Barnsley Road, Goldthorpe

Flood Risk Assessment
& Drainage Statement

For
Dearne Estates (Goldthorpe) Ltd

Report ref	Issue	Prepared by	Date	Reviewed by	Date
14013	1	J Mitchell	August 2014	M Pearse	August 2014
	2	J Mitchell	January 2016	M Pearse	January 2016

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Barnsley Road, Goldthorpe

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& Drainage Statement

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1. Introduction

1.1. This report is commissioned by Dearne Estates (Goldthorpe) Ltd to examine the flood risk associated with the development of land off Barnsley Road, Goldthorpe.

1.2. The objectives of this assessment are to identify any potential risk of flooding to the proposed development and any risks to the adjacent properties as a result of the development, in accordance with the requirements of the National Planning Policy Framework (NPPF) and its associated Technical Guidance. It will also assess the surface and foul water drainage proposals to ensure the development does not increase the risk of flooding elsewhere.

1.3. This report is based on information received from Yorkshire Water together with information obtained from the Environment Agency's (EA) online flood maps. Reference has also been made to the topographical survey undertaken by Midland Survey Ltd (16901/3 Dated December 2012).

1.4. This report presents the factual information available during the time of appraisal in 2014, interpretation of the data obtained and recommendations relevant to the scope of works. It has been assumed in the production of this report that the site is to be developed for a retail end use.

1.5. This report has been prepared for the sole use of Dearne Estates (Goldthorpe) Ltd. No other third party may rely upon or reproduce the contents of this report without the written approval of 3e Consulting Engineers. If any unauthorised third party comes into the possession of this report, they rely on it entirely at their own risk and 3e do not owe them any Duty of Care or Skill.

2. Site Location, Proposed Development and Topography

2.1 The site is centred on National Grid Reference 445002 404267 and is located immediately north of Barnsley Road, Goldthorpe, approximately 1km west of the village centre. The site is shown on the location plan included in **Appendix A.**

2.2 The subject site was unoccupied grazing land in 2014, roughly triangular and relatively level. The site boundaries are marked by hedgerows and wooden fencing to the north, east and south. Residential properties lie beyond the site boundary to the east with agricultural land beyond highways to all other site boundaries.

2.3 An Aldi foodstore was constructed in 2015 on the western portion of the existing development site. This foodstore development totalled approximately 0.81 hectares and included the provision of a new access off Barnsley Road which will also serve the proposed retail development discussed in this report.

2.4 It is now proposed to develop the larger eastern portion of the site (approximately 1.14 hectares) to provide a retail unit with associated car parking and servicing. Provision will also be made for the development of two smaller parcels of land to the north east and south east corners of the site. Access to the development is proposed from the recently constructed access off Barnsley Road to the south. The proposed development layout is included in **Appendix B**. Each parcel/plot within the blue line boundary will be submitted for planning permission under separate applications. However, given the size and nature of the development, it is necessary to asses the site as a whole and, therefore, this report makes recommendations based upon the entire 1.14 hectare site.

2.5 The topographical survey produced by Midland Survey Ltd shows the site to fall from the highest point in the southeast at a level of 41.1m AOD to the lowest point in the west at a level of 35.3m AOD. The existing highway to both the north and south of the site are at a level approximately 1.0m higher than the site. The topographical survey is shown in **Appendix C**. The proposed finished ground levels of the Aldi Foodstore development are shown on the drawing included in **Appendix D**.

2.6 All heights specified on the topographical survey relate to the OSGB 36 datum and have been computed using the OSTN(02) Geoid model.

3. Existing Watercourses, Drainage and Flood Risk

3.1 The nearest watercourse, Thurnscoe Dike, is located approximately 300m to the north of the site and flows in a westerly direction before joining Carr Dike and heading south under the A636 Barnsley Road and away from the site. The Environment Agency indicative flood map is shown in **Figure 1** below. The site is shown to be located entirely within Flood Zone 1 'Low Probability'. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1% AEP). The site is therefore not considered to be at risk of flooding from the watercourse.

