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Graven Hill
A41 Roundabout Drainage Strategy

Date: June 2020

Client Name: Graven Hill Village Development Company

Document Reference: WIE11386-101-TN-1-1-2

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

Issue	Prepared by	Checked & Approved by
First -24.06.20	Karthi Palanniyapan Senior Engineer [redacted]	Nick Jones-Hill Senior Associate Director [redacted]

1. Introduction

1.1. This technical note has been produced to brief the surface water drainage strategy proposed for A41 Roundabout adjacent to the Graven Hill Site. Proposed roundabout to replace existing Pioneer Road/A41 junction to improve traffic flow from Graven Hill Development and to provide a future vehicular link to the adjacent Wretchwick Green development site.

2. Surface Water Drainage Strategy

2.1. The drainage strategy has been developed on following assumptions.

- All highway surface, adjacent footways and verge between highway and footway has been considered to be 100% impermeable.
- The greenfield rate of 4.2 l/s/ha has been applied for storage estimate.
- MicroDrainage 2019.1 Quick Storage Estimator tool has been used to determine the attenuation requirements.
- Drainage catchment includes proposed A41 roundabout and highway widening on the east and west of the roundabout.
- Exiting surface water sewer arrangement serving the existing highway catchment will be retained where possible.
- Existing ditch base level is shallow therefore, to collect, convey, attenuate and discharge surface water into existing shallow ditch requires careful consideration to avoid pumping.

- Surface water from proposed highway widening formed at low level on the west arm would be discharged to existing ditch, due to gravity connection to proposed attenuation not being feasible. To compromise, the existing highway surface located adjacent to and within the proposed roundabout footprint, which is currently discharging surface water into ditch, has been connected to proposed attenuation system.
- Filter drains will be provided adjacent to proposed widening to provide treatment to "First Flush" from highway runoff.
- Kerb outlets will be used along the perimeter of the central island and filter drains to convey flow to attenuation system.
- Kerb drainage will be provided where gullies unable to provide gravity drainage system.
- SuDS Maintenance plan will be prepared following consultation with OCC Highways.

3. Drainage Catchment

3.1. It should be noted that the proposed roundabout would replace the existing Pioneer Road and A41 junction. Proposed catchment includes the full extent of the roundabout and road widening on the both east and west arm.

3.2. Attenuation feature has been proposed at the middle of the roundabout therefore, surface water from the catchment has to flow to attenuation feature by gravity. The proposed road widening has been designed to tie-in to existing road levels, a small part of proposed highway formed at low level referred as AREA1 which extends to an area of 1125m^2, which is unable to connect to attenuation by gravity. This area will be connected to the existing ditch to the north of the highway.

3.3. Existing highway has been previously connected to existing ditch and currently located adjacent to proposed roundabout and within roundabout footprint referred as AREA2 which extends to an area of 1650m^2. AREA2 has been proposed to connect to attenuation system, which provides approximately 50% betterment.

3.4. Table 1 below summarises the catchment impermeable area and discharge rate. Discharge rate is calculated based on greenfield runoff rate of 4.2 l/s/ha. See Appendix A for greenfield runoff calculation.

Table 1: Catchment Area and Discharge Rate

Catchment	Impermeable Area (ha)	Flow Rate (l/s)
A41 Highway (100%)	0.677	2.80

3.5. Table 2 below shows the Quick Storage estimate attenuation requirement based on the impermeable area and allowable discharge rate. See Appendix B for Quick Storage Estimate Calculation.

Table 2: Attenuation Requirements

Catchment	Impermeable Area (ha)	Discharge Rate (l/s)	Attenuation Required (m^3)
A41	0.677	2.8	528

4. Existing Ditches

4.1. Surface water from A41 roundabout proposed to outfall into the existing ditch to the east. Connectivity survey to be carried out to confirm downstream levels and connectivity.

