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**JOCKS & MORRELLO
GOOSE FARM
BROAD OAK
CANTERBURY
KENT**

**CONSENTED
POLYTUNNELS**

**DRAINAGE STRATEGY AND
SUDS MANAGEMENT &
MAINTENANCE PLAN**

Issue: B
Date: 23/04/18
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Job No: 86500



Registered No. FS 37624

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Amendments

Revision	Date	Description
A	19/04/2018	First Issue
B	23/04/2018	Address changed

References

Reference	Title
A	CIRIA Publication 753 – The SUDS Manual (2015)
B	BRE Digest 365
C	Sewers for Adoption 7 th Edition (WRc 2012)
D	Part H of the Building Regulations (2015)
E	The Soakaway Design Guide (KCC 2000)
F	Making it Happen (KCC 2007)
G	Drainage and Planning Policy Statement (KCC 2017)

1.00 Introduction

1.01 This Drainage Strategy has been developed in line with the detailed drainage design support the discharge of planning condition 4 and 5 of planning consent CA/17/02081 granted on 9th January 2018, where it states:

4. *Development shall not begin until a detailed sustainable surface water drainage scheme for the site has been submitted to (and approved in writing by) the local planning authority. The detailed drainage scheme shall demonstrate that the surface water 2 generated by this development (for all rainfall durations and intensities up to and including the climate change adjusted critical 100 year storm) can be accommodated and disposed of without increase to flood risk on or off-site. The development shall be carried out in accordance with such details as are approved and thereafter maintained.*

REASON: To ensure adequate drainage provision and to prevent pollution, in accordance with policies CC11, CC12, CC13 and QL12 of the Canterbury District Local Plan 2017, the National Planning Policy Framework.

5. *No development hereby permitted shall be occupied until details of the implementation, maintenance and management of the sustainable drainage scheme have been submitted to and approved in writing by the local planning authority. The scheme shall be implemented and thereafter managed and maintained in accordance with the approved details. Those details shall include: a) a timetable for its implementation, and b) a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage system throughout its lifetime.*

REASON: To ensure adequate drainage provision and to prevent pollution, in accordance with policies CC11, CC12 and QL12 of the Canterbury District Local Plan 2017, the National Planning Policy Framework.

Drainage Strategy & SUDS Management & Maintenance Plan

- 1.02 This strategy aims to demonstrate the methods of drainage available for the Surface Water Drainage. A Location Plan and layout of the proposed scheme and be found in the appendices of this document.
- 1.03 The site is classed green field and has an overall area of approximately 11.65ha (hectares). Due to the area of development being over 1 Hectare, the site was subject to a formal Flood Risk Assessment (FRA), completed by Monson Engineering and approved under the current planning permission.
- 1.04 The aim of this Drainage Strategy Report is to incorporate and adopt Best Management Practices (BMP's) for Sustainable Urban Drainage Systems (SUD's) in accordance with Site Specific Technical Reports and Published Documents referenced in Page (ii).

2.00 Existing Situation

- 2.01 The existing situation at Jocks & Morrello, Goose Farm within the application boundaries, is open land that has been used historically as orchards. The land currently has no formal drainage features, therefore water in higher intensity rainfall events may be able to run uncontrolled to the lower land.

3.00 Site Geology

- 3.01 The site is underlain by the London Clay Formation. This is typically described by the British Geological Survey as bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.
- 3.02 A Geindex report showing the local bedrock formations are contained in the appendices.
- 3.03 Soakage testing was attempted at various places in accordance with BRE Digest 365 throughout the application site, however infiltration was deemed not to be a viable method of surface water discharge at this site. The geotechnical investigations can be seen in the appendices.

4.00 Ground Water

- 4.01 Nearby historical borehole data indicate the ground water level to be around 48.5m BGL. Any fluctuations in the seasonal groundwater levels would pose no flood risk to the application site, therefore confident against the risk of groundwater flooding.

5.00 Topography

- 5.01 At Jocks & Morrello, the land generally slopes in a Northerly direction with a gradient of approximately 1:20. The land varies from 54mAOD at the South to 49mAOD at the North.

The full Topographical Survey can be found in the appendices.

6.00 Design Objective

- 6.01 The objective of the current design arrangement will be to;
- a) Retain/reduce the quantity of surface water runoff leaving the development area, to equal or less than the greenfield runoff rate for green field sites, up to and including the 1 in 100 year return period + 20% climate change, whilst assessing the effects of a 40% increase of the same return period in accordance with KCC Publication “Drainage and Planning Policy Statement (June 2017) Local Flood Risk Management Strategy Guidance” which aligns with Government publication “Flood Risk Assessments: Climate Change Allowances” (2016)
 - b) Improve the quality of surface water runoff by infiltration methods and open SUD’s wherever possible.

