P/2010/00255

St.GEORGE'S PARK

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APPENDIX F1

Flood Risk Assessment (February 2010)

National Football Centre Hotel & Sports Facilities, St. George's Park Flood Risk Assessment

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Regional Director

National Football Centre Hotel & Sports Facilities, St. George's Park: Flood Risk Assessment

Rev No	Comments	Checked by	Approved by	Date
	Draft			2nd February 2010
1	Revised Report incorporating NLP comments (11/02/10)	G.P.	D.P.	12th February 2010
2	Final Report incorporating NLP comments (15/02/10)	G.P.	D.P.	15th February 2010

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Table of Contents

Capabilities on project:
Water

1 Introduction and Background

1.1 Introduction

This flood risk assessment (FRA) has been prepared for The Football Association (The FA) and applies to revised proposals for the National Football Centre (NFC), at St. George's Park.

Construction of the NFC commenced in 2001 and was suspended in 2004. Prior to this the sports pitches (11 no.) and associated access roads were built. The current revised detailed planning application proposals will enable the NFC development to be completed and include the construction of:

- A small gatehouse at the entrance to the NFC site;
- A community changing facility;
- A 230 bedroom hotel incorporating conference facilities and a health/fitness suite in the central part of the site;
- A flexible sports hall, medical/exercise science facilities, and offices for staff and a full size indoor football pitch;
- Associated car parking.

A separate outline planning application is to be submitted for an enabling residential development within the wider NFC site. A separate FRA covers the residential development proposal.

The following information has been used as the basis of the assessment:

- Masterplan drawing produced by Red Box Architecture in February 2010;
- Preliminary Foul and Surface Water Drainage Strategy produced by Arup in January 2010;
- A series of Briefing Notes produced by Nathaniel Lichfield and Partners (December 2009 – January 2010);
- An EIA Scoping Opinion request to East Staffordshire Borough Council, produced by Nathaniel Lichfield and Partners in January 2010;
- A site visit conducted on the 28th November 2008;
- A topographic survey undertaken by Survey Operations in July 2008;
- The River Trent Catchment Flood Management Plan, Scoping Report produced in November 2006;
- A ground investigation of the site carried out by Exploration Associates in 2001.

Additionally, the Environment Agency (EA) provided site specific flood risk information.

1.2 Background

The site is located at St. George's Park, near Needwood, Burton on Trent. The wider NFC site covers an area of approximately 143 hectares (ha), however the planning application site to which this FRA relates is 22.4 ha. The redline boundary of the site is shown in Appendix B. The land runs along the main access route into the site and is bounded: to the west by the existing grass sports pitches; and to the east by the Lin Brook.

The site lies in open countryside and is located within the designated National Forest. Historically, the site has been used for both arable and pastoral agricultural practices (See Appendix A, Photograph 2).

Part of the site was formerly occupied by Byrkley Hall, which was erected in the 1890s and subsequently demolished in 1952 [Ref 1]. The site was acquired by Forte in 1991, following which the stable block and outbuildings were largely demolished. A small part of these remain standing, together with the remains of the estate's original icehouse. The whole site is now in the freehold ownership of National Football Centre Limited, a subsidiary of The FA.

Immediately to the east of the area currently under consideration lies the Lin Brook, which runs north to south through the centre of the wider NFC site. A system of weirs has been used to create a series of open ponds along the course of the Brook, which is otherwise a relatively shallow and narrow wetland corridor. A secondary stream enters the site from the north, culminating in a newly created pond, located at the bridge crossing point on the access road, see Photograph 3.

The topography at the site generally falls towards the Lin Brook. The lowest ground elevation at the site area in question is approximately 102m AOD (close to the Lin Brook). The maximum ground elevation is found in the north of the site and is approximately 123mAOD. Ground levels undulate throughout the site with the existing football pitches forming a series of unobtrusive plateau within this landscape. The topographic survey of the site is included in Appendix B.

In 2001 planning permission was granted by East Staffordshire Borough Council for the NFC. The planning permission has been implemented, although not completed. On the wider NFC site at present are nine grass pitches (two of which are double sized), two synthetic pitches, an energy centre (maintenance building), and three 'dirty' seminar rooms (to provide accommodation for half-time discussion and toilets). Some associated infrastructure (including three small car parks) and drainage works have also been carried out. Moreover there is a 'vortex' control unit that controls water run-off from the pitches, via a large (3,000m^3) storage tank which also serves to feed the irrigation system. Foundations were also laid for the extant hotel scheme and an underground tunnel was built with the intention of providing secure access from the hotel to the indoor pitch. Current plans for the hotel will utilise a different location from the original foundations. The foundations and underground tunnel will therefore be redundant. Please refer to Photographs 6-9.

For safety purposes the underground tunnel was filled with gravel and there is presently standing water over this tunnel (Photograph 10). The site is currently used by local football teams and an area towards the north has also been let for grazing.

Current and post-development site plans are included in Appendix B.

2 Flood Risk to Site

2.1 Historical Flooding

The EA confirms that there is no known history of flooding in the area of the site (see Appendix C).

Additionally we have liaised with the groundsman at the NFC, who has confirmed that only minor ponding has occurred during the past five years since construction ceased. This ponding has occurred briefly during periods of heavy rainfall at one of the unfinished access roads. Standing water was noted at the time of the site visit (see Photograph 11). It is envisaged that this minor case of flooding will be resolved once construction resumes and the road is completed.

2.2 Existing Flood Risk

2.2.1 Flooding from Rivers and Sea

The site is regarded by the EA as lying within Flood Zone 1 – an area with less than 1 in 1000 (<0.1%) annual probability of river flooding (see Appendix C). Whilst the corridor that follows the Lin Brook is classified as lying within Flood zone 3 (high probability of flooding), ground levels rise steadily at the site moving westwards from the Brook.

