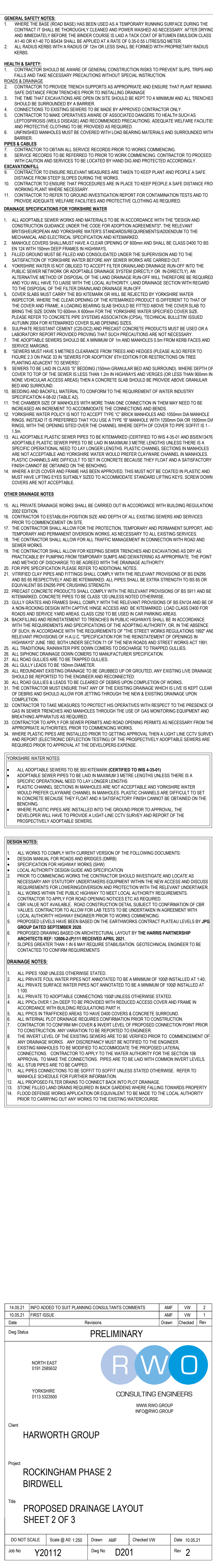
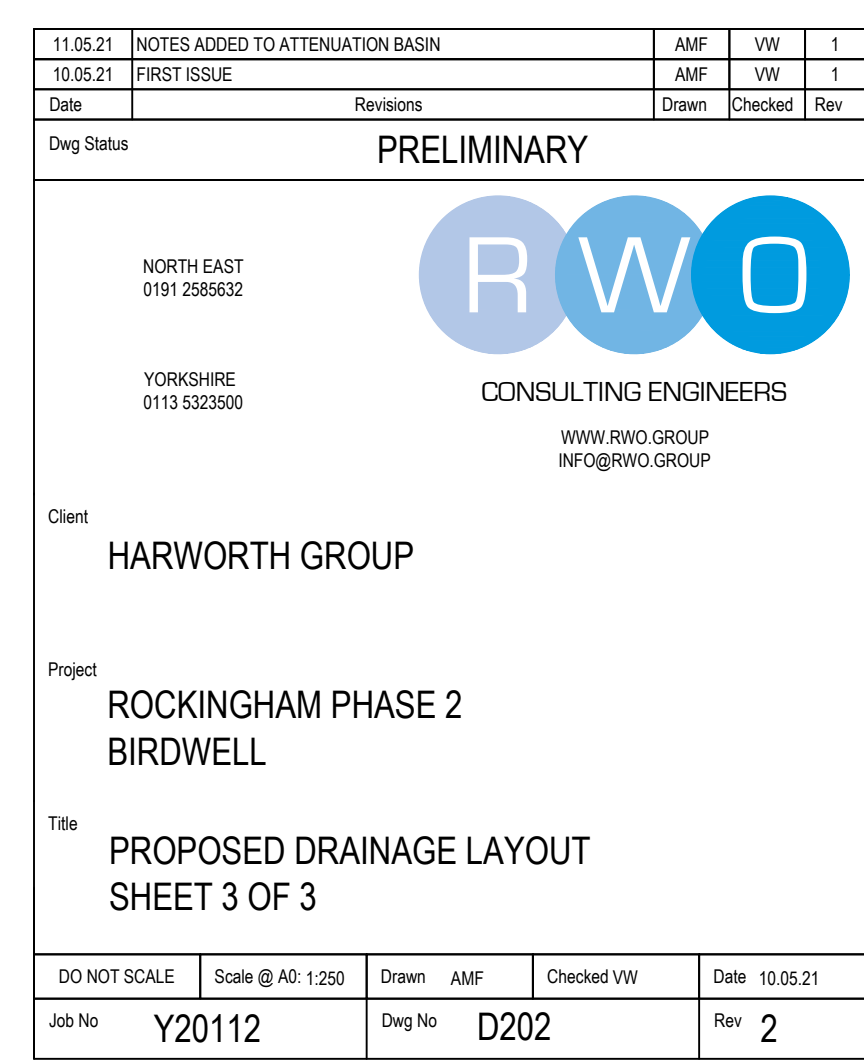