7.00 Development Drainage Proposals**Surface Water Drainage**

- 7.01 The surface water calculations for the consented polytunnels will be in accordance with the requirements set out in the Kent County Council publications “Making it Happen”, “Drainage and Planning Policy Statement” and other Statutory and non-statutory industry guidance. Given that soakage was confirmed not to be viable at this site, it is proposed that the surface water drainage is dealt with via attenuation methods.
- 7.02 The polytunnels will be constructed so they will run predominantly down the slope to the South and any rainfall will fall in the gap between each tunnel. Each gap will be intentionally maintained as a grass strip, which will absorb the majority of the run-off generated by the covered section of the tunnel – mimicking the existing situation. The ground under the polytunnels will be dry and therefore the ground will be particularly absorbent so all the rainfall run-off will be absorbed as it does in the uncovered situation. Given this situation, it is likely that around 50% will soak into the ground, leaving a potential 25% remaining to deal with. Therefore, a coefficient of 0.5 has been used for the runoff calculations.

Drainage Strategy & SUDS Management & Maintenance Plan

- 7.03 Any runoff shall be intercepted by a bunded swale running along the Northern boundary, directing the surface water to the North West where the water will be allowed to discharge to the existing ditch network at the equivalent to the 1 in 1 year greenfield runoff rate, 42.34 l/s. This will be achieved by using a 225mm diameter pipe, which will only allow a flow of around 42-43 l/s. This pipe will be marked and protected by headwalls at both ends and will have the benefit of a trash screen at the upstream end to prevent blockages. Calculations for the greenfield runoff rates can be seen in the appendices.
- 7.04 Any exceedance volumes will be managed by the flood retention bunding, to ensure the design flood is entirely contained within the application boundary and will be allowed to drain down at the given flow rate and will half drain within 24 hours.
- 7.05 All arisings generated from the formation of the swale construction shall be re-used on site to form the flood retention bunding, designed to hold any exceedance flows as “above ground storage” from the highest intensity rainfall events until such time as it can flow to the receiving ditches at the given discharge rate. All construction details can be found in the appendices.
- 7.06 This design caters for up to and including the 1 in 100 year return period + 20% climate change, whilst assessing the effects of a 40% increase of the same return period in accordance with KCC Publication “Drainage and Planning Policy Statement (June 2017) Local Flood Risk Management Strategy Guidance” which aligns with Government publication “Flood Risk Assessments: Climate Change Allowances” (2016). Calculations are contained within the appendices.

8.00 Residual Flood Risk

- 8.01 This development site was subject to a flood risk assessment which identified the flood risk elements which have been eliminated through the design process, in accordance with local policy and industry best practice.
- 8.02 The design caters for up to and including the 1 in 100 year return period + 20% climate change, whilst assessing the effects of a 40% increase of the same return period in accordance with KCC Publication “Drainage and Planning Policy Statement (June 2017) Local Flood Risk Management Strategy Guidance” which aligns with Government publication “Flood Risk Assessments: Climate Change Allowances” (2016)
- 8.03 Local groundwater fluctuations have been assessed and there is no risk of groundwater flooding.

9.00 Future Maintenance

9.01 Maintenance regimes of the various drainage methods will vary, depending on the development proposals and surroundings. However, a general guide to the management and maintenance of the various methods of drainage have been provided below, along with the organisation responsible for the ongoing maintenance for the lifetime of the development;

Flood Retention Bunding

9.02 Flood Retention Bunding is a key part of the systems operation by receiving any exceedance flows the soakaways or storage systems cannot deal with, acting as the above ground storage. In order for these to remain effective, the maintenance management team must ensure large amounts of sediment do not build up so far that it renders the bunding ineffective. Checks must also be made to ensure there is no scour damage that may lead to a future breach of the flood retention bund.

Ongoing maintenance is recommended in the table below.

Table 1 – Bund Maintenance Activities – By the Farm Management Team

Maintenance Activity	Remedial Action	Inspection Frequency	
Inspect bund for build up of sediment and debris	Remove sediment and debris with appropriate tools and dispose to the appropriate facility.	Post completion – up to 1 year	Quarterly
		On-going	Annually or as required
Inspect vegetation growth	Cut back vegetation/grass to ensure the bund is visible and the storage in not compromised.	Post completion – up to 1 year	Quarterly
		On-going	Annually or as required
Inspect bund for erosion.	Repair any affected areas by replacing any lost soil and re-turfing where necessary.	Post completion – up to 1 year	Quarterly
		On-going	Annually or as required

Drainage Strategy & SUDS Management & Maintenance Plan

Swales

- 9.03 The surface water runoff not able to naturally infiltrate at source, will be directed to the swale at the Northern Boundary. This Swale will run in a westerly direction towards the discharging headwall to the ditches to the north.