4.2. Existing ditch under proposed road will be culverted.

A. Greenfield Runoff Calculation

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	1.000	Urban	0.000
SAAR (mm)	673	Region Number	Region 6

Results l/s

QBAR Rural	4.2
QBAR Urban	4.2
Q100 years	13.4
Q1 year	3.6
Q30 years	9.5
Q100 years	13.4

B. Quick Storage Estimate

CALCULATIONS

Company:	WIE	Office:	Birmingham
Sheet No:	1 of 1	Project No:	WIE11386
By	Karthi P	Date	12.06.2020
Checked:	Nick J	Date	12.06.2020

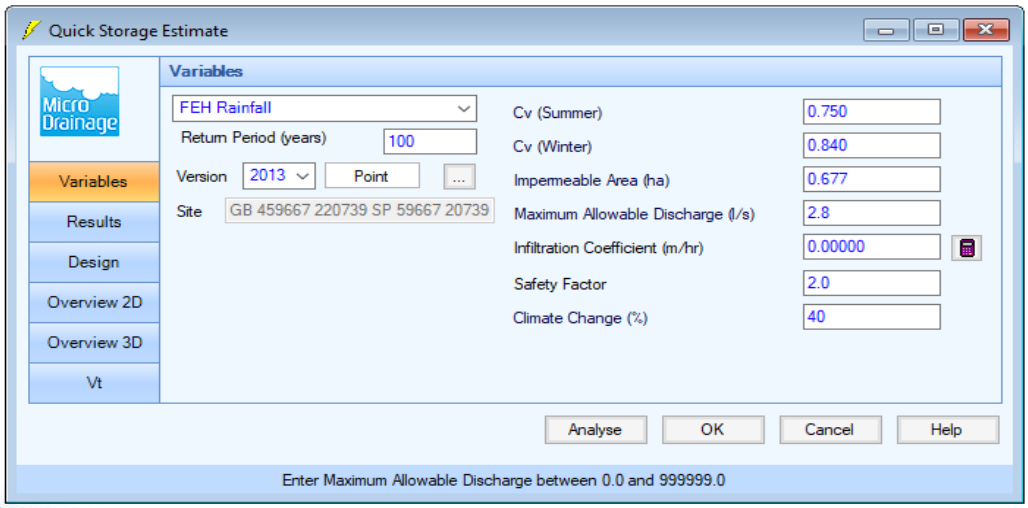
Project Title **WIE11386 - Graven Hill**

Calculations Title **Surface Water Management - Cacthment A41 Roundabout**

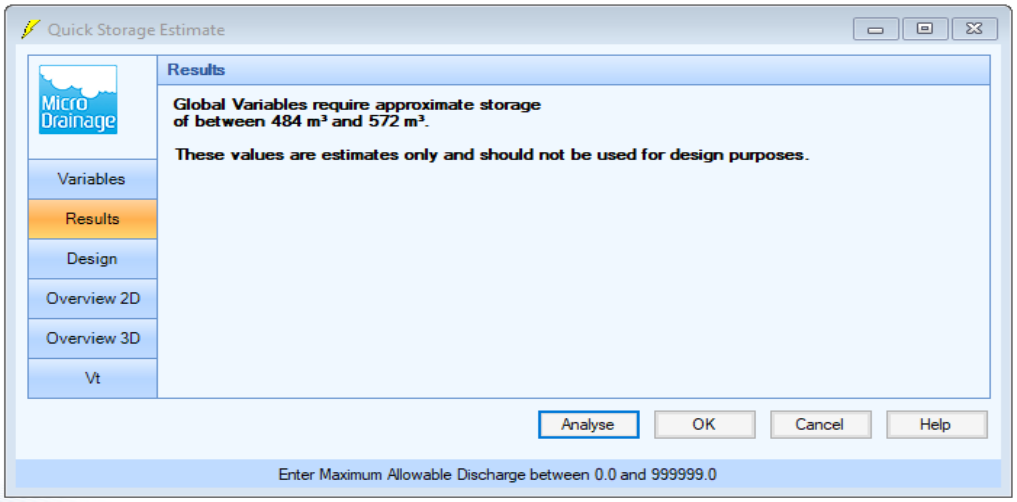
LOCATION	CALCULATIONS	OPTIONS

In order to calculate the volume of surface water attenuation required for the Site, Windes Microdrainage version 2019.1, Source Control module, Quick Storage Estimate has been used. The input and output data for which are shown below;

