiltration

Infiltration should be considered as the primary option to discharge surface water from the developed study area. The effectiveness of infiltration is completely dependent on the physical conditions at the study area. Potential obstacles include:

- Local variations in permeability preventing infiltration - It is understood that the site is located on Lowestoft Formation superficial deposits and Red Crag Formation bedrock. Both of these have been confirmed as permeable, with infiltration rates confirmed via on-site soakage testing.
- According to the on-site ground investigation shallow soakaway drainage is not considered suitable for most of the site due to the cohesive nature of the shallow site soils. However, the more granular deeper soils have better infiltration rates calculated from borehole records. Therefore, deeper soakaway drainage is considered feasible.
- Groundwater - For infiltration drainage devices, Building Regulation approved document H2 states that these *"should not be built in ground where the water table reaches the bottom of the device at any time of the year"*. The EA advises that the base of any infiltration must have 1.2m clearance above peak seasonal groundwater levels.
- Source Protection Zones - The study area is located within a Groundwater Source Protection Zone.

From the information available in the Site Investigation Report, infiltration is considered a viable option as part of the drainage strategy. From the information available regarding the application site's underlying granular soils and recorded infiltration rates, infiltration is considered a viable option, provided that it utilises deeper trenches or bore soakaways rather than shallow surface infiltration due to the greater cohesiveness of the surface soils.

Discharge to watercourse

There will be no surface water connection into any nearby watercourses as preferable methods are available.

Discharge to surface water sewer

There will be no surface water connection into the public sewer as preferable methods are available.

7.3.2 Network modelling

To determine whether the proposed SuDS provide sufficient attenuation storage, the Causeway 'Flow' tool has been used. The network was modelled as semi detailed networks with each catchment split into a series of nodes and catchment areas divided equally to better represent system behaviours and thus better reflect storage requirements. No quick storage was used.

The volumes can be later revised at detail design stage by the introduction of specific flow control methods.

Calculations have been run using the local infiltration rates for each ponds closest infiltration test soakaway in accordance with LLFA requirements. The proposed impermeable area has been based on an assumed 60% of the developable area for each development parcel.

Calculations show this system can attenuate surface water runoff without flooding during a 1 in 100 year event inclusive of 45% climate change. Further details on the storage structure and sizing, with attenuation calculations can be found in **Appendix H**.

7.3.3 Proposed drainage strategy

The proposed drainage strategy has been prepared in accordance with the information presented in this report and consultation with the LLFA.

The proposed SuDS for the site include mostly infiltration basins, consisting of an attenuation basin with infiltration below. The basins have been located depending on the positions of the relative infiltration rates, and underlying soil type. The proposed SuDS features are designed to provide the required storage volume to retain the 1 in 100 plus 45% climate change event.

The SuDS measures are outlined in the Indicative Surface Water Strategy as attached in **Appendix I**. In principle, the strategy contains the following features:

- **Infiltration techniques** are considered suitable on site due to the permeable nature of the underlying geology and therefore **infiltration systems** will be the main outfall technique incorporated into the drainage design, a typical detail of which can be found in **Appendix J**. The proposed infiltration systems will target the Lowestoft formation gravels/sands, depths for this vary from 2.8m to 6.1m deep. The groundwater monitoring results in **Table 3.4** suggest peak groundwater depths of approximately 7.8m. This will provide an unsaturated zone of approximately 1.7m-5m in depth. Consultation with the EA will be required to confirm the design aspects of the deep infiltration system. All soakaway features will be located at a minimum 5 metre distance from buildings in accordance with Building Regulations Part H[7] and the Suffolk design guide;
- **Permeable paving** can provide surface water attenuation and water quality benefits. Main roads will not be constructed using permeable paving due to ownership and future maintenance issues, where responsibility will most likely lie with the highway authority. Therefore, private roadways and parking areas will have the paving systems installed;
- **Swales** will be utilised for both conveyance and treatment purposes. Located along highways and proposed landscaped areas
- **Rainwater harvesting** via the use of Rain Gardens will also be utalised as additional on-site attenuation at source, but it has not been included as part of any of the calculations;

The dimensions, volumes and location of the SuDS features will need to be revised as the masterplan develops and during the detailed planning stage. Detailed design of individual features is not part of the scope of this report. Preliminary design criteria have been based upon guidance given in the CIRIA publication 'The SUDS Manual'.

Temporary drainage should be established for the construction phase of development to prevent silt mobilisation, potentially impacting on flow regimes and silt pollution downstream. The construction of SuDS should be considered in the early stages of site design.

7.3.4 Adoption and maintenance

Maintenance of SuDS features should be undertaken in line with maintenance schedules outlined in the SuDS Manual and if adopted, any Anglian Water or NAV company maintenance guidance.

A SuDS management strategy can be found in **Appendix K**.

7.4 Water quality

The SUDS Manual contains guidance on how to assess water quality, stating *"Determining the hazard posed by the land use activities at a site and the extent to which underlying soil layers and/or proposed treatment components reduce the associated risk can be done using a variety of methods that vary in complexity and data requirements."*

The assessment methodology required is determined by reference to Table 4.3 of the SuDS Manual. Based on this, the quality impacts of the proposed development can be

summarised with the following pollution hazard levels and management requirements for discharge to the receiving groundwater (there will be no off-site discharge, therefore receiving surface water is not considered here):

- Residential roofs – **Very Low** Pollution Hazard – Simple Index Approach;
- Individual property driveways, roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices) – **Low** Pollution Hazard – Simple Index Approach; and
- Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals retail), all roads except low traffic roads and trunk roads/motorways – **Medium** Pollution Hazard – Simple Index Approach

It is therefore considered appropriate to use the Simple Index Approach (SIA) for the purpose of this assessment. The Simple Index Approach (SIA) to assessing water quality management requirements has been developed by CIRIA to support the implementation of the water quality management design methods set out in the SuDS Manual, with appropriate cross referencing to the relevant 'Design Conditions'. The CIRIA Susdrain website contains a spreadsheet based procedure that can be used for all the UK.

Table 26.1 of the SUDS Manual indicates that for the Simple Index Approach:

- Simple pollution hazard indices should be based on land use (e.g. Table 26.2); and
- Risk reduction for groundwater should be done using Simple SuDS hazard mitigation indices (e.g. Table 26.4)

Extracts of Tables 26.2 and 26.4 are replicated below, highlighting the relevant features applicable to this site:

Table 7.2: Extract of SuDS Manual Table 26.2: Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (0.8 where potential for metal leaching)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements/day	Low	0.5	0.4	0.4

Table 7.3: Extract of SuDS Manual Table 26.4: Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates	TSS	Metals	Hydro-carbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.6	0.5	0.6
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e. graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.4	0.4
Constructed permeable pavement (where a 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
Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.8	0.8	0.8
Proprietary treatment systems - These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.			

The SuDS Manual States:

Total SuDS mitigation index ≥ pollution hazard index

(for each contaminant type) (for each contaminant type)

Taking each land type use in turn:

- Residential roofs – an infiltration trench alone (mitigation 0.4) is sufficient to mitigate for any of the potential pollutants (indices 0.05-0.2);
- Commercial roofs – an infiltration trench alone (mitigation 0.4) is sufficient to mitigate for any of the potential pollutants (indices 0.05-0.3);
- Individual property driveways, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices) – permeable pavement alone (mitigation 0.6-0.7) is sufficient to mitigate for any of the potential pollutants (indices 0.4-0.5);

In addition to these standalone features, the use of rainwater harvesting, infiltration basins and associated inlet forebays; and other treatment systems (where applicable) will provide additional levels of treatment. Aside from residential roof runoff, all surface

water runoff will pass through a treatment train of at least three features and therefore the water quality requirements are considered to be met.

7.5 Foul drainage provision

A proposed foul drainage network is designed to convey flows towards their respective catchments low point. Catchment 3 will flow to the northwest of the site towards a pumping station adjacent to the infiltration basin and public right of way. A rising main will then pump flows back towards the south where they will connect with flows from catchment 1. Combined they will flow southeast towards an existing combined sewer located in Humber Doucy Lane.

Catchment 2 will flow to the southeast towards a pumping station where a rising main will run west along Humber Doucy Lane connecting into the combined sewer.

A pre-planning enquiry with Anglian Water (PPE-0202525 as seen in **Appendix L**) has been undertaken and it was confirmed that there is capacity for up to 675 homes in the existing system.

The proposed foul drainage strategy can be seen in **Appendix M.**

8 CONCLUSIONS AND RECOMMENDATIONS

This FRA complies with the NPPF and Planning Practice Guidance and demonstrates that flood risk from all sources has been considered in the proposed development. It is also consistent with the Local Planning Authority requirements with regard to flood risk.

The proposed development site lies in an area designated by the EA as Flood Zone 1 and is outlined to have a chance of flooding of less than 1 in 1,000 (<0.1%) in any year from fluvial sources. The proposed development is classified as 'more vulnerable' and therefore considered appropriate within Flood Zone 1 without application of the Exception Test.

This FRA has considered multiple sources of flooding and concluded the following:

Table 8.1: Flood risk summary

Source	Level of risk	Mitigation
Fluvial	Very Low Flood Zone 1	None required due to distance to fluvial watercourses
Tidal	Very Low	None required due to distance to tidally influenced watercourses
Surface water	Low	The development will incorporate a surface water drainage strategy to accommodate surface water generated on site. Surface water will be attenuated on site and discharged directly to the ground via infiltration features. SuDS will be utilised to control surface water flows, designed to store the volume of water associated with a 1 in 100 year rainfall event (including an allowance for climate change), providing a betterment over the existing scenario.
Groundwater	Low	None required due to depth of continuous groundwater although perched groundwater may be encountered during excavation works.
Sewers	Low	None required save upkeep of new sewer networks installed during development.
Reservoir	Very Low	None required
Other sources	Very Low	None required

Overall, taking into account the above points, the development of the site should not be precluded on flood risk grounds.

APPENDIX A
RSK GROUP SERVICE CONSTRAINTS

1. This report and the drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Barratt David Wilsons and Hopkins Homes the "client") in accordance with the terms of a contract between RSK and the "client" dated August 2023. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable civil engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent, or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates, or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate, or such other terms as may be agreed between RSK and the client.