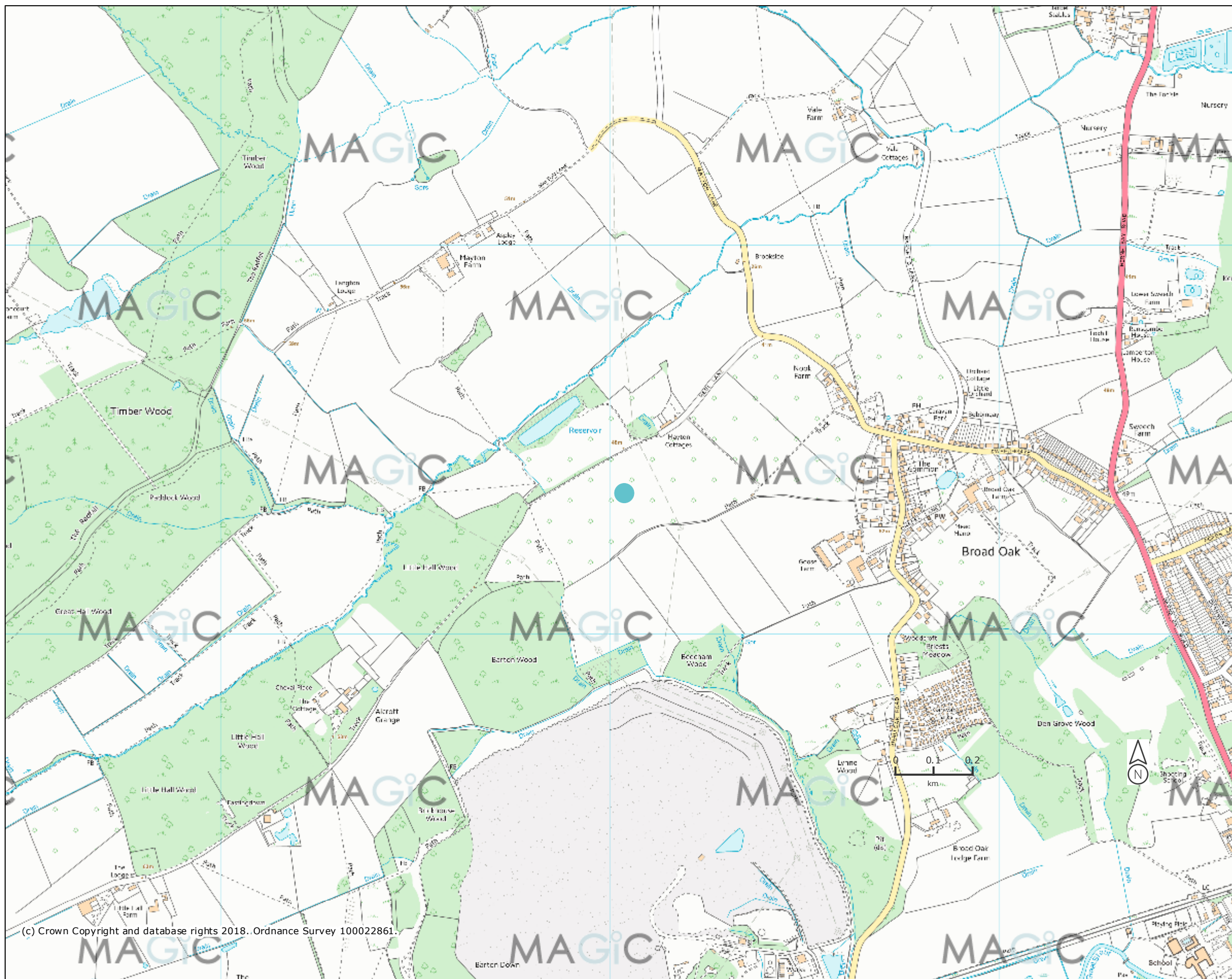
- 9.04 At any points of discharge into the swale, there shall be anti-scour measures integrated into the design to ensure any potential erosion is kept to an absolute minimum. This can be managed with grass seeding of the swales.

The ongoing maintenance activities for this system are tabulated on the following page in Table 2.

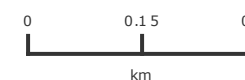
Table 2 – Swale Maintenance Activities – By the Farm Management Team

Maintenance Activity	Remedial Action	Inspection Frequency	
Inspect swales for Litter and debris	Remove litter and debris with appropriate tools and dispose to the appropriate facility.	Pre-completion	Monthly
		Post completion – up to 1 year	Monthly
		On-going	Monthly or as required
Inspect vegetation growth	Cut back vegetation/grass to ensure the channel is visible and the flow is not restricted.	Pre-completion	Monthly
		Post completion – up to 1 year	Monthly
		On-going	Quarterly or as required
Inspect channel and discharge points for erosion.	Repair any affected areas by replacing any lost soil and re-turfing where necessary.	Pre-completion	Quarterly
		Post completion – up to 1 year	Quarterly
		On-going	Annually
Inspect channel for build-up of sediment.	Remove excess sediment from the channel with the appropriate equipment and dispose to an appropriate facility.	Pre-completion	Monthly
		Post completion – up to 1 year	Quarterly
		On-going	Annually or as required
Inspect outlet pipes and culverts for sediment build-up.	Remove any excess sediment from the pipes/culverts with drainage rods and/or professional jetting techniques.	Pre-completion	Monthly
		Post completion – up to 1 year	Quarterly
		On-going	Annually or as required