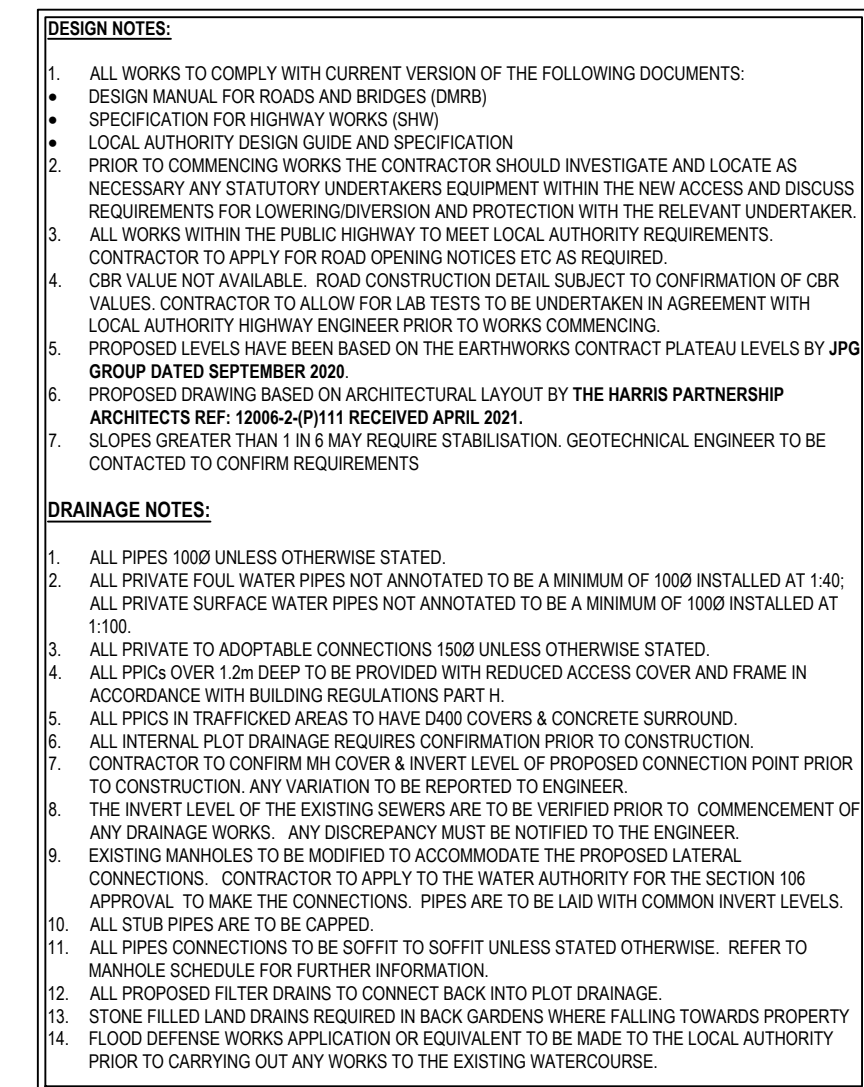