Furthermore, at the time of the site visit, the rate of flow of the Lin Brook, which is generally narrow and shallow, appeared low. Whilst the ponds are of reasonable size, the fall of the land on either side of the Lin Brook suggests that the site is very unlikely to be affected by flooding of the Lin Brook and associated ponds.

In summary, the existing level of flood risk from rivers is deemed to be low.

2.2.2 Flooding from Land

The majority of the site is undeveloped (Greenfield), with the exception of works completed to date. Whilst the topography is identified as gently rolling, there are no major steep slopes at the site.

The ground investigation report indicates that below the turf and topsoil (0.2m – 0.3m), lies glacial till (typically 4.5m – 7.5m, although close to the Lin Brook the minimum thickness is approximately 1m), and below this lies weathered Tea Green Marl (part of the Mercia Mudstone Group) [Ref 2]. The glacial till is a firm, becoming stiff to very stiff, sandy gravely clay, which contains lenses, or possible seams, of water-bearing silty sand or silty, sandy gravel. The ground conditions are therefore deemed to allow some natural infiltration however this will need to be verified by permeability testing during the detailed design stage.

An extensive network of shallow land drains, discharging to the Lin Brook, was identified during the ground investigation. Additionally, a series of swales have been constructed along the main access road into the site in order to promote natural infiltration of runoff from the road (See Photograph 12). Excess surface water runoff from existing hardstanding areas discharges to the Lin Brook.

Ponding is known to occur in a small area along one of the unfinished access roads however; following liaison with the groundsman at the NFC it us understood that this problem is relatively minor and short lived. There is standing water over the buried tunnel which was designed to provide access to the indoor pitch from the extant hotel scheme. Whilst the depth of this water is yet to be determined it is envisaged that it is relatively shallow.

Drainage from and irrigation of the grass pitches is provided by the 3,000m^3 storage tank located towards the south eastern edge of the wider NFC site. The overflow route from the storage tank is to the Lin Brook via a 300mm diameter pipe. Despite the unrestricted nature of the overflow system, there are no known flooding problems at the Lin Brook or elsewhere at the wider NFC site arising from the drainage of the football pitches.

In summary, the existing level of flood risk from land is deemed to be low.

2.2.3 Flooding from Groundwater

The EA was unable to provide groundwater information however the ground investigation report, carried out over May and June of 2001, provides some data on groundwater levels.

Seepages of ground water were noted in the walls of several of the trial pits, which suggest a relatively high water table within the site boundary with groundwater as high as 2m below ground level.

Further groundwater monitoring would be required in order to fully assess groundwater conditions at the site throughout the year. However, despite the shallow groundwater noted at the site during the ground investigation, the topography means that groundwater flooding is unlikely to occur other than close to Lin Brook i.e. outside of the redline boundary of the site.

In summary, the existing level of flood risk from groundwater is deemed to be low.

2.2.4 Flooding from Sewers

There is minimal sewerage infrastructure lying within the site boundary.

The small number of existing sheds and buildings which are currently foul drained, drain to local individual foul soakaways.

The ground investigation confirmed that an extensive network of shallow land drains has been installed at the site, discharging to the Lin Brook (see Photograph 13).

In summary, the existing level of flood risk from sewers is deemed to be low.

2.2.5 Flooding from Reservoirs, Canals and Artificial Sources

There are a number of weirs and ponds within the wider NFC site boundary; however these are aligned with the Lin Brook and due to the rising slopes on either side of the Lin Brook, are unlikely to affect the area currently under investigation.

In summary, the existing level of flood risk from these sources is deemed to be low.

2.3 Post Development Flood Risk

2.3.1 Flooding from Rivers and Sea

Whilst the development will involve significant land works, any changes in ground level are unlikely to affect the level of flood risk from the Lin Brook, since all building work is at significant height (>10m) above the Lin Brook.

The proposed development type is classified as more vulnerable according to PPS25 Table D.2, however in accordance with PPS25 table D.3, this degree of vulnerability is deemed compatible with the designated Flood Zone of the site i.e. Flood Zone 1.

In summary, the post-development level of flood risk from rivers is predicted to remain low.

2.3.2 Flooding from Land

The proposed development will involve an increase in the total impermeable area at the site. As a consequence, rainfall runoff rates will increase and this will need to be mitigated. However; it is envisaged that all rainfall will eventually end up in the Lin Brook. This is understood to be no different from the current situation, since at present any rain that falls over permeable surfaces and is allowed to infiltrate naturally, travels to the Lin Brook as groundwater.

It is proposed that Sustainable Drainage Systems (SUDS) are used on site to manage the flow of surface water through the development to the Lin Brook (see Section 2.4). The SUDS will allow a controlled rate of discharge and will incorporate the appropriate number of treatment train components.

It is predicted that the ponding that is known to occur in a small area along one of the unfinished access roads will be resolved through the completion of the road, and the construction of roadside swales.

It is understood that the buried tunnel, which was designed to provide access to the indoor pitch from the extant hotel scheme, is not part of the current plans for the development. Regardless of whether this tunnel is removed (and the hole backfilled) or left in its current state, the standing water in this area is unlikely to cause any flooding problems. Furthermore this water is likely to evaporate or infiltrate during the summer months.

The proposed works should not lead to the creation of any steep slopes at the site, and if the recommendations set out in Section 2.4 are followed, overland flood risk is likely to remain low even taking into account the likely effects of climate change upon rainfall runoff.

In summary, the post-development level of flood risk from land is predicted to remain low.

2.3.3 Flooding from Groundwater

It is understood that the proposed hotel will require some excavation, and will involve the construction of a ‘semi-basement’ (see Appendix B). The semi-basement, which will not be used for overnight sleeping accommodation, will involve an excavation to a maximum depth of approximately 2m below the existing ground level. Due to the relatively high water table at the site, the semi-basement will require a flood proof design. Further groundwater monitoring will inform the design of the semi-basement and associated retaining wall at the detailed design stage.

