Report No: 14/032.01
Revision: 02
Dated: 27th August 2019

Land off Lowfield Road
Bolton upon Dearne
South Yorkshire

Flood Risk Assessment

Client:

Gleeson Developments Ltd
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Sheffield Business Park
Sheffield
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Prepared by:

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REVISION HISTORY

Revision	Date	Details
00	28th January 2015	First issue
01	23rd August 2019	FRA updated
02	27th August 2019	Appendix F added

CONTENTS

APPENDICES

ABBREVIATIONS

AEP:	Annual exceedance probability
AOD:	Above Ordnance Datum
CCA:	Climate change allowance
FFL:	Finished floor level
FRA:	Flood risk assessment
PPG:	Planning Practice Guidance
SFRA:	Strategic Flood Risk Assessment

1.0 INTRODUCTION

1.1. JOC Consultants Ltd is instructed by Gleeson Developments Ltd (the Client), to prepare a site specific flood risk assessment (FRA) for a proposed housing development on land off Lowfield Road, Bolton upon Dearne. The development is the subject of a planning application to Barnsley Metropolitan Borough Council. The application number is 2019/0623.

1.2. References in this report to "the site" are references to the site to which the planning application applies. Specific references to sources of information used in the report are shown in square brackets and are listed in section 10. Figures 1 to 5 are presented immediately following page 17 and the appendices follow thereafter.

1.3. This report is prepared specifically for the Client for the purpose of the aforementioned planning application and the report may not be used for any purpose other than for the purpose for which it was commissioned, and it may not be assigned to any third party without our written permission.

1.4. In the preparation of this FRA, JOC Consultants Ltd has relied on information provided to us by statutory authorities and by the Client and accepts no liability for its accuracy or adequacy or for the consequences of any changes to or re-assessment of this data in the future.

2.0 OBJECTIVES

2.1. The objectives of this flood risk assessment are to:

1. establish whether the proposed development is likely to be affected by current or future flooding from any source;
2. establish whether the proposed development will increase flood risk elsewhere; and
3. recommend, as appropriate, measures for managing flood risk.

3.0 PLANNING POLICY ON FLOOD RISK

3.1 National Policy

3.1.1. National Planning Policy in relation to flood risk is set out in the National Planning Policy Framework (NPPF) [1].

3.2 Local Policy

3.2.1. Local policy is defined in the Barnsley Local Plan, adopted in January 2019 [2]. Policies CC1; CC3; and CC5 are relevant to flood risk and drainage. These policies reflect the requirements of the NPPF and require sustainable drainage for all major developments.

3.2.2. Local policy on development and flood risk is informed by the Barnsley Strategic Flood Risk Assessment (SFRA), [3]. Reference to the SFRA is made in subsequent sections of this report.

3.3 Planning Practice Guidance

3.3.1. In addition to national and local policy, the Planning Practice Guidance for Flood Risk and Coastal Change [4] provides advice to planning authorities to assist them when considering planning applications in areas at risk of flooding. The Environment Agency Standing Advice [5] also provides guidance to assist local planning authorities when considering planning applications in areas at risk of flooding.

3.3.2. This report has been prepared with reference to the Planning Practice Guidance and the Standing Advice.

4.0 LOCATION AND DESCRIPTION OF THE SITE

4.1. The site is situated between Lowfield Meadows and Lowfield Lakes, as shown outlined in red in Figure 1. The NGR coordinates at the site are approximately 446094E, 402399N.

4.2. The gross area of the site is approximately 2.55ha, and the site has a permeable undeveloped surface.

4.3. Existing ground levels are shown on the topographical survey plan, reproduced in Appendix A. The site falls in elevation towards ESE. Ground levels are between 21.97m AOD(N) at the NW corner and 17.43m AOD(N) at the NE corner. The general gradient falls in an ESE direction.

4.4. The British Geological Survey database of the Geology of Great Britain shows no recorded superficial deposits. The bedrock is the Mexborough Rock - Sandstone.

4.5. The ground investigation [6] identified *"fine to coarse gravelly sand"* overlying sandstone in the Middle Coal Measures. The investigation concluded from infiltration tests that infiltration drainage will not be a feasible option for this site.

4.6. The River Dearne is approximately 190m to the south of the site and flows eastwards. This watercourse is designated as Main River and is therefore regulated by the Environment Agency.

4.7. The site is in the 'greenfield' condition, being fully pervious.

4.8. The site is not within an Environment Agency Flood Warning Area.

5.0 THE PROPOSED DEVELOPMENT

5.1. The proposed development forms Phase 3 of an on-going development. Phases 1 and 2 comprised developments of 60 houses and 58 houses respectively on the land to the west of the site and Phase 3 is a development of 97 houses, as shown in the site layout plan at Appendix B.

5.2. As infiltration drainage is not feasible, it is proposed to discharge surface water from the development to the River Dearne, as shown on the Engineering Layout Plan in Appendix C. The disposal of surface water is discussed further in section 7.2.

5.3. Full details of the proposed development are provided in the plans and documents included with the planning application.

5.4. The development is classified as **More Vulnerable** in accordance with Table 2 of the Planning Practice Guidance, paragraph 066.

6.0 FLOOD RISK

6.1 Assessment methodology

6.1.1. The development and proposed or recommended mitigation measures are assessed against the Design Flood, as defined in PPG paragraph 055 [4], taking into account existing flood defences.

