

PLANNING APPLICATION FOR A RENEWABLE ENERGY SCHEME COMPRISING GROUND MOUNTED PHOTOVOLTAICS

FLOOD RISK ASSESSMENT

**LAND AT PELHAM SPRING (MAGGOTS END), BISHOP'S
STORTFORD, UTTLESFORD**

ON BEHALF OF LOW CARBON SOLAR PARK 6 LIMITED



Pegasus Group

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DESIGN **ENVIRONMENT** **PLANNING** **ECONOMICS** **HERITAGE**

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1. INTRODUCTION

Background

- 1.1 Pegasus Planning Group Ltd has been appointed by Low Carbon Solar Park 6 Limited (herein referred to as “the Applicant”) to undertake a Flood Risk Assessment (FRA) for a proposed solar energy scheme at land at Maggots End, Bishop’s Stortford, Uttlesford.
- 1.2 This assessment considers the risks of all types of flooding to the site including tidal, fluvial, surface, historic, groundwater, sewer and artificial sources. It also includes a drainage strategy to manage surface water runoff, no foul water will be produced by the development.

National and Local Policies

- 1.3 The National Planning Policy Framework (NPPF) states that a site-specific Flood Risk Assessment will be required for proposals:
- a) that are greater than 1 hectare in area within Flood Zone 1;
 - b) for all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3;
 - c) in an area within Flood Zone 1 which has critical drainage problems; and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.
 - d) in an area within Flood Zone 1 identified in a Strategic Flood Risk Assessment as being at increased flood risk in the future.
 - e) in an area in Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.
- 1.4 The site is located within Flood Zone 1 and is larger than 1ha. therefore, it requires an FRA in accordance with NPPF.
- 1.5 As of April 2015, the legislation for dealing with FRAs changed, with additional emphasis put on the use of Sustainable Drainage Systems (SuDS) within drainage schemes for new developments.

- 1.6 In February 2016, the Environment Agency (EA) introduced new guidance relating to climate change allowance, which has increased the percentage rate of change applied to the 1 in 100 year event scenario.
- 1.7 As such, any new application will require a surface water drainage scheme submitted to accompany all planning applications and will be required to demonstrate the use of SuDS within the design and should be in line with the requirements as set out within the National Planning Policy Framework Technical Guidance (NPPFTG).
- 1.8 The following report has been based on information and requirements derived from NPPF, NPPFTG, the British Geological Survey (BGS), the EA planning maps.
- 1.9 This assessment has also reviewed the requirements of the Uttlesford District Council Level 1 Strategic Flood Risk Assessment (SFRA) dated May 2016.

Strategic Flood Risk Assessment

- 1.10 JBA Consulting undertook a Level 1 Strategic Flood Risk Assessment (SFRA) in May 2016 on behalf of Uttlesford District Council. This SFRA was produced as an update to an existing out-dated SFRA from March 2008.
- 1.11 This report is used to inform any site within the catchment area that requires a site-specific FRA.
- 1.12 The main purpose of the SFRA is:

The Planning Practice Guidance advocates a tiered approach to risk assessment and identifies the following two levels of SFRA

Level 1: where flooding is not a major issue and where development pressures are low. The assessment should be sufficiently detailed to allow application of the Sequential Test.

Level 2: where land outside Flood Zone 2 and 3 cannot appropriately accommodate all the necessary development creating the need to apply the NPPF's Exception Test. In these circumstances the assessment should consider the detailed nature of the flood characteristics within a Flood Zone.

This updated SFRA is a Level 1 SRFA with the aim of providing guidance to planning and developers on flood risk and to enable the application of the Sequential Test.

In preparing its Local Plan, the Council is considering a number of Areas of Search. These consist of nine new settlement Areas of Search, three urban extension Areas of Search (Saffron Walden, Great Dunmow, Bishop's Stortford), and Areas of Search covering the key villages. They are also considering Areas of Search for each of the smaller 'Type A' villages (villages with primary schools).

1.13 The key objectives of the 2016 SFRA are:

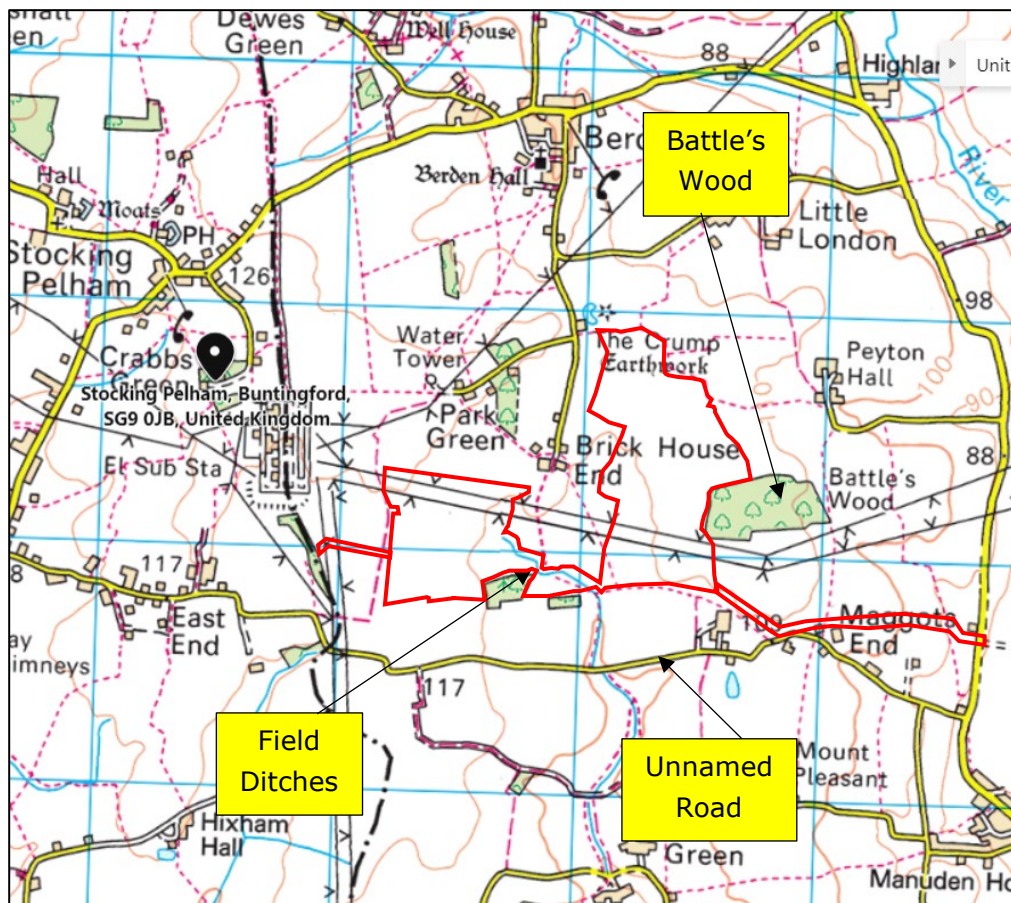
- Critically review and update the 2008 SFRA, taking into account the latest flood risk information and any updates to legislation and policy;*
- Provide an individual flood risk analysis of the Areas of Search identified within the district as part of the Local Plan preparation;*
- Provide mapping showing the Flood Zones for planning and flood risk from other sources in accordance with the provision of national flood risk guidance.*

2. EXISTING SITE AND HYDROLOGY

Site Location & Existing Conditions

- 2.1 The site area is approximately 76.39 Ha in overall size and is entirely greenfield.
- 2.2 The site consists of various agricultural fields and is accessed from an existing carriageway to the south of the site which links East End to Maggots End.
- 2.3 The site has existing various field ditches running within the southern part of the site.
- 2.4 Approximate site co-ordinates are E: 547095; N: 227872, with the nearest post code CM23 1AZ. The site is located off an unnamed road running through Maggots End, Bishop's Stortford, Uttlesford.
- 2.5 The Environment Agency flood map shows the entire site as lying entirely within Flood Zone 1 (<1:1000 year probability of flooding).
- 2.6 A copy of the EA flood map can be found at Section 5 of this report.

Figure 2.1 – Site Location



2.7 A topographical survey has been produced by Anthony Brookes Surveys Ltd (dated March 2021) it shows the site as typically falling from north to south and generally in the direction of the existing field ditches throughout the site. A copy of the topographical survey can be found in **Appendix A**.

Existing Drainage and Hydrology

2.8 A few existing field ditches lie within the southern part of the site and flow in a southerly direction and are assumed to flow into the Bourne Brook further south past the site boundary.

2.9 There are no known existing sewer system networks within the vicinity of the site, however, public sewer records have not been requested at this stage.

2.10 Geological data held by the British Geological Survey (BGS) indicates that the bedrock geology underlying the site is "Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated) - Chalk"

2.11 The Soilscape soils data shows the site as both "Lime-rich loamy and clayey soils with impeded drainage – slightly impeded drainage"

3. PROPOSED DEVELOPMENT

- 3.1 It is proposed to develop the site to consist of the construction, operation, maintenance and decommissioning of a ground mounted solar park. Further details of the proposal and the technology used are provided separately as part of the planning application.
- 3.2 The development will consist of mounted solar panel modules, substations, battery stations, access roads and a transformer compound.
- 3.3 The existing site area is entirely 'greenfield' development with areas of trees and vegetation along the perimeter boundaries, therefore the majority of the site is considered to be permeable. The nature of the proposals consists of mainly solar panel modules which are raised off the ground, therefore not creating any impermeable areas. The only areas of impermeable nature will be the new access roads, substation/power station units and transformer compound.
- 3.4 The site is to be accessed from an existing carriageway to the south of the development that links East End to Maggots End.
- 3.5 A copy of the proposed site layout can be found at **Appendix B**.

4. DEVELOPMENT VULNERABILITY AND FLOOD ZONE CLASSIFICATION

National Planning Policy Framework (NPPF)

- 4.1 Local Planning Authorities, (LPA) have a statutory obligation to consult the Environment Agency, (EA) on all applications in flood risk zones. The EA will consider the effects of flood risk in accordance with the NPPF.
- 4.2 NPPF requires that, as part of the planning process:
- A 'site specific' Flood Risk Assessment will be undertaken for any site that has a flood risk potential.
 - Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' land uses.
 - Sustainable drainage systems are used for surface water disposal where practical.
 - Flood risk is managed through the use of flood resilient and resistant techniques.
 - Residual risk is identified and safely managed.
- 4.3 Table 1 of NPPF, categorises flood zones into:
- Zone 1- Low probability (< 1 in 1000 years)
 - Zone 2- Medium probability (1 in 1000 - 1 in 100 years)
 - Zone 3a- High probability (> 1 in 100 years)
 - Zone 3b- The functional floodplain (>1 in 20 years)
- 4.4 The NPPF sets out a matrix indicating the types of development that are acceptable in different Flood Zones (see Table 4.1). The proposed development is a solar farm and is located entirely in Flood Zone 1 and therefore, development in this area is considered appropriate.

4.5 NPPF also categorises types of development into Flood Risk Vulnerability groups (FRVG). NPPF does not specifically categorise solar farms into a FRVG, however, given the type of development and that no personnel are present at the site it is fair to conclude that the development can be classified as 'less vulnerable'.

Table 4.1 – NPPF Guidance

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	✗	Exception Test Required	Exception Test Required	✓
Zone 3b	Exception Test Required	✗	✗	✗	✓

Sequential test

4.6 The development lies within Flood Zone 1 therefore the sequential test is deemed to have been passed.

Exception Test

4.7 In accordance with the NPPF guidance the exception test is not required.

5. SITE SPECIFIC FLOODING ISSUES AND EXISTING FLOOD RECORDS

5.1 Local Planning Authorities, (LPA) have a statutory obligation to consult the Environment Agency, (EA) on all applications in flood risk zones. The EA will consider the effects of flood risk in accordance with the NPPF.

National Planning Policy Framework (NPPF)

5.2 In accordance with the National Planning Policy Framework, this Flood Risk Assessment considers all sources of flooding including:

- a) Tidal Flooding – from sea;
- b) Fluvial Flooding – from rivers and streams;
- c) Pluvial Flooding – overland surface water flow and exceedance;
- d) Historic flooding – known historic flooding issues;
- e) Groundwater flooding – from elevated groundwater levels or springs;
- f) Flooding from sewers – exceedance flows from existing sewer systems; and
- g) Artificial sources – reservoirs, canals etc.

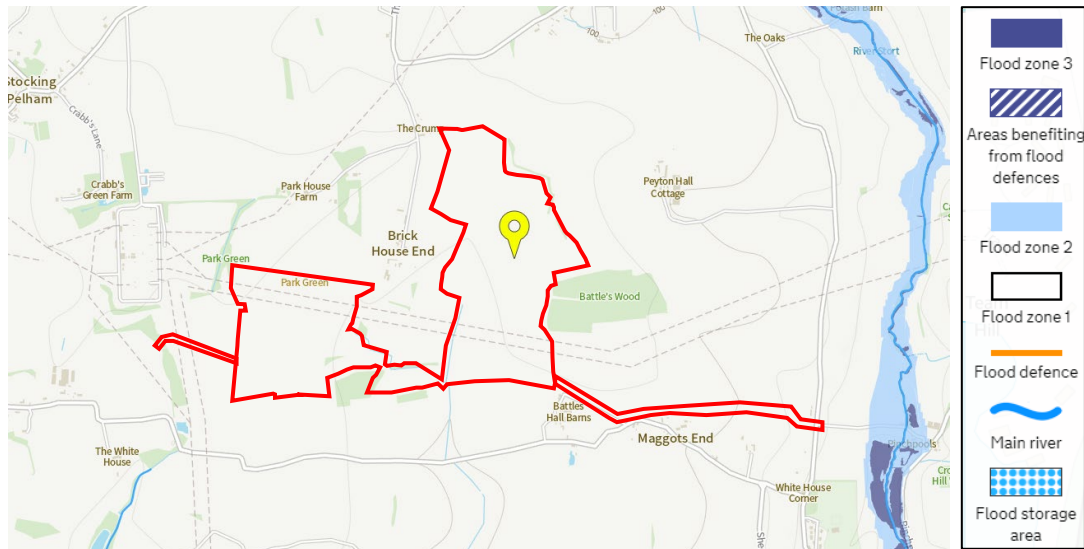
Tidal Flooding

5.3 The Environment Agency website provides basic flood mapping data as a general guide to whether a site is at risk of flooding from various sources including rivers and seas for Flood Zoning classification.