Appendix A - Site Location Plan

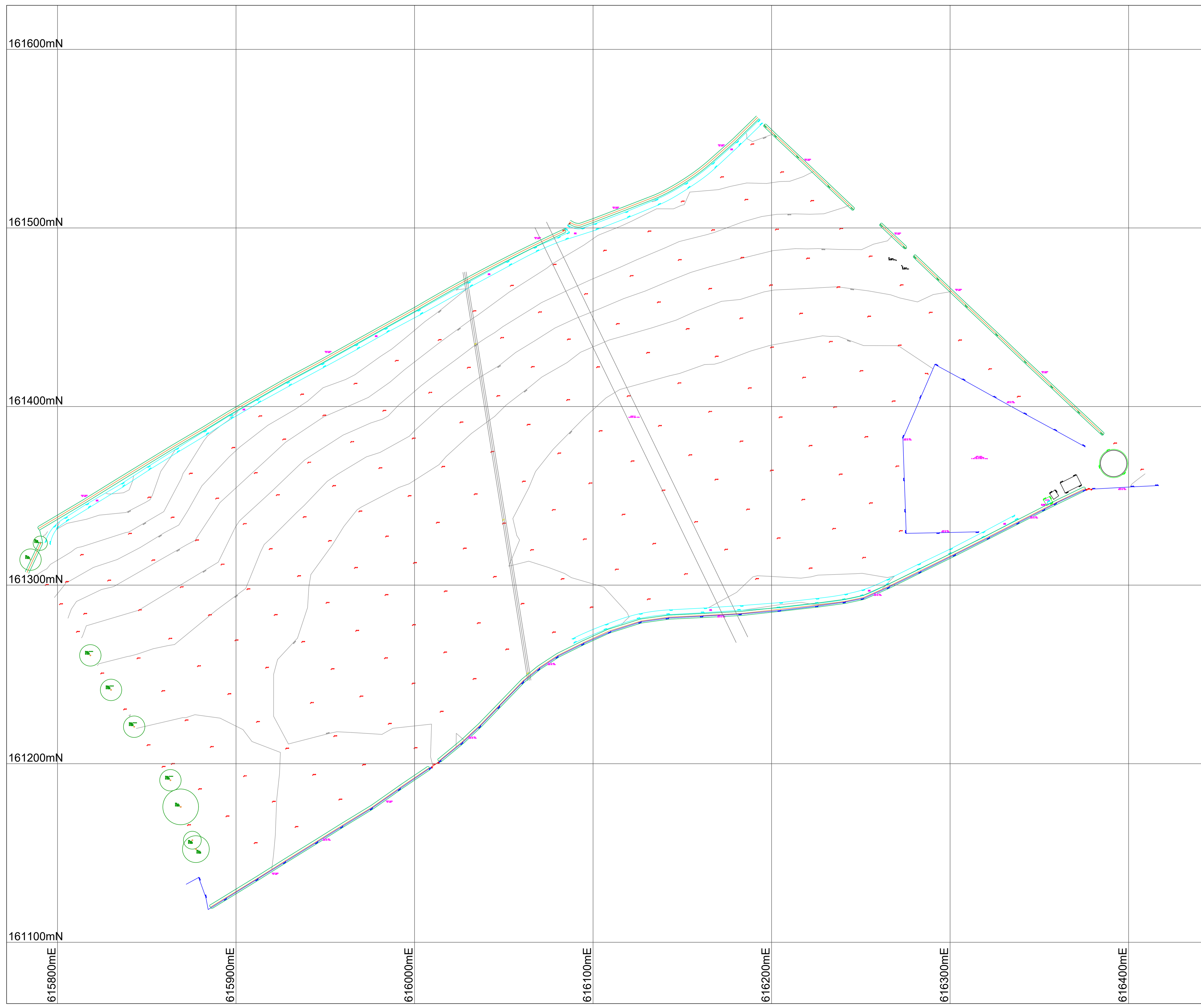


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 ymin = 159700
 xmax = 618600
 ymax = 163000



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Appendix B - Topographical Survey



LEGEND

CATV	CABLE TELEVISION COVER	BD	BACK DROP
EIC	ELECTRIC INSPECTION COVER	BL	BASE/BED LEVEL
EJB	ELECTRIC JUNCTION BOX	CL	COVER LEVEL
EP	ELECTRICITY POLE	CP	CATCH PIT
ER	EARTHING ROD	DC	DRAINAGE CHANNEL
FH	FIRE HYDRANT	DP	DOWN PIPE
GJB	GAS JUNCTION BOX	G	GULLY
GV	GAS VENT	IC	INSPECTION COVER
JB	JUNCTION BOX	IL	INVERT LEVEL
MK(E)	SERVICE MARKER (ELECTRIC)	MH(C)	MANHOLE (COMBINED)
MK(G)	SERVICE MARKER (GAS)	MH(F)	MANHOLE (FOUL)
MK(W)	SERVICE MARKER (WATER)	MH(S)	MANHOLE (SURFACE WATER)
OHW	OVERHEAD WIRE	RE	RODDING EYE
SC(G)	STOP COCK (GAS)	RWP	RAIN WATER PIPE
SC(W)	STOP COCK (W)	SEG	SIDE ENTRY GULLY
STAY	SUPPORT FOR TELEPHONE POLE	SVP	SOIL VENT PIPE
SV	STOP VALVE	UTL	UNABLE TO LIFT
BT	TELEPHONE INSPECTION COVER	VP	VENT PIPE
TJB	TELEPHONE JUNCTION BOX	WO	WASH OUT
TP	TELEPHONE POLE	B	BOLLARD
WIC	WATER INSPECTION COVER	BH	BORE HOLE
WM	WATER METER	BP	BRICK PILLAR
DPC	DAMP PROOF COURSE	BS	BUS STOP
THL	THRESHOLD LEVEL	CPS	CONCRETE PAVING SLABS
T.O.W	TOP OF WALL	FB	FLOWER BED
WL	WATER LEVEL	LB	LITTER BIN
CLG	CEILING LEVEL	LC	LIGHTING COLUMN
DHL	DOOR HEAD LEVEL	P	POST
FL	FLOOR LEVEL	PB	POST BOX
SCLG	SUSPENDED CEILING LEVEL	RNP	ROAD NAME PLATE
US	UNDERSIDE	RS	ROAD SIGN
USB	UNDERSIDE OF BEAM	RW	RETAINING WALL
WCL	WINDOW CILL LEVEL	SP	SIGN POST
WHL	WINDOW HEAD LEVEL	SU	STEP(S) UP
		TCB	TELEPHONE CALL BOX
		TS	TREE STUMP