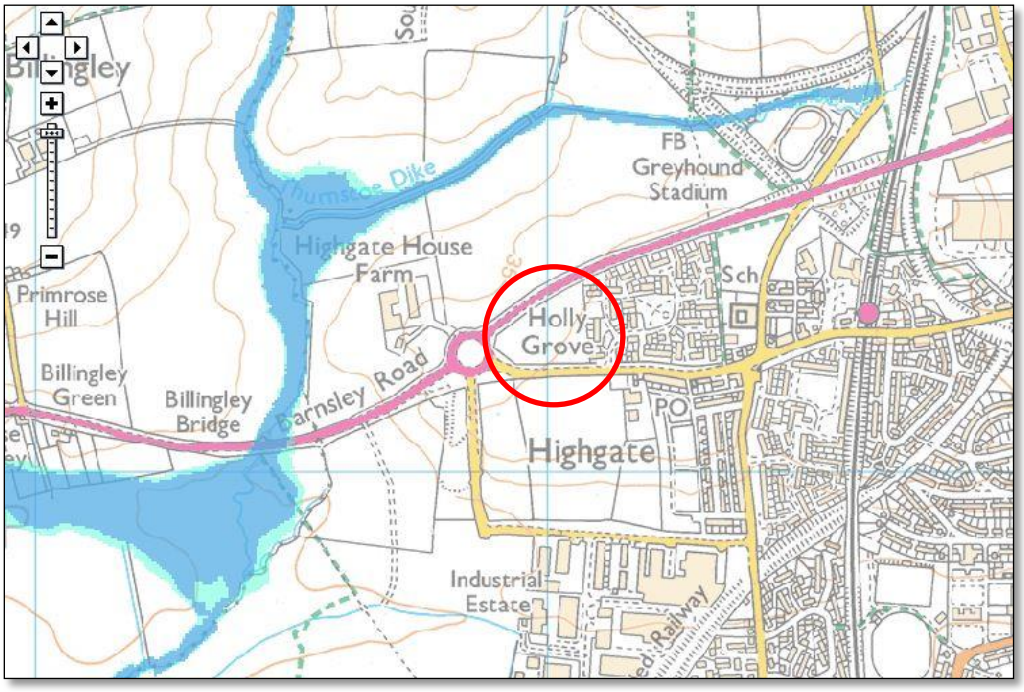


Figure 1 – Extract of EA Flood Map

3.2 The site may be at risk of pluvial flooding from any existing drainage systems adjacent to the site and from overland flood flows. The Environment Agency, working with Lead Local Flood Authorities (LLFA's) have produced a series of updated Flood Maps for Surface Water (FMfSW). These flood maps are based upon the latest modelling techniques

and flood data. **Figure 2**, below, indicates the location of this predicted surface water flooding.

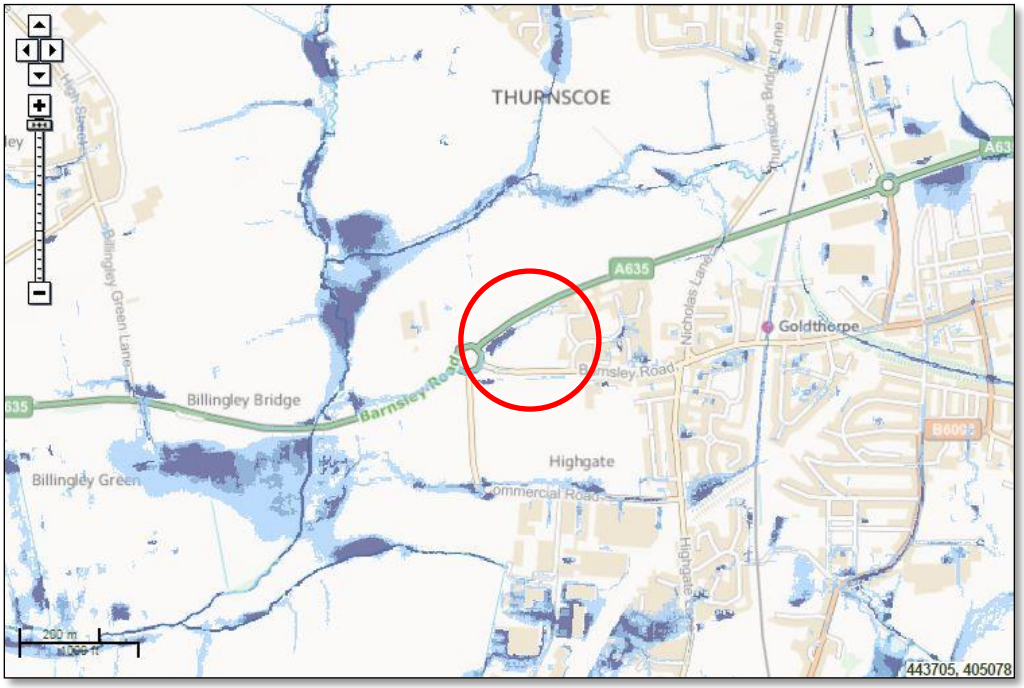


Figure 2 – Extract of Flood Map for Surface Water

3.3 The surface water flood map shows a small area of 'High' risk located along the north western boundary of the site. This 'High' risk zone indicates that this part of the site may have a 1 in 30 (3.3%) or greater chance of flooding in any one year. However, given the levels across the site, and the recent upfilling of the Aldi development, these floodwaters be directed away from the proposed development and will not have any significant impact. It is therefore considered that the site is not at risk of pluvial flooding.

3.4 Both surface and foul water sewers are present within the north eastern corner of the site and flow in a northerly direction. Flood risk from these sewers is considered to be low as manholes covers located within the site are set at a higher level than the upstream and downstream covers. Any surcharge within the system is likely to discharge onto the adjacent highways and be conveyed away from the development. Furthermore, a significant volume of surface water attenuation has been provided within the adopted sewer system, to the north of the site, to reduce the likelihood of flooding.