6.1.2. Events which exceed the Design Flood and breach events are assessed as residual risks.

6.2 Data collection and consultations

Enquiries to the Environment Agency

6.2.1. As the site is in flood zone 1, the Environment Agency was not directly consulted for this FRA, but a review of the data on the Environment Agency website yielded the following evidence.

- the site is in flood zone 1 where the annual probability of fluvial flooding is less than 0.1%
- the site is not in an area at risk of flooding due the uncontrolled release of water from a reservoir;
- the site is mostly at a 'very low' risk of surface water flooding, the probability of which is less than 0.1%. There is however a low to medium risk at the south east corner of the site where depths are indicated to be less than 300mm and the direction of flow is southwards, away from the site.

Enquiries to the Lead Local Flood Authority

6.2.2. The LLFA was consulted regarding the proposed surface water discharge rate of 11.2 l/s and it confirmed that it has no objection in principle to this discharge rate. The LLFA response to our enquiry is provided in Appendix F.

Enquiries to the Danvm Drainage Commissioners

6.2.3. We understand from our telephone consultation with the engineer to the Danvm Drainage Commissioners in January 2015 that a surface water discharge into the IDB drainage system, at a rate not exceeding the 'greenfield' run-off rate, will be acceptable in principle, subject to the approval of the detailed design.

6.3 Existing flood defences

6.3.1. The site does not benefit from flood defences, being in flood zone 1.

6.4 History of Flooding

6.4.1. The level 1 SFRA Map 2 shows that the site was unaffected by the following flood events:

- March 1947;
- January 1982;

- Autumn 2000: and
- June 2007.

6.4.2. There is no evidence that the site has been affected by other flood events.

6.5 Risk of tidal or fluvial flooding

6.5.1. The site is not in an area at risk of flooding from tidal sources.

6.5.2. The Environment Agency flood zone map shows the site to be in flood zone 1, where the annual probability of flooding from rivers or the sea is less than 0.1% (1 in 1000 years). This is confirmed by the SFRA Maps 3 and 4 which show that the site is not in flood zones 3 or 2 respectively.

Loss of floodplain storage

6.5.3. The development will result in no loss of floodplain storage.

6.6 Risk of surface water flooding

Risk to the site

6.6.1. As stated in 6.2.1 above, the risk of surface water flooding is very low in most of the site. A low to medium risk affects a small area at the south east corner of the site.

Effect of the proposed development on rapid-response run-off

6.6.2. Development of the site for housing will increase surface water run-off volume due to the creation of impervious area. For the purposes of this FRA the extent of impervious area resulting from the proposed development is assumed to be approximately 50% of the gross site area. The impervious area in Gleeson developments is however, typically less than 50%, so the assumption is conservative.

6.6.3. The effect of the development on rapid response surface water run-off generated by a storm of critical duration in the 3.3% and 1% A.E.P. events is shown in Figures 2 and 3 respectively. It is assumed that run-off from the permeable areas will be equivalent to the standard percentage run-off, based on the Hydrology of Soil Types database (SPR HOST) which, for this site is 25.4%, according the FEH[1] catchment descriptors. Tables D1 to D4, (see

[1] Flood Estimation Handbook

Appendix D), show the effect of the development to be an increase in rapid response run-off volume of approximately 127%.

6.6.4. The effect of the development on surface water run-off will be mitigated by the application of sustainable drainage techniques, as recommended in section 7.2 below. Provided such measures are implemented, the development will not increase flood risk elsewhere.

6.7 Risk of sewer flooding

6.7.1. Flooding from drains and sewers can occur however when the capacity of the system is exceeded or when the system is inundated with floodwater from other sources, such as watercourses.

6.7.2. The site is not in an area identified in the SFRA as being at risk from sewer flooding and as there is no history of flooding problems in the vicinity of the site, the risk of this type of flooding is therefore assessed to be low.

6.8 Risk of groundwater flooding

6.8.1. Groundwater flooding of land occurs when the water table rises above the ground surface or enters basements and is typically associated with permeable rock such as chalk. It is unlikely that the site would be affected by groundwater flooding as any rise in the water table would be intercepted by the drainage dykes and the River Dearne. This risk is therefore assessed as low.

6.9 Risk of flooding from reservoirs and canals

6.9.1. The site is not at risk of flooding due to the release of water from reservoirs or canals.

6.10 Effects of climate change

6.10.1. The effects of climate change must be assessed over the lifetime of the development which, in accordance with paragraph 026 of the Planning Practice Guidance, is 100 years for residential development. The effects of climate change must therefore be considered up to 2119.

6.10.2. Current guidance on climate change [7] provides the anticipated changes to peak river flow and rainfall intensity for different scenarios of carbon dioxide emissions over future epochs up to 2115. Climate change allowances are provided for each river basin district in England.

Peak river flow allowances

6.10.3. As the development is classified as More Vulnerable and is in flood zone 1, the Central allowance should be used to assess climate change effects, in accordance with the guidance. The allowances applicable to the Humber river basin district in the relevant period are shown in Table 6.1 below.