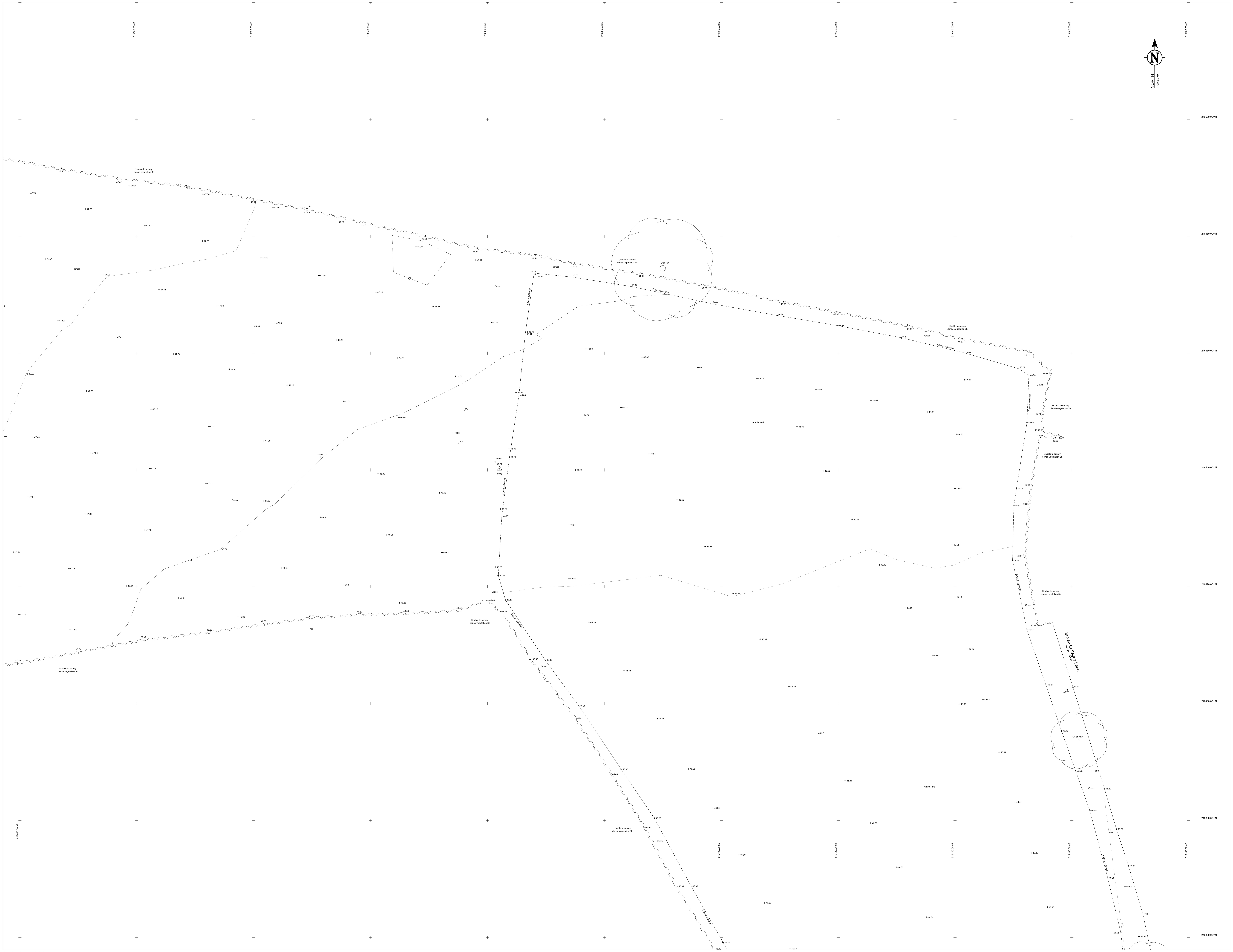
6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base an but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the appropriate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B
TOPOGRAPHIC SURVEY



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
AR	Assumed Route	FB	Flower Bed	SI	Sign Post
AV	Air Valve	FBD	Floor Board Direction	SP	Arch Spring Point Height
BB	Belisha Beacon	FH	Fire Hydrant	SV	Stop Valve
BH	Bore Hole	FL	Floor Level	SW	Surface Water
BL	Bed Level	FP	Flag Pole	SY	Cable Stay
BO	Bollard	FW	Foul Water	Tac	Tactile Paving
BrP	Brace Post	GG	Gully Grate	TC	Telecom Cover
BS	Bus Stop	GV	Gas Valve	TH	Trial Pit
BU	Bush	HH	Head Height	THL	Threshold Level
B/W	Barbed Wire Fence	IC	Inspection Cover	TL	Traffic Light
BX	Box (Utilities)	IL	Invert Level	ToW	Top of Wall
C/B	Close Board Fence	I/R	Iron Railings	TP	Telegraph Pole
CH	Cill Height	KO	Kerb Outlet	TS	Traffic Signal Cover
CL	Cover Level	LP	Lamp Post	TV	Cable TV Cover
C/L	Chain Link Fence	MH	Manhole	UB	Universal Beam
C-Lev	Ceiling Level	MP	Marker Post	UC	Unknown Cover
Col	Column	NB	Name Board	UK	Unknown Tree
C/P	Chestnut Paling Fence	OHL	Overhead Line (approx)	UMG	Unmade Ground
CR	Cable Riser	Pan	Panel Fence	USB	Under Side Beam
C/W	Chicken Wire	PB	Post Box	UTL	Unable To Lift
DC	Drainage Channel	PM	Parking Meter	UTS	Unable To Survey
DH	Door Head Height	PO	Post	VP	Vent Pipe
Dil.	Dilapidated	P/R	Post & Rail Fence	WB	Waste Bin
DP	Down Pipe	P/W	Post & Wire Fence	WH	Weep Hole
DR	Drain	P/Wall	Partition Wall	WL	Water Level
EBx	Electric Box	RE	Rodding Eye	WM	Water Meter
EC	Electric Supply Cover	RL	Ridge Level	WO	Wash Out
EL	Eaves Level	RP	Reflector Post	(X.XX)	Floor to Ceiling Height
EP	Electric Pole	RS	Road Sign	(X.XX)F/C	Floor to False Ceiling Ht
				△	Survey Control Station

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	618771.157	246546.877	49.065	PK Nail
ST02	618833.333	246487.064	48.534	Peg & Nail
ST03	618940.927	246457.294	47.970	Peg & Nail
ST04	619062.069	246440.177	46.989	Peg & Nail
ST05	618754.513	246556.119	49.100	Peg & Nail
ST06	618768.901	246701.015	50.030	Peg & Nail
ST07	618774.744	246844.264	50.966	Peg & Nail
ST08	618696.961	246940.177	50.881	Peg & Nail
ST09	618654.958	247054.452	49.663	Peg & Nail
ST10	618667.262	247224.152	45.797	Peg & Nail
ST11	618573.463	247148.686	48.384	Peg & Nail
ST12	618486.569	247082.195	50.090	Peg & Nail
ST13	618514.968	246929.884	51.001	Peg & Nail
ST14	618506.033	246782.241	51.107	Peg & Nail
ST15	618552.795	246638.965	50.001	Peg & Nail
ST16	618631.550	246538.745	48.889	Peg & Nail
ST17	618682.150	247240.537	45.530	PK Nail
ST18	618666.608	247242.629	45.520	PK Nail
ST19	618557.844	247206.556	47.452	PK Nail
ST20	618292.115	247132.807	50.388	PK Nail

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) national grid at a single point using Smartnet, then orientated to grid north with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies any coordinated data used in conjunction with this survey must be derived directly from this control data.

REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

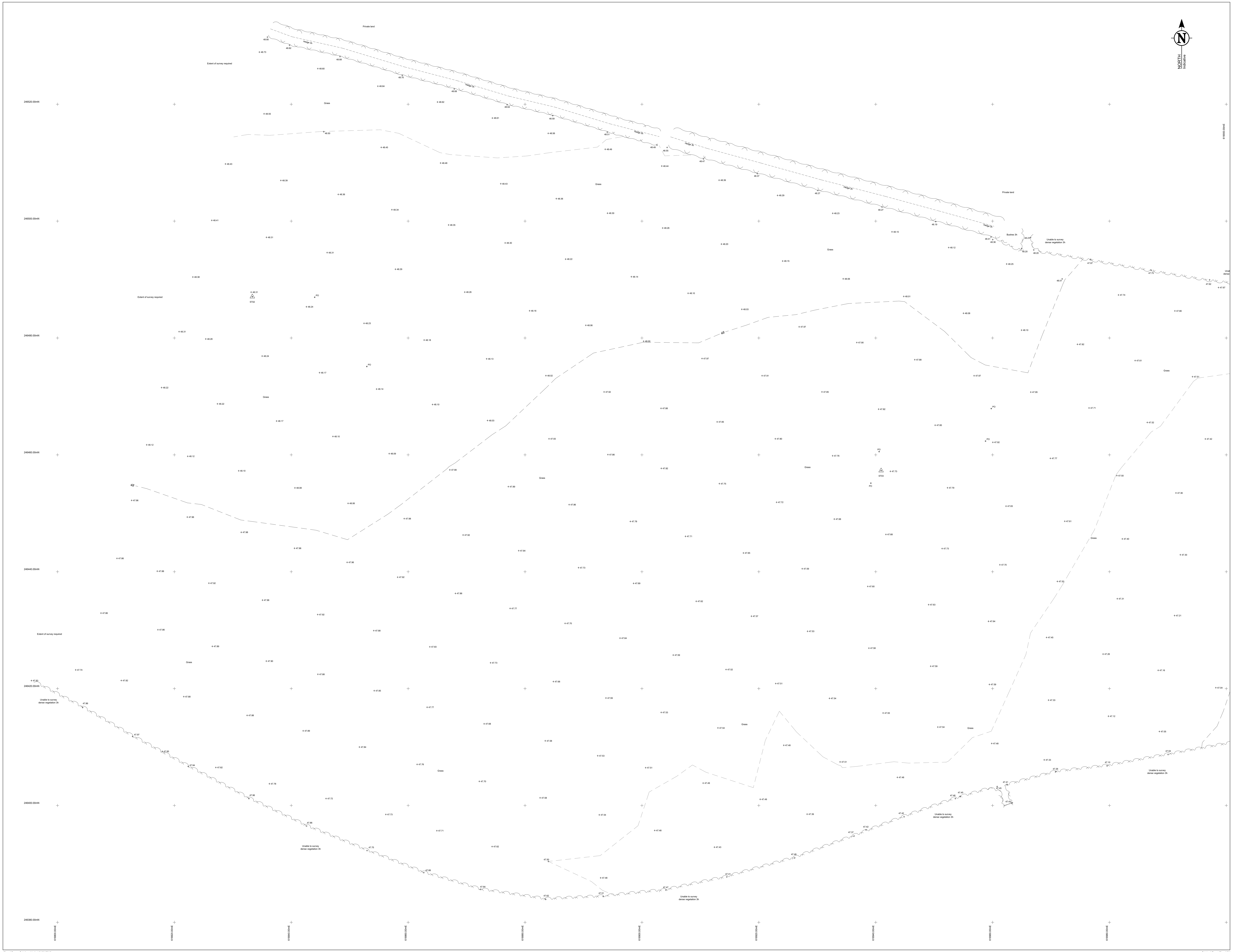
LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 1 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-01			REVISION	ISSUE DATE 11.07.22