3.5 A further source of flooding is as a result of excess run-off from the development. It is important that the proposed ground levels are configured such that any flooding on site is directed away from the proposed building and towards the surface water storage facilities. It should also ensure that any overland flows resulting from excess run-off are retained on site within the development area and not permitted to discharge off site.

3.6 Given the above, it is recommended that finished floor levels should be set 150mm above external ground levels to ensure any floodwaters are directed away from the proposed buildings and towards the attenuation facilities.

4. Surface & Foul Water Drainage

4.1 The proposed surface water drainage system should seek to meet the requirements of the NPPF. Additionally, the current Building Regulations now requires disposal of new development surface water run-off to discharge by infiltration (to ground), to watercourse or to surface water sewer in that order of priority.

4.2 Sustainable Urban Drainage Systems (SUDS) should also be used wherever possible to mimic as far as practicable the natural run off regime, improve water quality, reduce run-off volume and attenuate peak flows. These should be designed in accordance with the current guidance, Ciria C753 'The SuDs Manual'.

4.3 The Phase II Geo-Environmental Assessment produced by 3e Consulting Engineers (Ref: 14013/SI, Issue 2, dated 14.01.16) indicates that infiltration methods are not considered suitable for the discharge of surface water. Infiltration rates of between $1.6x10^{-6}$m/s and $3.43x10^{-6}$m/s were recorded within the silty sandstone and interbedded Coal Measures at three locations across the overall site.

4.4 There are no watercourses within or adjacent to the site to which the surface water could outfall.

4.5 Given the above hierarchy, surface water flows should, therefore, be directed to the nearest surface water sewer. This is recorded as being a 450mm diameter public sewer located in the north eastern corner of the site, adjacent to the A635, Dearne Valley Parkway.

4.6 Due to the un-developed nature of the site and the lack of any existing drained impermeable areas, a greenfield run-off rate should be used to determine the proposed surface water discharge rate from the site. The greenfield run-off rate should be calculated based on 5.0 l/sec/ha and the total site area. The previous Aldi Foodstore development, located on the western part of the site, was previously granted a greenfield run-off rate of 5.0 l/sec based upon this same principle.

4.7 Given the remaining site area of 1.14 hectares, it would not be considered feasible to split the discharge rate and attenuation facilities into smaller parcels. The remainder of the site should, therefore, be developed with a single storage facility and a single restricted run-off rate into the adjacent surface water sewer. Based upon the site area, a restricted run-off rate of 5.7 l/sec should be used.

4.8 Flows from the proposed development should be restricted to this maximum discharge rate using a suitable flow control device with surface water attenuation provided below ground to accommodate these flow rates. Given the invert levels on the existing sewer system, a surface water pumping station may also be required.

4.9 All proposed surface water systems should be designed to accommodate the worst case 1 in 30 year storm event without flooding. Furthermore, the worst case 1 in 100 year plus climate change storm event should also be retained on site in an area that will not affect any existing or proposed buildings. In accordance with the National Planning Policy Framework Technical Guidance, Table 5, a climate change uplift of 20% should be applied to all rainfall estimates.

4.10 Initial calculations have been undertaken which show approximately 290m^3 of storage will be required to accommodate the worst case 1 in 30 year event. Approximately 400m^3 will be required to accommodate the worst case 1 in 100 year event and approximately 510m^3 of storage will be required for the worst case 1 in 100 year event plus an allowance for climate change.

4.11 In line with current planning requirements and CIRIA guidance, the use of Sustainable Urban Drainage (SUDs) techniques to assist in the treatment of surface water at source should be considered within developments. A detailed drainage design has not yet been undertaken but a detailed SUDs options evaluation has been carried out and is included within **Appendix E**. This should be reviewed when preparing the detailed design of the proposed drainage system.

4.12 Foul water flows should discharge into the existing 150mm diameter foul water public sewer located in the north east corner of the site. Given the invert levels on the existing sewer system, a foul water pumping station may be required.

5. Conclusions & Recommendations

5.1 The site is shown to be located entirely within Flood Zone 1 'Low Probability'. The proposed development is classified as a 'Less Vulnerable' development in accordance with Table 2 of the NPPF Technical Guidance document and as such is notes as an 'Appropriate' development (in accordance with Table 3 of the guidance).

5.2 The development is considered to have a low risk of surface water flooding despite having small areas of 'High' risk adjacent to the site. Existing site levels should ensure the development is not at risk of flooding, however, finished floor levels within the site should be set a minimum of 150mm above adjacent ground levels. External levels should be shaped within the site to ensure that overland flows are directed away from any proposed or existing buildings and towards the surface water drainage and attenuation facilities.

5.3 Given the low permeability of the underlying strata, soakaways and infiltration methods are not considered suitable at this location for surface water disposal. In addition, there are no watercourses adjacent to or within the site to which the surface water run-off could discharge.