Table 6.1: Total percentage change in peak river flow in the period 2070 - 2115		
River Basin District	Allowance Category	Climate change effect
HUMBER	Central	20%

6.10.4. As the site is approximately 190m to the north of the River Dearne, it is unlikely that an increase of 20% in the flow rate would alter its flood zone designation. This however can only be verified by a detailed hydrological and hydraulic analysis which is beyond the scope of this report.

Peak rainfall intensity

6.10.5. Current climate change guidance requires the Central and Upper End allowances to be used when assessing the effects of increases to peak rainfall intensities. The allowances apply across the whole of England and are shown in Table 6.2 for the period 2070 to 2115.

Table 6.2: Total percentage change in peak rainfall intensity in the period 2070 - 2115	
Allowance Category	Climate change effect
Upper end	40%
Central	20%

6.10.6. The surface water drainage system is understood to have been designed with a 30% climate change allowance, being the mean of the Central and Upper End recommendations.

7.0 FLOOD RISK MANAGEMENT

7.1 Fluvial flood risk

7.1.1. No flood risk management measures are necessary in respect of fluvial flooding.

7.2 Surface water flood risk

7.2.1. The effect of the proposed development on surface water run-off volumes can be mitigated by the implementation of sustainable drainage principles, as recommended in The SUDS Manual [8]. The Building Regulations require surface water to be discharged according to the following preference hierarchy:

- to ground by infiltration;
- to a watercourse;
- to a sewer, if options (1) and (2) are not reasonably practicable.

7.2.2. Section 7.7 of the ground investigation report [6] states:

"Generally, moderate to poor infiltration rates were recorded. Soakaways are therefore not considered to be a viable method of surface water drainage for the proposed development."

7.2.3. On the evidence of the ground investigation it is concluded that infiltration drainage is not a feasible option for the development. Surface water will therefore be discharged to the River Dearne, due south of the eastern boundary of the site.

7.2.4. The mean annual run-off rate for the site is estimated using the IH 124 methodology [9] to be 11.2 l/s. The calculation of this flow rate is provided in Appendix E.

7.2.5. The drainage system for the development is designed to ensure:

- no surface water flooding resulting from a rainfall event having an A.E.P. of 33% (1 in 30 years);
- only "tolerable" flooding resulting from a rainfall event having an A.E.P. of 1% (1 in 100 years).

7.2.6. "Tolerable" flooding would be flooding to a depth that does not result in flooding of buildings and which does not prevent safe access and egress to and from the site.

7.2.7. The surface water run-off volumes from the impervious areas only, generated by storms having an annual probability of exceedance of 3.3% and 1%, are shown in Figures 4 and 5 respectively. It is assumed that run-off from permeable areas will not enter the piped drainage system. The controlled discharge volume, based on a controlled discharge rate equivalent to the mean annual flow rate is also shown and it is apparent that the critical duration in the 3.3% A.E.P. event is approximately 5 hours, and for the 1% A.E.P. event the critical duration is approximately 7 hours. The calculations supporting Figures 4 and 5 are shown in Appendix D Tables D5 and D6. The storage capacity required to detain the excess volume from these events is estimated to be 390m^3 and 620m^3 respectively. These estimates provide a preliminary indication of storage requirements. The detailed design of the surface water drainage system however, using a Micro Drainage model, resulted in an attenuation storage basin having a capacity of 554m^3 and the design has been approved by Yorkshire Water.

7.3 Sewer flooding risk

7.3.1. No flood risk management measures are necessary in respect of sewer flooding.

7.4 Groundwater flood risk

7.4.1. No flood risk management measures are necessary in respect of groundwater flooding.

7.5 Flood risk from reservoirs and canals

7.5.1. No flood risk management measures are necessary in respect of flooding from reservoirs and canals.

7.6 Residual risk

7.6.1. Residual flood risks are those which remain after the implementation of measures to protect against the design flood. The residual risks are:

- flood events greater than the design event of 1% AEP; and
- CCA greater than 30%.

7.6.2. As the site is in Flood Zone 1, it is above the level of the 0.1% AEP flood, (the extreme event). There is therefore no residual risk from this event.

7.6.3. Should climate change result in a 40% increase in peak rainfall, the additional volume would be accommodated within the freeboard of the attenuation storage basin. Should this be

exceeded, there would be an exceedance flow overland, following the downward gradient to the River Dearne.

7.7 Safe access and egress

7.7.1. Access and egress to and from the development will not be impeded during a 1% AEP event in the River Dearne as the site is in Flood Zone 1..

8.0 THE SEQUENTIAL TEST AND EXCEPTION TEST

8.1. The Sequential Test and Exception Test are not required for a More Vulnerable development in Flood Zone 1.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

9.1.1. The development is Major Development; is classified as More Vulnerable; is situated in flood zone 1 and is on a site more than 20m from a Main River. It is not therefore necessary for the Environment Agency to be consulted in respect of flood risk.

9.1.2. There is no historical evidence of the site having been affected by flooding.

9.1.3. The development will result in no loss of floodplain storage and will have no effect on flood risk elsewhere.

9.1.4. The risk of surface water flooding at the site is very low except for a small area at the south east corner where there is a low to medium risk. This risk will be mitigated by the surface water drainage system for the development.

9.1.5. The risk of flooding from sewers and groundwater is assessed to be low.

9.1.6. The site is not in an area at risk from flooding due to the failure of a reservoir dam or the breach of a canal.

9.1.7. The development will not result in the loss of any floodplain storage.

9.1.8. Climate change effects will increase surface water run-off volumes over the lifetime of the development but are unlikely to alter the assessments of flood risk at the site.