Original Sheet Size A0H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

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A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
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AV	Air Valve	FBD	Floor Board Direction	SP	Arch Spring Point Height
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BL	Bed Level	FP	Flag Pole	SY	Cable Stay
BO	Bollard	FW	Foul Water	Tac	Tactile Paving
BrP	Brace Post	GG	Gully Grate	TC	Telecom Cover
BS	Bus Stop	GV	Gas Valve	TH	Trial Pit
BU	Bush	HH	Head Height	THL	Threshold Level
B/W	Barbed Wire Fence	IC	Inspection Cover	TL	Traffic Light
BX	Box (Utilities)	IL	Invert Level	ToW	Top of Wall
C/B	Close Board Fence	I/R	Iron Railings	TP	Telegraph Pole
CH	Cill Height	KO	Kerb Outlet	TS	Traffic Signal Cover
CL	Cover Level	LP	Lamp Post	TV	Cable TV Cover
C/L	Chain Link Fence	MH	Manhole	UB	Universal Beam
C-Lev	Ceiling Level	MP	Marker Post	UC	Unknown Cover
Col	Column	NB	Name Board	UK	Unknown Tree
C/P	Chestnut Paling Fence	OHL	Overhead Line (approx)	UMG	Unmade Ground
CR	Cable Riser	Pan	Panel Fence	USB	Under Side Beam
C/W	Chicken Wire	PB	Post Box	UTL	Unable To Lift
DC	Drainage Channel	PM	Parking Meter	UTS	Unable To Survey
DH	Door Head Height	PO	Post	VP	Vent Pipe
Dil.	Dilapidated	P/R	Post & Rail Fence	WB	Waste Bin
DP	Down Pipe	P/W	Post & Wire Fence	WH	Weep Hole
DR	Drain	P/Wall	Partition Wall	WL	Water Level
EBx	Electric Box	RE	Rodding Eye	WM	Water Meter
EC	Electric Supply Cover	RL	Ridge Level	WO	Wash Out
EL	Eaves Level	RP	Reflector Post	(X.XX)	Floor to Ceiling Height
EP	Electric Pole	RS	Road Sign	(X.XX)F/C	Floor to False Ceiling Ht
				△	Survey Control Station

DRAWING NOTES

Topographical Surveys

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Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

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Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	618771.157	246546.877	49.065	PK Nail
ST02	618833.333	246487.064	48.534	Peg & Nail
ST03	618940.927	246457.294	47.970	Peg & Nail
ST04	619062.069	246440.177	46.989	Peg & Nail
ST05	618754.513	246556.119	49.100	Peg & Nail
ST06	618768.901	246701.015	50.030	Peg & Nail
ST07	618774.744	246844.264	50.966	Peg & Nail
ST08	618696.961	246940.177	50.881	Peg & Nail
ST09	618654.958	247054.452	49.663	Peg & Nail
ST10	618667.262	247224.152	45.797	Peg & Nail
ST11	618573.463	247148.686	48.384	Peg & Nail
ST12	618486.569	247082.195	50.090	Peg & Nail
ST13	618514.968	246929.884	51.001	Peg & Nail
ST14	618506.033	246782.241	51.107	Peg & Nail
ST15	618552.795	246638.965	50.001	Peg & Nail
ST16	618631.550	246538.745	48.889	Peg & Nail
ST17	618682.150	247240.537	45.530	PK Nail
ST18	618666.608	247242.629	45.520	PK Nail
ST19	618557.844	247206.556	47.452	PK Nail
ST20	618292.115	247132.807	50.388	PK Nail

SURVEY GRID AND LEVEL DATUM

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

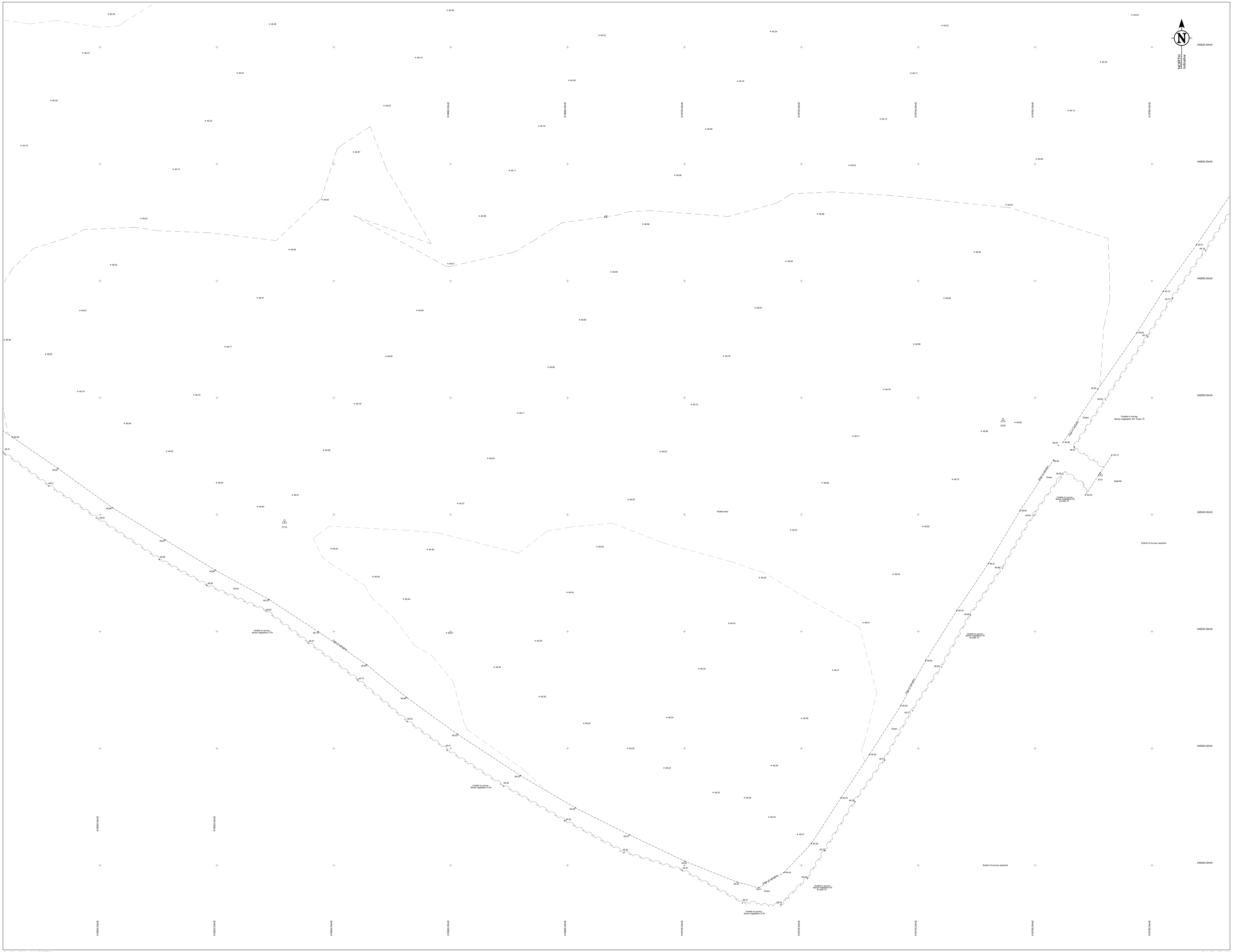
0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 2 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-02				11.07.22



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
AR	Assumed Route	FB	Flower Bed	SI	Sign Post
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B/W	Barbed Wire Fence	IC	Inspection Cover	TL	Traffic Light
BX	Box (Utilities)	IL	Invert Level	ToW	Top of Wall
C/B	Close Board Fence	I/R	Iron Railings	TP	Telegraph Pole
CH	Cill Height	KO	Kerb Outlet	TS	Traffic Signal Cover
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C/L	Chain Link Fence	MH	Manhole	UB	Universal Beam
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C/P	Chestnut Paling Fence	OHL	Overhead Line (approx)	UMG	Unmade Ground
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SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 3 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-03			REVISION	ISSUE DATE 11.07.22

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Original Sheet Size A0H

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 4 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-04			REVISION	ISSUE DATE 11.07.22