	TREE	Species Trunk Canopy Height
	SURVEY STATION	

	GATE - GATES
	FENCE
	BUILDING
	OVER HEAD BUILDING LINE
	FACE OF WALL
	CHANGE OF SURFACE
	EDGE OF UNDERGROWTH
	TREE LINE/HEDGE ROOT LINE
	TOP OF BANK
	BOTTOM OF BANK
	KERB
	DROP KERB
	CONTOUR WITH VALUE
	OVER HEAD CABLE

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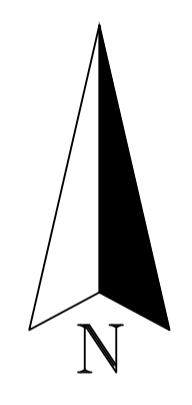
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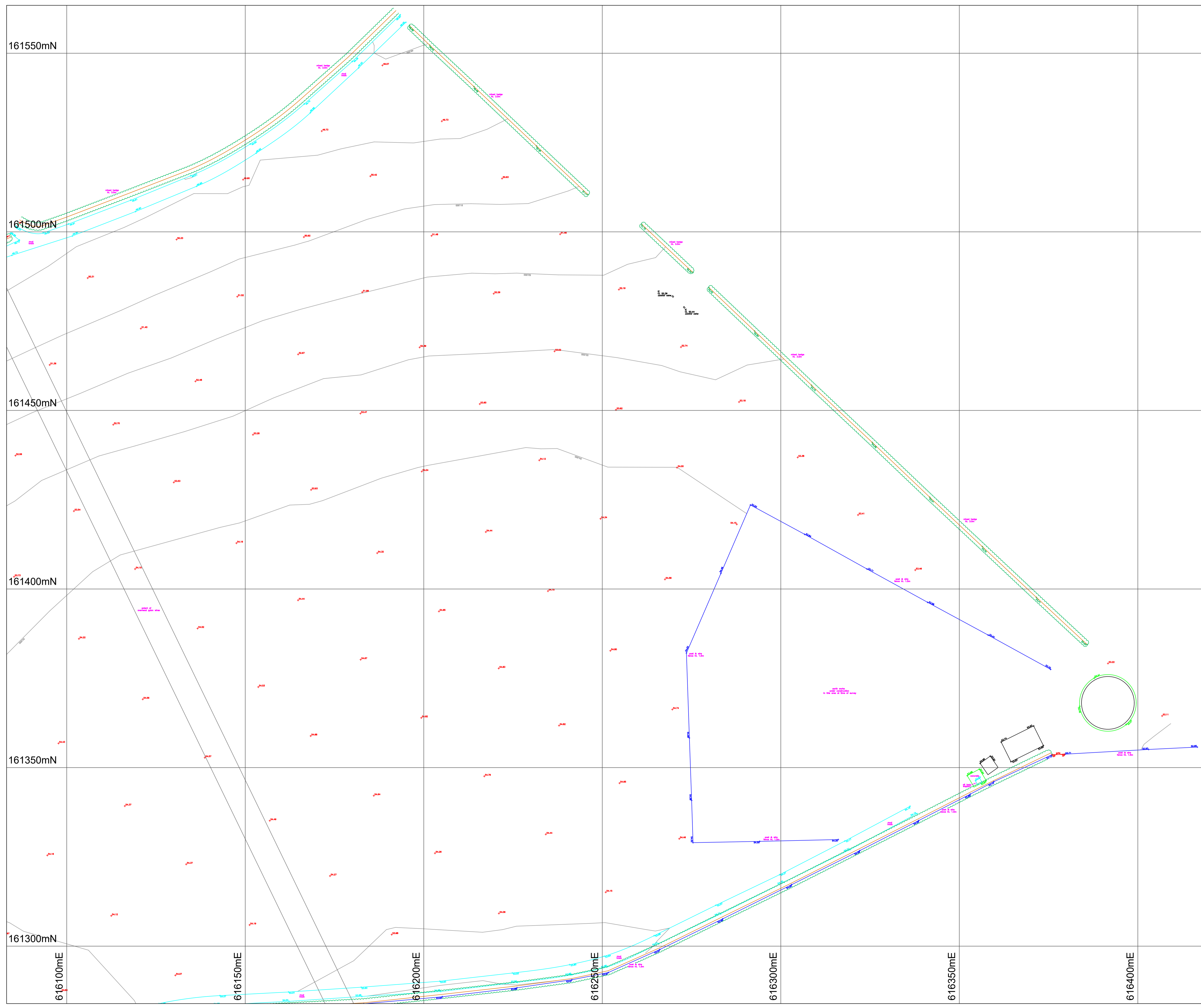
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Site
**GOOSE FARM
 BROADOAK, STURRY**