Provided a flood proof design of the semi-basement is adopted, the post-development level of flood risk from groundwater will remain low.

2.3.4 Flooding from Sewers

The proposed NFC development will generate significant foul water discharge. As there is no immediate local sewer network it would be cost prohibitive to discharge to the nearest existing sewer. It is therefore proposed that the foul water generated on site (including discharge from the community changing facilities) would be treated on site by a new waste water treatment plant. This approach has been accepted in principle by the EA.

The treated effluent would discharge to the Lin Brook, either directly or via additional treatment as necessary, at discharge rates and water quality to be agreed with the EA.

Sanitary appliances at the proposed gatehouse will connect to a septic tank package treatment plant, discharging treated effluent to the Lin Brook with any additional treatment necessary, and subject to EA consent

The generated foul water rates will be calculated based on the number and type of sanitary appliances provided on site or on the number of people on site, in accordance with Sewers for Adoption 6th Edition.

For further information on the proposed foul water drainage please refer to Preliminary Foul and Surface Water Drainage Strategy produced by Arup (January 2010).

Historically, the site has been used primarily for agricultural purposes. Accordingly, there is no local surface water sewer network. However, an extensive network of shallow land drains has been installed at the site, discharging to the Lin Brook. This network will be largely unaffected by the development.

It is proposed that surface water will be managed on site using SUDS, discharging to the Lin Brook. The SUDS will incorporate flow control devices and the appropriate number of treatment train components. Discharge to the Lin Brook will be limited to the current greenfield runoff rate. The surface water drainage strategy is discussed in more detail in Section 2.4.

In summary, the post-development level of flood risk from sewers will remain low and largely unchanged in the case of surface water drainage and will increase slightly in the case of foul water sewerage.

2.3.5 Flooding from Reservoirs, Canals and Artificial Sources

The proposed development should not in any way impact upon the existing weirs, and ponds aligned with the Lin Brook. Nor should the drainage of the football pitches, or the use of the storage tank, be affected by the development, which will be drained separately.

The post-development level of flood risk from these sources will therefore remain low.

2.4 Rainfall Runoff

The existing surface water drainage is deemed inadequate for the proposed development. A new surface water drainage strategy is therefore required for the site. The preliminary surface water drainage strategy for the NFC scheme has been developed by Arup, and approved in principle by the EA (see Appendix D).

It is proposed that SUDS will be used on site to manage the flow of surface water through the development to the Lin Brook. The SUDS will incorporate flow control devices and the appropriate number of treatment train components. Discharge to the Lin Brook will be limited to the current greenfield runoff rate.

Proposals are subject to budgetary and site constraints, and will be developed further during detailed design, but are expected to include:

Road

Shallow roadside swales and filter drains will convey surface water to a wetland area and to a series of larger swales which will discharge to the Lin Brook at a controlled rate not exceeding the existing greenfield runoff rate.

Car Parks

Permeable surfaces will be incorporated where appropriate within the three car parking areas, providing a degree of attenuation storage and the first level of treatment of surface water runoff.

Other Hardstandings

Other hardstandings will be drained to adjacent swales, filter trenches or, where development proposals do not allow this, via a gullied system.

Building Roofs

Rainwater harvesting will be considered for building roofs (only), to reduce surface water volumes and the potable water demand. The provisions of rainwater harvesting will be subject to budgetary and operational constraints (it may not be acceptable to hotel operators to use recycled water due to discolouration).

Below Ground Storage

Due to the topography, it may not be possible to achieve the required stormwater attenuation storage using above ground open water features only. Therefore, some underground storage, such as geocellular storage, may be required to supplement other surface water management features. Any underground storage should be lined in order to prevent the ingress of groundwater.

Wetland

A wetland feature is proposed to the north of the new hotel. Some roads and landscaped areas will drain to the Lin Brook via the wetland. The wetland will provide another level of treatment of surface water runoff.

Storage Swales

A number of deeper swales are proposed to the vegetated slope between the development and the Lin Brook. Flow control will be provided at each swale, with low flow passed forward towards the outfall to Lin Brook. Each storage swale will provide another level of treatment of surface water runoff.

Existing Football Pitches

It is proposed that the existing pitch drainage and irrigation system will remain unchanged by the proposed development, and that the proposed development will drain to a separate outfall.

Should there be insufficient runoff from the pitches to meet the irrigation demand, then it may be possible to divert some of the runoff from the proposed development to the storage facility to supplement the runoff from the pitches, and to reduce potable water demand. This should be considered during the detailed design and discussed with the EA and facility managers as necessary.

For further details including an assessment of greenfield runoff rates and attenuation storage volumes, and a drawing of the surface water drainage strategy, please refer to the Preliminary Foul and Surface Water Drainage Strategy (Appendix D).

Post-development, the implementation of SUDS on site will ensure that the rainfall runoff rate and volume do not increase against existing conditions. Furthermore, it is envisaged that the proposed development will not have an effect upon conditions downstream of the site as discharges to the Brook will be limited to the current greenfield runoff rate.

3 Conclusions

3.1 Conclusions

The proposed development site is identified by the EA as lying within Flood Zone 1. The proposals involve works in Flood Zone 1 only, thereby satisfying the requirements of Flood Risk Vulnerability and Flood Zone compatibility as indicated in Table D3 of PPS25.

The proposed works will involve a net increase in the total impermeable area at the site. As a consequence, the rainfall runoff rate and volume will increase and mitigating measures will be required. Nonetheless, post-development, all surface water will end up in the Lin Brook as is currently the case.

It is predicted that the implementation of SUDS at the site, including swales, a wetland area and below ground attenuation storage, will mitigate the likely increase in runoff caused by the development and the effects of climate change. Furthermore, through SUDS combined with control devices, it is envisaged that the proposed development will not have an effect upon rainfall runoff conditions downstream of the site. The incorporation of SUDS into the surface water drainage strategy will be considered in greater depth during the detailed design process.