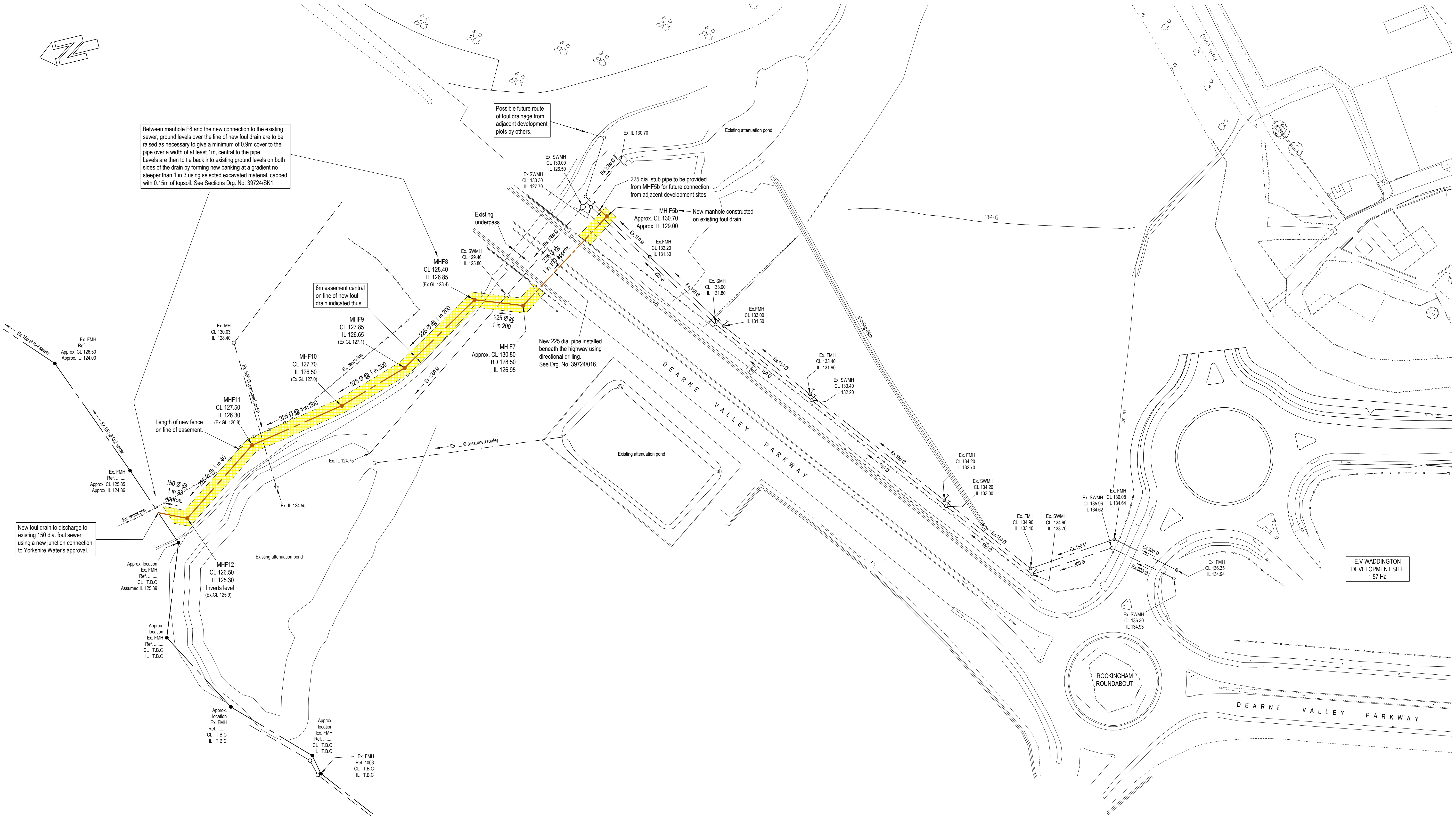
Appendix A RWO Drainage Layout Drawings







Appendix B Eastwood & Partners Drainage Layout Drawing



Between manhole F8 and the new connection to the existing sewer, ground levels over the line of new foul drain are to be raised as necessary to give a minimum of 0.9m cover to the pipe over a width of at least 1m, central to the pipe. Levels are then to tie back into existing ground levels on both sides of the drain by forming new banking at a gradient no steeper than 1 in 3 using selected excavated material, capped with 0.15m of topsoil. See Sections Drg. No. 39724/SK1.

Possible future route of foul drainage from adjacent development plots by others.

6m easement central on line of new foul drain indicated thus.

New 225 dia. pipe installed beneath the highway using directional drilling. See Drg. No. 39724/016.

225 dia. stub pipe to be provided from MHF5b for future connection from adjacent development sites.

New manhole constructed on existing foul drain.

Length of new fence on line of easement.