5.4 Surface water run-off should be discharged into the existing surface water sewer located in the north east corner of the site. Based upon the site area and a greenfield run-off rate, a restricted run-off of 5.7 l/sec should be used. Flows from the proposed development should be restricted to this maximum discharge rate using a suitable flow control device and below ground surface water attenuation.

5.5 SUDs techniques should be provided, where possible, to treat the surface water run-off from the site at source, prior to discharging into the surface water drainage network.

5.6 Foul water flows should discharge into the existing 150mm diameter foul water public sewer located in the north east corner of the site at an unrestricted rate.

APPENDIX A

Site Location Plan



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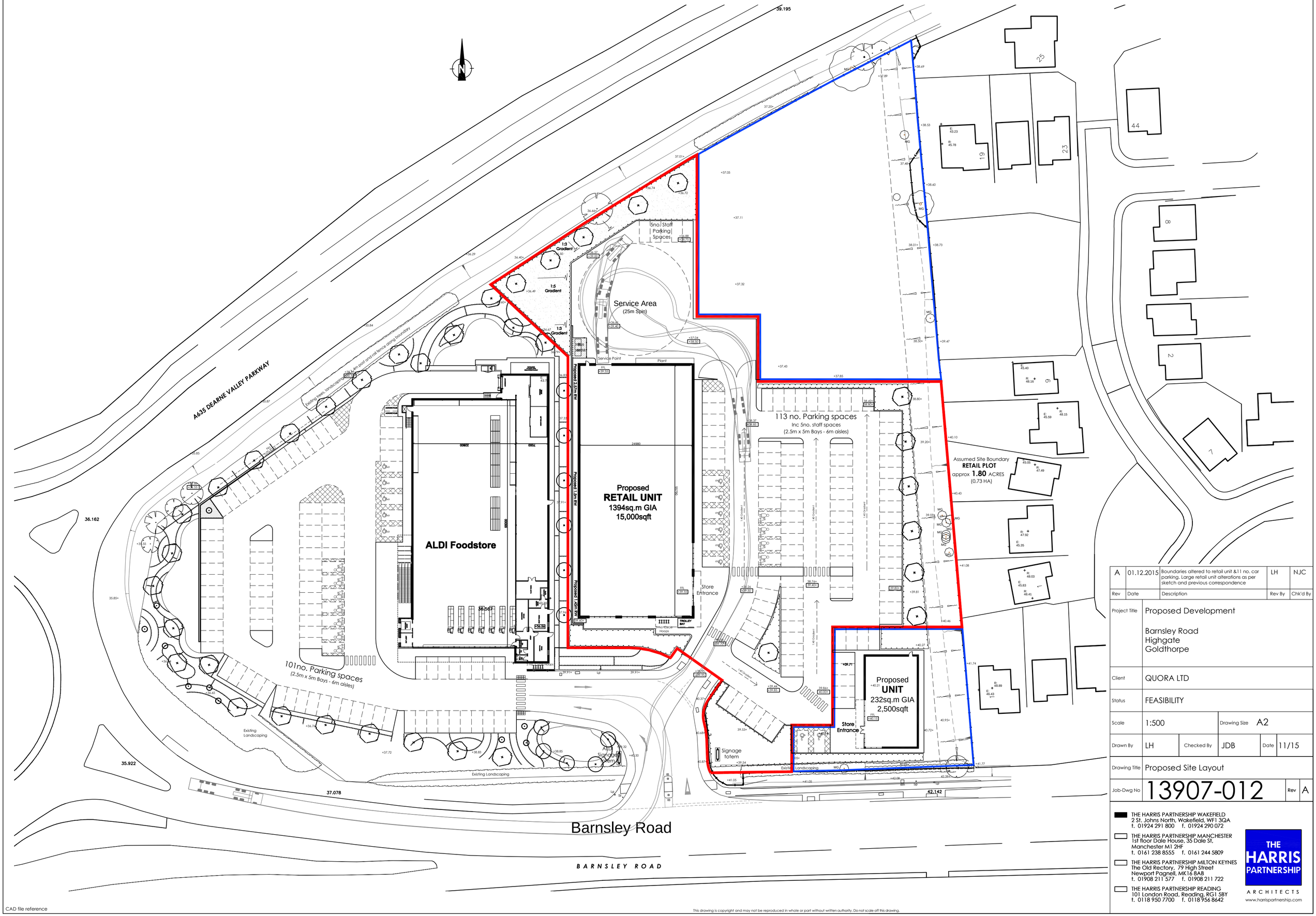
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Project	Barnsley Road, Goldthorpe For Dearne Estates (Goldthorpe) Ltd.		
Title	Site Location Plan		
Scale 1:25,000	Drawn AHC	Checked ACV	Date Apr '14
Job No. 14013	Drawing No. Fig 1		Rev 0

APPENDIX B

Proposed Development Layout



A	01.12.2015	Boundaries altered to retail unit &11 no. car parking. Large retail unit alterations as per sketch and previous corespondence	LH	NJC
Rev	Date	Description	Rev By	Chk'd By