Provided a flood proof design of the semi-basement is adopted, the works will not have an effect upon the existing level of flood risk from groundwater.

It is proposed that a waste water treatment plant will be built to serve the needs of the development. The treated effluent would discharge to the Lin Brook at discharge rates and water quality to be agreed with the EA. The flood risk from this source is deemed to be low.

The development is not predicted to affect the flood risk from artificial sources including the weirs and ponds located immediately to the east of the site, or the storage tank associated with the pitch drainage located immediately to the south of the site. The flood risk from artificial sources will therefore remain low and unchanged.

4 References

1. National Football Centre, Byrkley Lodge. Information to support a request for East Staffordshire Borough Council to form a Scoping Opinion. January 2010 (Nathaniel Lichfield and Partners).
2. National Football Centre, Byrkley Park. Interpretative Report on Ground Investigation. February 2002 (Exploration Associates).

Appendix A: Photographs

Photograph 1: Aerial photograph of the site

Photograph 2: Part of the site is still used for pastoral farming purposes

Photograph 3: Example of weir

Photograph 4: The artificially created pond

Capabilities on project:
Water

Photograph 5: The topography of the site comprises minor undulations

Photograph 6: Example of grass pitch

Photograph 7: Example of synthetic pitch

Photograph 8: The 3,000 m^3 drainage/irrigation storage tank

Photograph 9: BDP design hotel foundations (now redundant)

Photograph 10: The tunnel designed to provide access from the hotel to the indoor pitch lies beneath the water in the picture. The tunnel has been filled with gravel.

Capabilities on project:
Water

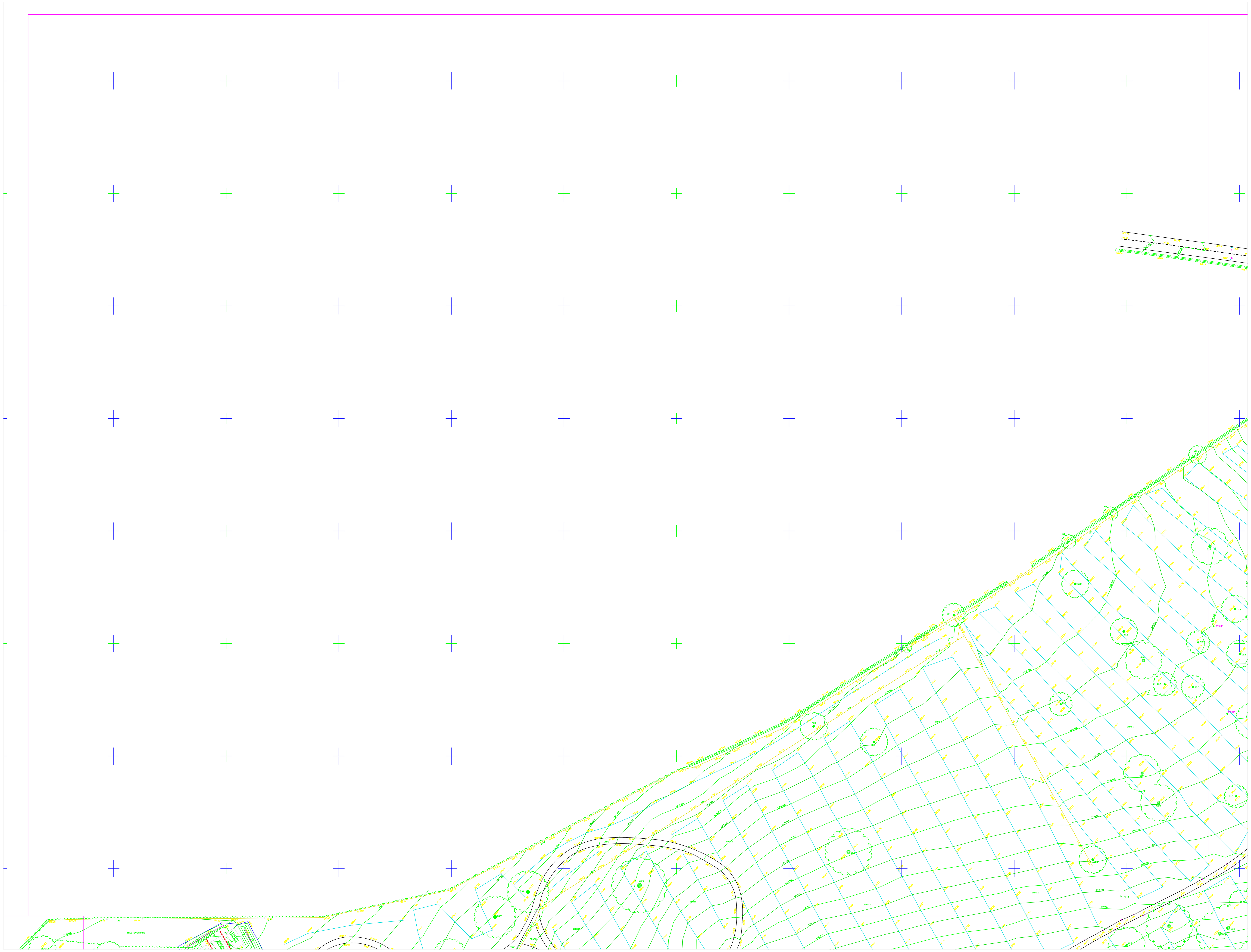
Photograph 11: Minor ponding on an unfinished access road

Photograph 12: Road drainage swale

Capabilities on project:
Water

Photograph 13: Land drainage outfall to Lin Brook

Appendix B: Pre-development and Post-development Site Plans



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Note:

All levels relate to existing Site Datum.
Orientation to existing Site Grid.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

STANDARD REFERENCE & ABBREVIATIONS

(AR)........Assumed Route
AV..........Air Valve
B/W.........Barbed Wire
BB..........Belisha Beacon
BH..........Borehole
BL..........Bed Level
BS..........Bus Stop
BT Box......British Telecom Box
BT..........British Telecom IC
BW..........Brick Wall
Bar.........Barrier
Bol.........Bollard
C/B.........Close Boarded
C/I.........Corrugated Iron
C/P.........Chestnut Paling
CB..........Control Box
CCTV........Closed Circuit TV
CD..........Cable Duct
CH/L........Chain Link
CL..........Cover Level
CM..........Cable Marker
COL.........Column
CONC........Concrete
CP..........Catch Pit
CPL.........Coping Level
CTV.........Cable Television
CW..........Concrete Block Wall
Chy.........Chimney
Cul.........Culvert
D.C.........Drainage Channel
DP..........Down Pipe
DR..........Drain
ECP.........Electricity Cable Pit
EIC.........Electricity Inspection Cover
EJ..........Expansion Joint
EJB.........Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL..........Eaves Level
ELB.........Electricity Box
EP..........Electricity Pole
ER..........Earth Rod
F/B.........Flower Bed
FFL.........Finished Floor Level
FH..........Fire Hydrant
FL..........Floor Level
FP..........Flagpole
G*.*........Girth (of tree)
G...........Gulley
GP..........Guide Post
GSV.........Gas Stop Valve
HSE.........Housing
HV..........High Voltage
Ht..........Height
I/R.........Iron Railing
IC..........Inspection Cover
IL..........Invert Level
KO..........Kerb Outlet
LB..........Letter Box
LP..........Lamp Post
MG..........Multi-Girth
MH..........Manhole
MKR.........Marker
MP,MS.......Mile Post or Stone
NP..........Street Name Plate
O/H.........Overhead
OHTL........Overhead Transmission Line
OSBM........Ordnance Survey Bench Mark
P/C.........Post & Chain
P/R.........Post & Rail
P/W.........Post & Wire
PAV.........Paving
PB..........Pillar Box
PC..........Pedestrian Crossing
PP..........Petrol Pump
PT..........Post or Pillar
RE..........Rodding Eye
RS..........Road Sign
RTW.........Retaining Wall
RWP.........Rain Water Pipe
SAP.........Sapling
SL..........Sump Level
SP..........Sign Post
SV..........Stop Valve (unspecified)
SVP.........Soil Vent Pipe
SW..........Stone Wall
SoL.........Soffit Level
TB..........Traffic Bollard
TBM.........Temporary Bench Mark
TCB.........Telephone Call Box
TFR.........Taken From Records
TIE.........Anchor Point (Masts/Poles)
TL..........Traffic Light
TLB.........Traffic Light Control Box
TM..........Ticket Machine
TMC.........Tarmac
TP..........Telecommunications Pole
TPIT........Trial Pit
U/C.........Under Construction
U/G.........Underground
UTL.........Unable to Lift (MH,IC etc)
VDP.........Vehicle Detector Pad
VP..........Vent Pipe
W/M.........Wire Mesh
WL..........Water Level
WM..........Water Meter
WO..........Wash Out
WST.........Water Stop Tap (domestic)
WSV.........Water Stop Valve (mains)

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Drawing Title
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NFC
Burton on Trent
Sheet * of *

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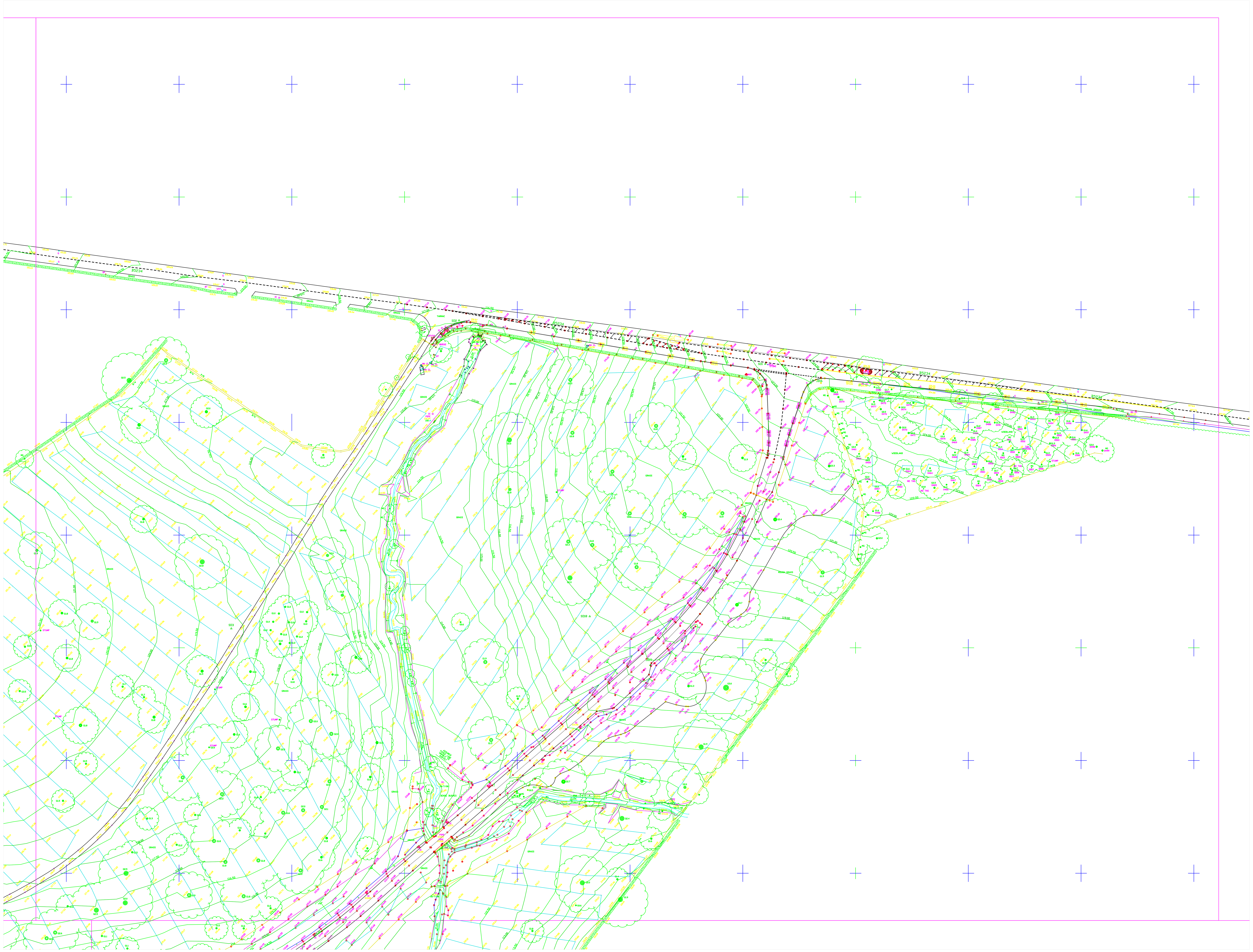