New foul drain to discharge to existing 150 dia. foul sewer using a new junction connection to Yorkshire Water's approval.

E.V WADDINGTON DEVELOPMENT SITE 1.57 Ha

ROCKINGHAM ROUNDABOUT

DEARNE VALLEY PARKWAY

NOTES

REV	DESCRIPTION	SIG	CHK	DATE
A	First Issue.			
B	Revised to take foul drain across Dearne Valley Parkway using directional drilling. Drawing re-titled.	MW	AP	03.07.19

E.V WADDINGTON LTD.

ROCKINGHAM

OFF-SITE FOUL DRAINAGE TAKEN
BENEATH DEARNE VALLEY PARKWAY

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SCALE WHEN PLOTTED AT A1			DRAWING STATUS		
1:750			PRELIMINARY		
DRAWN	CHECKED	DATE	DRAWING NUMBER	REV	
MW	AP	03-07-19	39724/010	B	

Appendix C JPG Drainage and Flood Risk Statement



DRAINAGE & FLOOD RISK STATEMENT

Rockingham Phase 2 and 3 Barnsley

Reference

4652-2-JPG-XX-XX-RP-D-0620-S2-P01

Date

December 2019

Author

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APPENDICES

Appendix A Site Location Plan

Appendix B Topographic Survey

Appendix C Yorkshire Water Sewer Records

Appendix D Proposed Development Plan

Appendix E Environment Agency Flood Map

Appendix F Micro Drainage Greenfield Discharge Calculations

Appendix G Foul Water Drainage Calculations



CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Harworth Group
Advantage House
Poplar Way
ROTHERHAM
S60 5TR

This report has been prepared for the sole use and reliance of the above named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of JPG (Leeds) Limited. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

Rev	Date	Revision Details	Status	Author(s)	Approved
P01	16.12.2019	First Issue	Information	JDM	



1.0 INTRODUCTION

JPG (Leeds) Limited has been instructed by Harworth Group to carry out a Drainage and Flood Risk Assessment for a proposed commercial development on land immediately to the north and south of Dearne Valley Parkway.

The report will review the drainage and flood risk issues associated with the proposed development and recommend any mitigation which should take place as part of the development.

This document is prepared in accordance with the requirements of and in response to the Planning Practice Guidance & National Planning Policy Framework (NPPF) which states that those proposing particular developments are responsible for:

- Providing an assessment of whether any proposed development is likely to be affected by flooding and whether it will increase the flood risk elsewhere and of the measures proposed to deal with these effects and risks; and
- Satisfying the local planning authority that any flood risk to the development or additional risk arising from the proposal will be successfully managed with the minimum environmental effect, to ensure that the site can be developed and occupied safely.

NPPF defines flood zones as follows:

- Zone 1 – Low Probability – less than 1 in 1000 annual probability (< 0.1%) of river or sea flooding in any year.
- Zone 2 – Medium Probability – between a 1 in 100 and 1 in 1000 annual probability (1% - 0.1%) of river flooding or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Zone 3a – High Probability – 1 in 100 or greater annual probability (> 1%) of river flooding or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b – Functional Floodplain – 1 in 20 or greater annual probability (5%) of river flooding in any year. This is land on which water has to flow or be stored in times of flood.

A Flood Risk Assessment is required for all sites in excess of 1ha within Zone 1 and all sites within Zones 2 and 3.



2.0 THE SITE

The site is located to the north east of Junction 36 of the M1 motorway, on both the north and south side of Dearne Valley Parkway, approximately 1.75km northwest of Hoyland town centre. The approximate centre of the site is located at NGR E435470, N401042.

Phase 2

The site is located to the south of Dearne Valley Parkway and is an irregular shape covering an area of approximately 28.037ha.

The site is bounded by Dearne Valley Parkway to the north, a bridle track running from the east around the southern boundary and beyond this is open fields.

To the west is as watercourse/ditch running from south to north including a small pond in the north west corner. Further over to the west is future development land.

The site comprises of restored former opencast working and currently is a mixture of fields interspaced with woodland areas.