Project Title	Proposed Development Barnsley Road Highgate Goldthorpe					
Client	QUORA LTD					
Status	FEASIBILITY					
Scale	1:500		Drawing Size	A2		
Drawn By	LH	Checked By	JDB	Date	11/15	
Drawing Title	Proposed Site Layout					
Job-Dwg No	13907-012			Rev	A	

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CAD file reference

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APPENDIX C

Topographical Survey

444900E

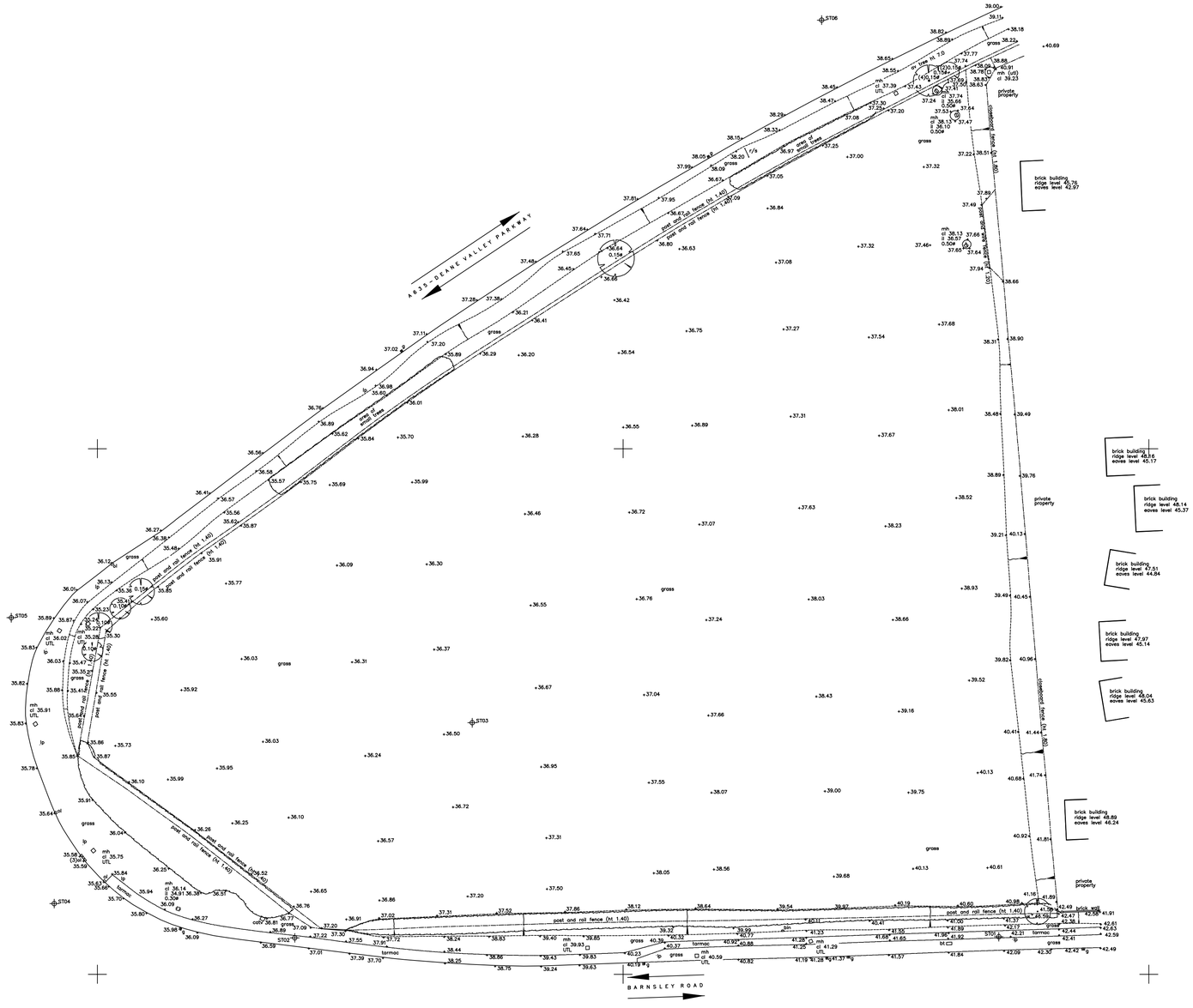
445000E

445100E

404400N

404300N

404200N



NOTES

ALL LEVELS ARE IN METRES DERIVED FROM GPS TRANSFORMATION OSTN02

COORDINATES ARE ORDNANCE SURVEY DATUM NATIONAL GRID DERIVED FROM GPS TRANSFORMATION OSTN02

THIS DRAWING HAS BEEN PRODUCED WITH A PLOT SCALE ACCURACY OF 1:500

SERVICE COVERS INDICATED WHERE VISIBLE. PIPE INVERTS/DETAILS SURVEYED FROM SURFACE INSPECTION ONLY. GENERALLY DAMAGED COVERS AND COVERS WITHIN HIGHWAYS WILL NOT BE LIFTED.