5.4 This mapping (Figure 5.1) indicates that the site is located entirely within Flood Zone 1, an area with a low probability of flooding occurring (<1:1000 yr).

5.5 Given the above the risk to the site from this source of flooding is considered to be **Very Low.**

Figure 5.1 – Environment Agency Flood Map



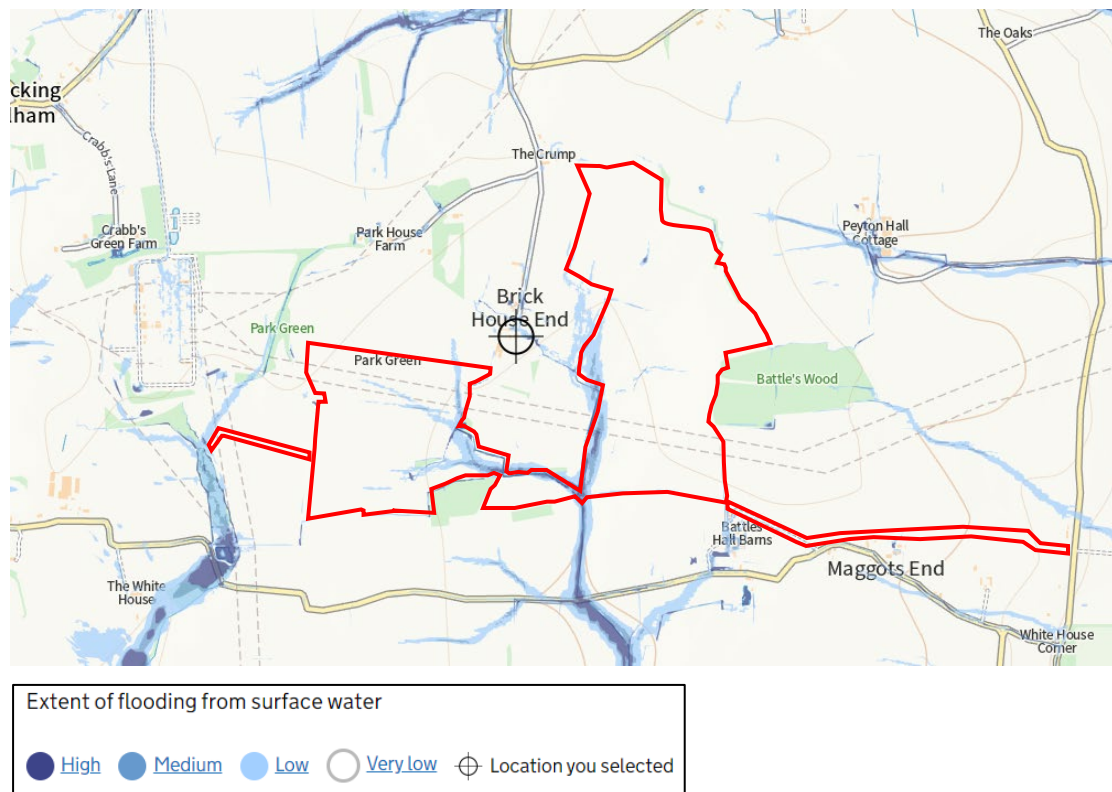
Fluvial Flooding

- 5.6 The site is entirely located within Flood Zone 1, an area with a low probability of flooding occurring (<1:1000 yr).
- 5.7 Given the above, Fluvial Flood risk to the site is considered to be **Very Low**.

Pluvial Flooding

- 5.8 The Surface Water (Pluvial) Flood Map (Figure 5.2) indicates that the majority of the site is at a very low risk from surface water flooding. There are some areas of high and medium risk indicated where the field drain ditch is located through the southern part of the site and where various low spots have occurred within the fields.

Figure 5.2 – Environment Agency Surface Flooding Map



5.9 The maps show the flood depths to be between 0 – 0.3m and 0.3 – 0.9m. During the proposed surface water drainage design, these areas can be picked up and redesigned so as to accommodate any existing overland flows and potential surface water flows using sustainable drainage techniques and positive drainage techniques where applicable.

5.10 Therefore, the development is considered to be at **Low** risk of flooding from surface water flows.

Historic Flooding

5.11 The SFRA lists the sources of historic flood risk as flows:

There is a reasonably good record of historical flooding within the District. The region is prone to localised flooding, with the main source of flooding from fluvial and surface water sources. Within recent years the February 2014 and October 2001 events have been the most serious, leading to widespread flooding across the District.

- 5.12 The SFRA provides a summary of the areas affected by major flood events:
- 10th November 1875: Saffron Walden.
 - 5th August 1917: Saffron Walden.
 - 19th September 1960: Saffron Walden.
 - Summer 1987: Ashdon.
 - October 2001: Clavering, Manuden, Stansted, Mountfitchet, Great Chesterford, Littlebury, Newport, Saffron Walden, Little Walden, Great Dunmow, Ashdon.
 - January 2003: Widespread across district.
 - 14th June 2007: Ashdon.
 - 7th February 2014: Saffron Walden, Newport, Wendens, Ambo, Debden, Stansted, Arkesden, Ashdon, Quendon, Henham, Stansted, Mountfitchet.
 - 23rd November 2014: Clavering, Berden, Manuden, Wimbish
- 5.13 It should be noted that from the above the site and surrounding area have not been indicated to have any historic flooding problems.
- 5.14 It is therefore considered that historic flooding at this site is **Very Low**.

Groundwater Flooding

- 5.15 The SFRA provides mapping that shows the risk from groundwater within the site extents as <25% and >=50% <75%.
- 5.16 The soilscape website describes the soil information for the area as 'slightly impeded drainage'.
- 5.17 There are no known reports of flooding at this site occurring from groundwater.
- 5.18 The risk of flooding from groundwater at this stage is considered to be **Low**.

Flooding from Sewers

Flooding from Adopted Sewers

5.19 The site is within open fields and no known flooding from this source is known to have been reported/recorded in the area.

Flooding from Private Drainage

5.20 Due to the topography of the surrounding area any flood water from the development would follow the natural gradient towards the field drain ditches.

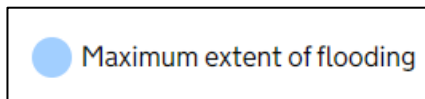
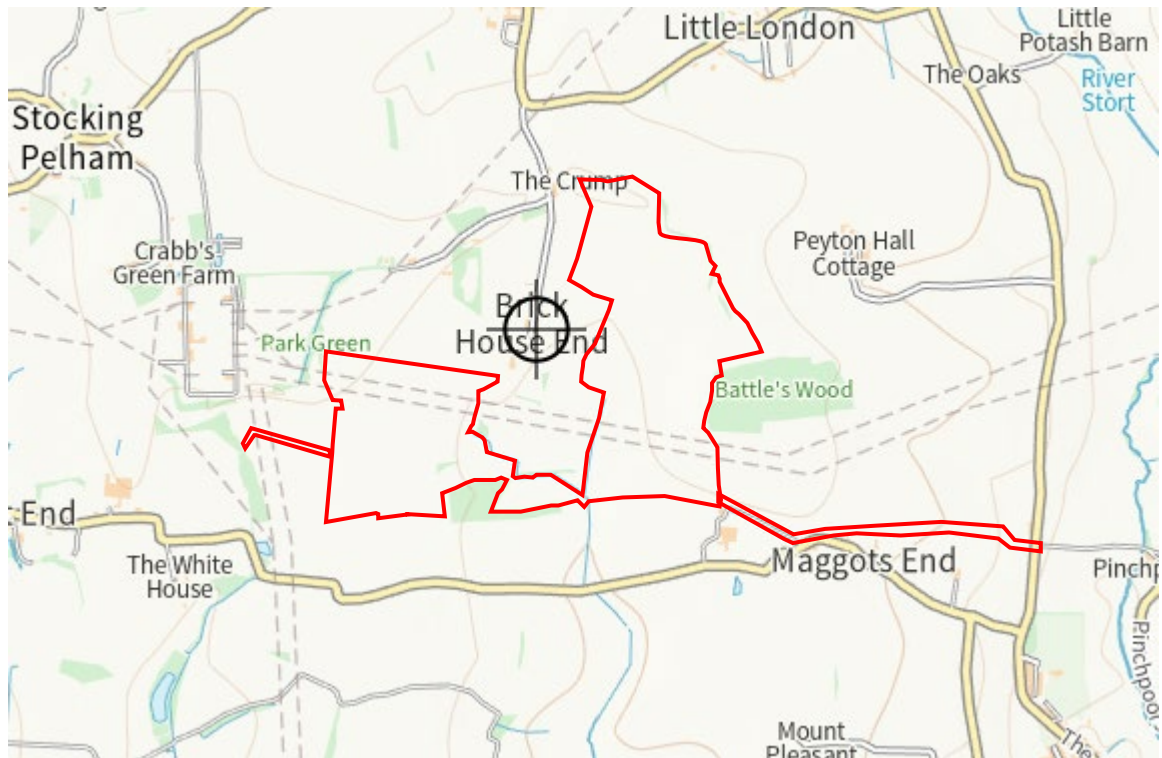
5.21 Therefore, the risk of sewer flooding to the site is therefore considered to be **Very Low**.

Flooding from Artificial Sources

5.22 From the EA map in Figure 5.3, it can be seen that there is a no risk from reservoirs flooding to the site.

5.23 Given the above the risk of flooding is from this source is considered to be **Very Low**.

Figure 5.3 – Environment Agency Flooding from Reservoir Map



Post Development Residual Flood Risk Summary

5.24 The risk of flooding is summarised in Table 5.1:

Table 5.1 – Flood Risk to the site from all sources

Flood Source	Flood Risk	Mitigation/Comments
Tidal	Very Low	<ul style="list-style-type: none"> The site is entirely in Flood Zone 1 and is currently not at risk from Tidal Flooding.
Fluvial	Very Low	<ul style="list-style-type: none"> The site is majority in Flood Zone 1 and is currently not at risk from Fluvial Flooding.
Pluvial	Low	<ul style="list-style-type: none"> The EA flood maps show the majority of the site has a very low - low probability of flooding

		<p>from surface water, with small areas of high risk highlighted.</p> <ul style="list-style-type: none"> • The site will be designed to accommodate any future surface water run-off.
Historic	Very Low	<ul style="list-style-type: none"> • The Level 1 SFRA shows the site has not been recorded as being flooded from any source. • No mitigation measures are required.
Groundwater	Very Low	<ul style="list-style-type: none"> • The site is underlain by Chalk Formation.
Sewers	Very Low	<ul style="list-style-type: none"> • The site is within green fields away from known sewer runs. The site will be naturally drained with no positive drainage system present. • No mitigation measures are required.
Artificial	Very Low	<ul style="list-style-type: none"> • There is no flood risk shown from reservoirs to the site or surrounding areas.

Access & Egress

- 5.25 The site is for a solar farm which, apart from regular maintenance requirements, will remain unmanned and unpopulated.
- 5.26 The site is not subject to any form of severe flooding, therefore in the event of an extreme event occurrence, access and egress to/from the site can be easily achieved to higher parts of the site as necessary.

6. FLOOD DEFENCES AND MITIGATION

- 6.1 The SFRA provides mapping of all known flood defences within the settlement areas. There are no defences present within or in the vicinity of the site.

Finished Levels and Flood Resistance

Solar Panels Specification

- 6.2 The proposed solar panels mounting structure will be a 'fixed system' and will be manufactured from galvanised steel sections. The vertical supports are to be driven directly into the ground with no need for concrete foundations. The panels are mounted above the ground and so are not expected to interfere with any overland flow routes.

Primary and Inverter Substations

- 6.3 The development site will consist of inverters and a substation to connect to underground electrical cables.
- 6.4 Minor excavation and levelling will be required to prepare a support pad for the substation and inverter units.
- 6.5 In line with the potential shallow and local surface water or groundwater flooding that may occur on site and with reference to standard design specifications used by electricity providers, it is recommended to raise the finished floor levels to a minimum of 150mm above existing ground levels and to locate vulnerable equipment away from areas where flood risk is higher.

Surface Water Runoff & Impermeable Areas

- 6.6 The increase in impermeable surface area from the proposed development site is summarised in the table below.

Table 6.1 – Increase in Impermeable Surface Area

Infrastructure/Features	Increase in surface Area
Solar Panels	Although the sloped panels will deflect precipitation, the panels will not increase the impermeable area of the site. The area covered by the panel vertical supports is considered negligible.
Maintenance Access Track	12,534 ² (made up of gravel but may become compacted over time and provide run off)
Inverters, batteries, customer switchgear and DNO substation	1,200m ²
Transformer Compound	1,232m ²
Total = 14,975m ² (Approximately)	

- 6.7 The proposed development will only increase the percentage impermeable surface area by 1.89%.
- 6.8 Consequently, the run-off from the post-development site would remain almost exactly as the existing land use. It is therefore proposed to allow the development to drain to the soil surface, where infiltration to the underlying soils would occur, to mimic the existing hydrological characteristics of the site.
- 6.9 It is important that development does not increase run-off from the site and thereby increase the risks of flooding for others. There may be risks associated with soil compaction or degradation during construction or brought about by the rain-shadows under the panels.
- 6.10 However, many such risks also exist with modern farming practices. It is therefore recommended that following installation of the panels the site is chisel-ploughed or

similarly cultivated and seeded with native meadow grass and wild flowers. Chisel-ploughing will reduce soil compaction on the site and promote seed growth; it has been proven to significantly increase infiltration rates thereby reducing runoff rates from the site. Additionally, longer meadow type grasses and wild flower vegetation provide high levels of natural attenuation which will serve to reduce the risks of erosion and limit surface water flows across the site. With the implementation of chisel-ploughing, changing the site's primary function to solar power generation will have several potential longer-term benefits regarding surface water runoff rates.

6.11 The absence of intensive farming activity will provide the following benefits which serve to reduce soil compaction and runoff rates from the site:

- The field will not be left without vegetation coverage in the winter (if in arable production);
- The field will not be intensively trodden or over grazed; and
- The field will not be regularly traversed by heavy machinery.

