



Site Access Culvert Technical Note

DAVIDSONS HOMES

LUTTERWORTH ROAD, BURBAGE

1st March

Ref: PJS21-065-DOC-01

Executive Summary

This technical note has been produced on behalf of Davidsons Homes in respect of a proposed residential development of up to 135 dwellings.

The technical note has been produced in response to a request from Leicestershire County Council (LCC) as Lead Local Flood Authority (LLFA) and Local Highway Authority (LHA) for further information relating to the proposed site access.

The proposed site access will be formed onto Lutterworth Road and will cross an existing ditch, which will require culverting to maintain a constant flow route.

A section of the ditch north and south of the proposed culvert will require minor horizontal and vertical realignment to improve flow, maintain adequate cover to culvert pipework and to facilitate a new footway.

The catchment draining to the proposed culvert has been assessed based on the assumption that the ditch receives highway drainage only. As the land to the east of the ditch falls towards the east away from the ditch, it is assumed that the ditch does not receive additional overland flow. The overall impermeable area assumed to drain to the culverts has been calculated as 1940m².

It is proposed to culvert the ditch below the new access road, using twin 225mm diameter pipes, with inlet and outlet headwalls. A larger diameter pipe will make it impractical to construct concrete protection and road pavement layers above the pipe.

Modelling has been undertaken using MicroDrainage software to check the capacity of the ditch and culverts, for flows from all events up to and including the 100 year plus 40% allowance for climate change event. Modelling demonstrates that the use of twin 225mm diameter pipes laid at 1:169 is satisfactory, with surface water contained within the ditch without flooding.

Document Issue Record

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PJS Reference	PJS21-065-DOC-01

Status	Revision	Date of Issue	Author	Checked	Approved
Original	-	01/03/2023	Matt Leask	Paul Smith	Paul Smith

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- ii. The date on which the final report is delivered

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1. INTRODUCTION

- 1.1. This technical note has been produced on behalf of Davidsons Homes in respect of a proposed residential development of up to 135 dwellings.
- 1.2. The technical note has been produced in response to a request from Leicestershire County Council (LCC) as Lead Local Flood Authority (LLFA) and Local Highway Authority (LHA) for further information relating to the proposed site access.

Site Summary

Site Name	Lutterworth Road, Burbage
Location	Lutterworth Road, Burbage, Hinckley, LE10 2DN
NGR (approx.)	SP446919
Development Type	Residential
Flood Zone Classification	Flood Zone 1
Lead Local Flood Authority	Leicestershire County Council
Local Planning Authority	Hinckley & Bosworth Borough Council
NPPF Vulnerability	More Vulnerable

Sources of Data

- 1.3. The following sources of information have been reviewed:

- i. StreetMap Online Mapping
- ii. Environment Agency Flood Map for Planning
- iii. Topographical Survey Data
- iv. Google Mapping
- v. WinDes MicroDrainage Simulation Software

- 1.4. Online resources accessed on 28/02/2023 and considered current as of that date.

Existing Site

- 1.5. The proposed development site boundary is shown in red, and site access approximately at the location of the blue star, in Figure 1 below.



Figure 1 - Site and Access Location

- 1.6. The site is currently greenfield and is bounded to the north by existing houses, to the south by the M69, to the east by agricultural fields and to the west by existing housing and Lutterworth Road (B578). A hedgerow and ditch run along the boundary between Lutterworth Road and the site.

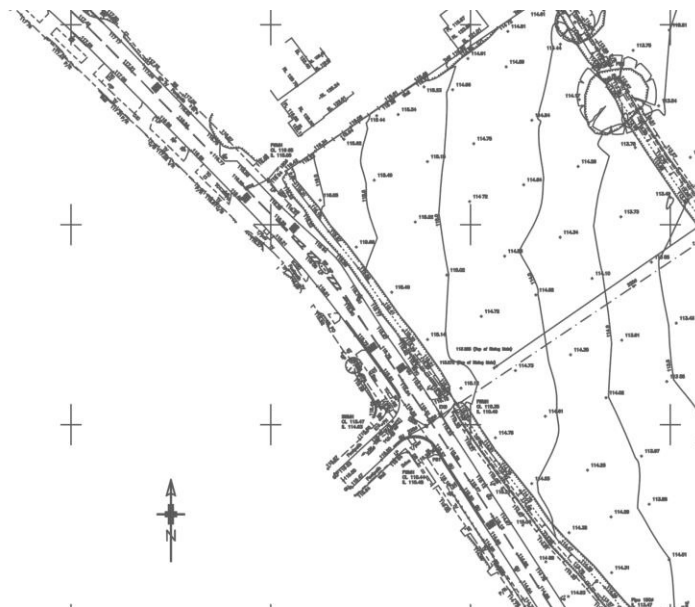


Figure 2 – Topographical Survey – Lutterworth Road

2. DEVELOPMENT SITE

Proposed Site Access

- 2.1. The proposed site access will comprise a 5.5m wide carriageway with 2m wide footways, formed as a junction with Lutterworth Road. Refer to Figure 2 below, and proposed access plan on drawing PJS21-065-513 in Appendix 2. The northern footway will replace the existing grassed verge to form a footway link to the existing footway that terminates opposite no. 110 Lutterworth Road.