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THE SURVEY ASSOCIATION

Original Sheet Size A0H

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

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SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
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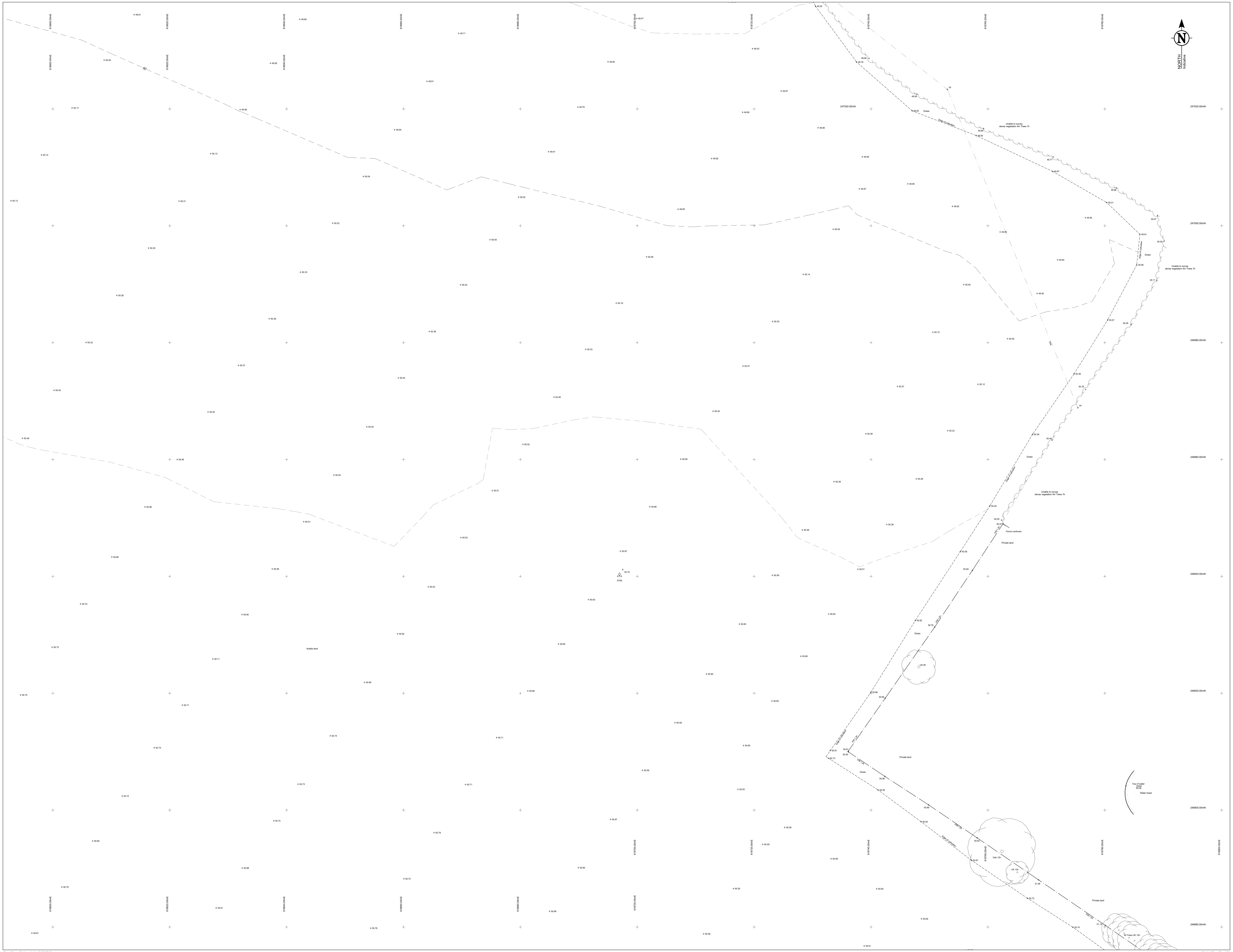
0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 5 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-05			REVISION	ISSUE DATE 11.07.22



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Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	618771.157	246546.877	49.065	PK Nail
ST02	618833.333	246487.064	48.534	Peg & Nail
ST03	618940.927	246457.294	47.970	Peg & Nail
ST04	619062.069	246440.177	46.989	Peg & Nail
ST05	618754.513	246556.119	49.100	Peg & Nail
ST06	618768.901	246701.015	50.030	Peg & Nail
ST07	618774.744	246844.264	50.966	Peg & Nail
ST08	618696.961	246940.177	50.881	Peg & Nail
ST09	618654.958	247054.452	49.663	Peg & Nail
ST10	618667.262	247224.152	45.797	Peg & Nail
ST11	618573.463	247148.686	48.384	Peg & Nail
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ST13	618514.968	246929.884	51.001	Peg & Nail
ST14	618506.033	246782.241	51.107	Peg & Nail
ST15	618552.795	246638.965	50.001	Peg & Nail
ST16	618631.550	246538.745	48.889	Peg & Nail
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ST18	618666.608	247242.629	45.520	PK Nail
ST19	618557.844	247206.556	47.452	PK Nail
ST20	618292.115	247132.807	50.388	PK Nail

SURVEY GRID AND LEVEL DATUM

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

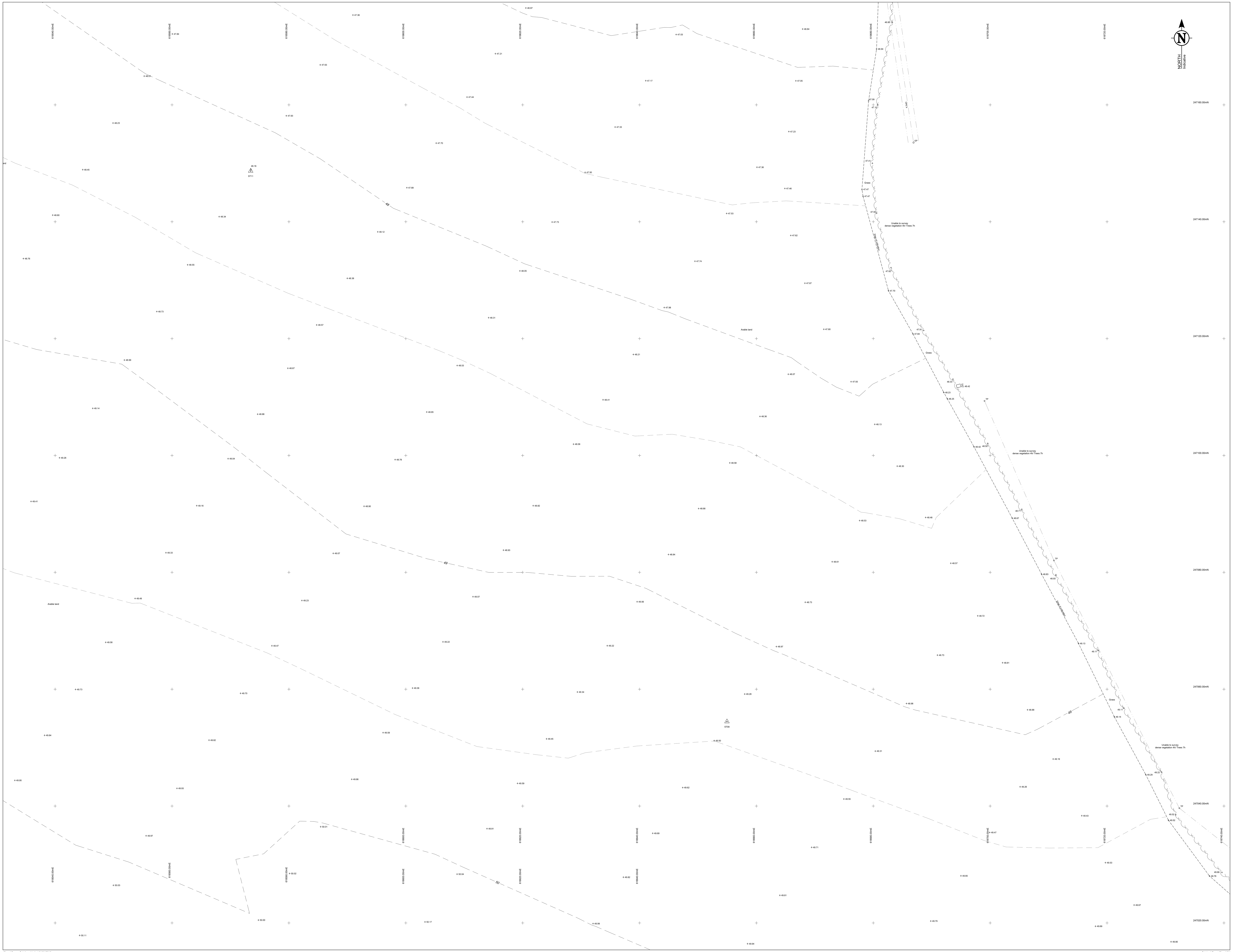
IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 6 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-06				11.07.22

RICS
chartered ices
THE SURVEY ASSOCIATION



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
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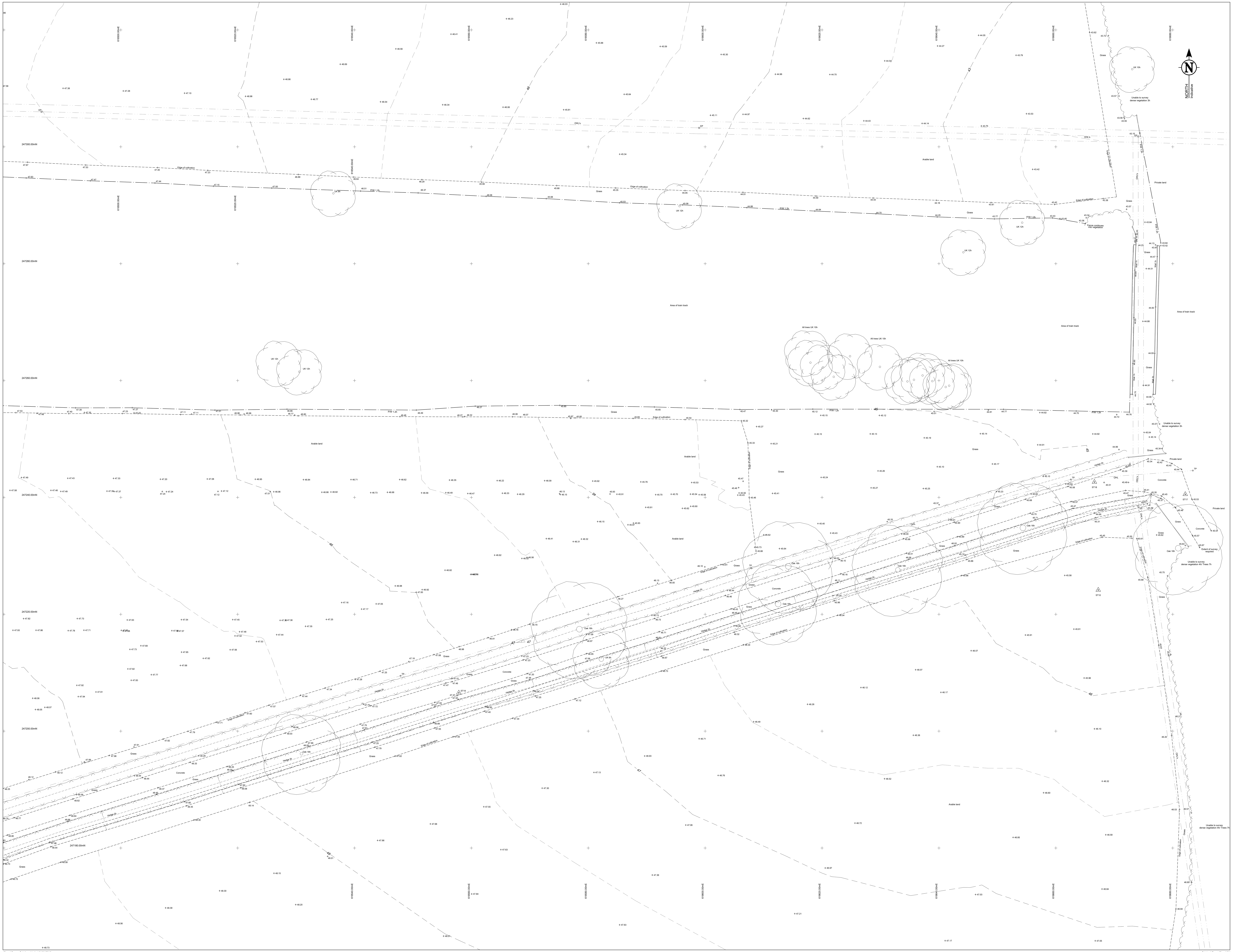
SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 7 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-07			REVISION	ISSUE DATE 11.07.22