Drawing
**TOPOGRAPHICAL SURVEY
 SHEET 1 of 4**

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Scale	1/1000 @ A1	Revision			



LEGEND

CATV	CABLE TELEVISION COVER	BD	BACK DROP
EJC	ELECTRIC INSPECTION COVER	BL	BASE/BED LEVEL
EJB	ELECTRIC JUNCTION BOX	CL	COVER LEVEL
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GATE - GATES	
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	FACE OF WALL
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	EDGE OF UNDERGROWTH
	TOP OF BANK
	BOTTOM OF BANK
	KERB
	DROP KERB
	1.0, 2.5 CONTOUR WITH VALUE
	OHW OVER HEAD CABLE
	TREE LINE/HEDGE ROOT LINE

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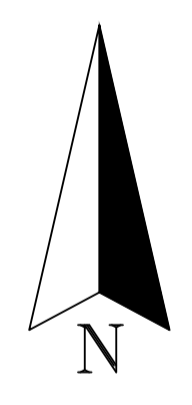
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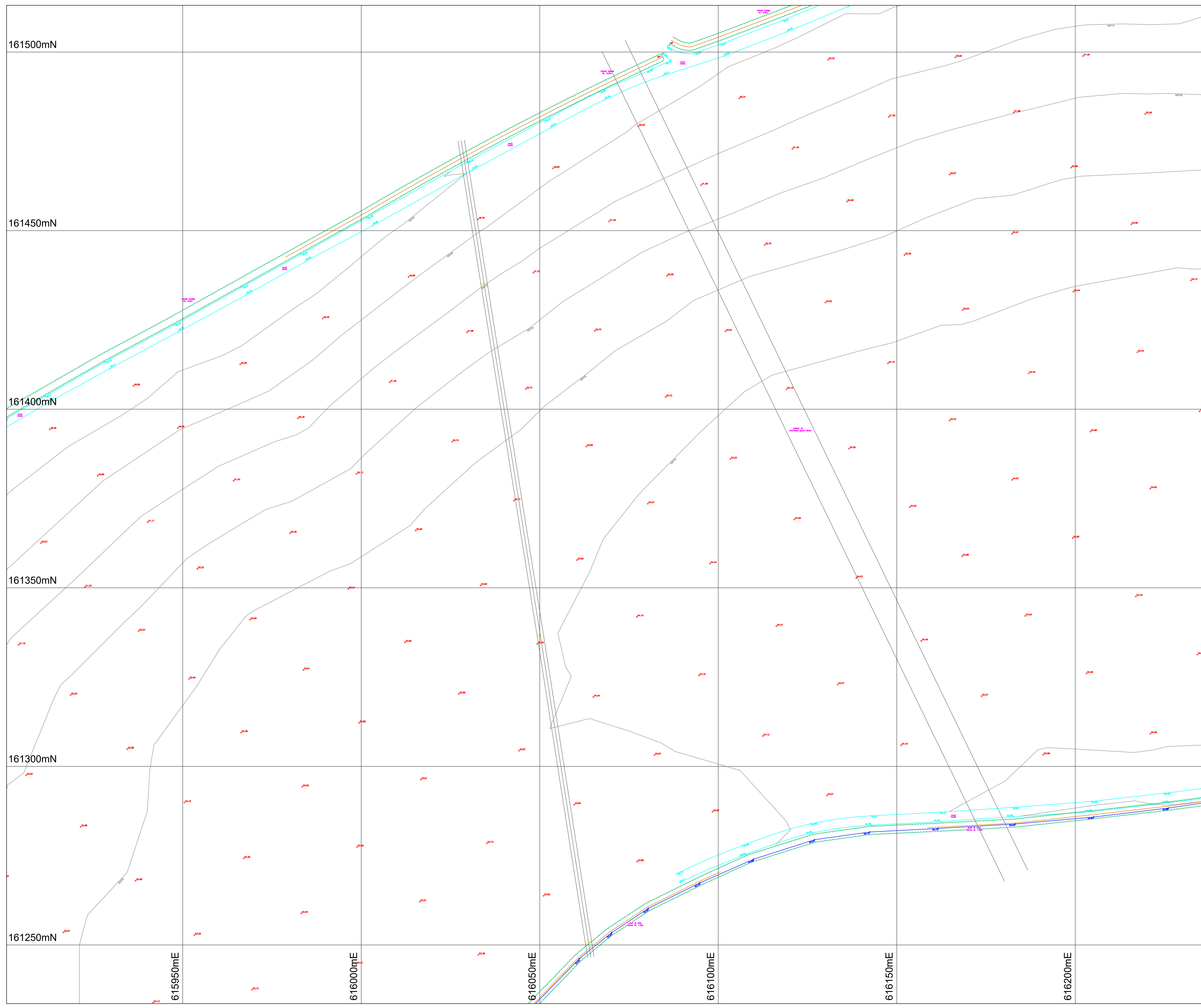
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SHEET 2 of 4**