6.12 Using the site for solar power generation therefore has the potential to provide betterment to the existing land use in terms of surface water runoff rates and downstream flood risk.

7. PROPOSED DRAINAGE STRATEGY

Surface Water Management

7.1 The SuDS hierarchy demands that surface water run off should be disposed of as high up the following list as practically possible:

- Into the ground (infiltration) and re-use, or then;
- To a surface water body, or then;
- To a surface water sewer, highway drain or another drainage system, or then;
- To a combined sewer.

7.2 Given the nature of the development it is intended to let the sites drain surface water away as per the current situation (i.e. to ground and overland toward an existing watercourse).

7.3 Whilst this is a sensible approach there are other sources of sustainable drainage options available which will assist in slowing/managing flows and also improve on water quality.

7.4 In order to determine the most suitable method of surface water disposal from the site the options listed above have been considered as follows:

Infiltration rates

7.5 Given the underlying strata of the site is "Lime-rich loamy and clayey soils with impeded drainage" it is unlikely that soakaways can be used effectively. However, soakaway testing has not been requested at this time.

Surface Water Body

7.6 The next option in the SuDS hierarchy is to dispose of surface water runoff into a nearby surface water body. The existing field drain ditch running within the southern part of the site is the nearest water body for the majority of the site.

SuDS selection process

7.7 Various methods of SuDS (Sustainable Drainage Systems) usage should be considered, but different methods have constraints attached to them that may not be suitable for this development. Therefore, an assessment of the suitability of different SuDS techniques have been made, which is summarised in the table below. Guidance from 'The SuDS manual' C753 has been used to form the basis of this assessment.

Table 7.1 – Assessment of SuDS Suitability

SuDS Technique	Potentially suitable for this development	Justification
Rainwater Harvesting	No	Not appropriate to the proposed development proposal.
Green Roofs	No	Not appropriate to the proposed development proposal.
Infiltration Systems (Soakaways, etc.)	Not likely	Given the existing below ground strata infiltration is unlikely on site.
Filter Drains	Yes	Can be used adjacent to the proposed internal access roads and to the north.
Swales	Yes	Shallow swales are feasible throughout the site and are considered as part of the drainage strategy.
Bioretention Systems	No	Not appropriate to the proposed development proposal.
Trees	No	Area is greenfield and very vegetated with existing trees etc. No additional tree

		planting is deemed necessary/appropriate for the development.
Underground storage	No	Not deemed appropriate for development as overland sustainable methods will be utilised.
Detention basins & ponds	Yes	Although ponds / basin would be a suitable feature there is no clear space from them on site. This may be reviewed at detailed design stage.
Wetlands	No	Due to the nature of the site, this is not considered feasible.
Permeable Paving	No	Not appropriate to the proposed development proposal.

Surface Water Drainage Strategy

- 7.8 The surface water drainage design has considered the use of SuDS appropriate to the development and suitable solutions discussed in the previous section.
- 7.9 It is proposed to allow the site to drain as close as naturally possible to the existing situation with run-off intercepted by a series of shallow swales / filter trenches adjacent to the proposed new internal access roads and swales located at the low parts of the site to collect and slow surface water run-off prior to discharging to the existing watercourses previously named.
- 7.10 The proposed development site will not affect the existing permeable areas, apart from very small areas as previously discussed, and run-off will be as existing greenfield rates, with additional sustainable features added to slow flows and also improve water quality.
- 7.11 The proposed drainage strategy layout can be found at **Appendix C**.

Water Quality

- 7.12 The SuDS Manual (CIRIA C753) states that the design of surface water drainage should consider minimising contaminants in surface water runoff discharged from the site. The level of treatment required depends on the proposed land use, according to the pollution hazard indices.
- 7.13 The developed land will be predominantly used for solar panels with some associated infrastructure and access roads. The development is considered to produce little to no pollution from surface run off onto the ground. Over land flows through grass will then pass along SuDS features such as swales which will provide additional water quality improvements to already low polluted water.

8. SUMMARY

- 8.1 The site is entirely greenfield with an existing field drain ditch running through the southern part of the development area.
- 8.2 It is proposed to redevelop the site for a new solar farm.
- 8.3 The site is located entirely within Flood Zone 1.
- 8.4 The proposed development will not add any significant areas of impermeable surfacing. Surface water runoff will drain partially to ground, as existing, and overland flows collected via new swale systems to slow run-off and improve water quality.
- 8.5 The proposal is considered to accord with the requirements of the National Planning Policy Framework (NPPF) with residual risk to the site fully mitigated, and as such considered low risk.

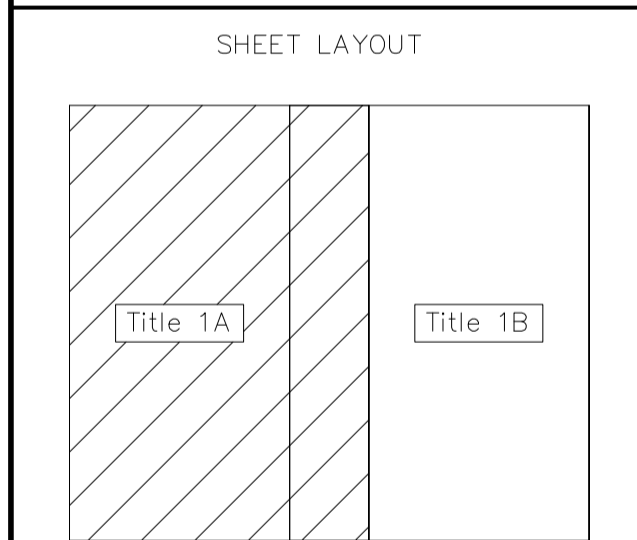
Appendix A – Topographical Survey

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228100.00 N

228000.00 N



STANDARD REFERENCES

ABBREVIATIONS

bb	bellis beacon	ko	kerb outlet
bl	barbed	lp	lamp post
brw	brick ret. wall	mh	manhole
bs	bus stop	mk	marker post
bt	telecoms cover	np	non-potable (food)
bw	brick wall	obf	open boarded fence
cbw	cable TV cover	p	post
cd	disconnected fence	pb	post box
cbrw	concrete block ret. wall	ret.	retaining wall
cbw	concrete block wall	re	retaining wall
cl	cover level	rg	road gully
of	chainlink fence	ra	road sign
ccoc	concrete	rep	retractor pipe
cp	concrete post	sp	signpost
cws	combined sewer	srw	stone ret. wall
dk	drop kerb	sv	stop valve
ep	electricity pole	svp	soil vent pipe
ECS	Electric Sub-Station	sw	stone wall
fb	flower bed	s/w	stony wire
fh	fire hydrant	swp	storm water sewer
f	floor level	top	telephone cabinet
fes	foul water sewer	tl	traffic light
g	gully	tp	telescope pole
gvs	gas valve	utr	vent pipe
ic	inspection cover	vp	vent pipe
il	invert level	w/w	wooden fence
irf	iron rolling fence	wm	water meter
j	junction box	wp	wood post

- Notes
- This survey has been computed and drawn "True to scale" and relates to the OSTN15 OS National Grid at a single point.
 - All levels are in metres and relate to the mean of the nearest five Ordnance Survey active GPS stations (OSGM15).
 - This survey was measured for a scale of 1:500, any subsequent enlargements should be verified on site.

Revisions

Anthony Brookes Surveys Ltd
LAND, OPS, BUILDING & ENGINEERING SURVEYORS

Unit 2 Thornbury Office Park
Midland Way
Thornbury
Bristol BS35 2BS
TEL: (01454) 419 133
FAX: (01454) 501 711
e-mail: info@anthonybrookes.com
web: www.anthonybrookes.com

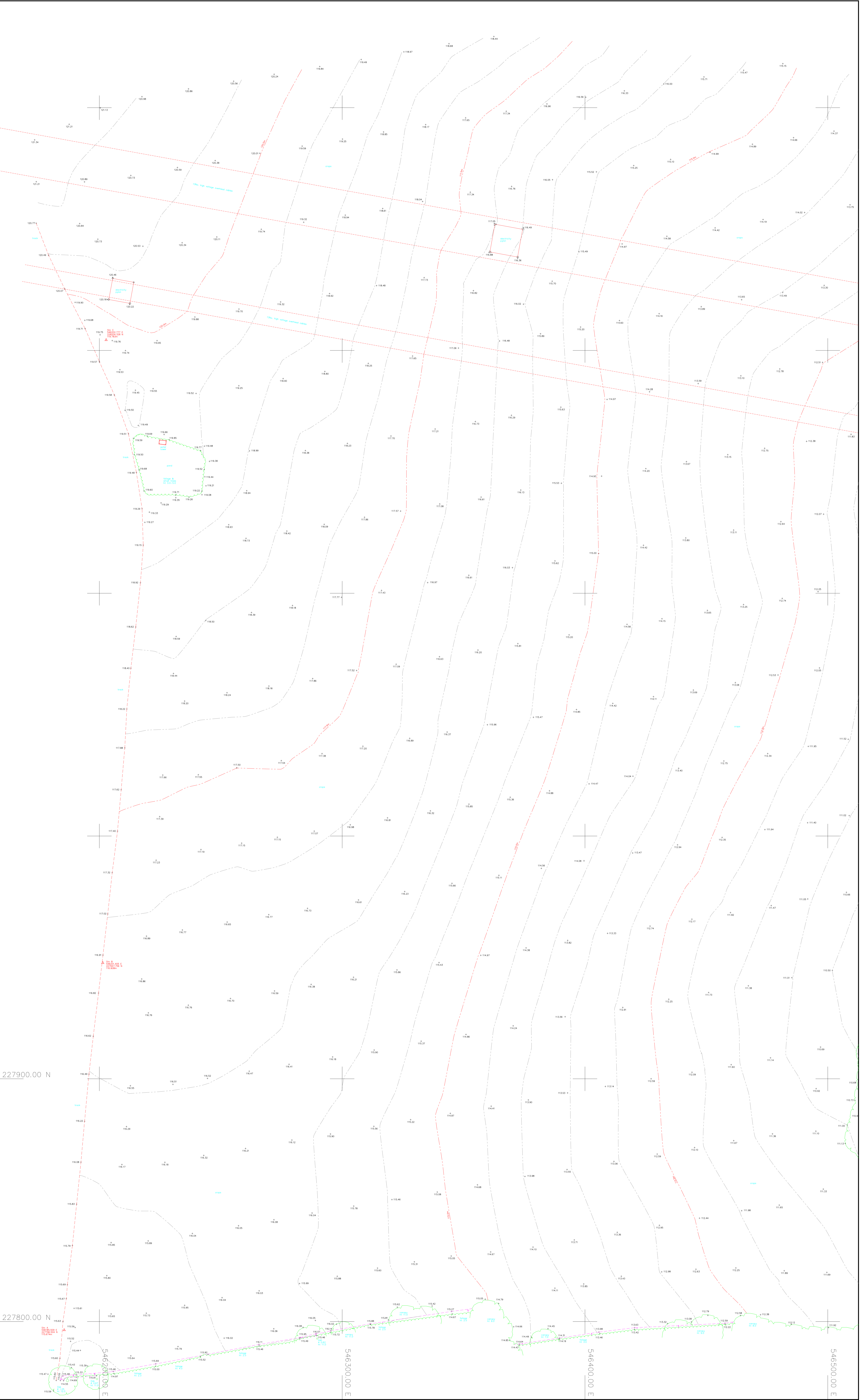
The copyright in the plans remain vested in Anthony Brookes Surveys Ltd who will grant an irrevocable licence for use by the client upon receipt of full payment. No liability for accuracy shall extend beyond the specified scale of original mapping. All services and other dimensions should be verified on site.

Surveyed: C Longshaw Date: July 2021
Drawn: C Longshaw Checked: July 2021

Drawing Title: **Topographical Survey
Proposed Solar Site
Stocking Pelham
SG9 0JU**

Client: **Pegasus Group
First Floor, South Wing
Equinox North
Great Park Road
Almondsbury, BS32 4QL**

Drawing No. 661/11694/1A Dev. Scale AD © 1:500



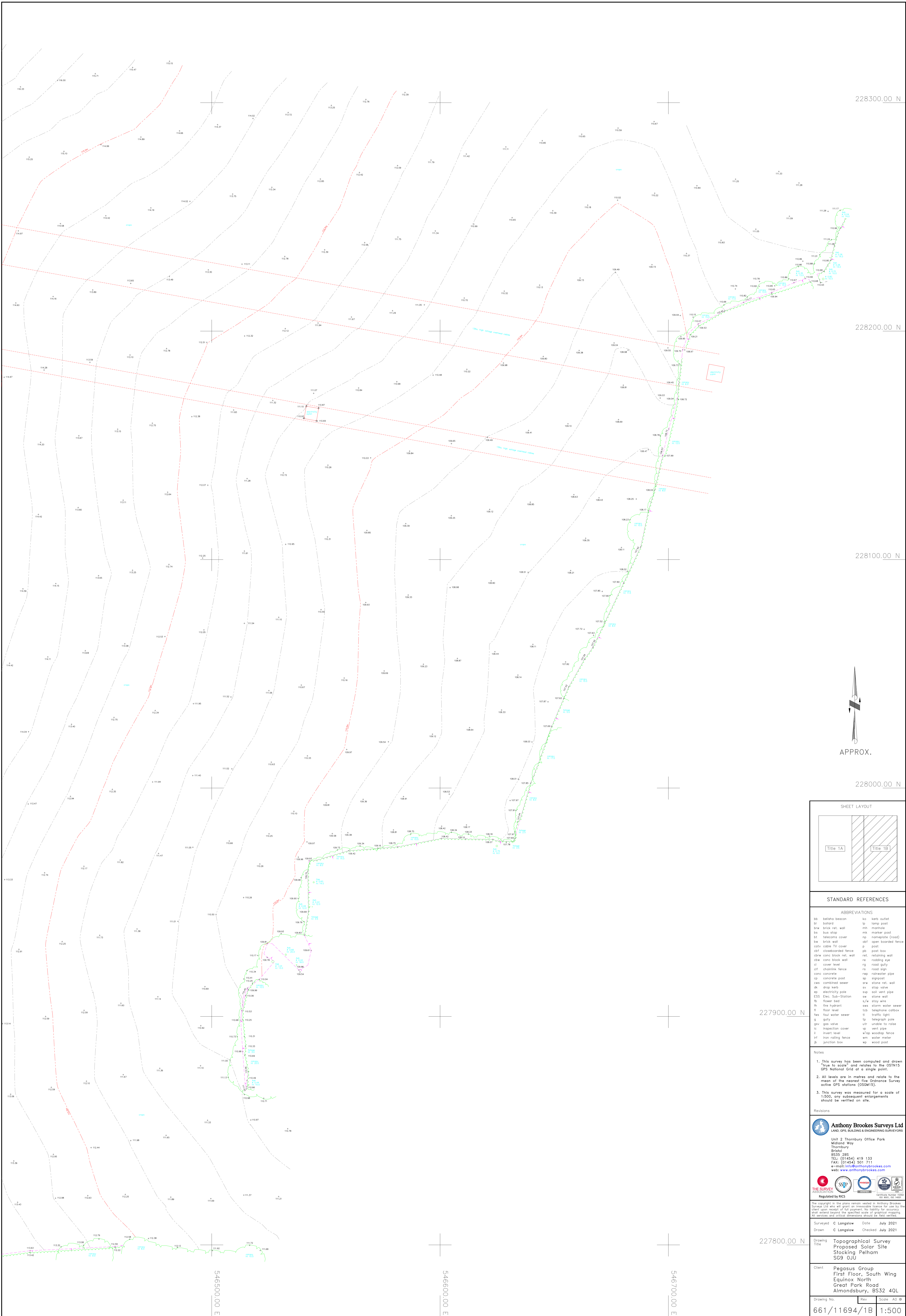
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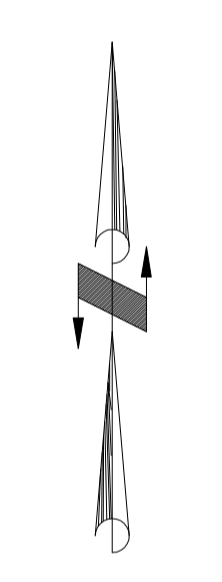