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

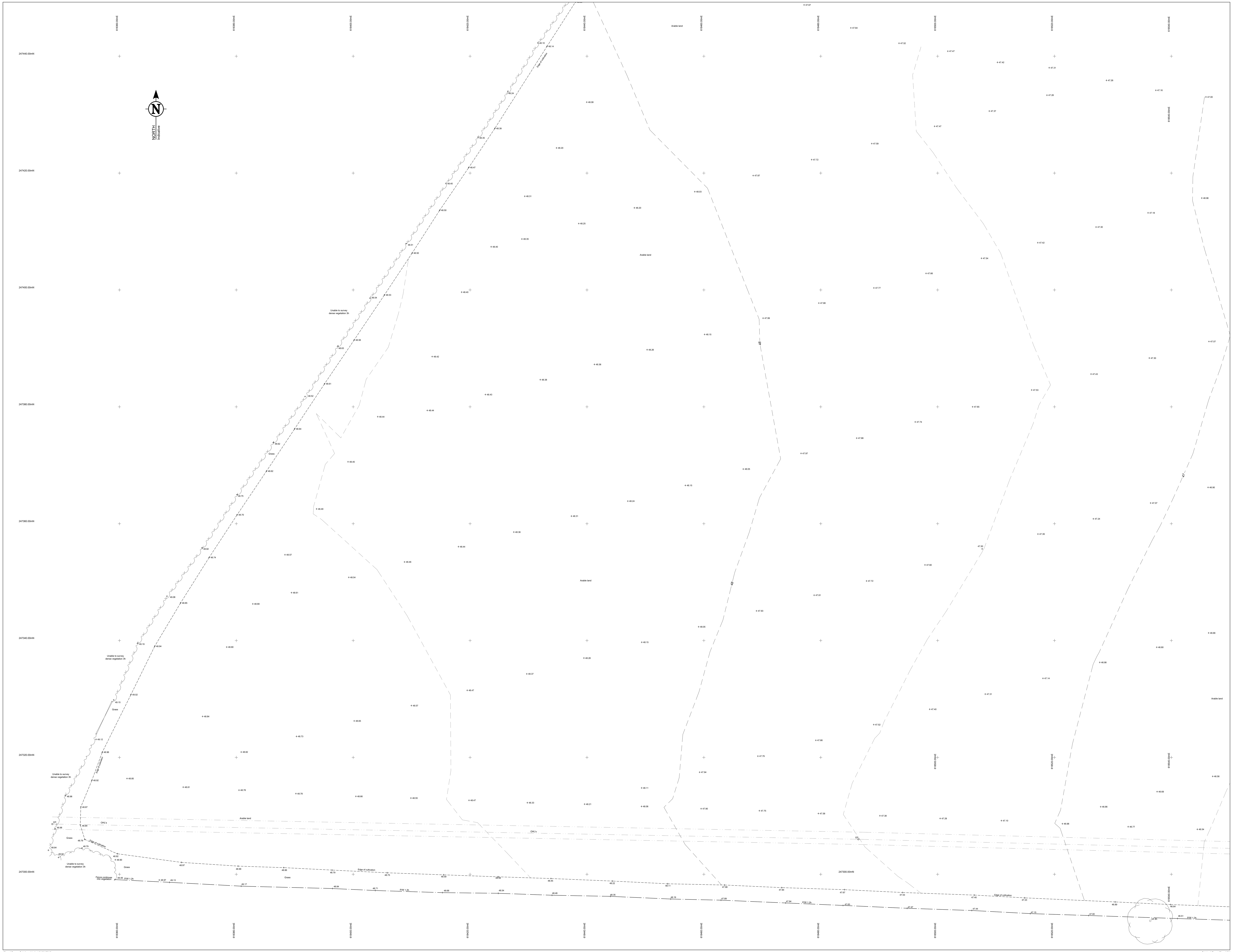
IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 8 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-08				11.07.22

Original Sheet Size A0H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
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0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 9 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-09			REVISION	ISSUE DATE 11.07.22

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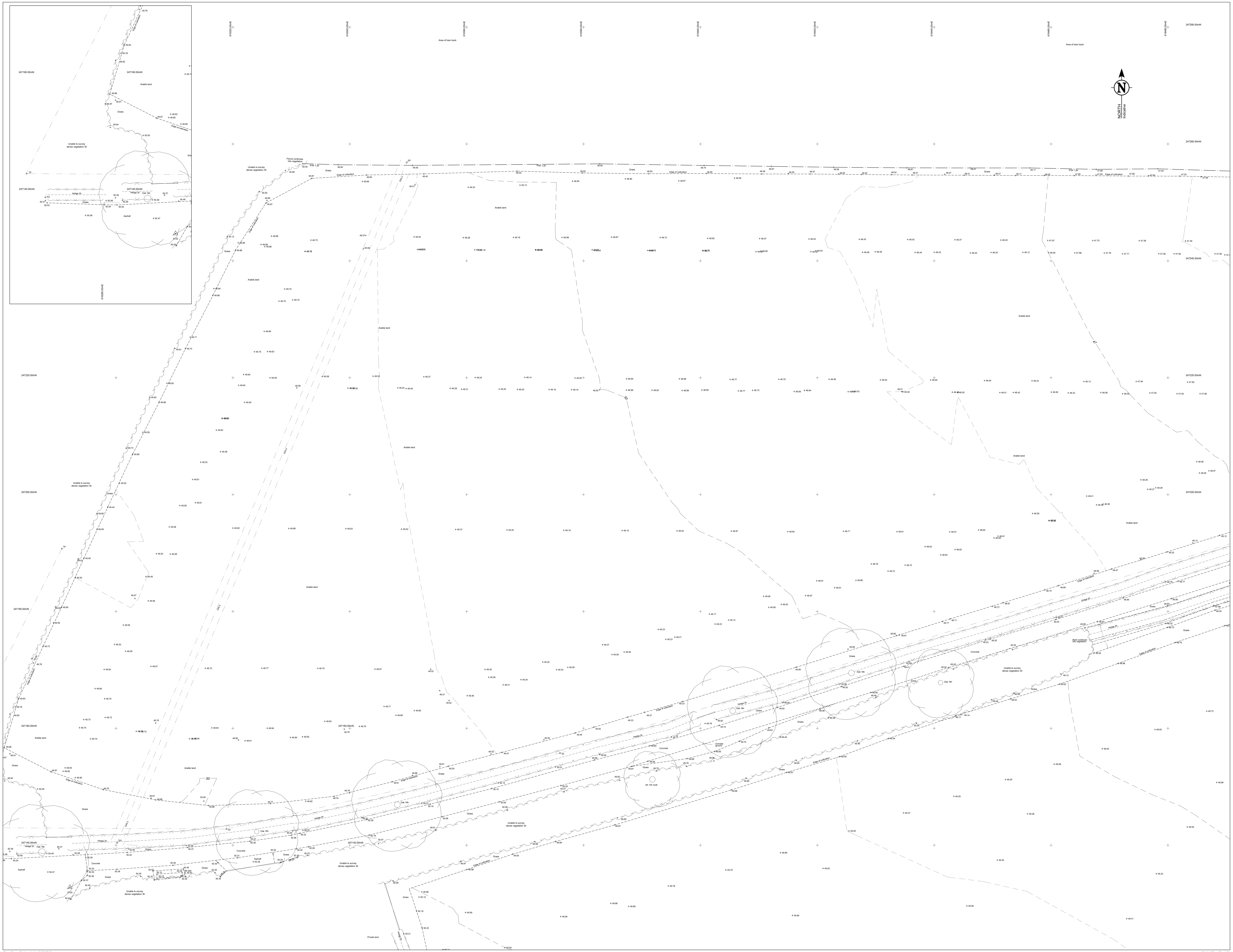

Original Sheet Size A0H

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

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DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

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Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

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Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

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Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	618771.157	246546.877	49.065	PK Nail
ST02	618833.333	246487.064	48.534	Peg & Nail
ST03	618940.927	246457.294	47.970	Peg & Nail
ST04	619062.069	246440.177	46.989	Peg & Nail
ST05	618754.513	246556.119	49.100	Peg & Nail
ST06	618768.901	246701.015	50.030	Peg & Nail
ST07	618774.744	246844.264	50.966	Peg & Nail
ST08	618696.961	246940.177	50.881	Peg & Nail
ST09	618654.958	247054.452	49.663	Peg & Nail
ST10	618667.262	247224.152	45.797	Peg & Nail
ST11	618573.463	247148.686	48.384	Peg & Nail
ST12	618486.569	247082.195	50.090	Peg & Nail
ST13	618514.968	246929.884	51.001	Peg & Nail
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ST15	618552.795	246638.965	50.001	Peg & Nail
ST16	618631.550	246538.745	48.889	Peg & Nail
ST17	618682.150	247240.537	45.530	PK Nail
ST18	618666.608	247242.629	45.520	PK Nail
ST19	618557.844	247206.556	47.452	PK Nail
ST20	618292.115	247132.807	50.388	PK Nail

SURVEY GRID AND LEVEL DATUM

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 10 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-10				11.07.22