TREE SPECIES SHOULD BE CONFIRMED BY TREE SPECIALIST IF CRITICAL.

OVERHEAD CABLES ARE INDICATED USING REMOTE SURVEY METHODS AND ARE SUBJECT TO SEASONAL VARIATION, AND SHOULD BE TREATED AS APPROXIMATE.

KEY (LAND)

mh – man hole
ic – inspection cover
cl – cover level
il – invert level
dp – depth
toc – top of cap
tot – top of tank
top – top of pipe
utl – unable to lift
wfc – water filled chamber
mkr – marker
fh – fire hydrant
g – gully
sv – stop valve
catv – cable television
wm – water meter
bt – telecom
s – storm
f – foul
re – rodding eye
er – earthing rod
elec – electric
fs – fire switch
g/run – gulley run
d/chan – drainage channel
sp – soil pipe
rwp – rain water pipe
wp – waste pipe
svp – soil vent pipe

vp – vent pipe
rs – road sign
lp – lamp post
tp – telecom pole
ep – electric pole
tl – traffic light
sl – spot light
c/box – control box
boll – bollard
ill – illuminated
cr – cable riser
ht – height
u/s – underside
f/bed – flower bed
c/b fence – closeboard fence
sec fence – security fence
ret wall – retaining wall
p & r fence – post & rail fence
s/birch – silver birch
h/chestnut – horse chestnut
h/thorn – hawthorn
con – conifer
sap – sapling
TBM – temporary bench mark
OSBM – ordnance survey bench mark

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	445071.457	404207.144	42.142
ST02	444937.535	404206.928	37.078
ST03	444971.304	404247.863	36.567
ST04	444891.794	404213.452	35.922
ST05	444883.627	404267.839	36.162
ST06	445037.771	404381.548	39.195