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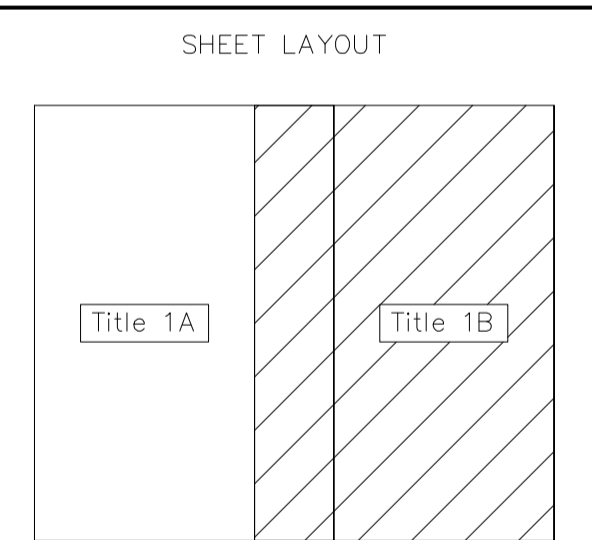
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228100.00 N

228000.00 N



APPROX.



STANDARD REFERENCES

ABBREVIATIONS

bb	bellho beacon	ko	kerb outlet
bl	bolton	lo	lamp post
brw	brick ret. wall	mn	manhole
bs	bus stop	mk	marker post
bt	telecoms cover	mp	manhole (round)
bw	brick wall	obf	open boarded fence
cbty	cable TV cover	p	post
cbf	disboarded fence	pb	post box
cbw	conc block ret. wall	ret.	retaining wall
cbe	conc block wall	rei	reading eye
cl	cover level	rg	road gully
coll	chaining fence	rs	road sign
conc	concrete	rep	rope/water pipe
cp	concrete post	sp	signpost
cws	combined sewer	srw	stone ret. wall
dk	drop kerb	sv	stop valve
ep	electricity pole	svp	soil vent pipe
ESS	Elec. Sub-Station	sw	stone wall
fb	flower bed	st/a	stay wire
h	fire hydrant	sws	storm water sewer
fl	floor level	tcp	telephone cabinet
fas	foul water sewer	tl	traffic light
g	gully	tp	telegraph pole
gsv	gas valve	utp	unborn to noise
ic	inspection cover	vp	vent pipe
il	invert level	w/h	wood/step fence
irf	iron railing fence	wm	water meter
j	junction box	wp	wood post

Notes

- This survey has been computed and drawn "true to scale" and relates to the OSN15 GPS National Grid at 1:1000 scale.
- All levels are in metres and relate to the mean of the nearest five Ordnance Survey active GPS stations (OSGM15).
- This survey was measured for a scale of 1:500, any subsequent enlargements should be verified on site.

Revisions

Anthony Brookes Surveys Ltd
 LAND, GPS, BUILDING & ENGINEERING SURVEYORS

Unit 2 Thornbury Office Park
 Midland Way
 Thornbury
 Bristol BS35 2BS
 TEL: (01454) 419 133
 FAX: (01454) 501 711
 e-mail: info@anthonybrookes.com
 web: www.anthonnybrookes.com

Regulated by RICS

Surveyed: C Longlow Date: July 2021
 Drawn: C Longlow Checked: July 2021

Drawing Title: **Topographical Survey
 Proposed Solar Site
 Stocking Pelham
 SG9 0JU**

Client: **Pegasus Group
 First Floor, South Wing
 Equinox North
 Great Park Road
 Almondsbury, BS32 4QL**

Drawing No. 661/11694/1B Rev. 1 Scale: A3 @ 1:500

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227800.00 N

227700.00 N

227600.00 N

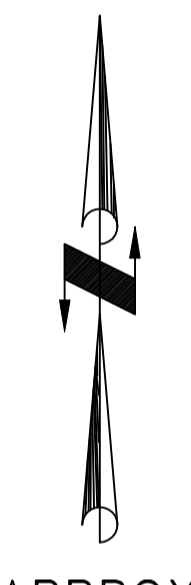
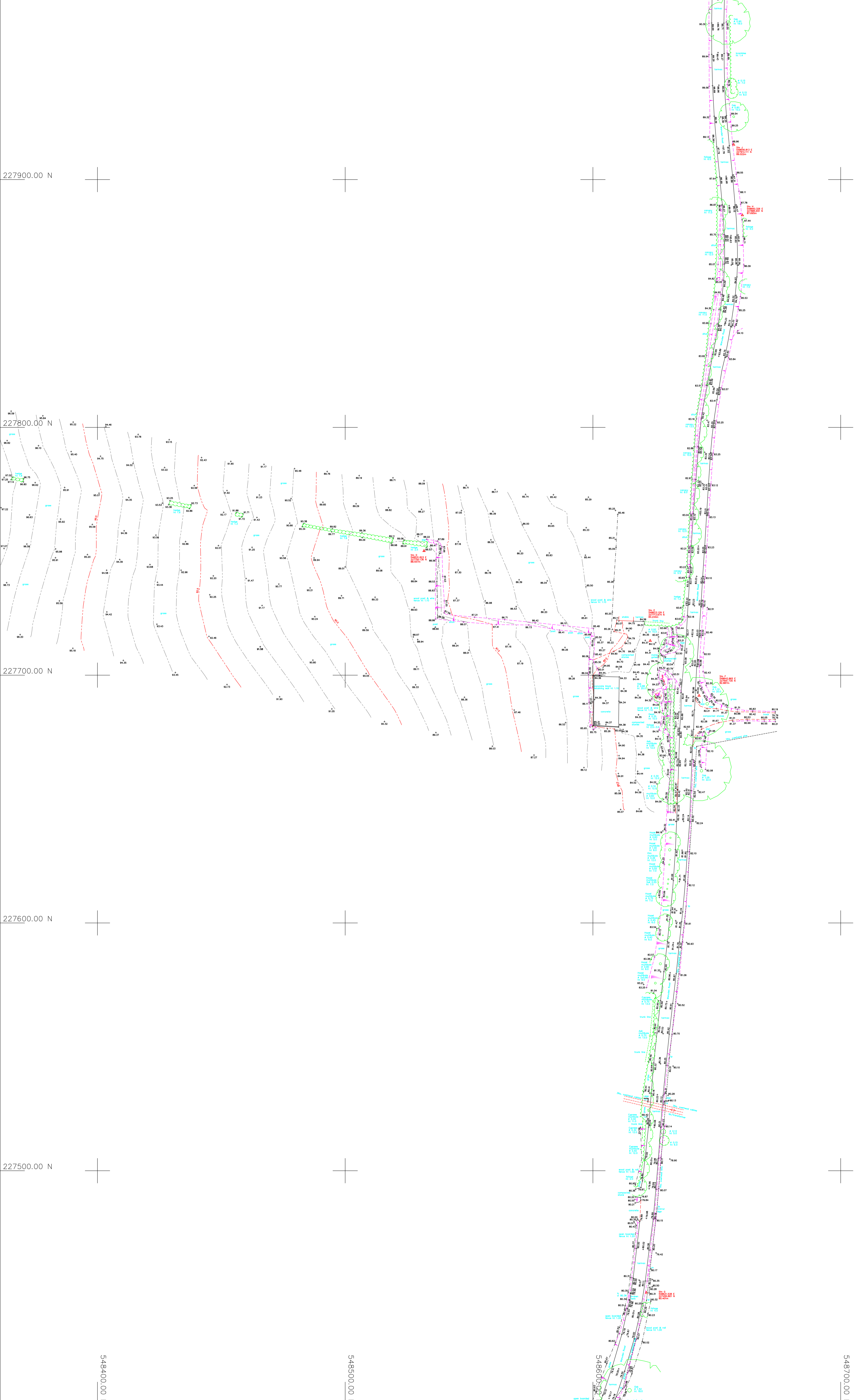
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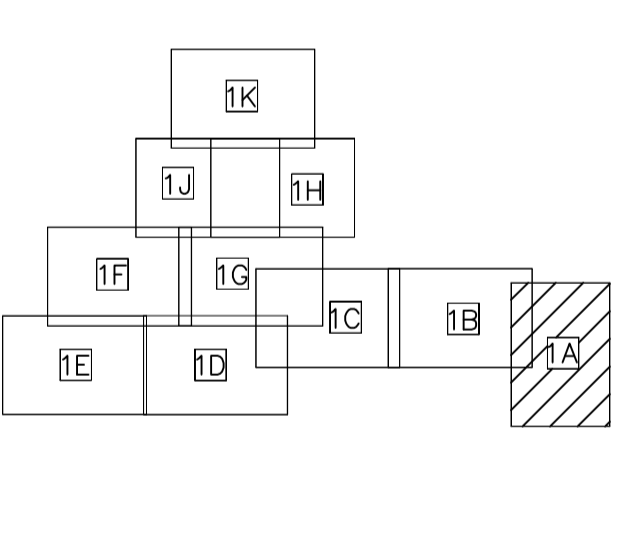
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548700.00 E



APPROX.

SHEET LAYOUT



STANDARD REFERENCES

ABBREVIATIONS	
bb	bellish beacon
bl	belland
bw	brick ret. wall
bs	bus stop
bt	telecoms cover
bw	brick wall
cbt	cable TV cover
cbf	closeboarded fence
cbrc	conc block ret. wall
cbw	conc block wall
cl	cover level
cif	chainlink fence
conc	concrete
cp	concrete post
cws	combined sewer
ok	drop kerb
ep	electricity pole
ESS	Elec. Sub-Station
fb	floor level
fh	fire hydrant
f	floor level
fws	four water sewer
g	gully
gsv	gas valve
ic	inspection cover
il	invert level
if	iron railing fence
j	junction box
ko	kerb outlet
lp	lamp post
mh	marker
mk	marker post
np	non-slip (road)
obf	open boarded fence
p	post
pb	post box
ap	apogee
ret.	retaining wall
re	roading eye
rg	road gully
rs	road sign
rap	rainwater pipe
ap	apogee
srw	stone ret. wall
sv	stop valve
sw	stop valve
sw	stone wall
sw	storm water sewer
tab	telephone callbox
tl	traffic light
tp	telegraph pole
utr	unable to raise
vp	vent pipe
w	w/Top woodsp fence
wm	water meter
wj	wheel post

Notes

- This survey has been computed and drawn "true to scale" and relates to the OSTN15 GPS National Grid of a single point.
- All levels are in metres and relate to the mean of the nearest five Ordnance Survey active GPS stations (OSGM15).
- This survey was measured for a scale of 1:500, any subsequent enlargements should be verified on site.