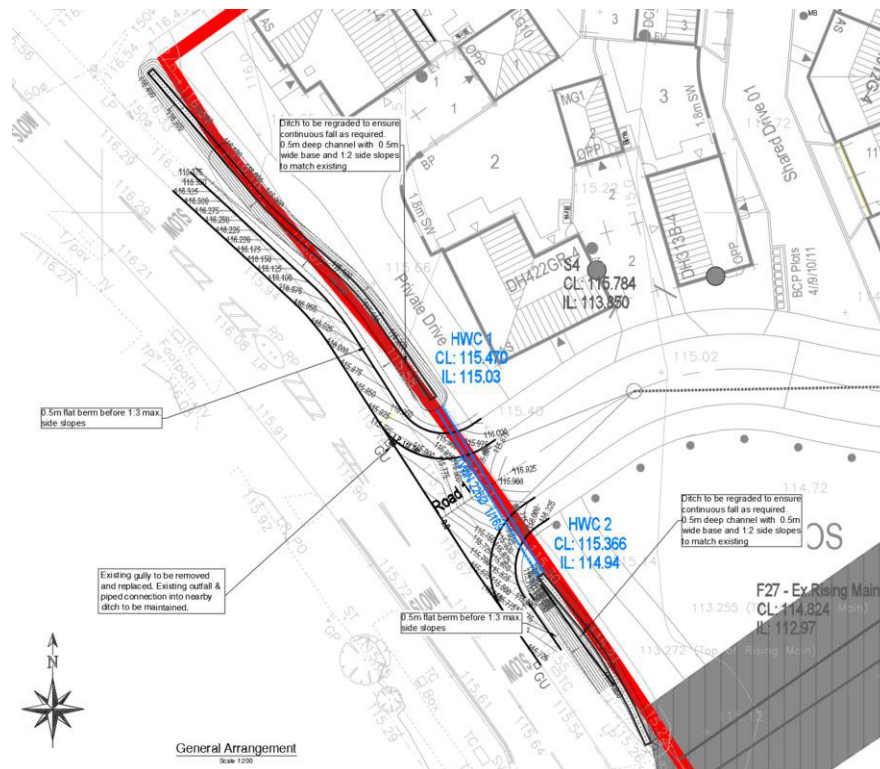


Figure 3 – Site Access

- 2.2. The proposed access will cross the existing ditch, which will require culverting to maintain a constant flow route.
- 2.3. A section of the ditch north and south of the proposed culvert will require minor horizontal and vertical realignment to improve flow, maintain adequate cover to culvert pipework and to facilitate the new footway. Refer to details on the drawing in Appendix 2.