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FP........Flagpole
G*.*........Girth (of tree)
G........Gulley
GP........Guide Post
GSV........Gas Stop Valve
HSE........Housing
HV........High Voltage
Ht........Height
I/R........Iron Railing
IC........Inspection Cover
IL........Invert Level
KO........Kerb Outlet
LB........Letter Box
LP........Lamp Post
MG........Multi-Girth
MH........Manhole
MKR........Marker
MP,MS......Mile Post or Stone
NP........Street Name Plate
O/H........Overhead
OHTL........Overhead Transmission Line
OSBM........Ordnance Survey Bench Mark
P/C........Post & Chain
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VP........Vent Pipe
W/M........Wire Mesh
WL........Water Level
WM........Water Meter
WO........Wash Out
WST........Water Stop Tap (domestic)
WSV........Water Stop Valve (mains)

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NFC
Burton on Trent
Sheet * of *

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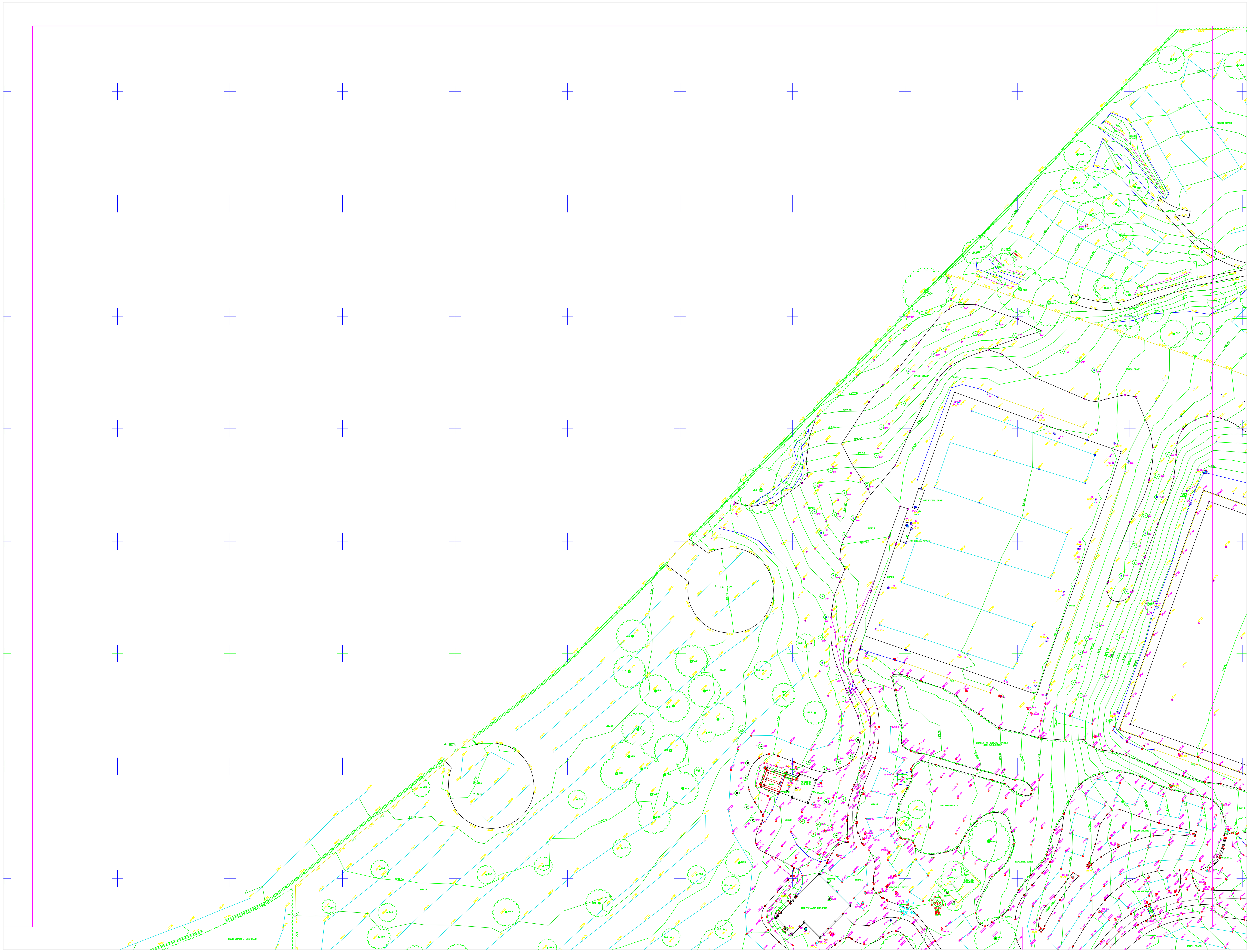