The site generally falls from south to north in the order of 36.5m.

Phase 3

The site is located to the north of Dearne Valley Parkway and is an irregular shape covering an area of approximately 9.72ha.

The site is bounded by Dearne Valley Parkway to the south, open agricultural land to the north, an existing business park to the east and to the west is as watercourse/ditch, pond and further over an existing business park.

The site comprises of restored former opencast working and currently is a mixture of fields and interspaced with woodland areas.

The site generally falls from south to north in the order of 21.0m.

A Site Location Plan is located in Appendix A and topographic survey in Appendix B.



3.0 EXISTING DRAINAGE AND SEWER NETWORK

A Yorkshire Water public sewer plan is provided in Appendix C, this indicates the following public sewers in close proximity to the site:

- There is a 150 mm diameter public foul water sewer recorded to the north located within the phase 3 development land.

An open watercourse and pond exist running adjacent to the west of phase 2 which flows in a south to north direction.

This passes beneath Dearne Valley Parkway in a culvert and becomes open watercourse again with a further pond located to the west of Phase 3 development land.

This watercourse is understood to be a tributary of the downstream watercourse known as Short Wood Dike which is located to the north of the phase 3.



4.0 DEVELOPMENT PROPOSALS

It is proposed to develop both phase 2 and phase 3 sites for commercial development.

Proposed development area for phase 2 is approximately 28.00 Ha.
Impermeable area for Phase 2 is approximately 15.00 Ha.

Proposed development area for phase 3 is approximately 10.00 Ha.
Impermeable area for Phase 3 is approximately 6.500 Ha.

A proposed site plan is provided in Appendix D.



5.0 FLOOD RISK ASSESSMENT

Publicly available information on flooding obtained from the Environment Agency (EA) website database is provided in Appendix E.

The site is indicated to fall within Flood Zone 1 which comprises land assessed as having a low risk of flooding from watercourse and/or sea with less than a 1:1000 annual probability of river or sea flooding.

NPPF Technical Guidance states all uses of land are appropriate in Flood Zone 1.

As the site area is greater than 1ha other sources of flooding need to be considered.

These include:

- Adjoining land.
- Ground water.
- Flooding from sewers.
- Flooding from reservoirs, canals and other artificial sources.

5.1 Flooding from Adjoining Land

Phase 2

The site sits in an elevated position above land to the north (Dearne Valley Parkway).

To the south land is of a similar elevation to the site at the boundary.

The ground generally falls away to the south and west outside of the site boundary.

There is an area of higher ground in the south east corner, but this generally falls towards the east. Any overland flows from this area would pass the site to the east.

To the west is the existing watercourse/ditch which is at a considerably lower level than the proposed site. Therefore, overland flooding from this location is considered unlikely.

Phase 3

The site sits in an elevated position above the land to the north which is open fields and generally falls in a north east direction.

To the south land is of a similar elevation to the site at the boundary and is public highway (Dearne Valley Parkway).

Any runoff from the public highway would be contained within the confines of the highway and associated drainage system.

Land to both the east and west of the site generally falls from the south to the north and is of similar level to the proposed phase 3 development at the boundary.



Any overland flows from here would generally pass the site in a south to north direction. Therefore, overland flooding from these locations is considered unlikely.

The risk of flooding from adjoining land is considered to be **low**.

5.2 Flooding from Groundwater

The proposed sites will be in an elevated position in relation to the nearest watercourses, thus it is unlikely there will be an issue with groundwater effecting the site.

The risk of flooding from ground water is considered to be **low**.

5.3 Flooding from Sewers

The sewers in proximity to the site are public sewers owned by Yorkshire Water and will be subject to regular maintenance and inspection, therefore blockage of these sewers is unlikely.

The risk of flooding from sewers is considered to be **low**.

5.4 Flooding from Reservoirs, Canals and Other Artificial Sources

A surface water balancing pond is located to the west of the phase 3 site. This feature is understood to be a facility associated with the adjacent public highway (Dearne Valley Parkway), which is owned/maintained by the highway authority and will be subject to regular maintenance and inspection therefore blockage/overtopping of this facility unlikely.