Drainage Catchment

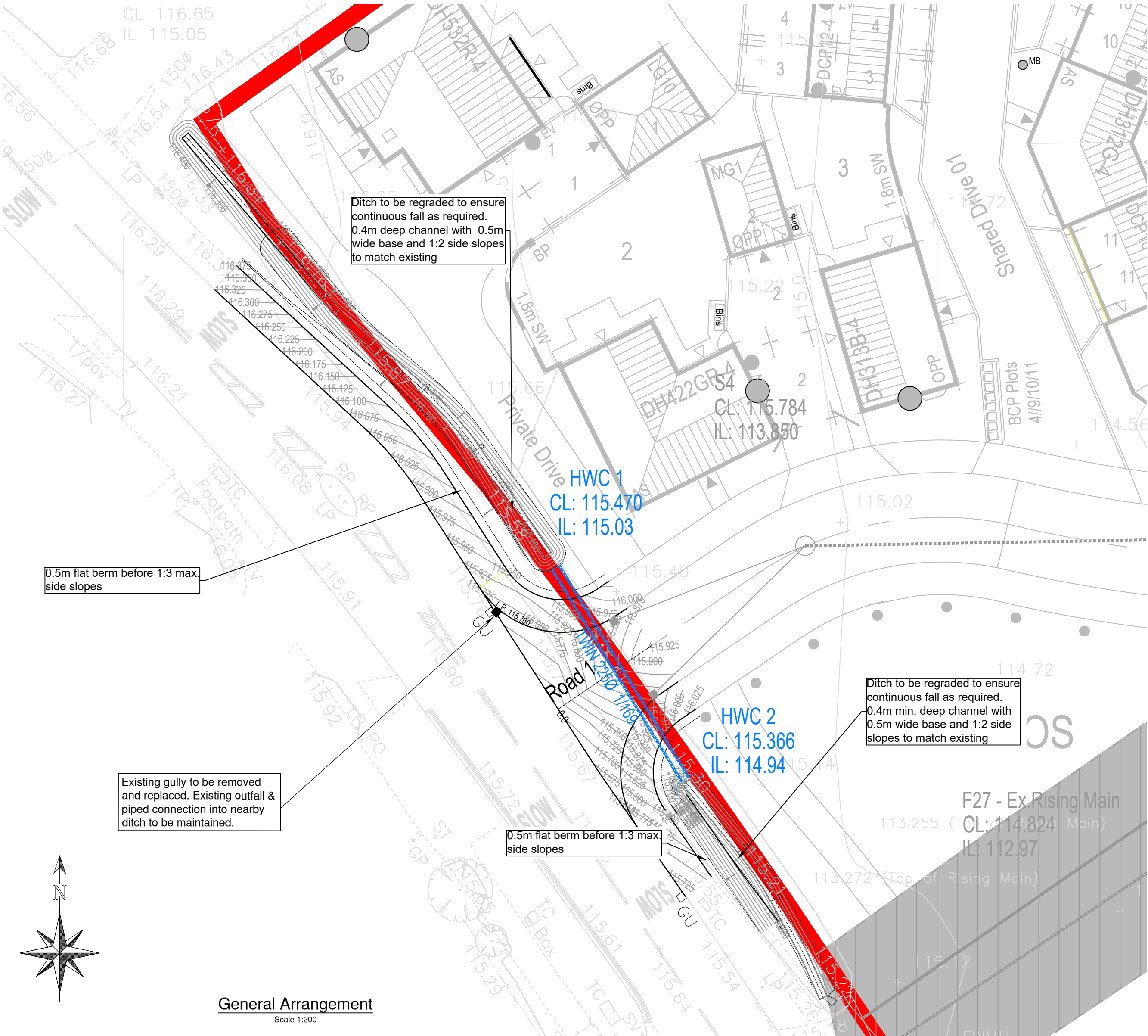
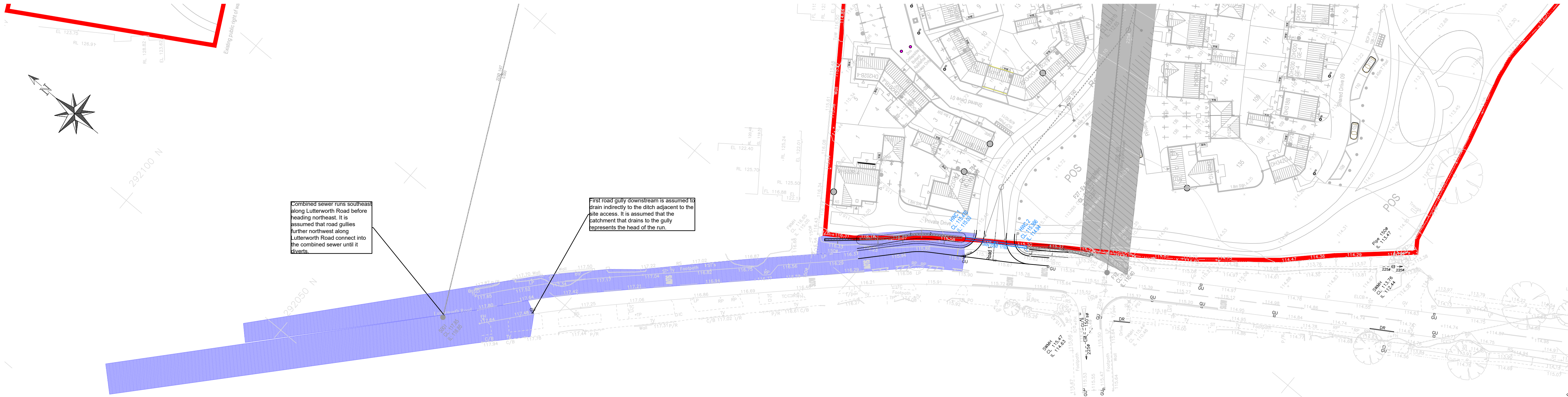
- 2.4. The catchment draining to the proposed culverts has been assessed based on the assumption that the ditch receives highway drainage only. As the land to the east of the ditch falls towards the east away from the ditch, it is assumed that the ditch does not receive additional overland flow.
- 2.5. There is no evidence that the ditch watercourse extends within a culvert further north along Lutterworth Road. It is likely that road gullies further north connect to the public combined sewer north of the access, that runs across the site from Lutterworth Road, with only those gullies further south and adjacent to the site discharging into the ditch. Assumed catchment areas are shown on drawing PJS21-065-513 in Appendix 2.
- 2.6. The overall impermeable area assumed to drain to the new culverts has been calculated as 1940m².