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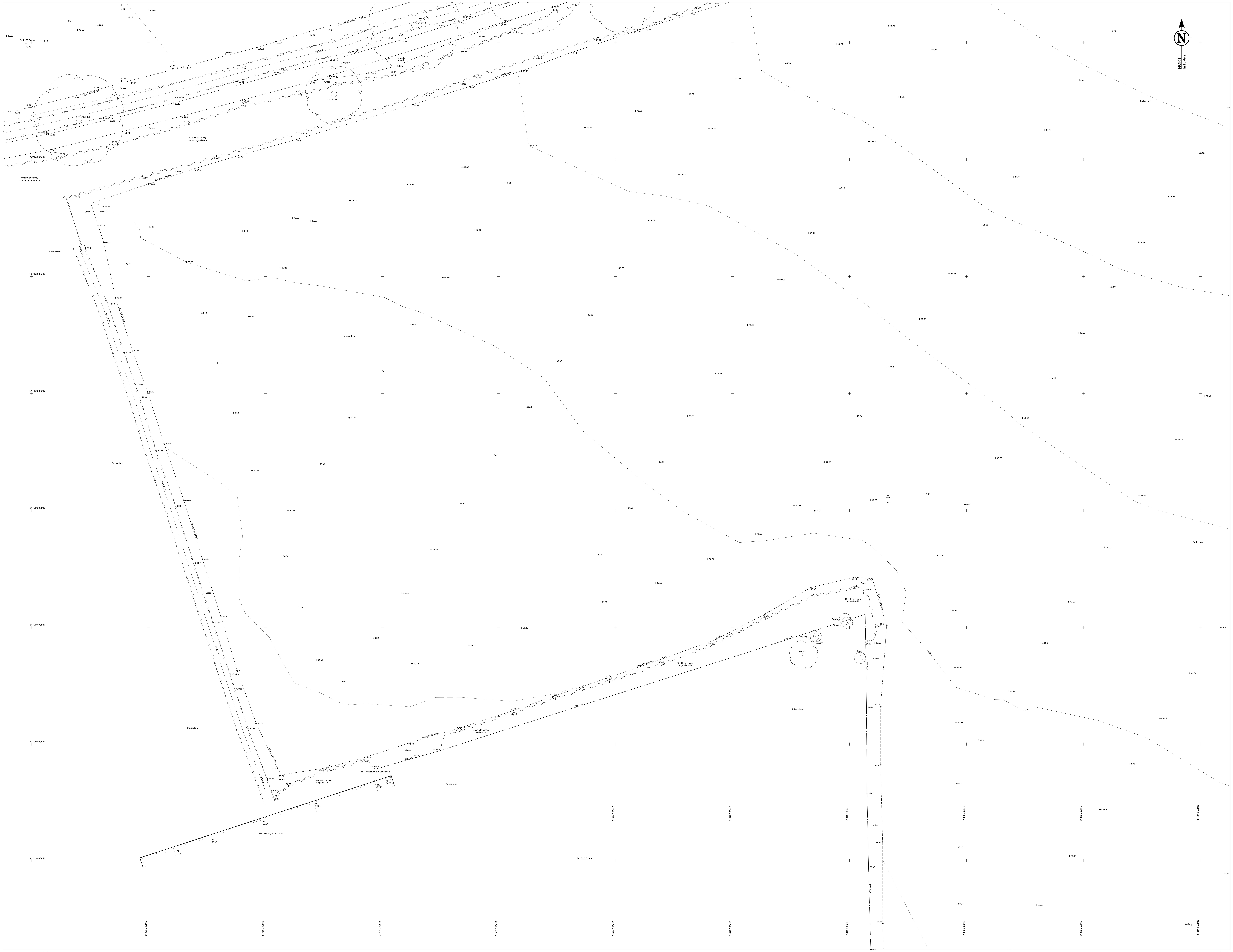

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
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BH	Bore Hole	FL	Floor Level	SW	Surface Water
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BU	Bush	HH	Head Height	THL	Threshold Level
B/W	Barbed Wire Fence	IC	Inspection Cover	TL	Traffic Light
BX	Box (Utilities)	IL	Invert Level	ToW	Top of Wall
C/B	Close Board Fence	I/R	Iron Railings	TP	Telegraph Pole
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DRAWING NOTES

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General

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 11 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-11				11.07.22

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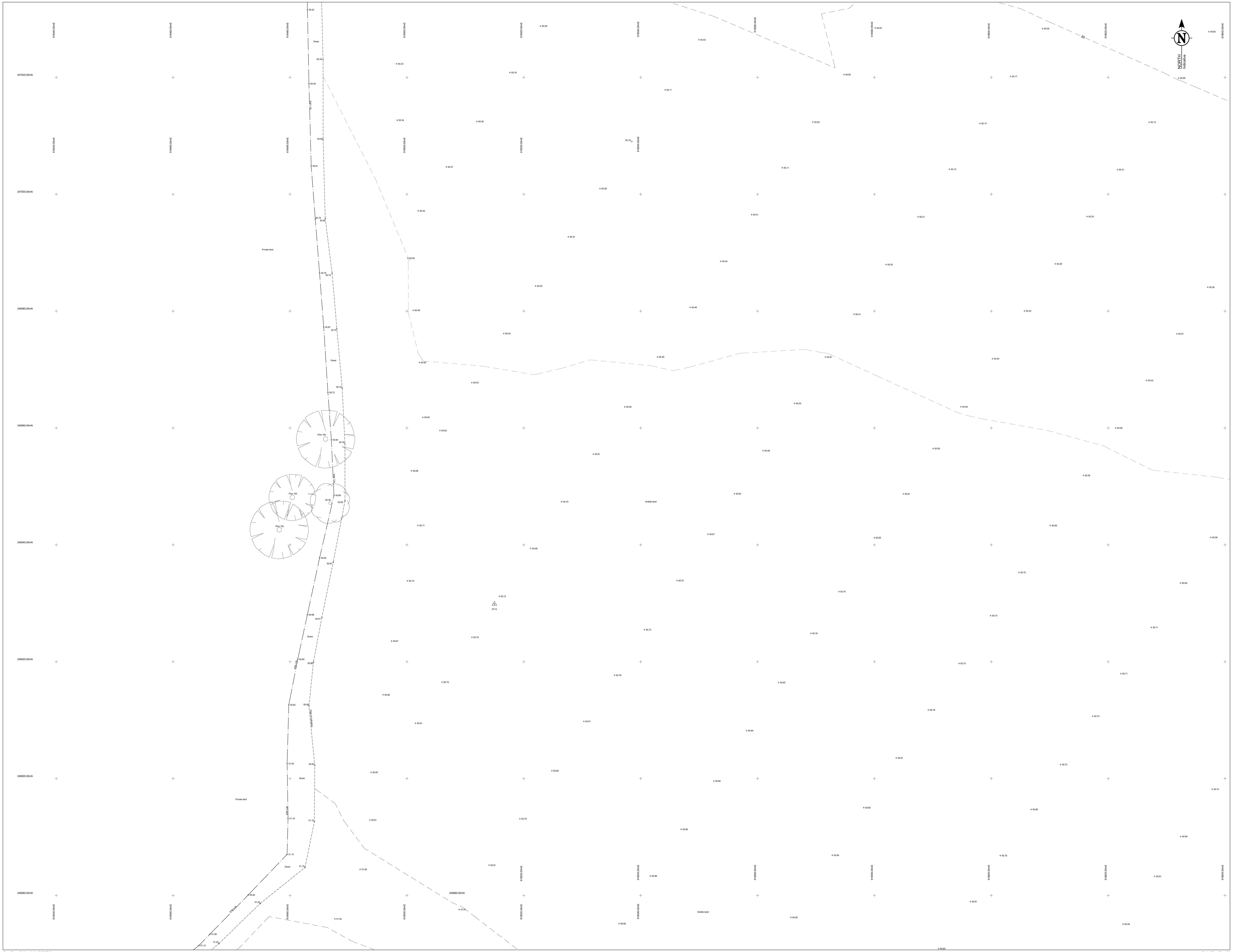
Original Sheet Size A0H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
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CL	Cover Level	LP	Lamp Post	TV	Cable TV Cover
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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

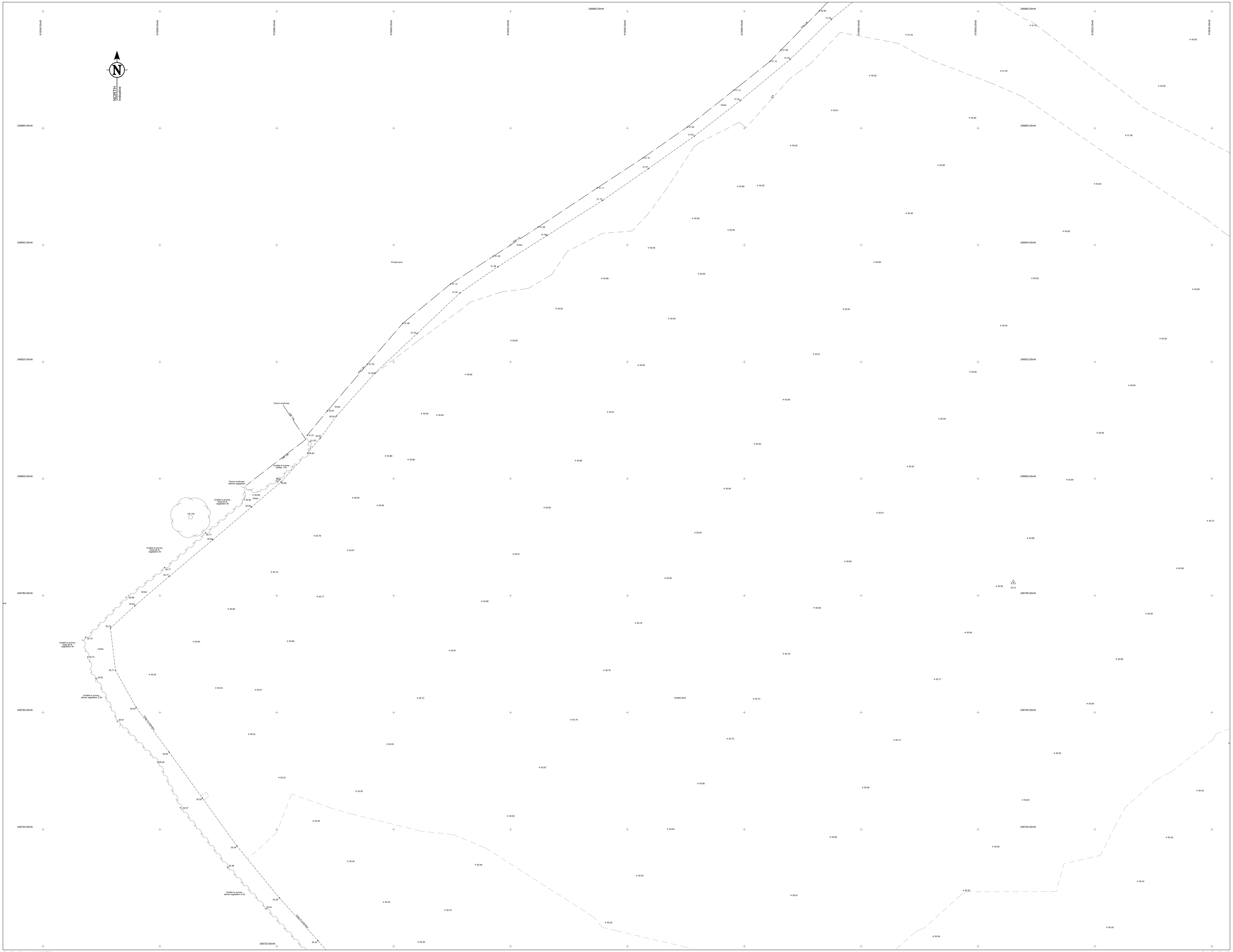
IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 12 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-12				11.07.22