Revisions

Anthony Brookes Surveys Ltd
 LAND, GPS, BUILDING & ENGINEERING SURVEYORS

Unit 2 Thornbury Office Park
 Midland Way
 Thornbury
 Bristol
 BS35 2BS
 TEL: (01454) 419 133
 FAX: (01454) 501 711
 e-mail: info@anthonybrookes.com
 web: www.anthonybrookes.com

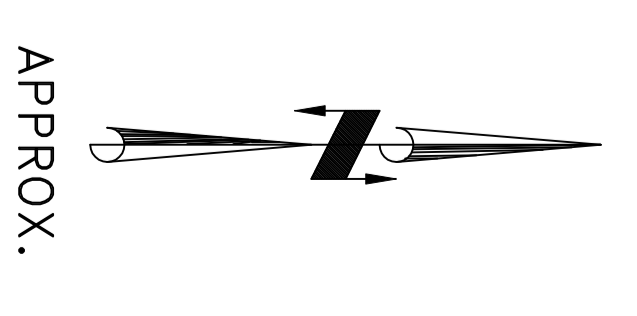
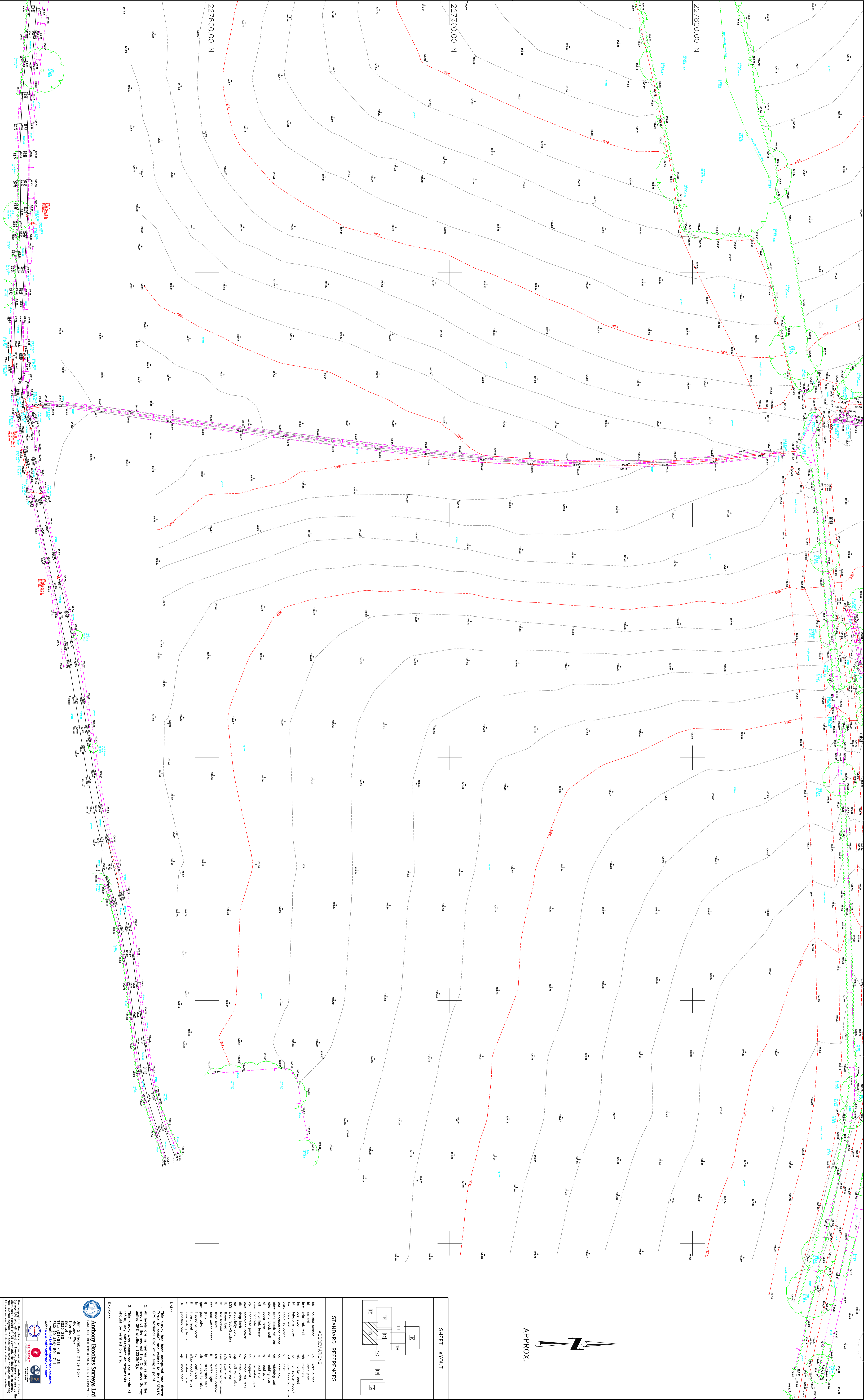
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Surveyed: J Rodriguez Date: March 2021
 Drawn: J Rodriguez Checked: March 2021

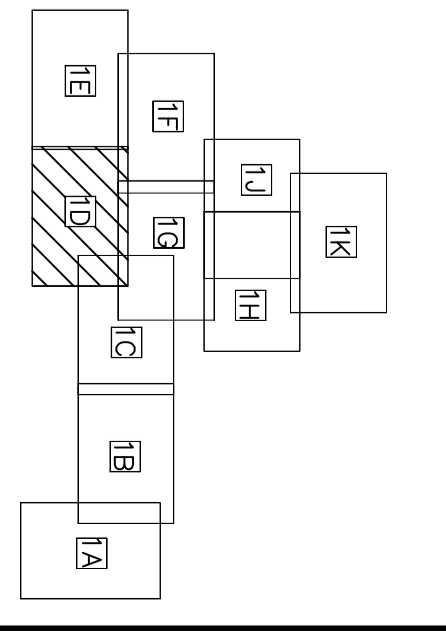
Drawing Title: **Topographical Survey**
Maggots End Solar Farm
Manuden
Herts

Client: **Pegasus Planning Group Ltd**
1st Floor, South Wing
Equinox North, Great Park Road
Bristol BS32 4QL

Drawing No. **661/11836/1A** Rev. **1** Scale **A0** © **1:500**



SHEET LAYOUT



STANDARD REFERENCES

ABBREVIATIONS	
bl	blinded
br	bracket
bu	buried
ca	cast
ch	chain
cl	closed
co	concrete
cu	copper
da	dashed
db	double
dc	double
de	depth
di	diameter
dl	double
dm	diameter
dn	down
do	double
dr	diameter
ds	diameter
dt	diameter
du	double
dv	diameter
dw	diameter
dx	diameter
dy	diameter
dz	diameter
ea	east
eb	east
ec	east
ed	east
ee	east
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en	east
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eu	east
ev	east
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ex	east
ey	east
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fb	face
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iq	iron
ir	iron
is	iron
it	iron
iu	iron
iv	iron
iw	iron
ix	iron
iy	iron
iz	iron
ja	junction
jb	junction
jc	junction
jd	junction
je	junction
jf	junction
jj	junction
jk	junction
jl	junction
jm	junction
jn	junction
jo	junction
jp	junction
jq	junction
jr	junction
js	junction
jt	junction
ju	junction
jv	junction
jw	junction
jx	junction
jy	junction
jz	junction

- Notes**
- This survey has been completed and drawn in accordance with the current standards of the Institution of Civil Engineers (ICE) and the Institution of Surveyors (IS).
 - All levels are in metres and relate to the datum of the nearest Ordnance Survey datum point.
 - This survey was measured for a scale of 1:500, any subsequent enlargements should be verified on site.

Anthony Brookes Surveys Ltd
 Unit 2 Thornbury Office Park
 Thornbury
 Bristol BS35 9JF
 Tel: 01454 501 113
 Fax: 01454 501 711
 www.anthonysurveys.com

Topographical Survey
 M3000s End Solar Farm
 Herts

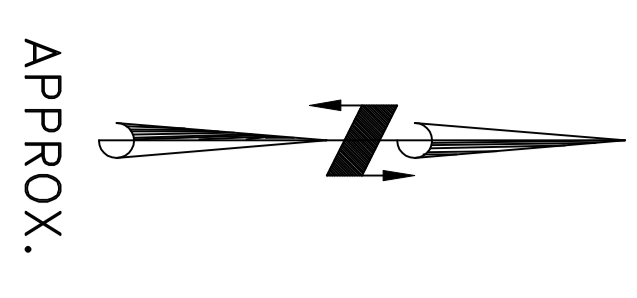
Client:
 Parsons Planning Group Ltd
 15 Friar Lane, South Wile
 Egham, Surrey, GU20 0EX
 Bristol BS32 40L

Drawn: J. Badger Date: March 2021
Checked: J. Badger Date: March 2021

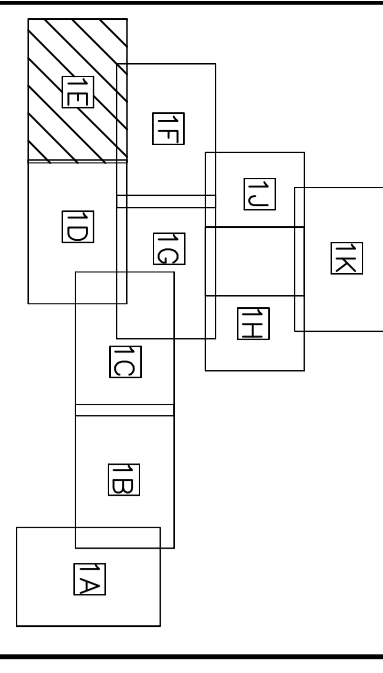
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Drawing No.: 661/11836/1D

227800.00 N

227800.00 N



APPROX.



SHEET LAYOUT

227700.00 N

STANDARD REFERENCES

ABBREVIATIONS	DESCRIPTION
bb	Building boundary
bc	Boundary
br	Boundary
ca	Concrete
cc	Concrete
cd	Concrete
cf	Concrete
ch	Chimney
cl	Cladding
co	Concrete
cs	Concrete
cu	Concrete
cv	Concrete
ca	Concrete
cc	Concrete
cd	Concrete
ce	Concrete
cf	Concrete
cg	Concrete
ch	Chimney
cl	Cladding
co	Concrete
cs	Concrete
cu	Concrete
cv	Concrete
ca	Concrete
cc	Concrete
cd	Concrete
ce	Concrete
cf	Concrete
cg	Concrete

- NOTES**
1. This survey has been completed and drawn.
 2. All levels are in metres and relate to the datum of the Ordnance Survey (OS) datum.
 3. This survey was measured for a scale of 1:500. Any subsequent measurements should be verified on site.

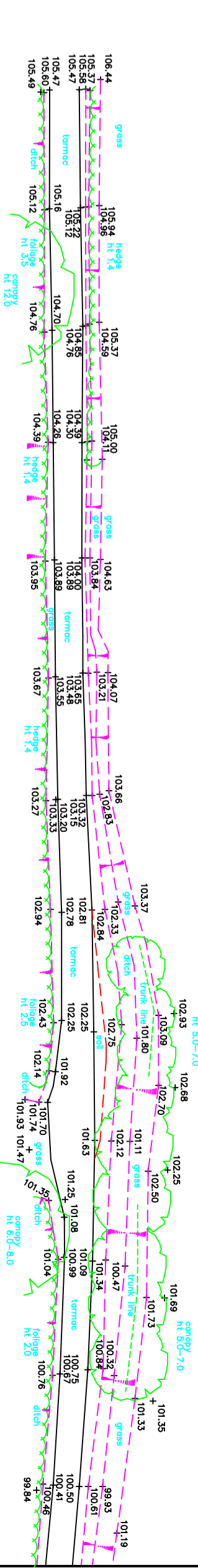
Anthony Brookes Surveys Ltd
LAWN GOLF BUILDINGS & ENGINEERING SURVEYORS
Lime 2, Thornbury Office Park
Thornbury
Bristol BS35 4DL
TEL: (01454) 419 131
FAX: (01454) 419 131
www.anthonysurveys.com
anthonysurveys@anthonysurveys.com

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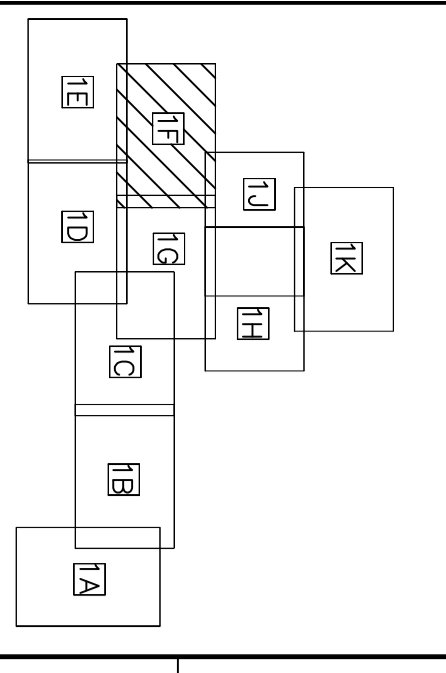
Drawn: **Topographical Survey**
Checked: **March 2021**

Client: **Popagus Planning Group Ltd**
1st Floor, South Wing
Equinox North, Great Park Road
Bristol BS32 4DL

Drawing No: **661/1836/1E**
Scale: **A3 0**
Date: **1:500**



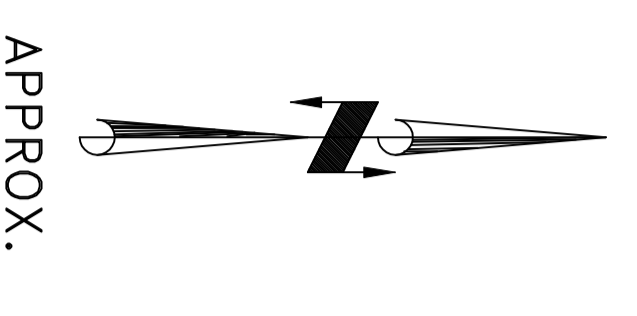
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STANDARD REFERENCES

ABBREVIATIONS

b1	British Mason	b2	British Brick
b3	Red brick	b4	Yellow brick
b5	White brick	b6	Black brick
b7	Blue brick	b8	Green brick
b9	Orange brick	b10	Grey brick
b11	Red concrete	b12	Yellow concrete
b13	White concrete	b14	Black concrete
b15	Blue concrete	b16	Green concrete
b17	Orange concrete	b18	Grey concrete
b19	Red stone	b20	Yellow stone
b21	White stone	b22	Black stone
b23	Blue stone	b24	Green stone
b25	Orange stone	b26	Grey stone
b27	Red slate	b28	Yellow slate
b29	White slate	b30	Black slate
b31	Blue slate	b32	Green slate
b33	Orange slate	b34	Grey slate
b35	Red tile	b36	Yellow tile
b37	White tile	b38	Black tile
b39	Blue tile	b40	Green tile
b41	Orange tile	b42	Grey tile
b43	Red roof	b44	Yellow roof
b45	White roof	b46	Black roof
b47	Blue roof	b48	Green roof
b49	Orange roof	b50	Grey roof
b51	Red wall	b52	Yellow wall
b53	White wall	b54	Black wall
b55	Blue wall	b56	Green wall
b57	Orange wall	b58	Grey wall
b59	Red window	b60	Yellow window
b61	White window	b62	Black window
b63	Blue window	b64	Green window
b65	Orange window	b66	Grey window
b67	Red door	b68	Yellow door
b69	White door	b70	Black door
b71	Blue door	b72	Green door
b73	Orange door	b74	Grey door
b75	Red fence	b76	Yellow fence
b77	White fence	b78	Black fence
b79	Blue fence	b80	Green fence
b81	Orange fence	b82	Grey fence
b83	Red gate	b84	Yellow gate
b85	White gate	b86	Black gate
b87	Blue gate	b88	Green gate
b89	Orange gate	b90	Grey gate
b91	Red path	b92	Yellow path
b93	White path	b94	Black path
b95	Blue path	b96	Green path
b97	Orange path	b98	Grey path
b99	Red road	b100	Yellow road
b101	White road	b102	Black road
b103	Blue road	b104	Green road
b105	Orange road	b106	Grey road
b107	Red track	b108	Yellow track
b109	White track	b110	Black track
b111	Blue track	b112	Green track
b113	Orange track	b114	Grey track
b115	Red boundary	b116	Yellow boundary
b117	White boundary	b118	Black boundary
b119	Blue boundary	b120	Green boundary
b121	Orange boundary	b122	Grey boundary
b123	Red line	b124	Yellow line
b125	White line	b126	Black line
b127	Blue line	b128	Green line
b129	Orange line	b130	Grey line
b131	Red spot	b132	Yellow spot
b133	White spot	b134	Black spot
b135	Blue spot	b136	Green spot
b137	Orange spot	b138	Grey spot
b139	Red mark	b140	Yellow mark
b141	White mark	b142	Black mark
b143	Blue mark	b144	Green mark
b145	Orange mark	b146	Grey mark
b147	Red symbol	b148	Yellow symbol
b149	White symbol	b150	Black symbol
b151	Blue symbol	b152	Green symbol
b153	Orange symbol	b154	Grey symbol
b155	Red note	b156	Yellow note
b157	White note	b158	Black note
b159	Blue note	b160	Green note
b161	Orange note	b162	Grey note



Notes

- This survey has been completed and signed 'True to scale' and refers to the OSN15 OS National Grid of a single point.
- All levels are in metres and refer to the datum of the Ordnance Survey (OSBM15).
- This survey was measured for a scale of 1:500 and should be verified on site.