Proposed Culvert and Ditch Realignment

- 2.7. It is proposed to culvert the ditch below the new access road, using twin 225mm diameter pipes, with inlet and outlet headwalls. A larger diameter pipe will make it impractical to construct a concrete protection and road pavement layers above the pipe.
- 2.8. Using two pipes in parallel will reduce the risk from blockage, as it is unlikely that both pipes will fully block simultaneously.
- 2.9. The ditch appears to be culverted by 150-225mm diameter pipes further south of the site and so the use of 225mm diameter pipes will not restrict flow beyond the current situation.
- 2.10. The ditch will be realigned replicating the typical cross section of existing ditch, to ensure that a consistent depth of 400mm is maintained, and that the bed is lower at the headwalls to ensure increased cover to the culvert pipes below the road.
- 2.11. Modelling has been undertaken using MicroDrainage software to check the capacity of the ditch and culverts, for flows from all events up to and including the 100 year plus 40% allowance for climate change event.
- 2.12. A single pipe with a cross-sectional area equivalent to twin 225mm diameter pipes has been used within the model.
- 2.13. Modelling demonstrates that the use of twin 225mm diameter pipes laid at 1:169 is satisfactory, with surface water shown to be contained within the ditch without flooding, during the design event. Refer to Appendix 3, for MicroDrainage calculation and results.

Appendix 1 – Topographical Survey

Appendix 2 – Culvert Section Plan



Overview

Scale 1:500

MANHOLE COVER LEVELS APPROX (m)	
FOUL WATER SEWER INVERT LEVELS (m)	
SURFACE WATER SEWER INVERT LEVELS (m)	
MANHOLE DIAMETER (mm)	

Datum: 114.00M AOD	
EXISTING CHAINAGE (m)	
EXISTING LEVELS (m)	

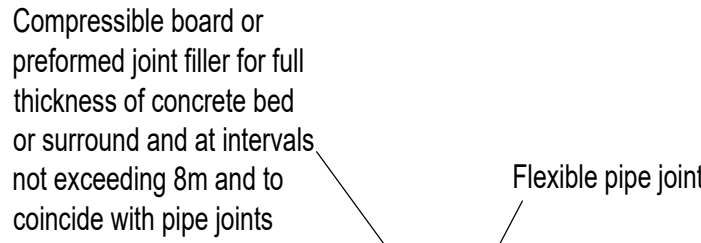
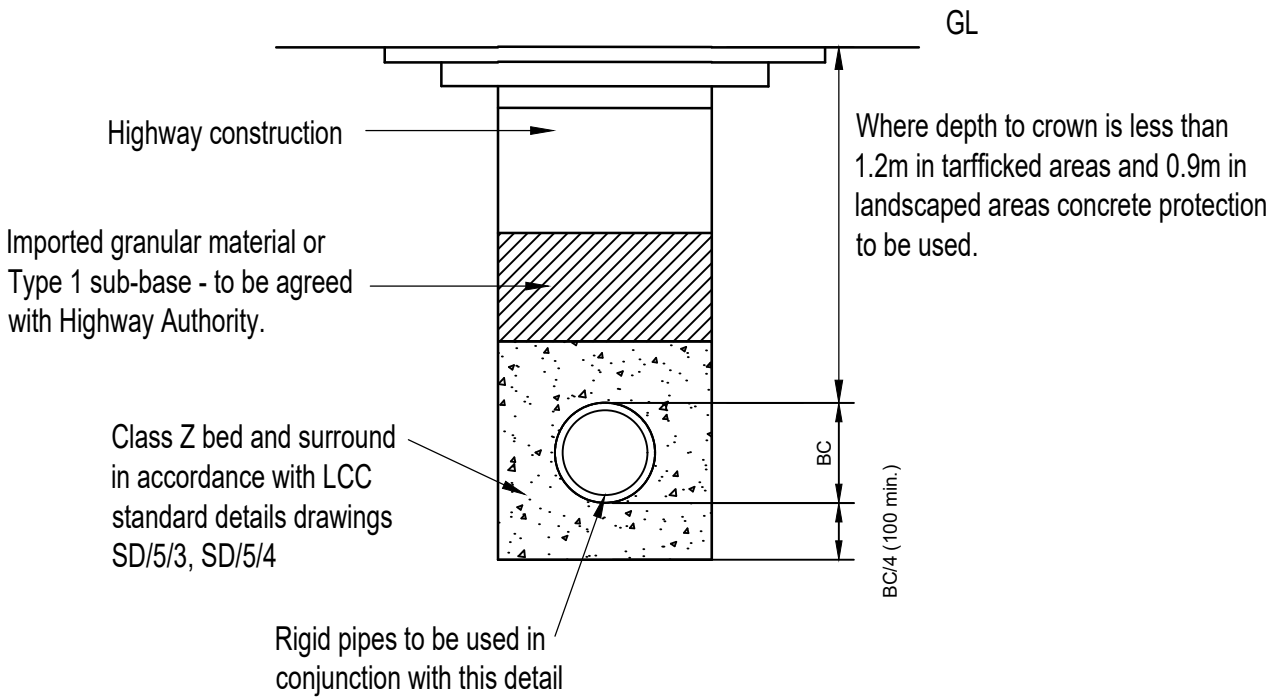
Section
Scale H=1:500 V=1:100