Input:



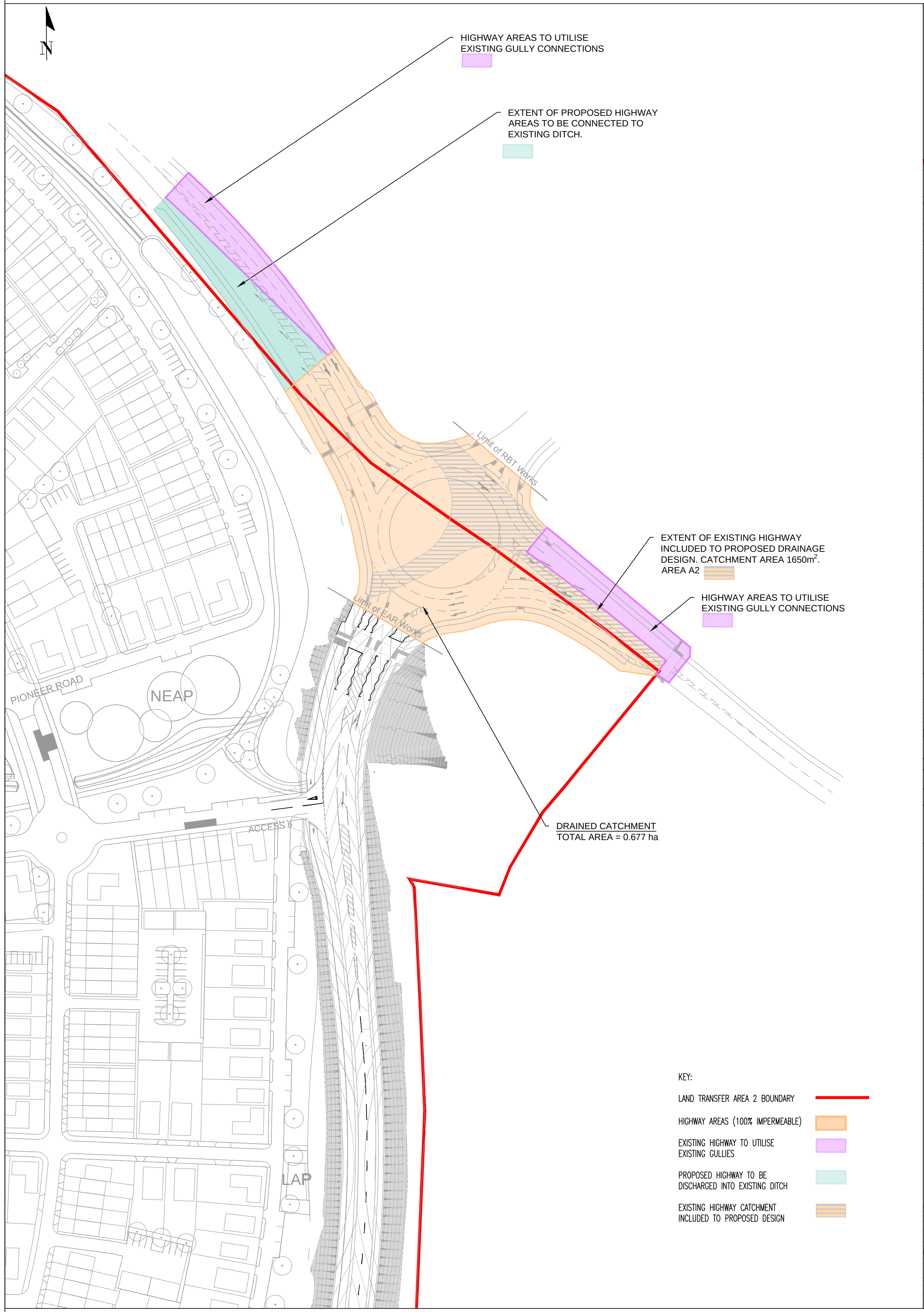
Output:



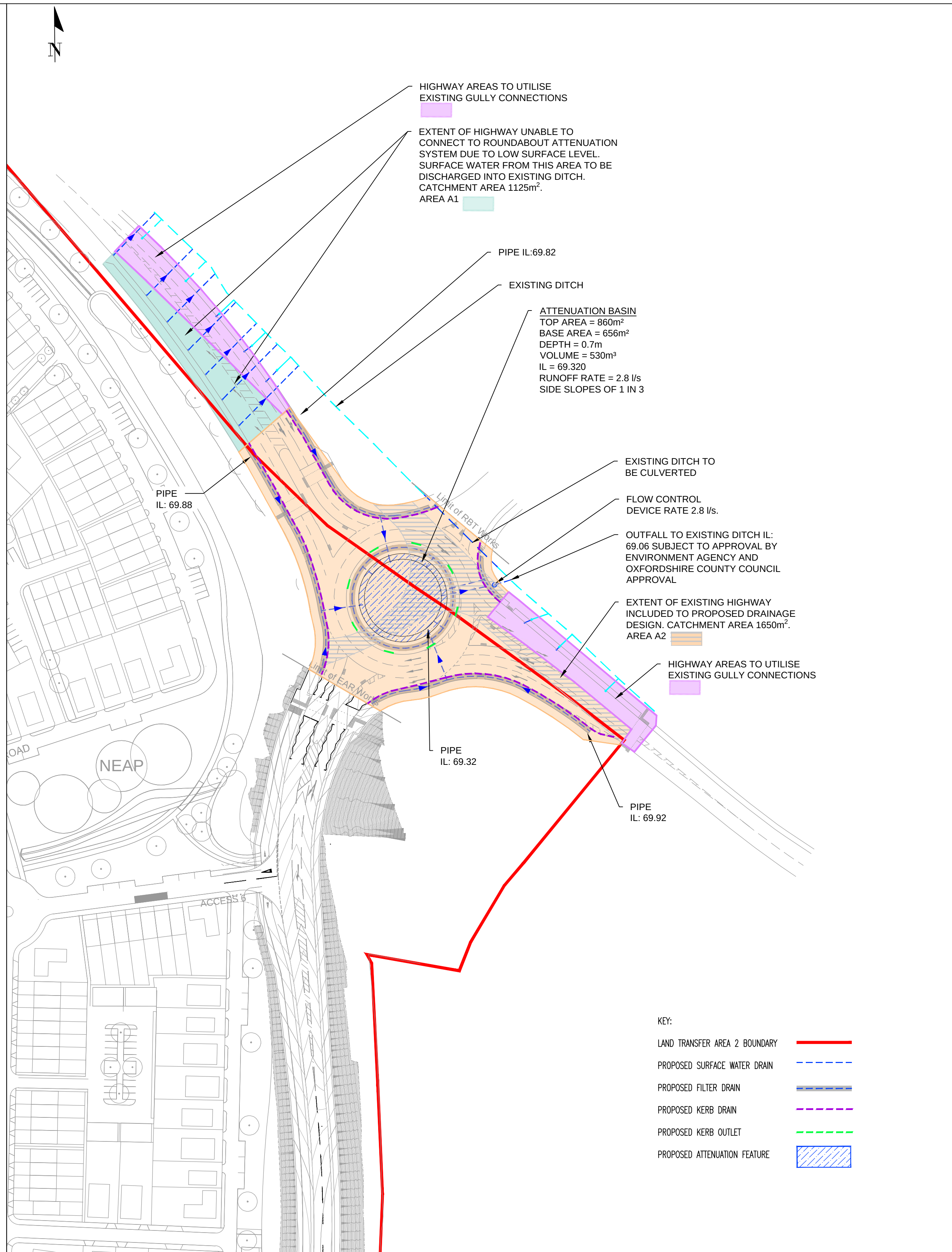
As Windes Quick Storage Estimate provides a range of attenuation volumes it is considered that an average value of the range is suitable for preliminary design sizing.