Anthony Brooks Surveys Ltd
 1st Floor, South Wing
 1st Floor, South Wing
 Bristol BS2 4DL

ES&S 285
 FAX: (01454) 501 711
 www.anthonysurveys.com

Professional Surveyors
 1st Floor, South Wing
 1st Floor, South Wing
 Bristol BS2 4DL

Client: **Pegasus Planning Group Ltd**
 1st Floor, South Wing
 1st Floor, South Wing
 Bristol BS2 4DL

Drawing: **Topographical Survey**
 Mogsops End Solar Farm
 Mogsops

Drawn: **J. Redgrave** Date: **March 2021**
 Checked: **March 2021**

Drawing No: **661/1836/1F** Scale: **A3 @ 1:500**

228000.00 N

227900.00 N

54600.00 E

54700.00 E

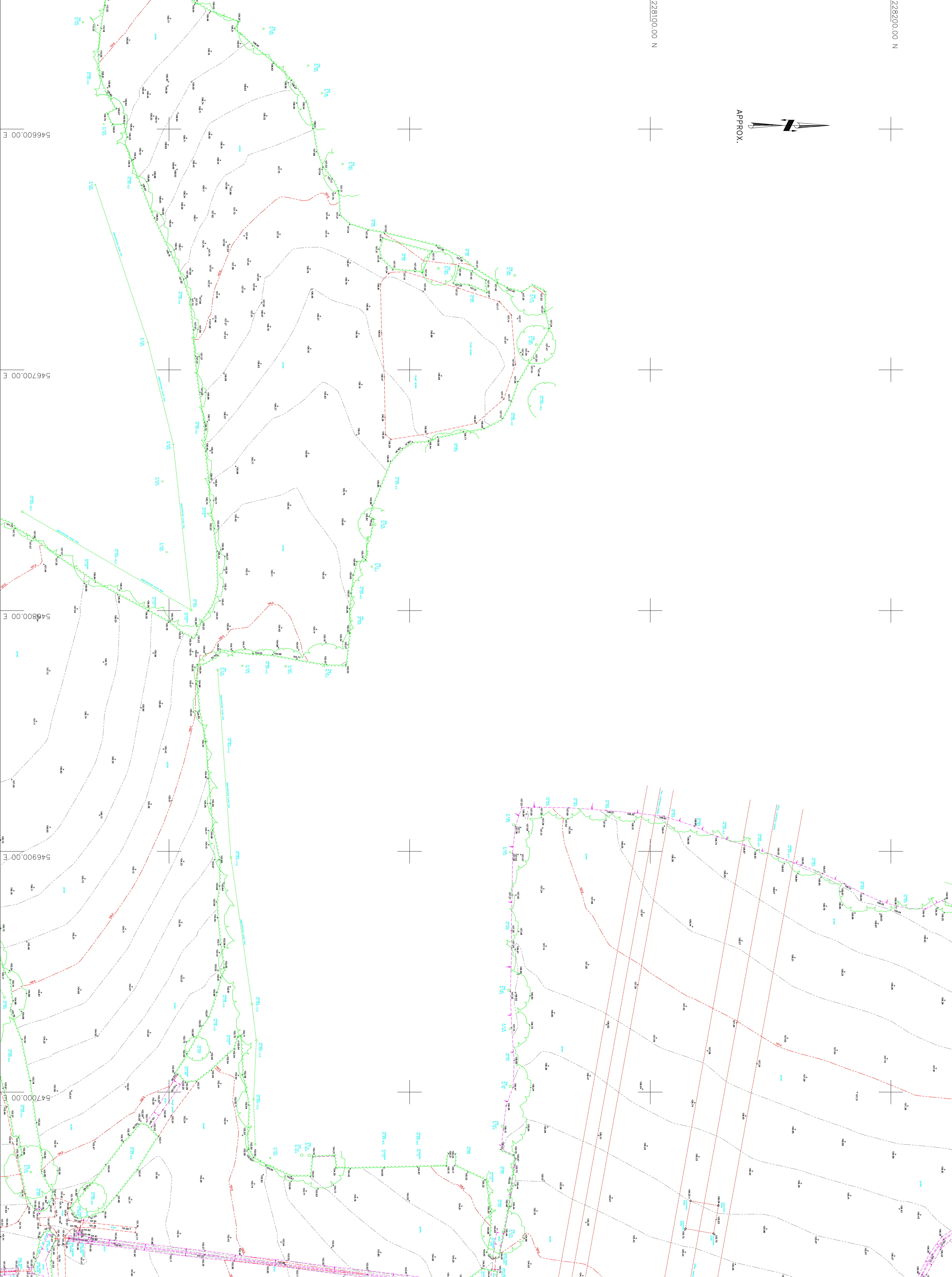
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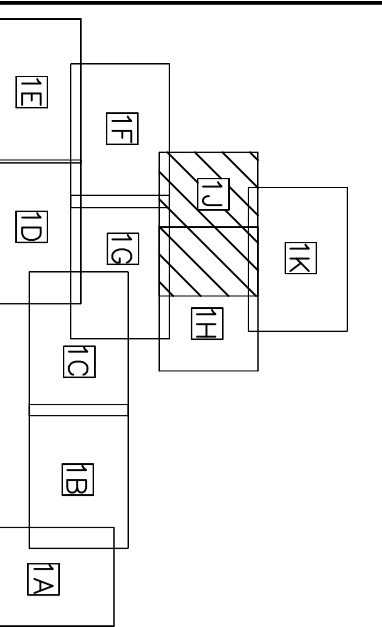
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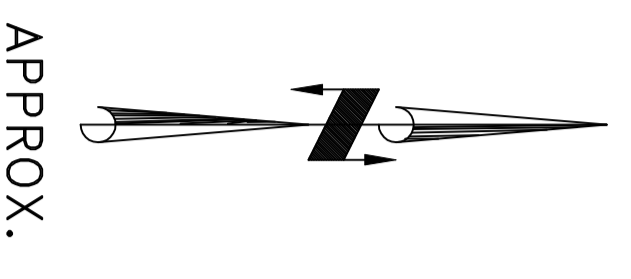
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STANDARD REFERENCES

ABBREVIATIONS	DESCRIPTION
bl	black level
br	brick red wall
ch	chamber
cl	concrete level
co	concrete
cr	concrete cover
cl	concrete level
co	concrete
cr	concrete cover
cl	concrete level
co	concrete
cr	concrete cover
cl	concrete level
co	concrete
cr	concrete cover
cl	concrete level
co	concrete
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cr	concrete cover
cl	concrete level
co	concrete
cr	concrete cover
cl	concrete level
co	concrete
cr	concrete cover
cl	concrete level
co	concrete
cr	concrete cover



APPROX.

228500.00 N

228400.00 N

228300.00 N

228500.00 N

228400.00 N

228300.00 N

228500.00 N

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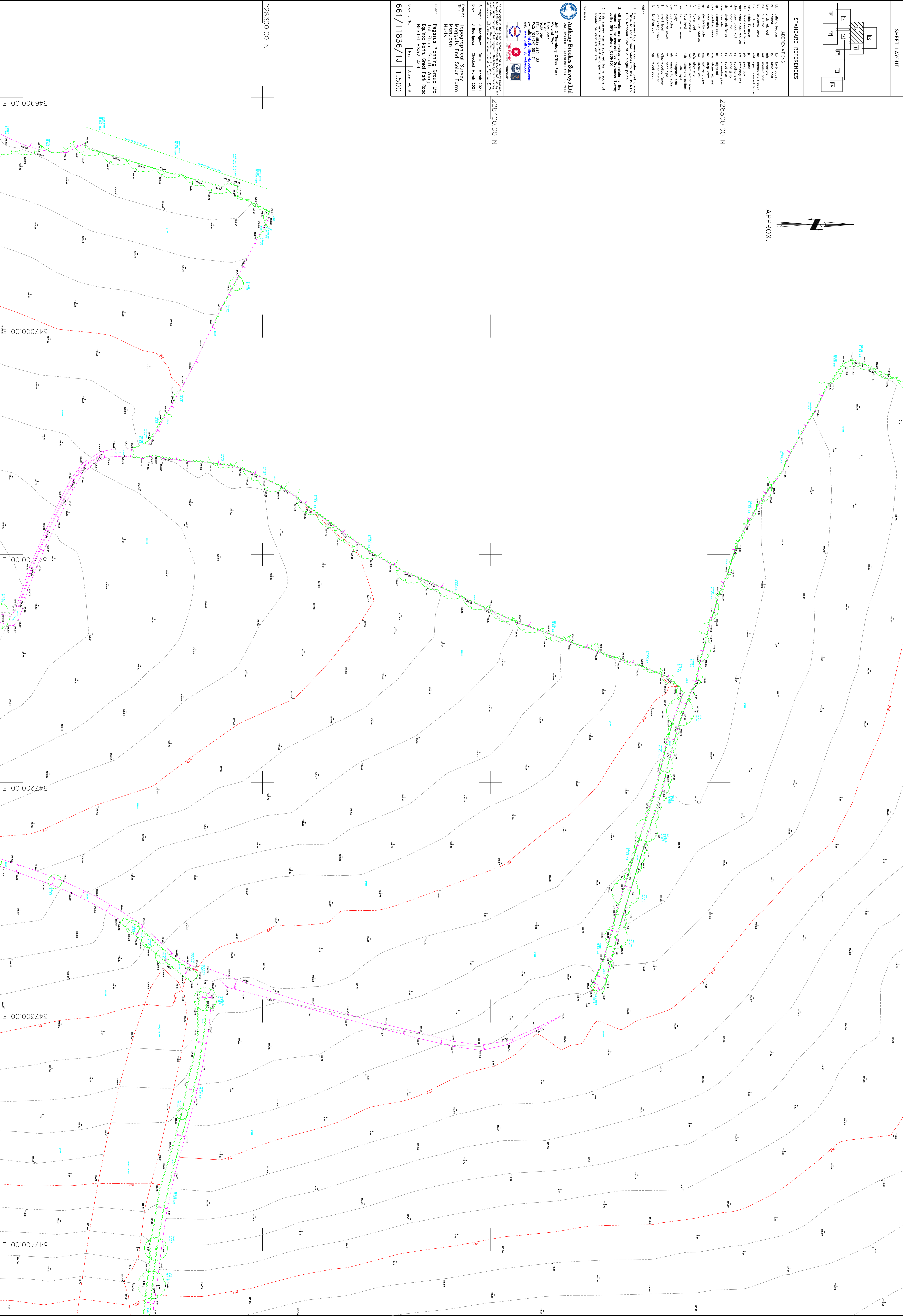
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Anthony Brooks Surveys Ltd
 1st Floor, South Wing
 Moggo's End Solar Farm
 Mendips
 Bristol BS32 4DL

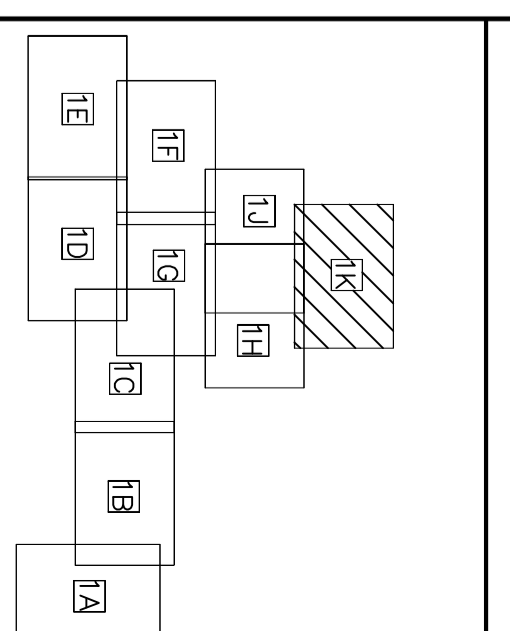
Drawing: Topographical Survey
 Client: Pegasus Planning Group Ltd
 Date: March 2021
 Designer: J Reddiger
 Checked: March 2021

Surveyed: J Reddiger
 Date: March 2021
 Design: J Reddiger
 Checked: March 2021

Drawing No: 661/1836/1J
 Scale: A3 @ 1:500

ES&S ZONE
 REG NO: 250171
 REG DATE: 15/03/11
 REG TYPE: 1

- Notes:
1. This survey has been completed and drawn to scale and refers to the OSN15 OS National Grid of a single point.
 2. All levels are in meters and relate to the active OS stations (OSM15).
 3. This survey was measured for a scale of 1:500.
- Revisions:
- | | | |
|----|--------|-------|
| by | Issued | Issue |
| by | Issued | Issue |
| by | Issued | Issue |



STANDARD REFERENCES

Table with 2 columns: ABBREVIATIONS and descriptions. Includes symbols for various survey features like spot levels, contours, and structures.