KEY:

- x 92.70 Proposed spot level
- Proposed twin-piped culvert and headwall
- Proposed contour
- Ditch/culvert catchment = 1940m²
- Existing road gully
- Proposed road gully

General Notes

- Do not scale this drawing. If in doubt, ask.
- This drawing is to be read in conjunction with all other relevant Engineers, Architects and specialist design drawings and details.
- All dimensions are in metres unless noted otherwise. All levels are in metres unless noted otherwise.
- Any discrepancies noted on site are to be reported to the Engineer immediately.
- This drawing is for discussion purposes and not for construction.



Compressible filler shall consist of bitumen impregnated insulating board to BS 1142:Part 3 or similar. Thicknesses to comply with Table 3 on SD/5/3.

Expansion Joint for Concrete
Scale 1:20

A	01.03.23	Ditch alignment revised. Catchment area added. Concrete protection details revised.	ML	PJS
Rev	Date	Amendments	By	CHK

Client

Davidsons Homes

Lutterworth Road, Burbage

Drawing Title

S278 Culvert Section

Drawn	Checked	Status	Scale
Initial	ML	ML	As Shown
Date	18/11/22	18/11/22	Information
Project Number	Drawing Number	Revision	
PJS21-065	DR-513	A	

Appendix 3 – MicroDrainage Calculations

PJS Consulting Engineers Limited		Page 0
Unit 4 Winking Hill Farm Kingston-on-Soar, Nottingham Nottinghamshire NG11 0DP	Lutterworth Road Burbage	
Date 28/02/2023 16:40 File Site Access Culvert.mdx	Designed by Matt.Leask Checked by	
Innovyze	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	14.295	0.410	34.9	0.194	5.00	0.0		0.040	V	-1	Pipe/Conduit	
1.001	8.936	0.260	34.4	0.000	0.00	0.0		0.040	V	-1	Pipe/Conduit	
1.002	11.837	0.320	37.0	0.000	0.00	0.0		0.040	V	-1	Pipe/Conduit	
1.003	15.220	0.090	169.1	0.000	0.00	0.0	0.600		o	319	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.15	116.020	0.194	0.0	0.0	0.0	1.58	819.4	26.3
1.001	50.00	5.25	115.610	0.194	0.0	0.0	0.0	1.59	825.3	26.3
1.002	50.00	5.37	115.350	0.194	0.0	0.0	0.0	1.53	795.6	26.3
1.003	50.00	5.58	115.030	0.194	0.0	0.0	0.0	1.25	100.3	26.3

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.003	HWC 2	115.359	114.940	0.000	0	0

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Unit 4 Winking Hill Farm Kingston-on-Soar, Nottingham Nottinghamshire NG11 0DP	Lutterworth Road Burbage	
Date 28/02/2023 16:40	Designed by Matt.Leask	
File Site Access Culvert.mdx	Checked by	
Innovyze	Network 2019.1	

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0
 Number of Offline Controls 0
 Number of Time/Area Diagrams 0
 Number of Online Controls 0
 Number of Storage Structures 0
 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Storm Duration (mins)	30
Ratio R	0.401		

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Micro
Drainage