There are no other known reservoirs, canals or artificial sources within the vicinity of the site. The site is therefore not at risk from such sources.

The risk of flooding from sewers is considered to be **low**.



6.0 SURFACE AND FOUL WATER DRAINAGE

The proposed site drainage will comprise of a separate surface and foul water drainage system.

The proposed drainage will be designed in accordance with current Building Regulations, SFA and industry best practice as required.

The following summarises the requirements for the discharge of surface and foul water from the site.

6.1 Sustainable Urban Drainage Systems (SUDS)

Initial investigations indicate the sites are underlain by significant depths of made ground/fill due to former mine workings in the area, therefore the disposal of surface water by infiltration methods is not deemed feasible.

Given the underlying ground strata the use of infiltration methods for the discharge of surface water is deemed unsuitable due to potential settlement issues associated with the made ground becoming inundated with surface water.

Sustainable Urban Drainage System (SUDS) may be used in conjunction with conventional drainage systems to improve water quality as well as manage surface water discharge.

The following audit has been carried out relating to suitability of SUD's systems.

Drainage Method	Description/Suitability	Proposal/Feasibility
1. Infiltration.	Methods not deemed suitable due to underlying ground strata	Not applicable.
2. Ponds and wetlands.	May be suitable if land is allocated	Applicable.
3. Infiltration Basins.	Methods not deemed suitable due to underlying ground strata	Not applicable.
4. Detention Basins.	May be suitable if land is allocated.	Applicable.
5. Swale.	May be utilised convey water.	Applicable.
6. French/Filter drain.	May be utilised convey water.	Applicable.
7. Pervious/Permeable Pavement.	Methods not deemed suitable due to underlying ground strata	Not applicable.
8. Geocellular Systems/Tank systems.	May be used as surface water attenuation.	Applicable.
9. Oversized pipes.	May be used as surface water attenuation.	Applicable.
10. Box culverts.	May be used as surface water attenuation.	Applicable.
11. Purpose designed tanks.	May be used as surface water attenuation.	Applicable.

6.2 Surface Water Drainage

The disposal of surface water shall be in accordance with the Requirement H3 of Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway/infiltration system, watercourse and public sewer in that priority order.

As noted in Section 6.1 the discharge of surface water drainage via infiltration methods is not feasible, therefore the second consideration should be discharge to watercourse.



The nearest watercourse is a tributary of the downstream watercourse known as Short Wood Dike. Short Wood Dike is located within land to the north of phase 3.

The tributary which passes adjacent to both phases of the development is located to the west and runs in a south to north direction passing beneath Dearne Valley Parkway.

This is the proposed location for discharge of surface water from both phases. Surface water discharge from the both sites would be restricted to agreed rates with the LLFA (Barnsley).

In previous consultation with Barnsley MDC land drainage department as part of the Hoyland Master Plan Strategy which cover phase 2 of the development. BMDC confirmed a greenfield discharge rate of 4.4 litres/second/hectare is applicable for the area which covers phase 2.

Based on the above figure the greenfield run off for the two phases would be as follows:

- Phase 2 impermeable area approximately 15.00Ha x 4.4l/s/ha = 66.0 l/s.
- Phase 3 impermeable area approximately 6.50Ha x 4.4l/s/ha = 28.6 l/s.

In addition, greenfield run-off calculations have also been prepared using Windes Micro Drainage software and results are located in Appendix F.

Greenfield run off based on the Micro Drainage calculations would be as follows:

- Phase 2 impermeable area approximately 15.00Ha (QBAR) = 62.2 l/s.
- Phase 3 impermeable area approximately 6.50Ha (QBAR) = 26.9 l/s.

The lower of the above figures will be used to calculate preliminary attenuation volumes.

Phase 2 Attenuation Volumes

Given the restricted surface water discharge rate on-plot surface water attenuation will be required, it is proposed this will be provided in a detention basin to the west of the site.