Minimum:	484.0	m^3			
Maximum:	572.0	m^3	Preliminary Estimate:	**528**	**m^3**

C. Drainage Strategy and Catchment Plan



DRAINAGE CATCHMENTS PLAN



DRAINAGE STRATEGY PLAN

This drawing should not be scaled. Dimensions to be verified on site.
Any discrepancies should be referred to the Engineer prior to work being put in hand.

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER'S, ARCHITECT'S OR OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.
3. THE CONTRACTOR MUST ENSURE AND WILL BE HELD RESPONSIBLE FOR THE OVERALL STABILITY OF THE BUILDING/STRUCTURE/EXCAVATION AT ALL STAGES OF THE WORK.
4. ALL WORK BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
5. ALL WORK IS TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES AND REGULATIONS.
6. OS DATA, TOPOGRAPHICAL SURVEY AND LIDAR DATA PROVIDED BY GLENN HOWELLS ARCHITECTS ON 3RD OCTOBER 2013
7. ADDITIONAL DRAINAGE SURVEY INFORMATION PROVIDED BY MK SURVEYS ON 18TH DECEMBER 2014
8. LAND TRANSFER AREA 1&2 BOUNDARY BASED ON GLENN HOWELLS ARCHITECTS DRAWING NO: 1982-A-L-573 REV V
9. NORTHERN AREA MASTERPLAN PROVIDED BY GLENN HOWELLS, DRAWING NO: 1982-A-L-011-AA
10. EMPLOYMENT AREA MASTERPLAN PROVIDED BY INC DESIGN, DRAWING NO: INC-SA[20]0020 REV. P08
11. CHOICE OF SURFACE WATER ATTENUATION FUTURE SUBJECT TO PROPOSED ROUNDABOUT FINISHED LEVELS.
12. INVERT LEVELS OF PIPE SHOWN HERE ARE INDICATIVE MINIMUM INVERT LEVELS SUBJECT TO FINAL ROUNDABOUT DESIGN LEVELS.
13. DRAINAGE PROPOSAL IS SUBJECT TO APPROVAL BY OXFORDSHIRE COUNTY COUNCIL HIGHWAYS/DRAINAGE ENGINEERS.

Rev	Date	Description	By
A01	19.06.20	DRAFT ISSUE	KP

Amendments

Project
GRAVEN HILL, BICESTER

Title
A41 ROUNDABOUT SURFACE WATER DRAINAGE STRATEGY

Client
Graven Hill Village Development Company Limited

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION UNUSUAL SIGNIFICANT HAZARDS

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION
1.
2.
3.

MAINTENANCE / CLEANING
1.
2.
3.

DECOMMISSIONING / DEMOLITION
1.
2.
3.

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Drawing Status
PRELIMINARY

Designed by KP	Checked by NJH	Project No WIE11386		
Drawn by KP	Date 18.06.2020			
Scales @ A1 work to figured dimensions only NTS		Computer File No WIE11386-145-92-500-001 Roundabout Drainage Strategy.dwg		
Publisher	Zone	Category	Number	Revision
WIE	145	92	500-	A01

File Path N:\Projects\WIE11386_GH0_LTA 2\WO145_A41 ROUNDABOUT_Got PO\7_CAD\92 Drainage\

A1-Wat-S-GHVDC, EAR - 00 Road Outline, Employment Masterplan INC-SAOS0011 - R191107_WIE, Masterplan Northern Area GH-1982-A-L-011-AA - R200131_WIE, R20 0302 - 20338_R8 - Topo Update 2020