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C/P.........Chestnut Paling
CB.........Control Box
CCTV.......Closed Circuit TV
CD.........Cable Duct
CH/L........Chain Link
CL.........Cover Level
CM.........Cable Marker
COL.........Column
CONC.......Concrete
CP.........Catch Pit
CPL.........Coping Level
CTV.........Cable Television
CW.........Concrete Block Wall
Chy.........Chimney
Cul.........Culvert
D.C.........Drainage Channel
DP.........Down Pipe
DR.........Drain
ECP.........Electricity Cable Pit
EIC.........Electricity Inspection Cover
EJ.........Expansion Joint
EJB.........Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL.........Eaves Level
ELB.........Electricity Box
EP.........Electricity Pole
ER.........Earth Rod
F/B.........Flower Bed
FFL.........Finished Floor Level
FH.........Fire Hydrant
FL.........Floor Level
FP.........Flagpole
G*.*.........Girth (of tree)
G.........Gulley
GP.........Guide Post
GSV.........Gas Stop Valve
HSE.........Housing
HV.........High Voltage
Ht.........Height
I/R.........Iron Railing
IC.........Inspection Cover
IL.........Invert Level
KO.........Kerb Outlet
LB.........Letter Box
LP.........Lamp Post
MG.........Multi-Girth
MH.........Manhole
MKR.........Marker
MP,MS.......Mile Post or Stone
NP.........Street Name Plate
O/H.........Overhead
OHTL........Overhead Transmission Line
OSBM........Ordnance Survey Bench Mark
P/C.........Post & Chain
P/R.........Post & Rail
P/W.........Post & Wire
PAV.........Paving
PB.........Pillar Box
PC.........Pedestrian Crossing
PP.........Petrol Pump
PT.........Post or Pillar
RE.........Rodding Eye
RS.........Road Sign
RTW.........Retaining Wall
RWP.........Rain Water Pipe
SAP.........Sapling
SL.........Sump Level
SP.........Sign Post
SV.........Stop Valve (unspecified)
SVP.........Soil Vent Pipe
SW.........Stone Wall
SoL.........Soffit Level
TB.........Traffic Bollard
TBM.........Temporary Bench Mark
TCB.........Telephone Call Box
TFR.........Taken From Records
TIE.........Anchor Point (Masts/Poles)
TL.........Traffic Light
TLB.........Traffic Light Control Box
TM.........Ticket Machine
TMC.........Tarmac
TP.........Telecommunications Pole
TPIT........Trial Pit
U/C.........Under Construction
U/G.........Underground
UTL.........Unable to Lift (MH,IC etc)
VDP.........Vehicle Detector Pad
VP.........Vent Pipe
W/M.........Wire Mesh
WL.........Water Level
WM.........Water Meter
WO.........Wash Out
WST.........Water Stop Tap (domestic)
WSV.........Water Stop Valve (mains)

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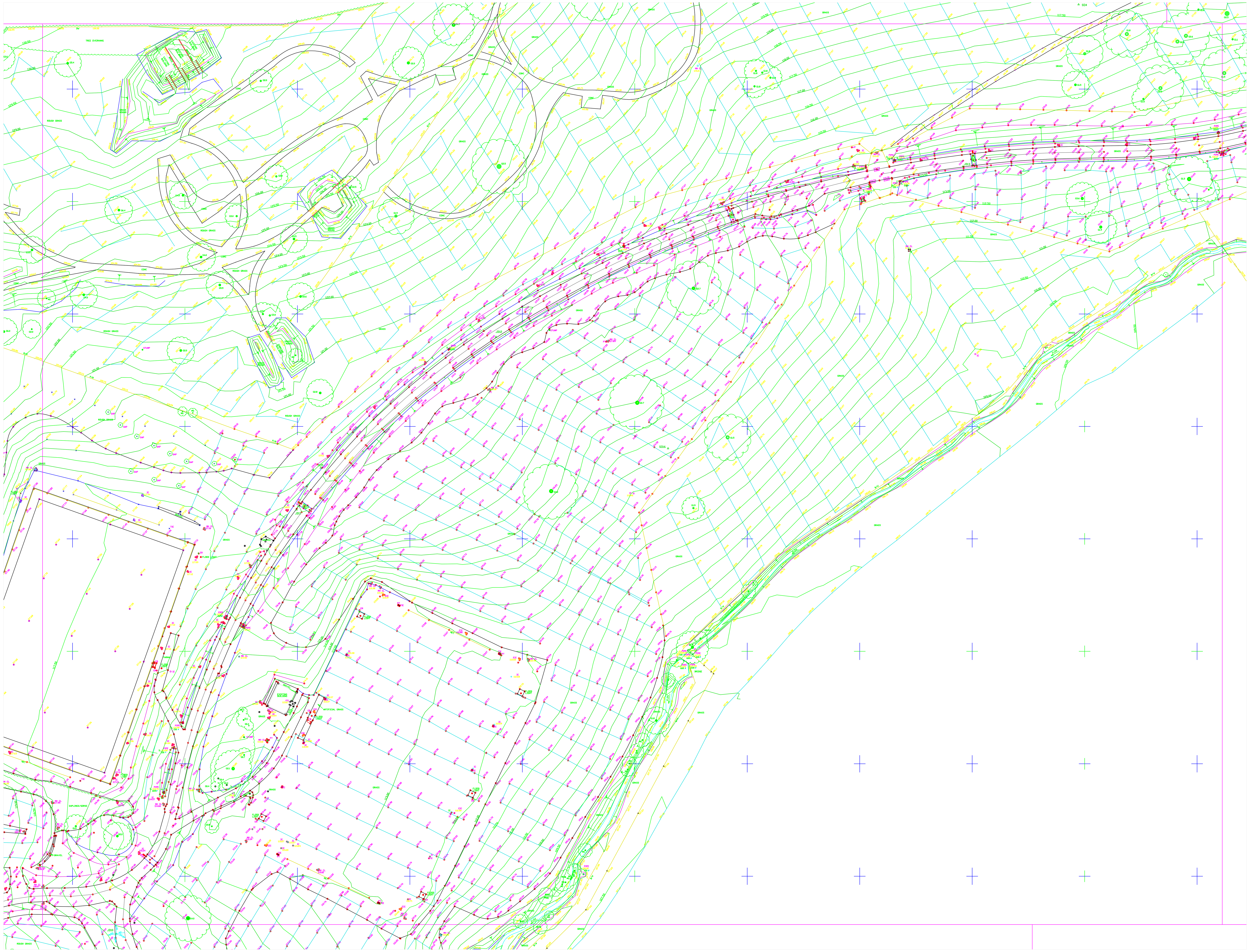
Client	Davis Langdon & Everest MidCity Place 71 High Holborn London, WC1V 6QS
Drawing Title	Topographical Survey of Land at : NFC Burton on Trent Sheet * of *
Scale(s) 1:500	Surveyor JD
Date Jul 08	Drawn AC
Job Number 08F167	Checked MG
Sheet Size & Drg Number & Revision	A0 08F167/001