The following provides a brief calculation of the approximate volumes of attenuation using the 'Quick Storage Estimate' element of Windes Microdrainage:

Storage Design Parameters

- Restricted discharge rate = 62.2 litres/second.
- Site area to be developed = 28.00Ha.
- Proposed Impermeable area = 15.00 Ha. (53.5% impermeable).
- M5-60 = 19.0.
- Ratio R = 0.363



- 1:2 Year Return Period = 2089-3366 m³.
- 1:30 Year Return Period = between 4736-6916 m³.
- 1:100 Year Return Period (+30% cc) = between 9280-12909 m³.

The proposed onsite drainage system shall be designed in accordance with the requirements of Building Regulations and Sewers for Adoption and shall demonstrate that:

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall event.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall event (including an allowance of 30% for the effects of future climate change), as defined in NPPF Technical Guidance.

Phase 3 Attenuation Volumes

Given the restricted surface water discharge rate on-plot surface water attenuation will be required, it is proposed this will be provided in a detention basin to the north of the site.

The following provides a brief calculation of the approximate volumes of attenuation using the 'Quick Storage Estimate' element of Windes Microdrainage:

Storage Design Parameters

- Restricted discharge rate = 28.6 litres/second.
- Site area to be developed = 10.00Ha.
- Proposed Impermeable area = 6.50 Ha. (65.0% impermeable).
- M5-60 = 19.0.
- Ratio R = 0.363
- 1:2 Year Return Period = 884-1420 m³.
- 1:30 Year Return Period = between 2010-2939 m³.
- 1:100 Year Return Period (+30% cc) = between 3953-5511 m³.

The proposed onsite drainage system shall be designed in accordance with the requirements of Building Regulations and Sewers for Adoption and shall demonstrate that:

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall event.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall event (including an allowance of 30% for the effects of future climate change), as defined in NPPF Technical Guidance.



6.3 Foul Water Drainage

The proposed foul water discharge has been calculated for both phases and is detailed below:

- Phase 2 foul water discharge – 16.80 l/s (design flow 6xDWF+10%).
- Phase 3 foul water discharge – 6.00 l/s (design flow 6xDWF+10%).

Calculation have been carried out using the method as detailed in SFA.

Foul Water drainage calculations are in Appendix G.

Discharge from both sites is proposed to drain into the existing 150 diameter public foul water sewer located in phase 3 land.

Discharge from Phase 3 will be directly into the public sewer at a convenient location to suit the proposed development.

Discharge from Phase 2 would be via a new section of sewer/drain to be constructed from the south to the north of Dearne Valley Parkway.

The pipe would pass beneath Dearne Valley Parkway via a method to be agreed with BMBC Highways. Possibly directional drilling.

This sewer/drain is to be sized to take Phase 2 along with foul water discharge from the Waddington and Gregory developments to the west.

The drain is been designed and precured by Waddingtons as their development will come on line first. Details are to be finalised by Waddingtons.

The proposed drain will be designed to SFA and Yorkshire Water Requirement and have sufficient capacity to serve all three developments.

The drain will be put forward for adoption at such a time that the criteria for adoption is met.

At the time of writing the drainage and flood risk assessment correspondence from YW had not been received. The report will be reviewed and updated as necessary once correspondence has been received from YW who are the local Sewerage/Water Company.



7.0 DRAINAGE MAINTENANCE AND MANAGEMENT

The proposed foul and surface water drainage systems including the detention basin will remain private in the short term.

The following maintenance and management guidance is provided.

7.1 Introduction

Pipe sizes and gradients are designed to be self-cleansing albeit regular maintenance and inspections are required to ensure the long-term efficiency of the systems.

All works should be undertaken by suitably qualified personnel and waste should be treated and removed by an appropriately registered company.

7.2 Drains/Sewers

The main objective of maintenance guidance is to establish procedures to ensure the sewer system functions appropriately in the long term within an environment of fiscal control.