9.1.9. The development is not required to pass the Sequential Test or Exception Test as it is in Flood Zone 1.

9.2 Recommendations

9.2.1. It is recommended that the drainage proposals are submitted to the Barnsley Lead Local Flood Authority for approval prior to the commencement of the development.

10.0 REFERENCES

1. National Planning Policy Framework. Department for Communities and Local Government. July 2018.

2. Barnsley Local Plan, adopted 3rd January 2019.

3. Barnsley Strategic Flood Risk Assessment. September 2010.

4. Planning Practice Guidance: Flood Risk and Coastal Change. Updated 15th April 2015. Department for Communities and Local Government.

5. Environment Agency Standing Advice to local planning authorities. April 2015. Updated 28th February 2017.

6. Geotechnical and Geo-environmental Phase 3 Lowfield Road, Bolton on Dearne. Report No. 37666-001, Eastwood and Partners, December 2014

7. Flood risk assessments: climate change allowances. Environment Agency, 19th February 2016, updated 15th February 2019.

8. The SuDS Manual: CIRIA Report C753, 2015.

9. Flood estimation for small catchments. Institute of Hydrology Report No. 124, June 1994.

Lowfield Road Phase 3 Development
Bolton upon Dearne

Figure 1: Location Plan

Figure 2: Effect of the development on rapid response surface water run-off (3.3% A.E.P event)

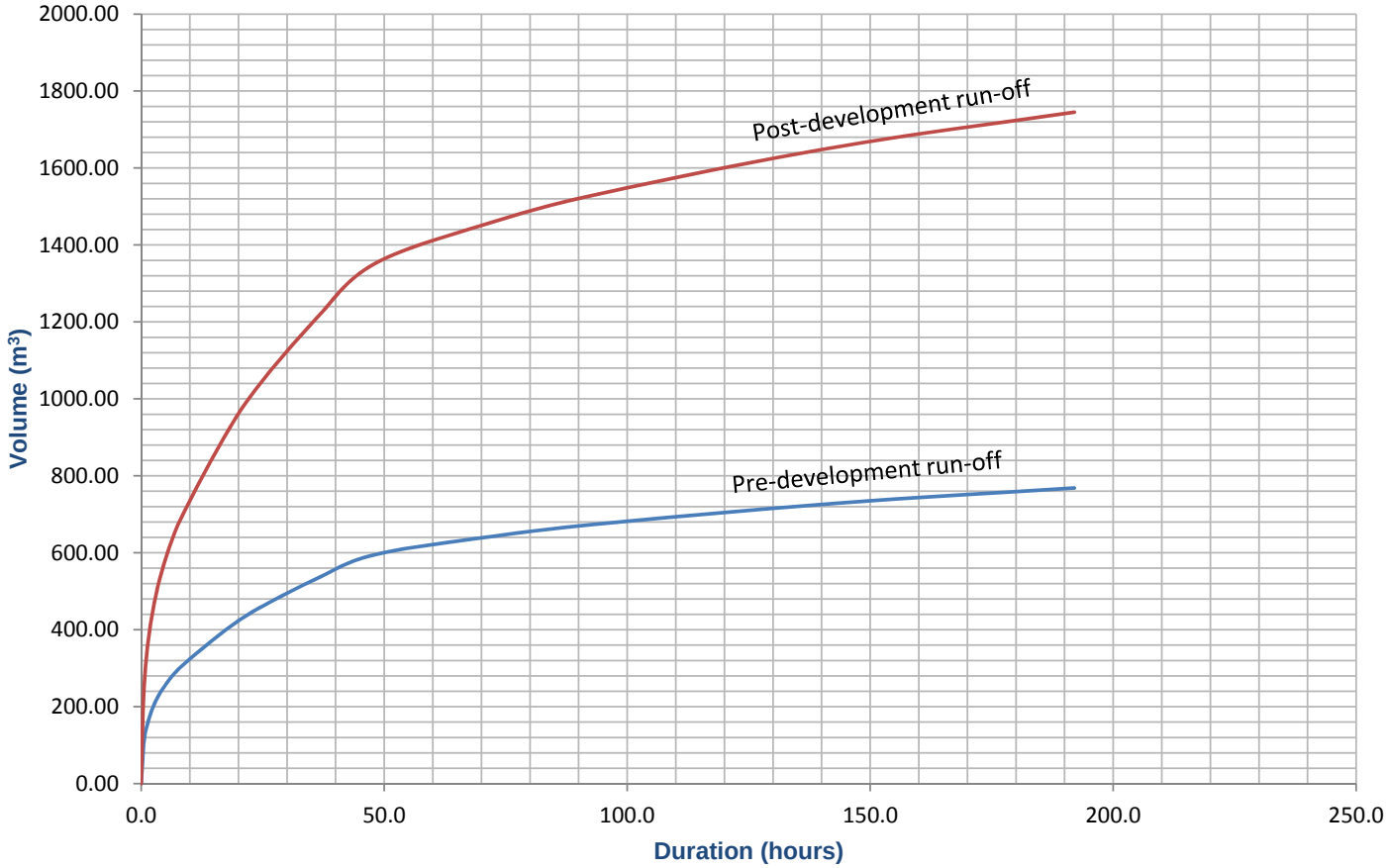


Figure 3: Effect of the development on rapid response surface water run-off (1% A.E.P. event)