NORTH

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MIDLAND SURVEY LTD

Client: JVH PLANNING CONSULTANTS LIMITED

Site Address: LAND OFF BARNSLEY ROAD, GOLDTHORPE, ROTHERHAM

Surveyor: S.M/J.S

Date: DECEMBER 2012

Scale: 1:500@A1

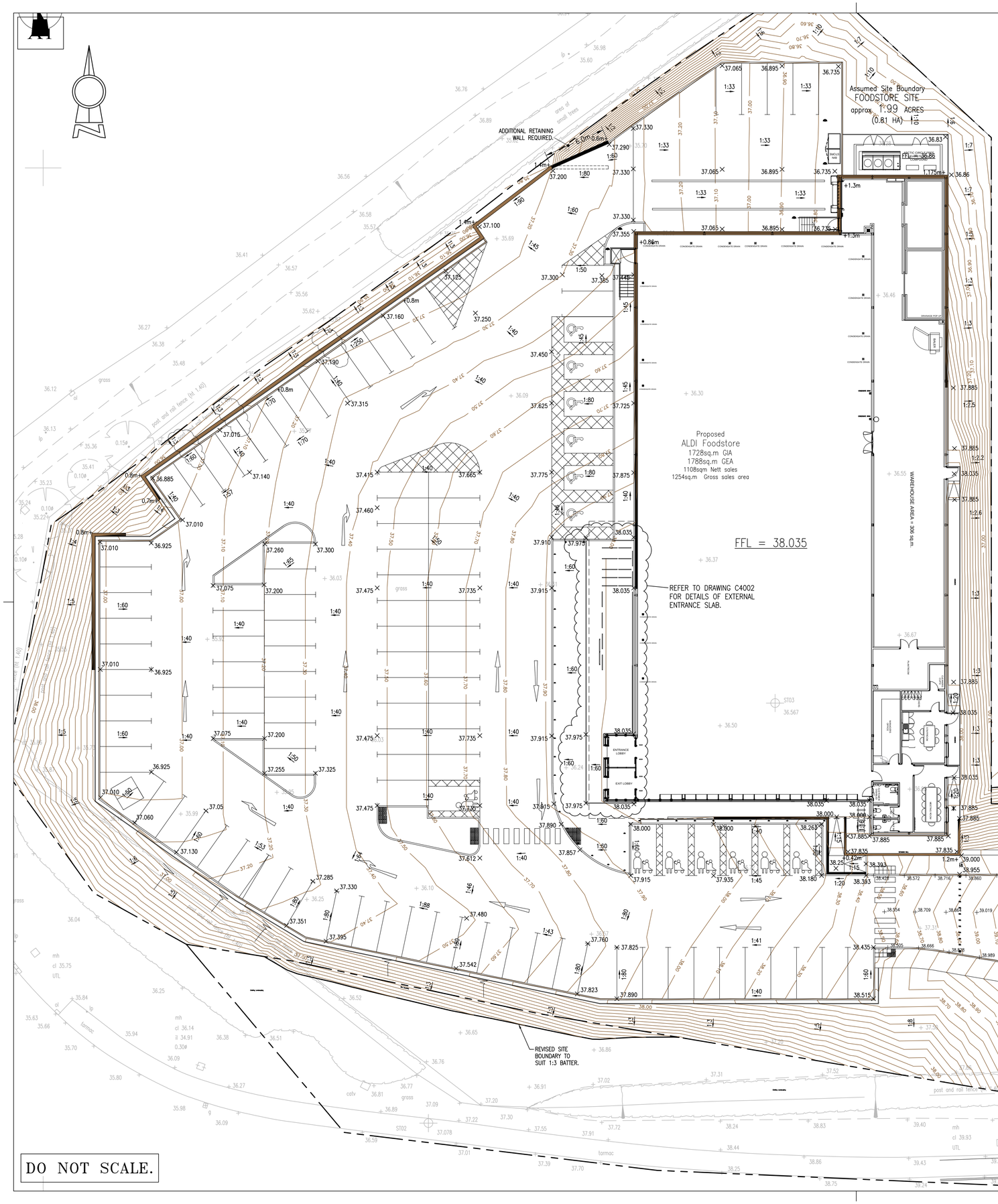
Dwg No: 16901/3

Checked: S.J.F

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APPENDIX D

Aldi Foodstore
External Levels Drawing



Outline Planning
RESIDENTIAL AREA
approx 2.81 ACRES
(1.14HA)

Only PDF/DWF Issues of this drawing are controlled. All other formats (eg. DWG AutoCAD FILES) are UN-controlled and are used at your own risk.

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Contractors should refer to the residual risks contained in the CDM Pre Construction Information before carrying out any site operations and should not issue parts of this drawing without including the CDM notes and references. This information will include details of the SIGNIFICANT risks which 3E have considered beyond that which a competent contractor should be aware.

HEALTH & SAFETY

1. CONTRACTOR SHOULD BE AWARE OF GENERAL CONSTRUCTION RISKS TO PREVENT SLIPS, TRIPS AND FALLS AND TAKE NECESSARY PRECAUTIONS WITHOUT SPECIAL INSTRUCTION.

ROADS & DRAINAGE

2. CONTRACTOR TO PROVIDE TRENCH SUPPORTS AS APPROPRIATE AND ENSURE THAT PLANT REMAINS A SAFE DISTANCE FROM TRENCHES PRIOR TO INSTALLING DRAINAGE.
3. THE TIME THAT EXCAVATIONS ARE OPEN ON SITE SHOULD BE KEPT TO A MINIMUM AND ALL TRENCHES SHOULD BE SURROUNDED BY A BARRIER.
4. CONNECTIONS TO EXISTING SEWERS TO BE MADE BY NWL APPROVED CONTRACTOR ONLY.
5. CONTRACTOR TO MAKE OPERATIVES AWARE OF ASSOCIATED DANGERS TO HEALTH SUCH AS LEPTOSPIROSIS (WEILS DISEASE) AND RECOMMENDED PRECAUTIONS. ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING TO BE PROVIDED AS REQUIRED.
6. UNFINISHED MANHOLES MUST BE COVERED WITH LOAD BEARING MATERIALS AND SURROUNDED WITH BARRIER.

PIPES & CABLES

7. SERVICE RECORDS TO BE REFERRED TO PRIOR TO WORK COMMENCING. CONTRACTOR TO PROCEED WITH CAUTION AND SERVICES TO BE LOCATED BY HAND DIG AND PROTECTED ACCORDINGLY.

EXCAVATION/FILL

8. CONTRACTOR TO ENSURE RELEVANT MEASURES ARE TAKEN TO KEEP PLANT AND PEOPLE A SAFE DISTANCE FROM STEEP SLOPES DURING THE WORKS.
9. CONTRACTOR TO ENSURE THAT PROCEDURES ARE IN PLACE TO KEEP PEOPLE A SAFE DISTANCE FROM WORKING PLANT WHERE NECESSARY.
10. CONTRACTOR TO REFER TO GROUND INVESTIGATION REPORT FOR CONTAMINATION TESTS AND TO PROVIDE ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING AS REQUIRED.

KEY

+37.24	EXISTING GROUND LEVEL
×38.035	PROPOSED FINAL GROUND LEVEL (LEVELS ASSUME FLUSH ACCESS AT ALL ENTRANCES)
+0.5m	EXTENTS OF PROPOSED RETAINING STRUCTURE WITH HEIGHT. REFER TO 3E STRUCTURAL DRAWINGS FOR DETAILS.