- Notes: 1. This survey has been completed and approved... 2. All levels are in meters and relate to the active GPS station (GS0415)... 3. This survey was measured for a scale of 1:500...

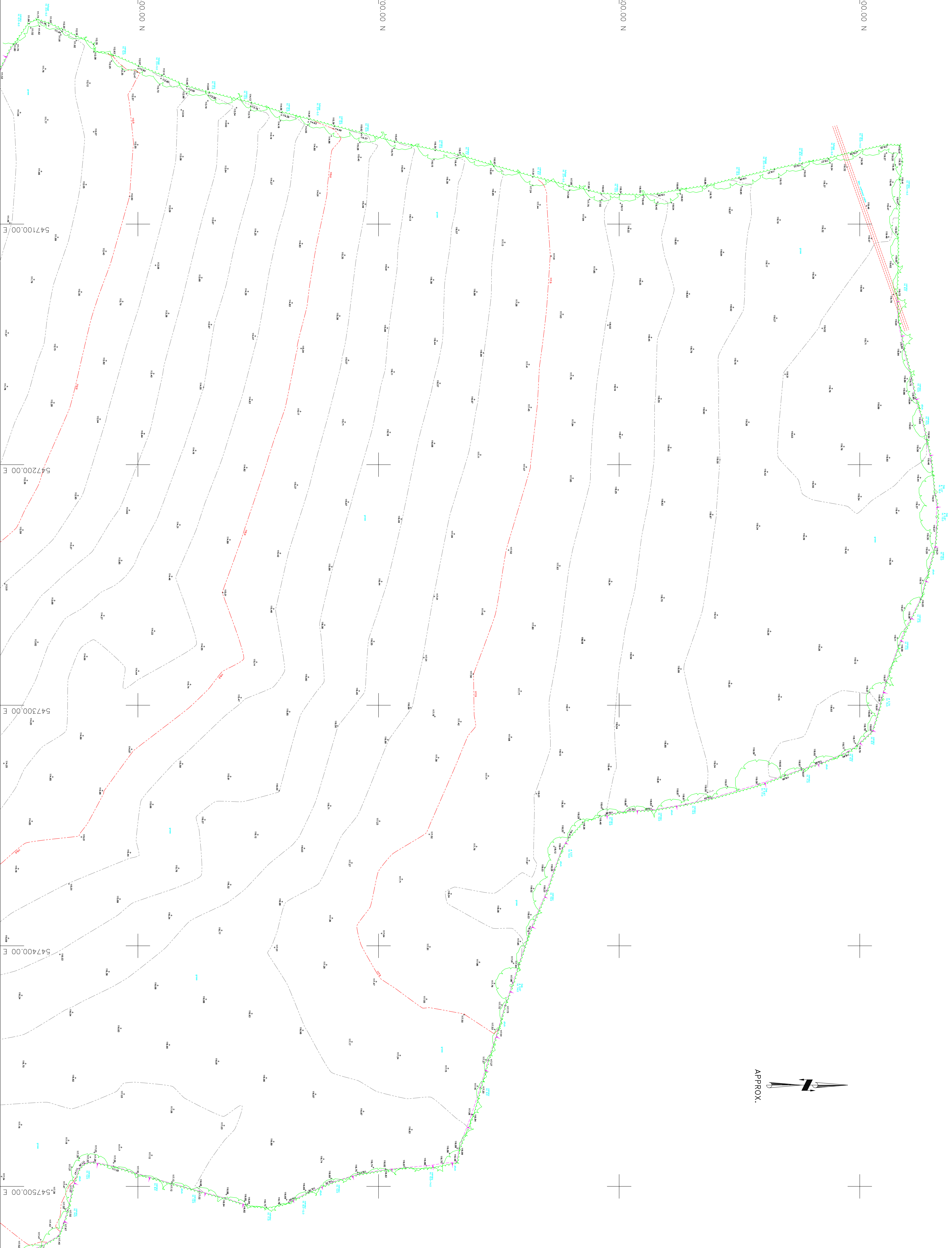
Antony Brooks Surveys Ltd

Antony Brooks Surveys Ltd
National Registry Office Park
Bridport
BES2 2BS
Tel: 01454 419 135
Fax: 01454 501 711
www.antonybrooks.com

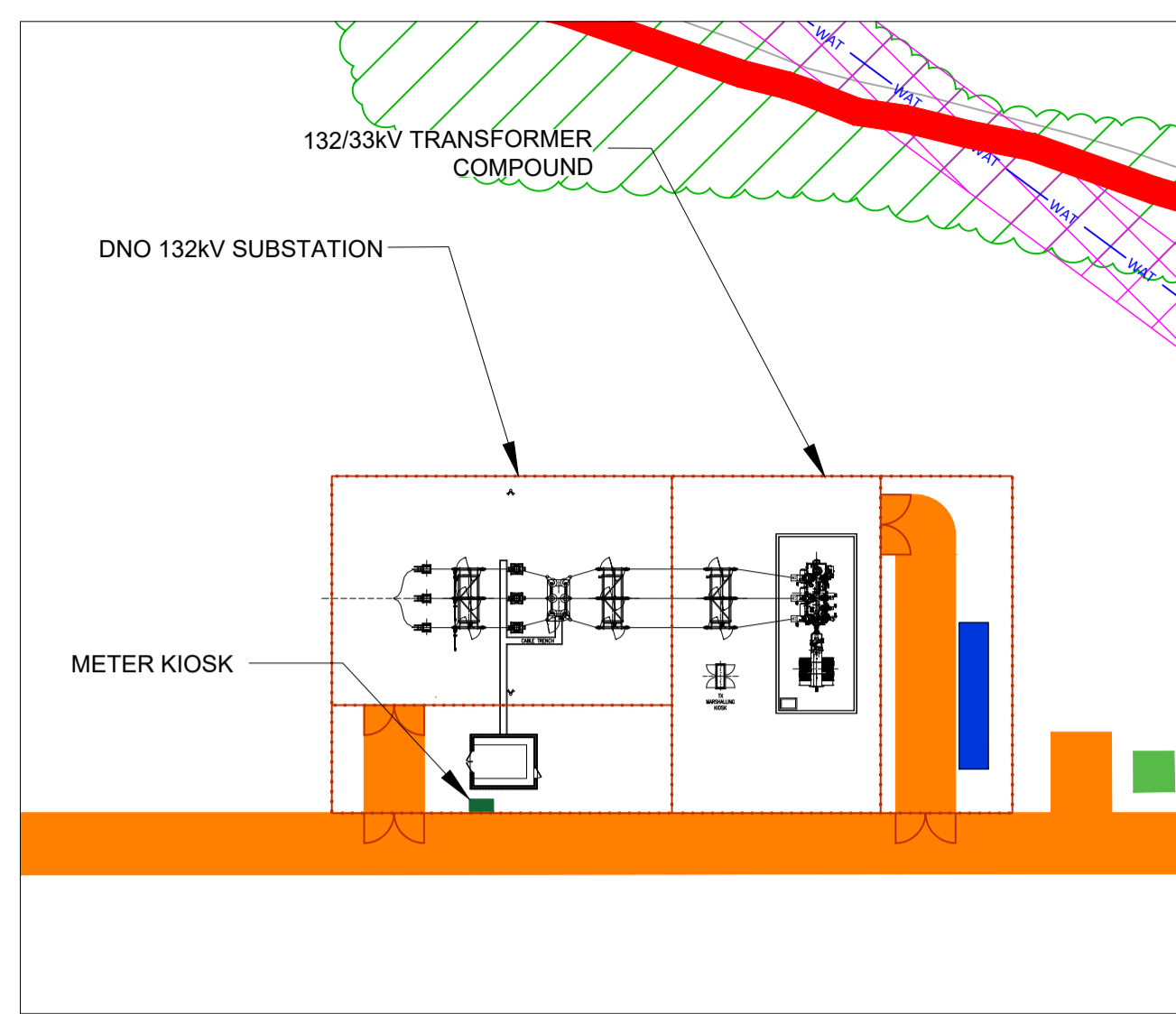
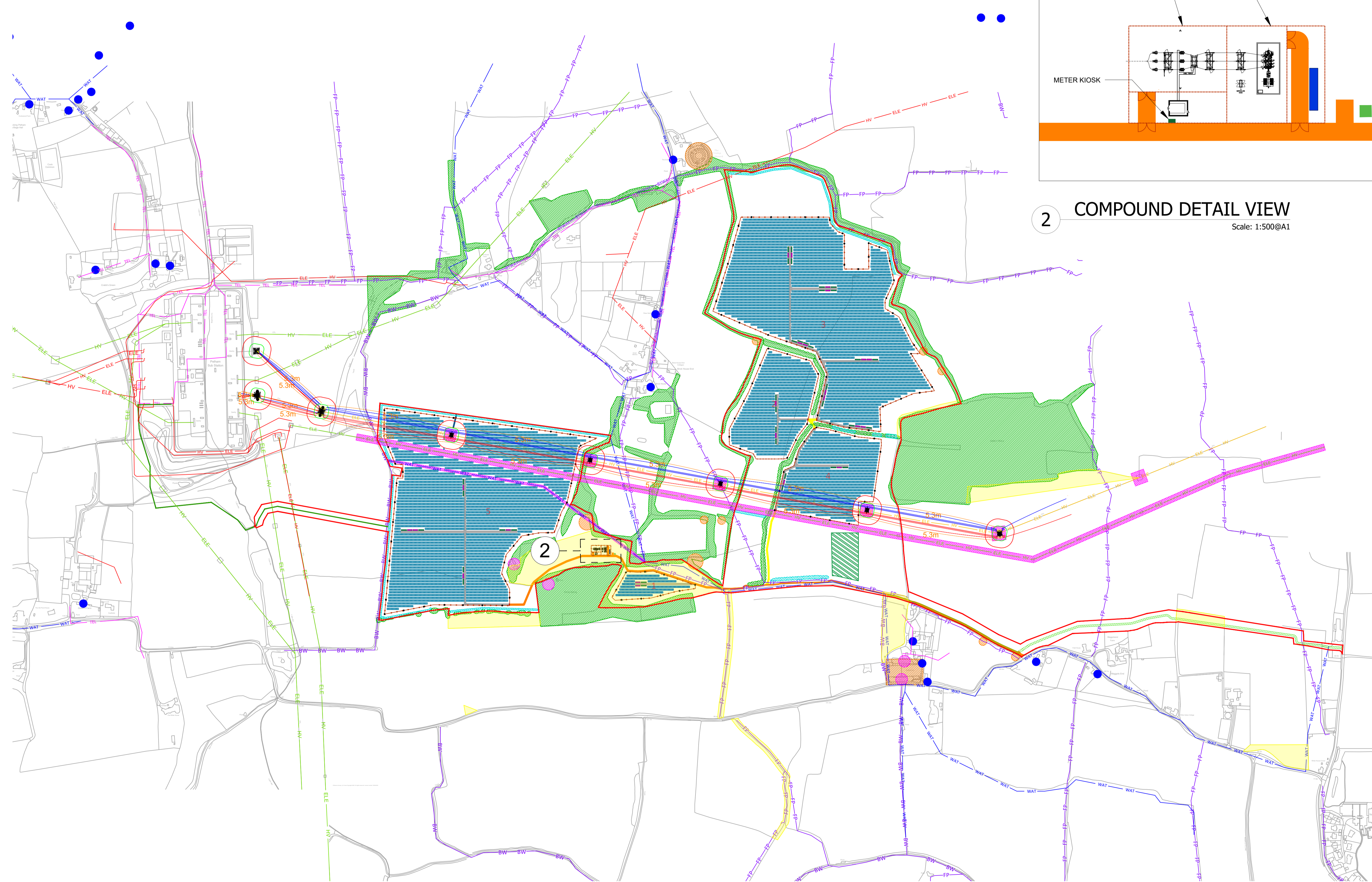
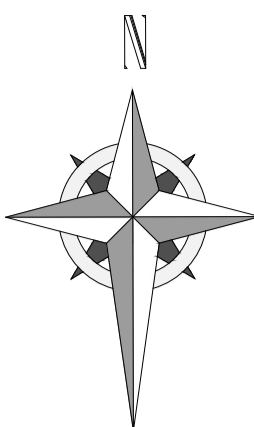
Drawn: J. Rudge
Checked: March 2021

Client: Pegasus Planning Group Ltd
East Floor, South Wing Road
Bristol BS32 4QJ

Project: Moggids End Solar Farm
Herbs
Drawing No: 661/11836/1K
Scale: A0 @ 1:500



Appendix B – Proposed Site Layout



2 COMPOUND DETAIL VIEW
Scale: 1:500@A1

This drawing is the copyright of Low Carbon and must not be reproduced in whole or in part without the written permission of Low Carbon.
All dimensions are to be confirmed on site prior to commencement of work.