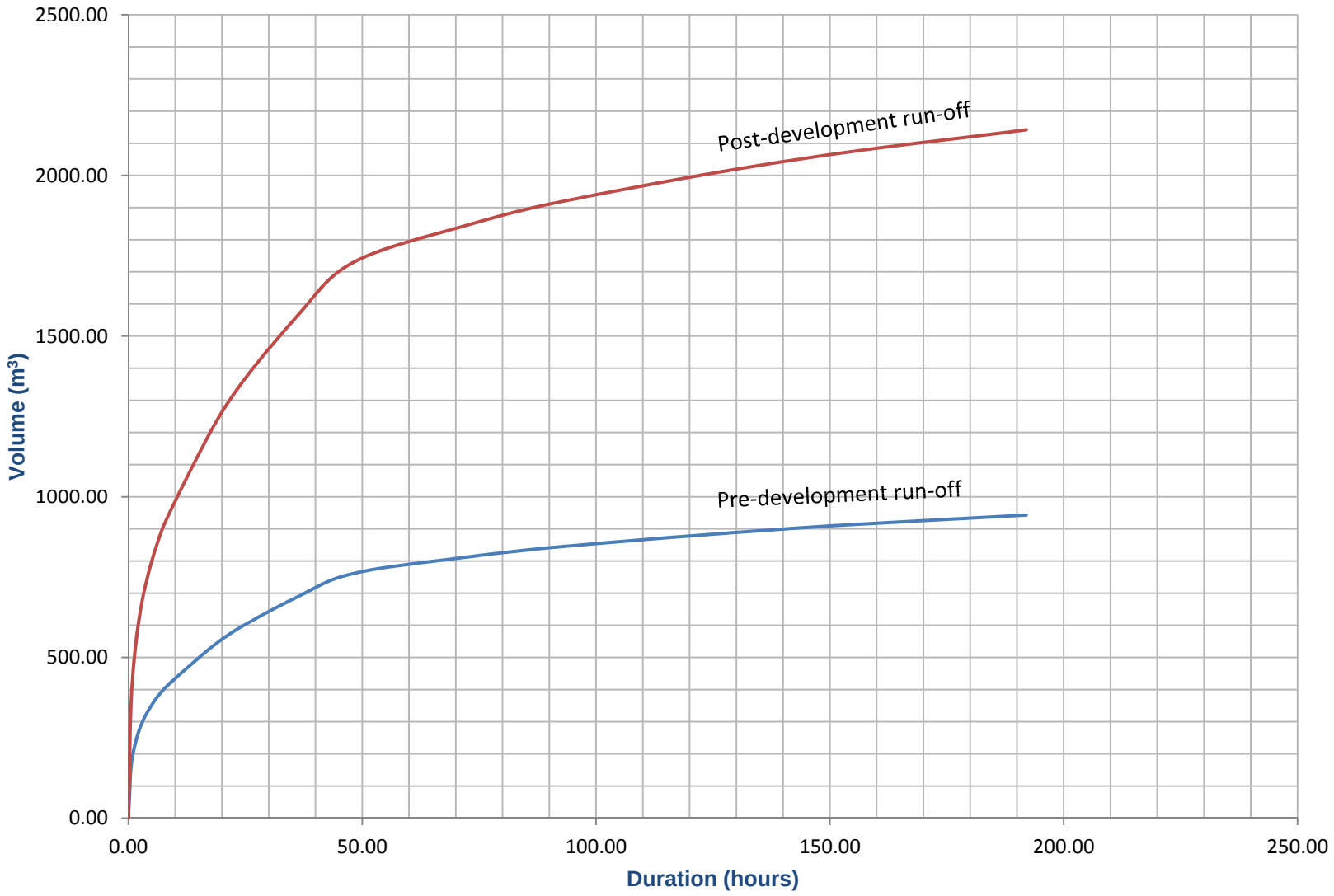


Figure 4: Surface water run-off from a 3.3% A.E.P. rainfall event including CCA (post-development)