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	BOTTOM OF BANK	
	KERB	
	DROP KERB	
	CONTOUR WITH VALUE	-1.0, 2.5
	OVER HEAD CABLE	
	TREE LINE/HEDGE ROOT LINE	

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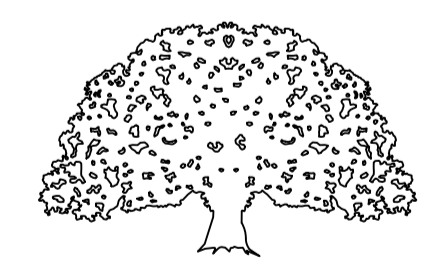
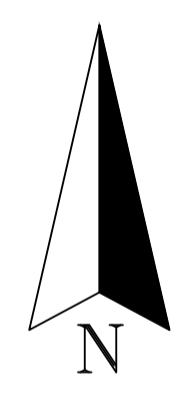
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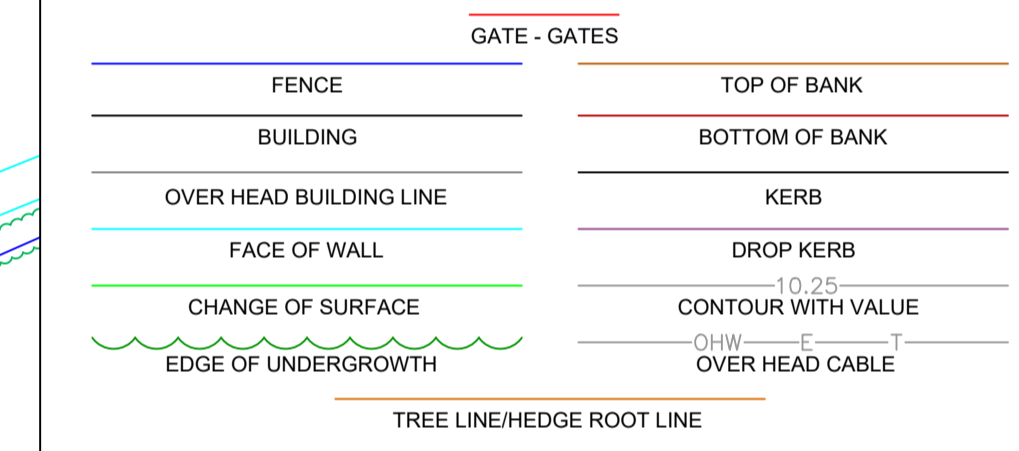
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GV	GAS VENT	IC	INSPECTION COVER
JB	JUNCTION BOX	IL	INVERT LEVEL
MK(E)	SERVICE MARKER (ELECTRIC)	MHC	MANHOLE (COMBINED)
MK(G)	SERVICE MARKER (GAS)	MHF	MANHOLE (FOUL)
MK(W)	SERVICE MARKER (WATER)	MH(S)	MANHOLE (SURFACE WATER)
OHW	OVERHEAD WIRE	RE	RODDING EYE
SC(G)	STOP COCK (GAS)	RWP	RAIN WATER PIPE
SC(W)	STOP COCK (W)	SEG	SIDE ENTRY GULLY
STAY	SUPPORT FOR TELEPHONE POLE	SVP	SOIL VENT PIPE
SV	STOP VALVE	UTL	UNABLE TO LIFT
BT	TELEPHONE INSPECTION COVER	VP	VENT PIPE
TJB	TELEPHONE JUNCTION BOX	WO	WASH OUT
TP	TELEPHONE POLE	B	BOLLARD
WIC	WATER INSPECTION COVER	BH	BORE HOLE
WM	WATER METER	BP	BRICK PILLAR
DPC	DAMP PROOF COURSE	BS	BUS STOP
THL	THRESHOLD LEVEL	CPS	CONCRETE PAVING SLABS
T.O.W	TOP OF WALL	LC	LIGHTING COLUMN
WL	WATER LEVEL	LB	LITTER BIN
CLG	CEILING LEVEL	LC	LIGHTING COLUMN
DHL	DOOR HEAD LEVEL	P	POST
FL	FLOOR LEVEL	PB	POST BOX
SCLG	SUSPENDED CEILING LEVEL	RNP	ROAD NAME PLATE
US	UNDERSIDE	RS	ROAD SIGN
USB	UNDERSIDE OF BEAM	RW	RETAINING WALL
WCL	WINDOW CILL LEVEL	SP	SIGN POST
WHL	WINDOW HEAD LEVEL	SU	STEP(S) UP
		TCB	TELEPHONE CALL BOX
		TS	TREE STUMP



ALL LEVELS AND CO-ORDINATES ARE RELATED TO THE ORDANCE SURVEY NATIONAL GRID OSTM15, UNLESS OTHERWISE NOTED.