Maintenance includes:

- Local repair or local replacement of damaged pipes or other structures in order to maintain the functioning of the sewer.
- Cleaning and removal of sediments, obstructions etc. to restore hydraulic capacity.
- Jetting/vacuum of sewers to be undertaken as often as necessary to remove silts and/or ordinary debris.
- In the event that any extraordinary issues are encountered during an inspection, further information may be required such as a CCTV survey report.
- Maintenance to be undertaken on a six monthly schedule.

To avoid damaging the pipe, PSI pressures need to be verified before jetting of plastic twin wall sewers. Cleaning of drainage systems may require the temporary sealing of the system and careful collection of the effluent for disposal off site.



7.3 Detention Basin

Regular inspection and maintenance is important for the effective operation of the detention basin. CIRIA's SUDS manual C753 Table 23.1 recommends the following maintenance regime for detention basins:

Maintenance schedule	Required action	Typical Frequency
Regular Maintenance	Remove litter and debris.	Monthly (or as required).
	Cut the grass – public areas.	Monthly (during growing season).
	Cut the meadow grass.	Half yearly (spring, before nesting season, and autumn).
	Inspect marginal and bankside vegetation and remove nuisance plants (first 3 years).	Monthly (at start, then as required).
	Inspect inlets, outlets, bankside, structures, pipework, etc. for evidence of blockage and/or physical damage.	Monthly.
	Inspect water body for signs of poor water quality.	Monthly (May – October).
	Inspect silt accumulation rates in any dry weather channel and in main body of the basin and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options.	Half yearly.
	Check any mechanical devices, e.g. flow controls.	Half yearly.
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above basin base; include 25% of basin surface).	Annually.
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level.	Annually.
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually.
	Remove sediment from any dry weather channel.	Every 1-5 years, or as required.
	Remove sediment and planting from one quadrant of the main body of basins.	Every 5 years, or as required.
Occasional maintenance	Remove sediment from the main body of big basins when pool volume is reduced by 20%.	With effective pre- treatment this will only be required rarely, e.g. every 25-50 years.
Remedial actions	Repair erosion or other damage.	As required.
	Replant, where necessary.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.

This regime can be tailored to suit the detention basin dependant on final landscaping details and many of the maintenance activities may be undertaken as landscaping maintenance.

7.4 Flow Control Chamber

The surface water drainage network has a discharge restriction imposed by Barnsley MBC; this is controlled by a flow control device.



Regular inspections of the flow control chamber should be carried out to ensure that debris that may obstruct the inlet to the flow control is not present. The frequency of inspection will depend on the location of the unit, it is recommended initial inspections should be on a three-month basis for the first year of operation followed by a six-monthly basis thereafter.

In the event that the inlet to the control unit becomes blocked, the pivoting bypass door may be operated by pulling the wire rope attached upwards to drain down the chamber and provide access for maintenance.

7.5 Manholes/Access Chambers

All manhole covers should be lifted, and the manholes visually inspected for silt, debris and signs of blockages within the drainage system. Check manhole covers and frames for damage and ensure correctly bolted together. This should be undertaken on a six monthly basis.

Should any debris or blockages be detected, the manholes should be cleaned along with associated pipe runs which should be high pressure jetted and CCTV surveyed to verify/identify that no further remedial works are required.



8.0 CONCLUSIONS

This assessment has looked at the drainage and flood risk issues to support a proposed commercial development on land adjacent to Dearne Valley Parkway.

The site lies within Flood Zone 1 and is therefore at low risk of flooding from river or sea. NPPF Technical Guidance states all uses of land are appropriate in Flood Zone 1.

Other sources of flooding have been assessed and the risk of flooding from these sources is considered to be low.

Surface water shall discharge to tributary of the downstream watercourse known as Short Wood Dike which passes through the west of the site.

Discharge from both phases will be restricted to greenfield run off rate as detailed in the report.

Surface water attenuation will be provided in a detention basin located to the west of the phase 2 development and to the north of the phase 3 development.

Foul water drainage will discharge to the existing 150 diameter public foul water sewer located in phase 3 land subject to agreement by YW.

Jonathan Millar
For and behalf of JPG (Leeds) Limited

December 2019