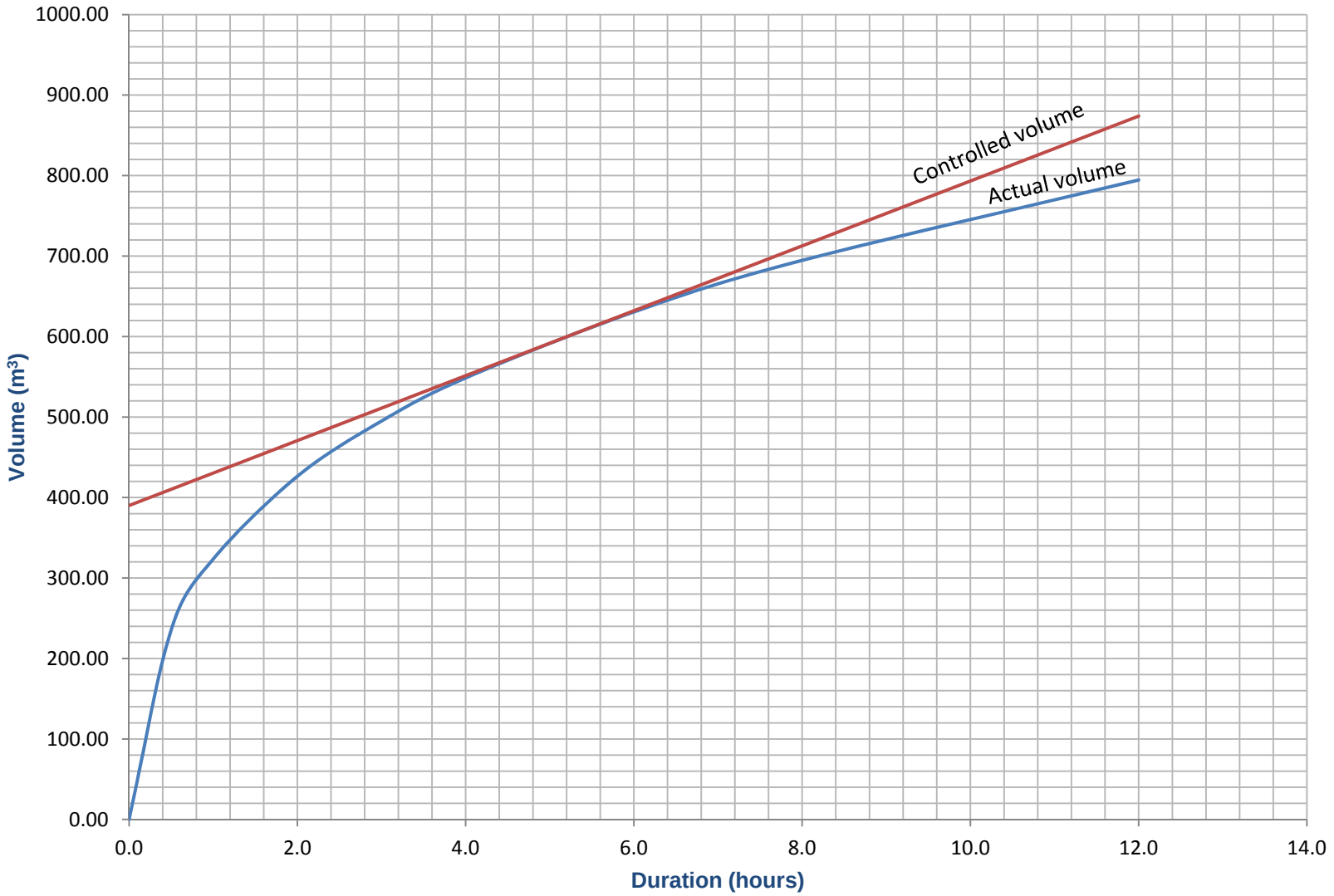
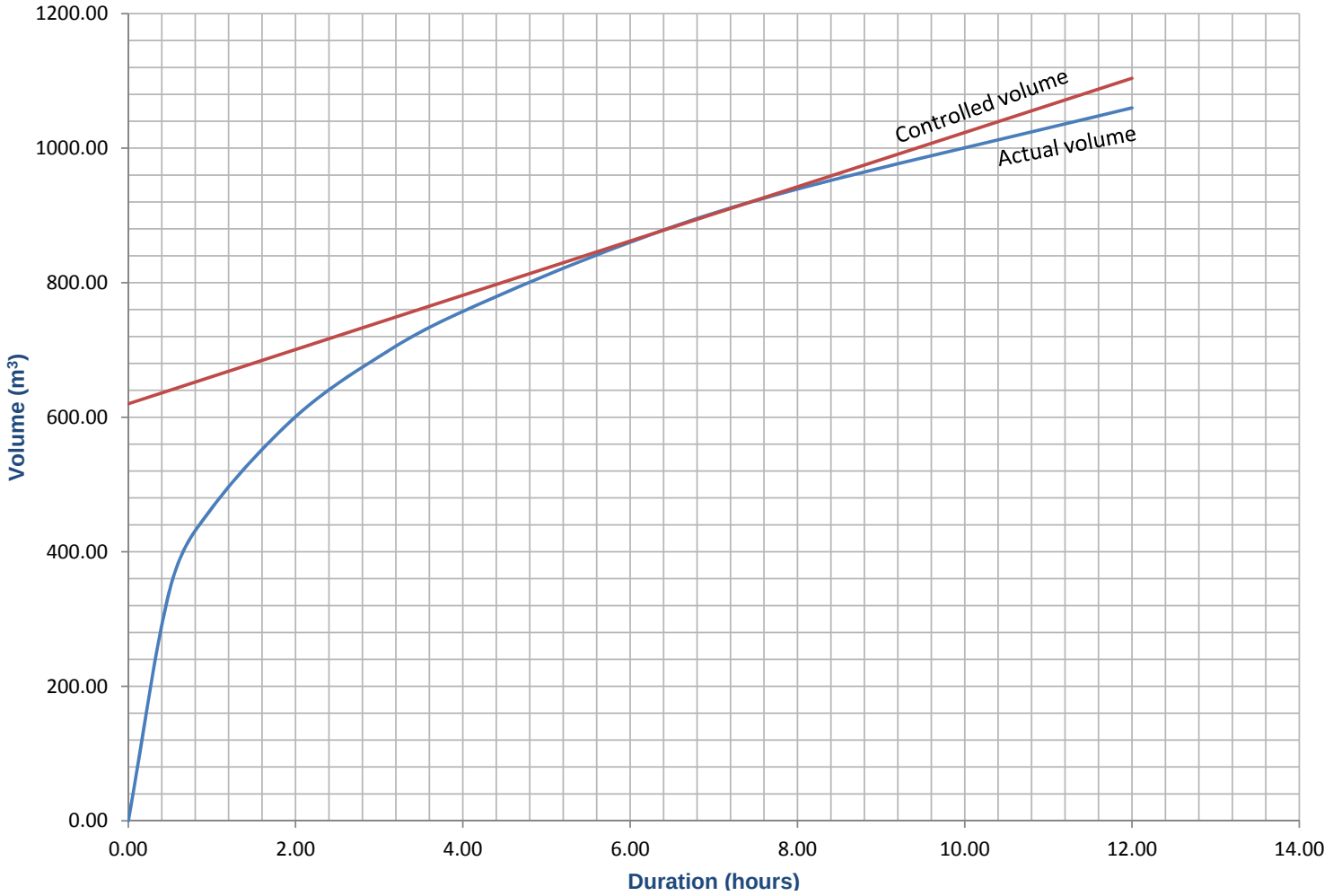