Revision	Date	Revision Notes	Drawn	Inspected
01	22.07.20	First Issue	PL	TS
02	22.08.20	Revised	PL	TS
03	23.11.20	Revised	PL	TS
04	24.12.20	Revised	PL	TS
05	09.01.21	Revised	PL	TS
06	19.02.21	Revised	PL	TS
07	23.03.21	Revised	PL	TS
08	23.03.21	Revised	PL	TS
09	23.03.21	Revised	PL	TS
10	23.03.21	Revised	PL	TS
11	23.03.21	Revised	PL	TS
12	23.03.21	Revised	PL	TS
13	23.03.21	Revised	PL	TS
14	23.03.21	Revised	PL	TS
15	23.03.21	Revised	PL	TS
16	23.03.21	Revised	PL	TS
17	23.03.21	Revised	PL	TS
18	23.03.21	Revised	PL	TS
19	23.03.21	Revised	PL	TS
20	23.03.21	Revised	PL	TS
21	18.11.21	Amendments to Red Line and Layout	MC	TS
22	18.11.21	Revised	MC	TS
23	12.07.22	Revised	PL	TS
24	12.07.22	Amendment to Layout	PL	TS
25	01.08.22	Red Line & Construction Access Amendment	GF	TS
26	01.08.22	Red Line & Construction Access Amendment	GF	TS

LEGEND:

PROPOSED SITE	PROPOSED CABLE ROUTE
DNO ACCESS	CONSTRUCTION AND MAINTENANCE ACCESS
SITE ACCESS	NATIONAL GRID ACCESS
PERIMETER FENCING	CONSTRUCTION FENCING

SOLAR SITE INFRASTRUCTURE:

DNO LV SUBSTATION	SECURITY GATE
CUSTOMER SWITCHGEAR	CCTV CAMERA
SOLAR PANEL	INVERTER
MODULES (PITCH 7%)	BATTERY
METER KIOSK	

SERVICES:

EASEMENT	ON ELEC CABLE	LIQ ELEC CABLE
UPON WAYLEAVE	BRELEWAY	FOOTPATH
BITWAY	WATER MAIN	TELECOMS
SCHEDULED MONUMENTS	TEMP CONSTRUCTION COMPOUND	LISTED BUILDINGS
BADGER SETTS	GREAT CRESTED NEWTS	

ENVIRONMENT:

EXISTING VEGETATION	PROPOSED VEGETATION
FLOWER RICH MARGINS	

Overall panel counts and acreage				
Field Number	acres	useful acres	Panel count	Megawatts
1	6.28	2.46	1532	0.67
2	20.35	10.43	8604	4.22
3	58.54	41.04	39716	17.48
4	27	11.86	10656	4.68
5	54	46	40438	17.79
TOTAL	166.17	111.59	101844	44.8

Status: **PLANNING**

Project: **Pelham Spring Solar Farm**



2nd Floor Billing Square, 5.7 Carlton Gardens
London SW1T 1AG
Tel: +44(0)207 4590700
enquiries@lowcarbon.com www.lowcarbon.com

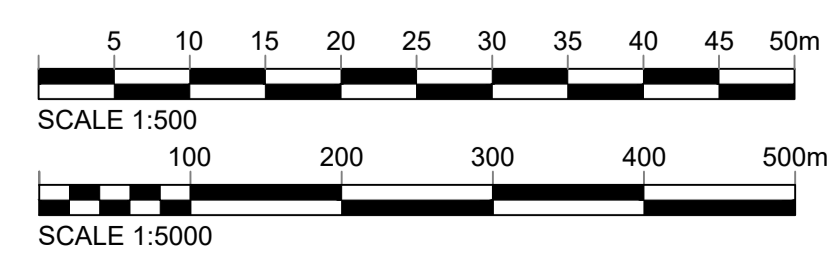
Drawing Title: **Pelham Spring Master Plan**

Drawn: PL Checked: TS First Issued: 22.07.2020

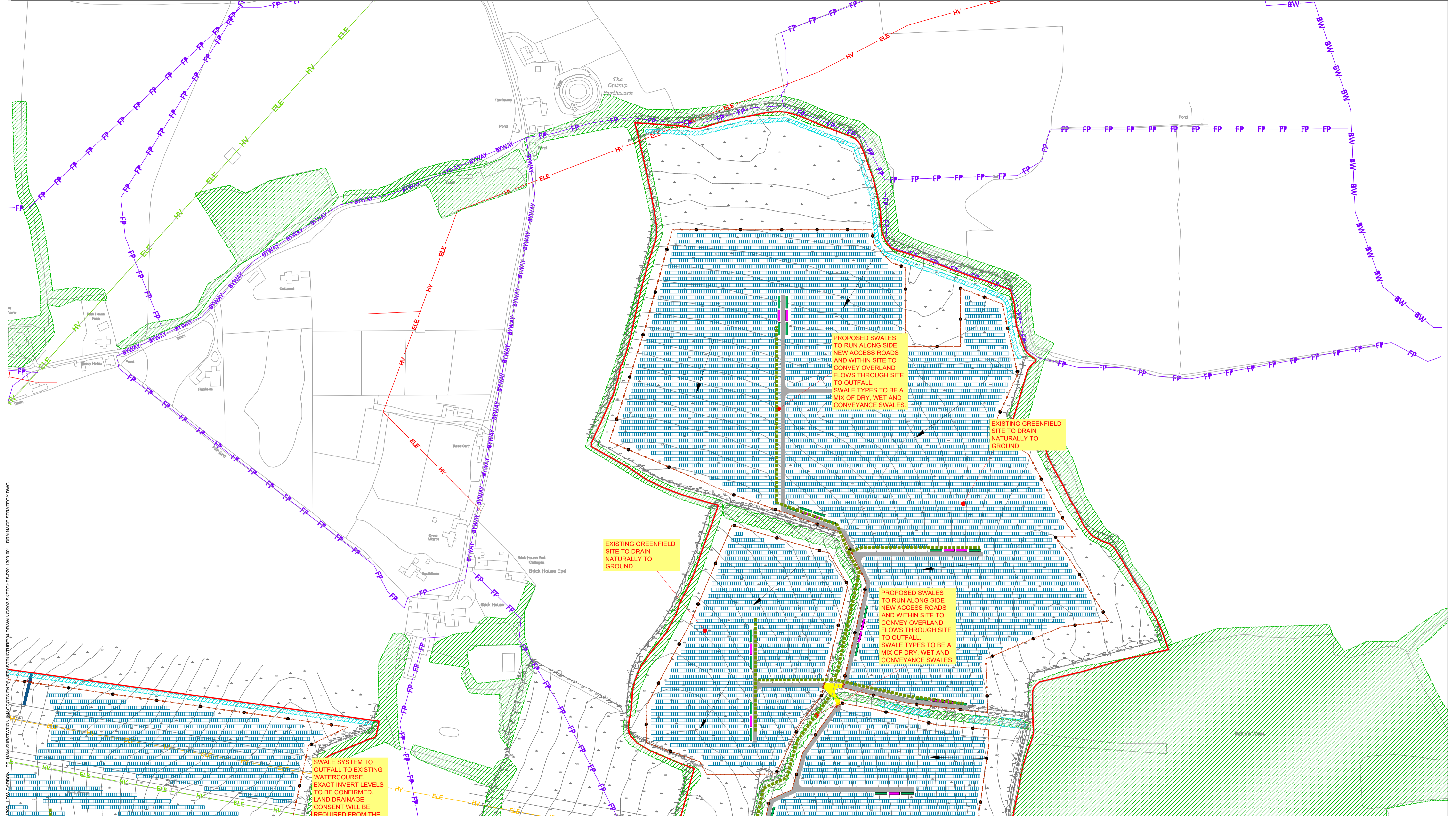
Project Code: LCS032- MP-01 Drawing Number:

Sheet Size: A1 Scale: A:N Revision: 25

1 PELHAM SPRING SOLAR FARM INDICATIVE SITE LAYOUT
Scale: 1:5000@A1



Appendix C – Proposed Drainage Strategy



IFC: BBS/COU/DATA/BRISTOL_PROJECTS/BRISTOL_LINE_PROJECTS/P201301_1300/P201301_1300/2024/LOW CARBON-PELHAM_SPRING/STRUCTURE/DRAINAGE/BRISTOL_P201301_1300_01-DRAINAGE_STRATEGY.DWG



EXAMPLES OF SWALE LAYOUTS

EXAMPLE OF DRY BASIN

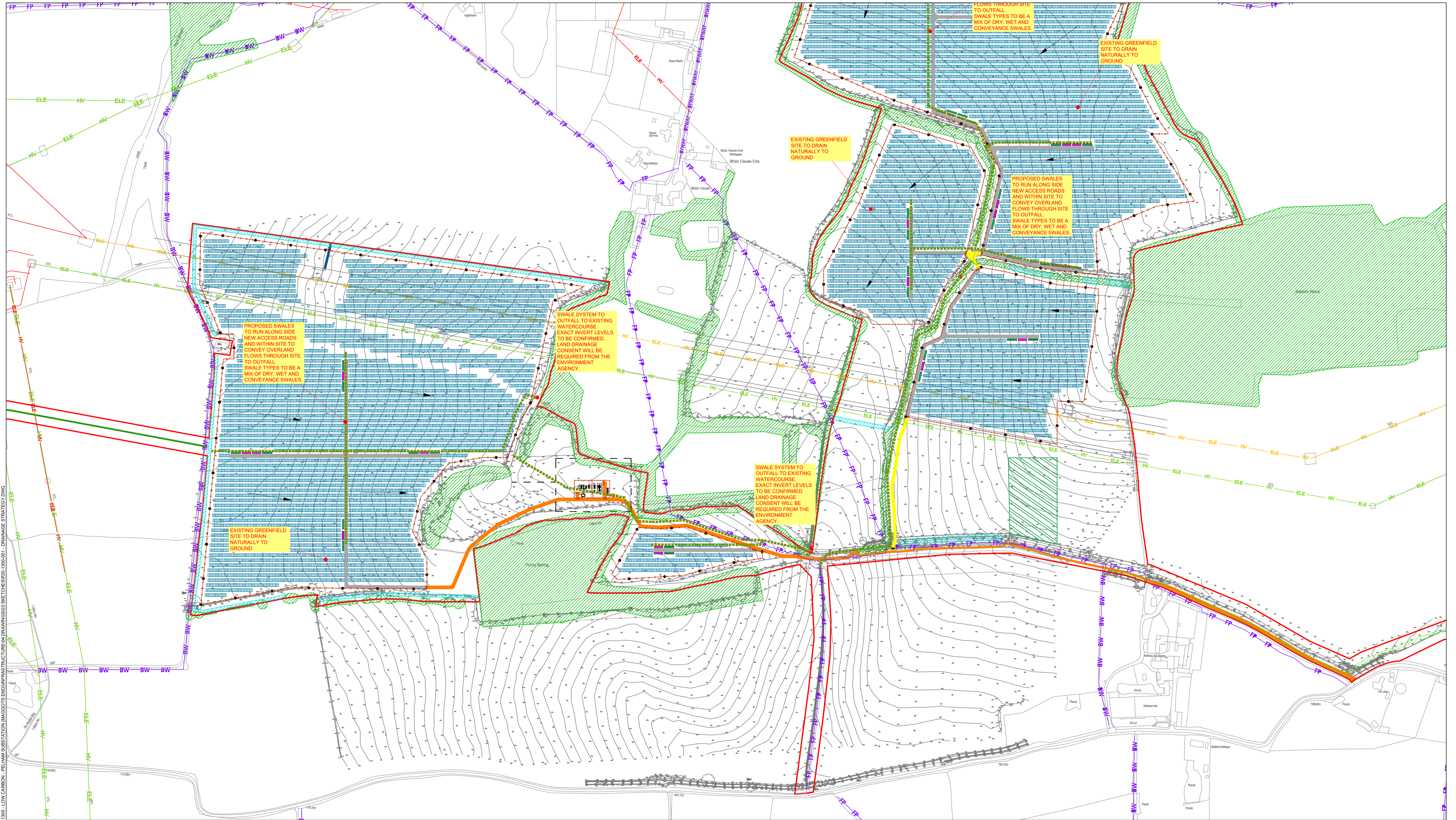
TYPICAL SOLAR PANEL ARRANGEMENT RAISED ABOVE GROUND

KEY

- PROPOSED SHALLOW SWALE. DEPTH VARY (APPROX. 0.5m - 1.0m DEEP) WITH 1:3 SIDE SLOPES. WIDTHS VARY.
- OVERLAND FLOW ROUTE

CLIENT: LOW CARBON UK LTD PROJECT: PROPOSED SOLAR FARM PELHAM SPRING (MAGGOTS END) BISHOPS STORTFORD TITLE: PROPOSED DRAINAGE STRATEGY	SCALE @ A1: 1:2000 CHECKED: LAJ DATE: 24.03.2021 DESIGN/DRAWN: MR	APPROVED: LAJ DRAWING STATUS: PLANNING PROJECT No: P20-1300 DRAWING No: 001 REV: B	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV</th> <th>DATE</th> <th>BY</th> <th>DESCRIPTION</th> <th>CHK</th> <th>APP</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>03.09.2021</td> <td>LAJ</td> <td>SITE LAYOUT UPDATE. SCALE ALTERED</td> <td>LAJ</td> <td>NRF</td> </tr> <tr> <td>B</td> <td>27.01.2022</td> <td>MR</td> <td>SITE LAYOUT UPDATE</td> <td>LAJ</td> <td>NRF</td> </tr> </tbody> </table>	REV	DATE	BY	DESCRIPTION	CHK	APP	A	03.09.2021	LAJ	SITE LAYOUT UPDATE. SCALE ALTERED	LAJ	NRF	B	27.01.2022	MR	SITE LAYOUT UPDATE	LAJ	NRF
REV	DATE	BY	DESCRIPTION	CHK	APP																
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IPC: BBS-001\DATA\BRISTOL_PROJECTS\2020\20-1300\20-1300-LOW CARBON_PELHAM_SPRING_MAGGORS_END\INFRASTRUCTURE\DRAWINGS\20-1300-01_DRAINAGE_STRATEGY.DWG



EXAMPLES OF SWALE LAYOUTS



EXAMPLE OF DRY BASIN



TYPICAL SOLAR PANEL ARRANGEMENT RAISED ABOVE GROUND

- KEY**
- PROPOSED SHALLOW SWALE. DEPTH VARY (APPROX. 0.5m - 1.0m DEEP) WITH 1:3 SIDE SLOPES. WIDTHS VARY.
 - OVERLAND FLOW ROUTE

First Floor, South Wing, Equinox North Great Park Road, Almondsbury, Bristol, BS32 4GL 01454 625945 www.pegasusgroup.co.uk Planning Design Environment Economics				REV: A, B DATE: 03.09.2021, 27.07.2022 BY: LAJ, MR	DESCRIPTION: SITE LAYOUT UPDATED, SCALE ALTERED SITE LAYOUT UPDATE	CHK: LAJ, LAJ APD: NRF, LAJ
CLIENT: LOW CARBON UK LTD		SCALE @ A1: 1:2500	CHECKED: NRF	APPROVED: NRF		
PROJECT: PROPOSED SOLAR FARM PELHAM SPRING (MAGGORS END) BISHOPS STORTFORD		DATE: 24.03.2021	DESIGN-DRAWN: LAJ	DRAWING-STATUS: PLANNING		
TITLE: PROPOSED DRAINAGE STRATEGY		PROJECT No: P20-1300	DRAWING No: 002	REV: B		

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