Original Sheet Size A0H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 13 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-13				11.07.22

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

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				△	Survey Control Station

DRAWING NOTES

Topographical Surveys

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General

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Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	618771.157	246546.877	49.065	PK Nail
ST02	618833.333	246487.064	48.534	Peg & Nail
ST03	618940.927	246457.294	47.970	Peg & Nail
ST04	619062.069	246440.177	46.989	Peg & Nail
ST05	618754.513	246556.119	49.100	Peg & Nail
ST06	618768.901	246701.015	50.030	Peg & Nail
ST07	618774.744	246844.264	50.966	Peg & Nail
ST08	618696.961	246940.177	50.881	Peg & Nail
ST09	618654.958	247054.452	49.663	Peg & Nail
ST10	618667.262	247224.152	45.797	Peg & Nail
ST11	618573.463	247148.686	48.384	Peg & Nail
ST12	618486.569	247082.195	50.090	Peg & Nail
ST13	618514.968	246929.884	51.001	Peg & Nail
ST14	618506.033	246782.241	51.107	Peg & Nail
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ST16	618631.550	246538.745	48.889	Peg & Nail
ST17	618682.150	247240.537	45.530	PK Nail
ST18	618666.608	247242.629	45.520	PK Nail
ST19	618557.844	247206.556	47.452	PK Nail
ST20	618292.115	247132.807	50.388	PK Nail

SURVEY GRID AND LEVEL DATUM

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 14 of 18				
CLIENT SAVILLS				SCALE 1:200
SURVEYOR MT/DS	SURVEY DATE 04.07.22	CHECKED BY WHG	APPROVED BY JLH	DWG STATUS FINAL
DRAWING NUMBER 42255IPLS-14			REVISION	ISSUE DATE 11.07.22

RICS chartered ices THE SURVEY ASSOCIATION

Original Sheet Size A0H

NORTH
Indicative

246700.00mN
246680.00mN
246660.00mN
246640.00mN
246620.00mN
246600.00mN
246580.00mN
246560.00mN
246540.00mN
246520.00mN
246500.00mN

618500.00mE
618540.00mE
618580.00mE
618620.00mE
618660.00mE

ST15
ST16

Grass
Arable land
Unable to survey - dense vegetation 2-3h

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
AR	Assumed Route	FB	Flower Bed	SI	Sign Post
AV	Air Valve	FBD	Floor Board Direction	SP	Arch Spring Point Height
BB	Belisha Beacon	FH	Fire Hydrant	SV	Stop Valve
BH	Bore Hole	FL	Floor Level	SW	Surface Water
BL	Bed Level	FP	Flag Pole	SY	Cable Stay
BO	Bollard	FW	Foul Water	Tac	Tactile Paving
BrP	Brace Post	GG	Gully Grate	TC	Telecom Cover
BS	Bus Stop	GV	Gas Valve	TH	Trial Pit
BU	Bush	HH	Head Height	THL	Threshold Level
B/W	Barbed Wire Fence	IC	Inspection Cover	TL	Traffic Light
BX	Box (Utilities)	IL	Invert Level	ToW	Top of Wall
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C/L	Chain Link Fence	MH	Manhole	UB	Universal Beam
C-Lev	Ceiling Level	MP	Marker Post	UC	Unknown Cover
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C/P	Chestnut Paling Fence	OHL	Overhead Line (approx)	UMG	Unmade Ground
CR	Cable Riser	Pan	Panel Fence	USB	Under Side Beam
C/W	Chicken Wire	PB	Post Box	UTL	Unable To Lift
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DP	Down Pipe	P/W	Post & Wire Fence	WH	Weep Hole
DR	Drain	P/Wall	Partition Wall	WL	Water Level
EBx	Electric Box	RE	Rodding Eye	WM	Water Meter
EC	Electric Supply Cover	RL	Ridge Level	WO	Wash Out
EL	Eaves Level	RP	Reflector Post	2.50	Floor to Ceiling Height
EP	Electric Pole	RS	Road Sign	F/C 2.50	Floor to False Ceiling Ht
					Survey Control Station

DRAWING NOTES

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General

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

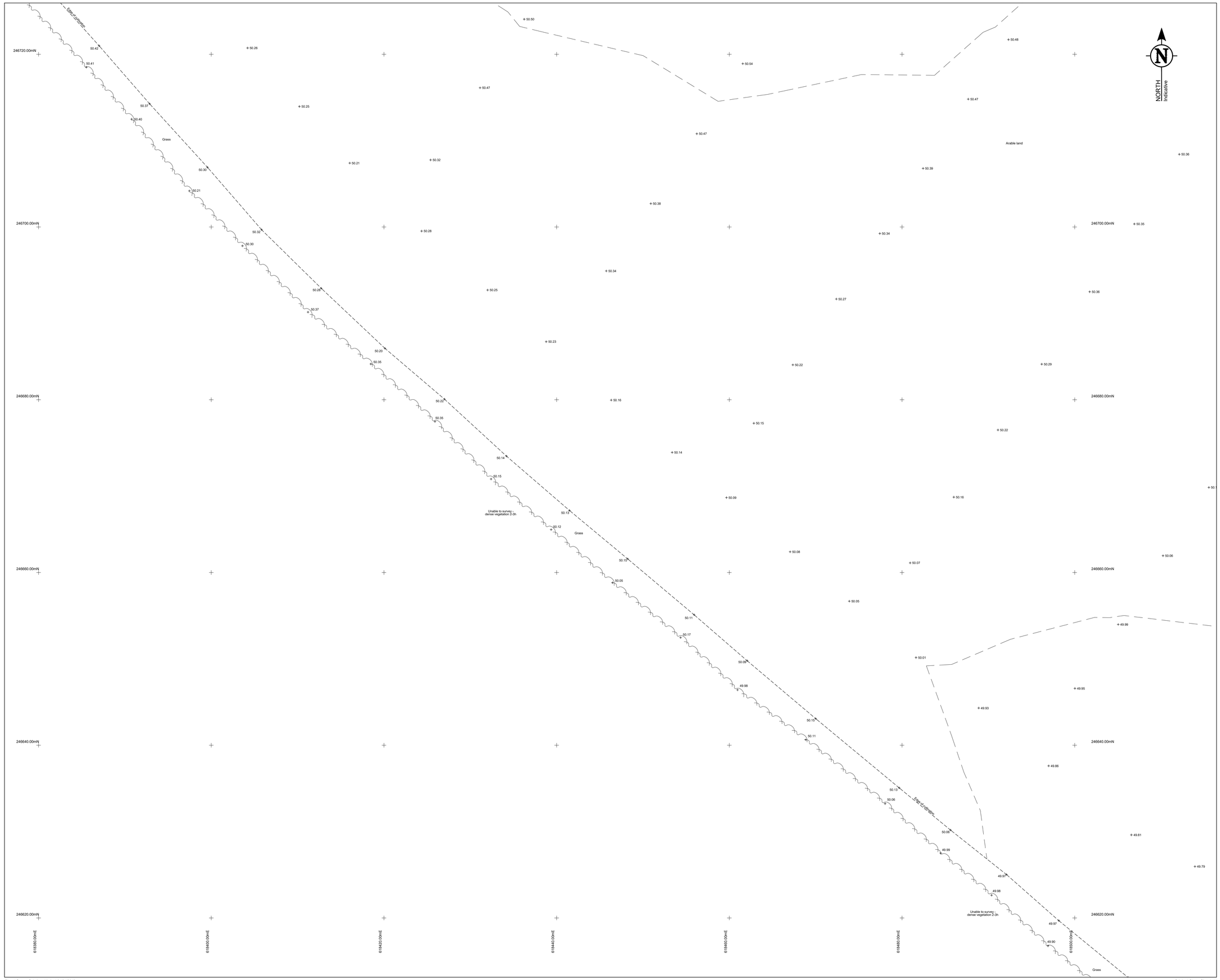
PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 15 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER		REVISION		ISSUE DATE
42255IPLS-15				11.07.22

RICS · chartered ices · THE SURVEY ASSOCIATION

Original Sheet Size A0H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	ER	Earth Rod	RSD	Roller Shutter Door
A/B	Air Brick	ET	EP+Transformer	RSJ	Rolled Steel Joist
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BS	Bus Stop	GV	Gas Valve	TH	Trial Pit
BU	Bush	HH	Head Height	THL	Threshold Level
B/W	Barbed Wire Fence	IC	Inspection Cover	TL	Traffic Light
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C/P	Chestnut Paling Fence	OHL	Overhead Line (approx)	UMG	Unmade Ground
CR	Cable Riser	Pan	Panel Fence	USB	Under Side Beam
C/W	Chicken Wire	PB	Post Box	UTL	Unable To Lift
DC	Drainage Channel	PM	Parking Meter	UTS	Unable To Survey
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Dil.	Dilapidated	P/R	Post & Rail Fence	WB	Waste Bin
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REV	DESCRIPTION	DRAWN	APPR	DATE

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LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