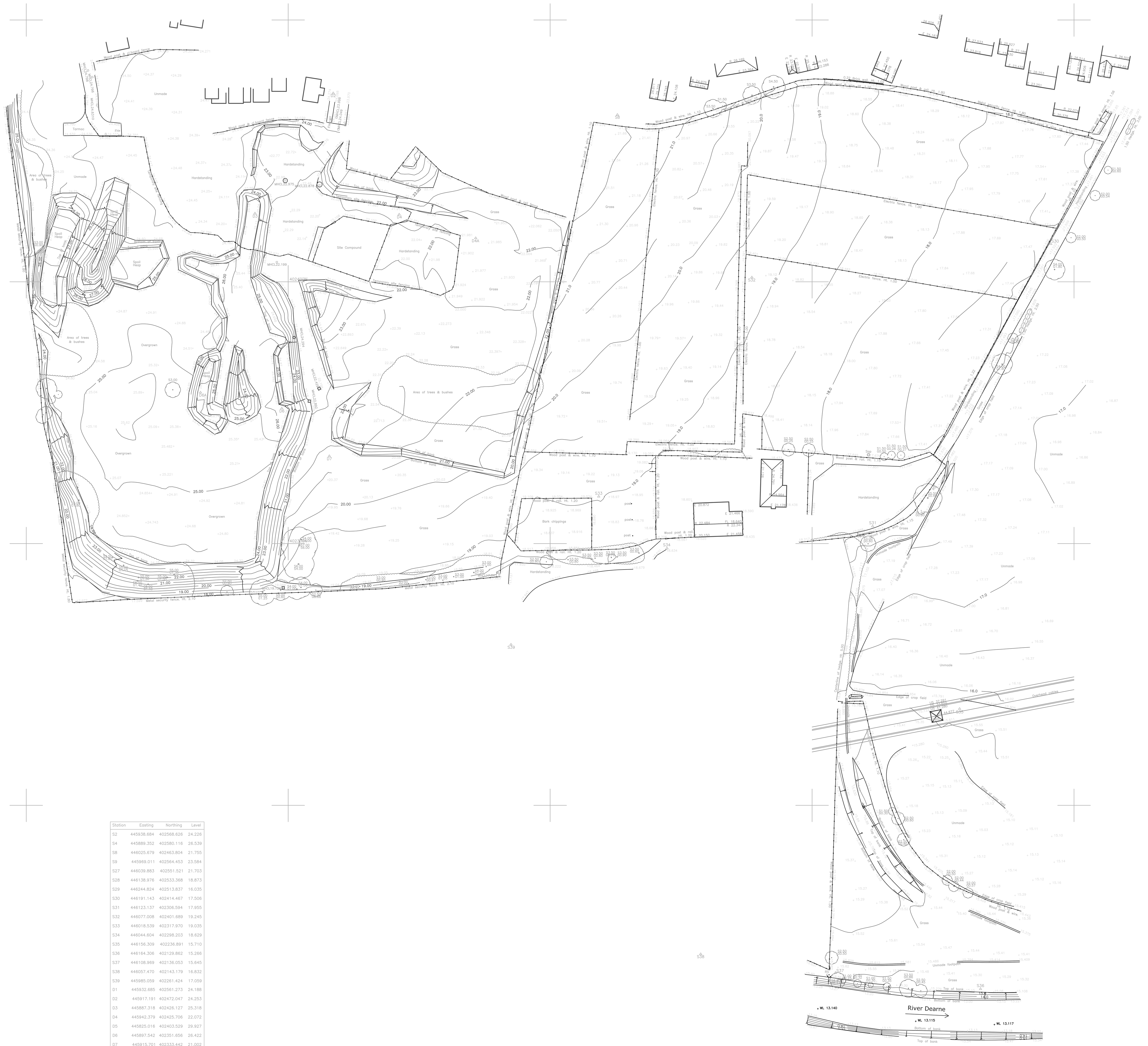