SUBJECT TO THE APPROVAL OF ALL RELEVANT AUTHORITIES

Date	Revisions	Drawn	Rev.
11.08.15	REVISED TO SUIT LATEST SERVICE RAMP LAYOUT AND ADDITIONAL CAR PARK SPACES.	JM	D
11.05.15	REVISED TO SHOW INCREASED HGV TURNING AREA. RETAINING WALL AMENDED.	JM	C
17.04.15	REVISED TO SUIT LATEST ARCHITECTS LAYOUT.	JM	B
07.04.15	ISSUED FOR CONSTRUCTION.	JM	A
26.03.15	REVISED TO SUIT LATEST CAR PARK LAYOUT.	JM	P8
03.02.15	CAR PARK LEVELS REVISED TO SUIT ARCHITECTS COMMENTS.	JM	P7
02.02.15	REVISED TO SUIT LATEST ARCHITECTS LAYOUT INC. EXTERNAL LOBBY.	JM	P6
30.01.15	WESTERN BOUNDARY CAR PARK LEVELS REVISED.	ST	P5
26.01.15	REVISED TO SHOW LATEST ARCHITECTS LAYOUT.	ST	P4
06.01.15	TENDER ISSUE. PARKING SPACE ADDED BY ARCHITECT.	ST	P3
19.12.14	LEVEL REVISED / RETAINING WALLS ADDED TO SUIT CURRENT ARCH LAYOUT DATED 18.12.14.	ST	P2
16.12.14	PRELIMINARY ISSUE	ST	P1

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Client: Aldi Stores Ltd [South]

Project: Aldi, Barnsley Road, Goldthorpe

Title: Proposed External Levels

Scale	Drawn	Checked	Date
1:200	ST	JM	DEC 14

Drawing Status: Construction

Job No.	Drawing No.	Revision
14013	C2000	D

APPENDIX E

SUDs Evaluation Matrix

SuD'S Evaluation

Development	Type	Site Area	Imp Area	SW Discharge	Sewer Adoption	Ground Conditions
14013 Barnsley Road, Goldthorpe	Retail	1.14ha	0.91ha	Discharge to Surface Water Sewer	Private surface water system within the site	Based on Phase II Site Investigation, underlining starta confirmed as Silty Sandstone and interbedded coal measures. Infiltration methods not considered suitable in this location. Infiltration rates of between 1.6 - 3.43x10^-6.

	Peak Flow Reduction	Volume Reduction	Water Quality	Amenity	Ecology	Residential	Commercial	High Density	Comments
Green Roofs	Med	Med	Good	Good	Good	Yes	Yes	Yes	Not considered appropriate given the negligble impact on surface water run-off volume and minimal betterment to peak flow reduction during periods of prolonged rainfall.
Rain Gardens	Good	Med	Med	Good	Good	Yes	Yes	Yes	Not considered suitable due to relatively small landscaped areas and low permeability ground conditions.
Soakaways	Good	Good	Good	Poor	Poor	Yes	Yes	Limited	Not considered feasible due to underlying strata.
Water Butts	Poor	Poor	Poor	Poor	Poor	Yes	Yes	Yes	Not considered suitable given the type of development and likley roof drainage systems.
Rainwater harvesting	High	High	Poor	Poor	Poor	Yes	Yes	Yes	Could be provided subject to future mainenence of the rainwater harvesting tanks. Provides little benefit during extreme storm events as tank will be full.
Filter Strips	Poor	Poor	Med	Med	Med	Yes	Yes	Yes	Insufficient space available on site to install suitable filter strips. Site gradient also limit the potential areas where filter strips could be used.
Filter Trenches/drains	Med	Low	High	Low	Low	Yes	Yes	Yes	Not considered feasible due to underlying strata.
Pervious Surfaces	Good	Good	Good	Poor	Poor	Yes	Yes	Yes	Pervious surfaces could be provided within car parking areas. Gradients may cause issues. Lined system will be required due to impermeable ground conditions. Maintenance of these bays would need to be considered.
Swales	Med	Med	Good	Med/Good	Med	Yes	Yes	Limited	Insufficient space available on site. Site gradient also limit the potential areas where filter strips could be used.
Channels and rills	Med	Med	Med/High	Med/High	Subject to design	Yes	Yes	Yes	Layout would not accommodate channels as they would need crossing point to be provided. Would provide little benefit to reduction in peak flows and volumes on this scheme.
Bio Retention	Med	Med	Good	Good	Med	Yes	Yes	No	Insufficient space available within the site.
Infiltration Basins	Avg	Good	Good	Good	Good	Yes	Yes	No	Insufficient space available within the site.
Detention Basins	Good	Poor	Med	Good	Med	Yes	Yes	Yes	Insufficient space available within the site.
Wetlands	Good	Poor	Good	Good	Good	Yes	Yes	Unlikely	Insufficient room to accommodate a wetlands feature which would provide sufficient volume.
Ponds	Good	Poor	Good	Good	Good	Yes	Yes	Unlikely	Insufficient room to accommodate a pond feature which would provide sufficient volume.
Cellular storage	Good	Poor	Poor	Poor	Poor	Yes	Yes	Yes	Cellular storage could be provided to accommodate the 1 in 30 year and 100 year +cc storm events

Information above taken from Ciria Guidance and Susdrain online information

Denotes 'Suitable' for use on this development

Denotes 'Possible' for use on this development. (Subject to futher investigation)

Denotes 'Not suitable' for use on this development.