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Note:

All levels relate to existing Site Datum.
Orientation to existing Site Grid.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

STANDARD REFERENCE & ABBREVIATIONS

(AR)........Assumed Route
AV........Air Valve
B/W........Barbed Wire
BB........Belisha Beacon
BH........Borehole
BL........Bed Level
BS........Bus Stop
BT Box......British Telecom Box
BT........British Telecom IC
BW........Brick Wall
Bar........Barrier
Bol........Bollard
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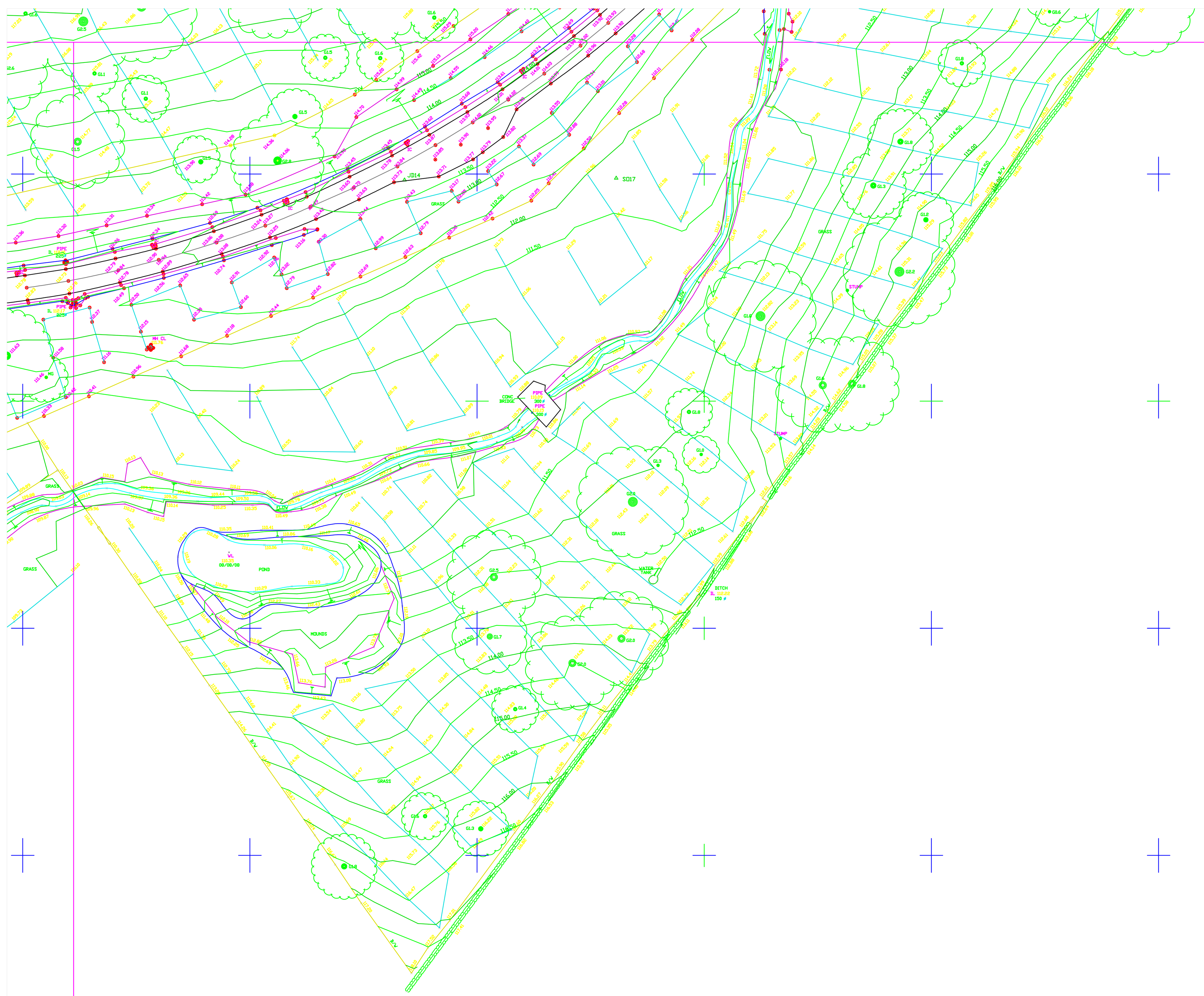

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