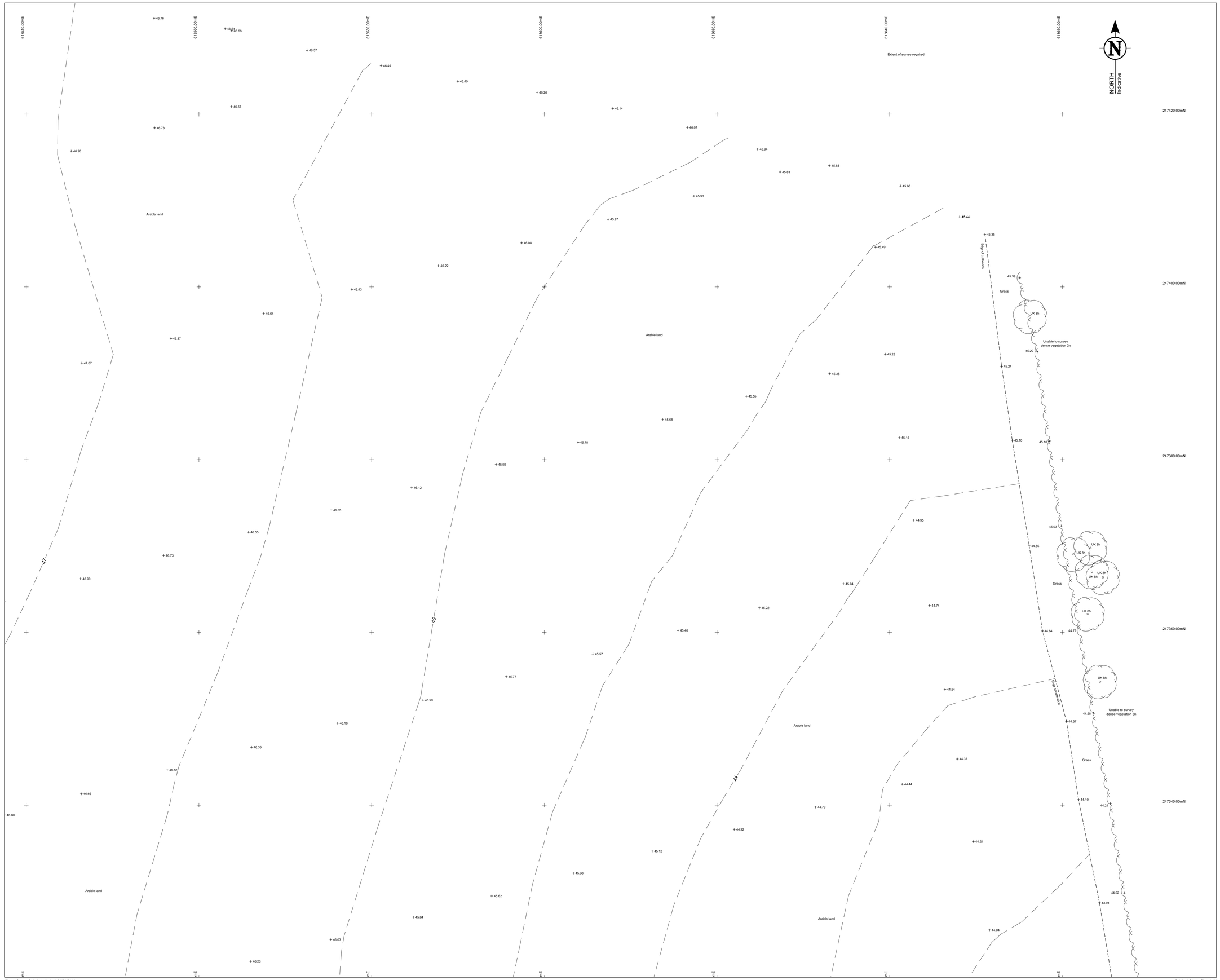
IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
HUMBER DOUCEY LANE, IPSWICH
SUFFOLK, IP4 3PF.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 16 of 18

CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.02.22	WHG	JLH	FINAL
DRAWING NUMBER		REVISION		ISSUE DATE
42255IPLS-16				11.07.22

Original Sheet Size A1H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

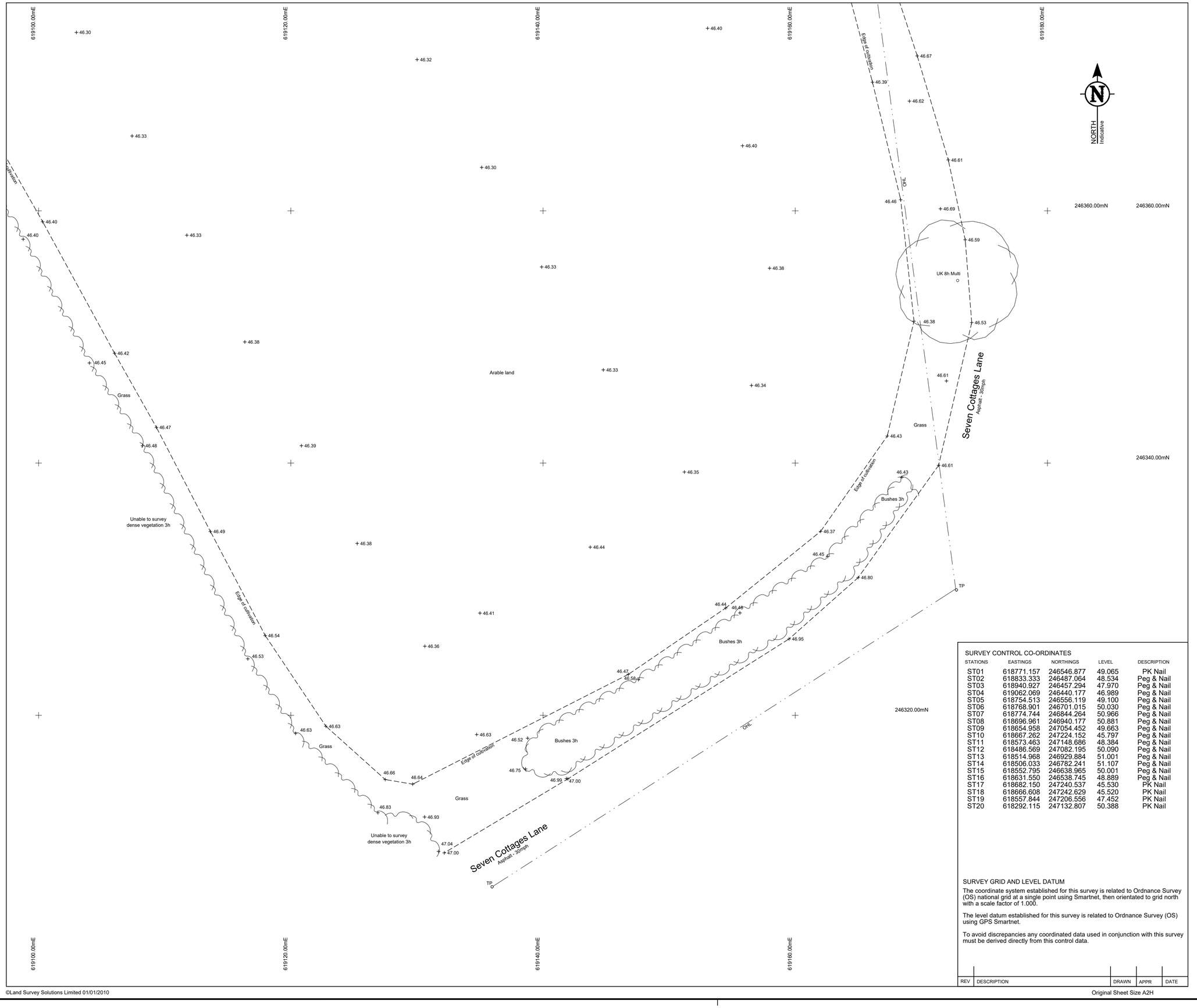
0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE: HUMBER DOUCEY LANE, IPSWICH SUFFOLK, IP4 3PF.				
DRAWING DETAIL: TOPOGRAPHICAL SURVEY Sheet 17 of 18				
CLIENT: SAVILLS				SCALE: 1:200
SURVEYOR: MT/DS	SURVEY DATE: 04.02.22	CHECKED BY: WHG	APPROVED BY: JLH	DWG STATUS: FINAL
DRAWING NUMBER: 42255IPLS-17			REVISION	ISSUE DATE: 11.07.22

RICS chartered ices THE SURVEY ASSOCIATION

Original Sheet Size A1H



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

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C/W	Chicken Wire	PB	Post Box	UTL	Unable To Lift
DC	Drainage Channel	PM	Parking Meter	UTS	Unable To Survey
DH	Door Head Height	PO	Post	VP	Vent Pipe
Dil.	Dilapidated	P/R	Post & Rail Fence	WB	Waste Bin
DP	Down Pipe	P/W	Post & Wire Fence	WH	Weep Hole
DR	Drain	P/Wall	Partition Wall	WL	Water Level
EBx	Electric Box	RE	Rodding Eye	WM	Water Meter
EC	Electric Supply Cover	RL	Ridge Level	WO	Wash Out
EL	Eaves Level	RP	Reflector Post	2.10	Floor to Ceiling Height
EP	Electric Pole	RS	Road Sign	2.10 F/C	Floor to False Ceiling Ht
					Survey Control Station

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

Do not scale from this drawing.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	618771.157	246546.877	49.065	PK Nail
ST02	618833.333	246487.064	48.534	Peg & Nail
ST03	618940.927	246457.294	47.970	Peg & Nail
ST04	619062.069	246440.177	46.989	Peg & Nail
ST05	618754.513	246556.119	49.100	Peg & Nail
ST06	618768.901	246701.015	50.030	Peg & Nail
ST07	618774.744	246844.264	50.966	Peg & Nail
ST08	618696.961	246940.177	50.881	Peg & Nail
ST09	618654.958	247054.452	49.663	Peg & Nail
ST10	618667.262	247224.152	45.797	Peg & Nail
ST11	618573.463	247148.686	48.384	Peg & Nail
ST12	618486.569	247082.195	50.090	Peg & Nail
ST13	618514.968	246929.884	51.001	Peg & Nail
ST14	618506.033	246782.241	51.107	Peg & Nail
ST15	618552.795	246638.965	50.001	Peg & Nail
ST16	618631.550	246538.745	48.889	Peg & Nail
ST17	618682.150	247240.537	45.530	PK Nail
ST18	618666.608	247242.629	45.520	PK Nail
ST19	618557.844	247206.556	47.452	PK Nail
ST20	618292.115	247132.807	50.388	PK Nail

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) national grid at a single point using Smartnet, then orientated to grid north with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies any coordinated data used in conjunction with this survey must be derived directly from this control data.

REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE				
HUMBER DOUCEY LANE, IPSWICH, SUFFOLK, IP4 3PF.				
DRAWING DETAIL				
TOPOGRAPHICAL SURVEY Sheet 18 of 18				
CLIENT				SCALE
SAVILLS				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
MT/DS	04.07.22	WHG	JLH	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
42255IPLS-18				11.07.22

RICS chartered ices THE SURVEY ASSOCIATION

Original Sheet Size A2H