CONTOUR INTERVALS SET AT 1.0M WHERE APPLICABLE

TREE SPECIALS AND DETAILS ARE QUOTED AS A MEAN SIZE AND SHOWN TO SCALE. HOWEVER NO RESPONSIBILITY CAN BE TAKEN FOR WRONG SPECIES IDENTIFICATIONS.

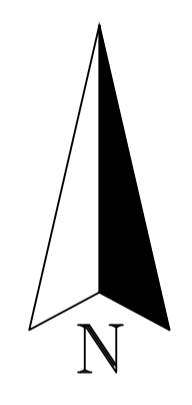
IT IS RECOMMENDED THAT FOR ANY WORKS INVOLVING DRAINAGE, THAT ADDITIONAL CHECKS ARE CARRIED OUT BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION COMMENCING.

DO NOT SCALE FROM A PDF.

DRAWING IS CORRECT AT TIME OF SURVEY.

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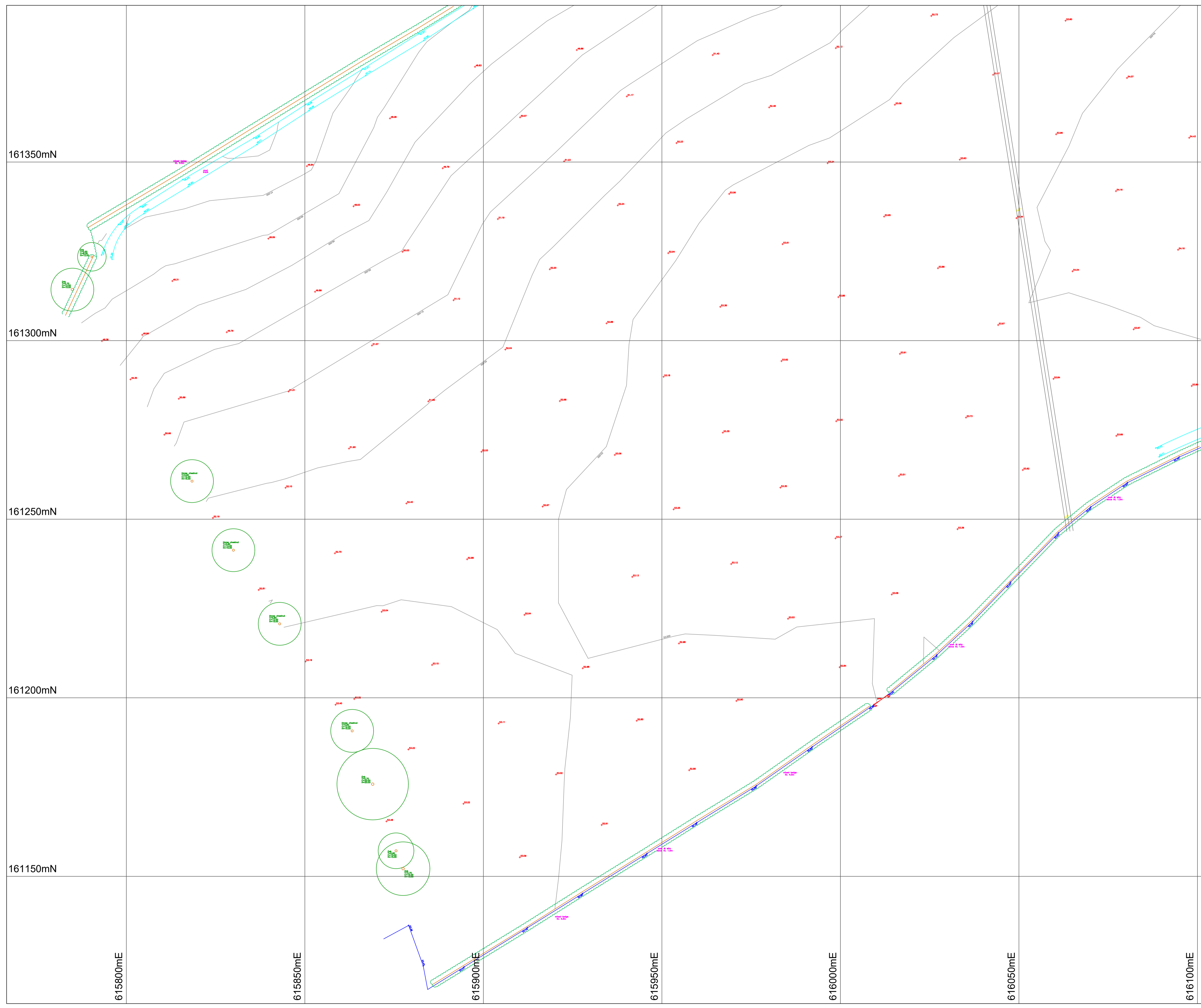
OAK SURVEYS LTD

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 Folkestone
 Kent, CT19 6DU Tel: 07792572772

Site
**GOOSE FARM
 BROADOAK, STURRY**

Drawing
**TOPOGRAPHICAL SURVEY
 SHEET 4 of 4**

Drawn by	C.H.	Date	29/01/18	Drawing No.	Oak_17-018
Scale	1/500 @ A1	Revision			



Appendix C - Bedrock Geology Map

GeoIndex Report