Figure 5: Surface water run-off from a 1% A.E.P. rainfall event including CCA (post-development)



APPENDIX A

Topographical survey plan



HAYCOCK & TODD

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SITE SURVEY

LOWFIELD ROAD BOLTON ON DEARNE. PHASE 2 & 3

Sheet 1 of 1	Surveyed by SH, DR
Datum	Drawn by SH, DR
GRID– Related to Ordnance Survey using One Point Localisation on Station S1. Orientation at OS Grid North.	Date of Survey September 2013 S7952 October 2014
	Scale 1/500
LEVEL– Related to Ordnance Survey by connection to the OS Active Network by G.P.S	Survey Job No. S8204

LEGEND

Manhole shown thus	MH	Spot Level	+123.562
Inspection Cover	IC	Kerb Line	
Lamphole	LH	Fence Line	Wood post & rail
Gully	G	Hedge Line	
Lampost	LP	Contours 5m interval	105
Telegraph Post	TP	Contours 1m interval	33
Electricity Poles	EP	Tree Spread	S 5.0
Road Traffic Signs	RS	Girth	G 1.30
Traffic Lights	TL	Cover Level	CL 112.335
British Telecom	BT	Invert Level	IL 111.733
Cable Television	CATV	Foul Drain	
Fire Hydrant	FH	Surface Water	
Safety Valve	SV	Unknown Service	Serv
Stopcock Water	SCW	Survey Station	S3
Stopcock Gas	Gas		
Unknown Stoptap	ST		

Station	Easting	Northing	Level
S2	445938.684	402568.626	24.226
S4	445889.352	402580.116	26.539
S8	446025.679	402463.804	21.755
S9	445969.011	402564.453	23.584
S27	446039.883	402551.521	21.703
S28	446138.976	402533.368	18.873
S29	446244.824	402513.837	16.035
S30	446191.143	402414.467	17.506
S31	446123.137	402306.594	17.955
S32	446077.008	402401.689	19.245
S33	446018.539	402317.970	19.035
S34	446044.604	402298.203	18.629
S35	446156.309	402236.891	15.710
S36	446164.306	402129.862	15.266
S37	446108.969	402136.053	15.645
S38	446057.470	402143.179	16.832
S39	445985.059	402261.424	17.059
D1	445932.685	402561.273	24.188
D2	445917.191	402472.047	24.253
D3	445887.318	402426.127	25.318
D4	445942.379	402425.706	22.072
D5	445825.016	402403.529	29.927
D6	445897.542	402351.656	26.422
D7	445915.701	402333.442	21.002
D4A	445971.586	402416.703	21.991
D6A	445866.512	402357.727	27.106

APPENDIX B

Site layout plan

Drawing No: 449/3 revision G dated 1st March 2019

- NOT FOR USE ON SITE -
PROVISIONAL LAYOUT DRAWING, SUBJECT TO PLANNING APPROVAL

0m 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m

Existing tree to be removed

Existing tree to be retained and protected during construction to British Standard 5837:1991.

Indicative Areas of new tree planting see schedule for species

New hedge planting

New hedge planting & fence to detail

Grass to front garden

Paving slab access paths to level threshold for principle entrance. Gradient not to exceed 1in 12 for maximum 5.00m length

Private drives.

1.80m high screen wall

S.W. boarded vertical screen fence 1.80m high (100 x 22mm boards with 22mm gaps, 3No. 75 x 38mm rails, 100 x 100mm posts @ 1.875m centres).

Plot division fence, post & wire

(201) House type code reference number

10 Plot number

Garages location.

Parking bays

169.000 Proposed finished floor level + / - 0.5m

HOUSE TYPE

code	type	no
201	2 bed semi det/ terr	18
202	2 bed semi det	10
301	3 bed semi det	13
302	3 bed semi det	12
303	3 bed semi det	6
304	3 bed detached	7
307	3 bed detached	8
309	3 bed semi det	11
311	3 bed semi det	3
403	4 bed detached	1
404	4 bed detached	4
405	4 bed detached	4
TOTAL		**97**

gleeson

Richard Ward Design

Chartered Architectural Technologist
Architectural Design & Development Consultant

Richard S. Ward
M.C.I.A.T.
Telephone 01604 410943

2. Burtram Close
Weston Favell
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LOWFIELD ROAD
BOLTON ON DEARNE 3

planning layout

GLEESON
HOMES & REGENERATION

G	P215 changed to 304 type.	01.03.19

A	Type 406 omitted, types 307 and 311 added, various plot substitutions.	19.12.14
B	AQ1-1 & AQ1-2 odour contours added.	12.10.15
C	Parking arrangements increased across the development, Plots 124, 130-159, 141, 146, 155-158, 170, 171, 174-176, 178-198, 203, 204, 207, 208, 213-219 revised. Road from P172-176 & p152-155 revised.	06.01.16
D	Drive spec to schedule revised.	25.08.16
E	Landscape buffer to open space added.	09.01.17
F	P120,125 & 146 type 307 substituted for original 310, driveway spec revised. Plot 121 type changed to 304. 122-124, 161-164, 165-167 revised to accommodate gap either side of type 405's	05.04.17

Scale
1:500 at A1

Date
28.11.14

Dwg No
449/3G

APPENDIX C

Engineering layout plan

1. All work to be in accordance with the current Building Regulations
2. Only written dimensions to be used
3. Discrepancies and abnormalities to be reported.
4. If in doubt Ask.

N

EXISTING MANHOLE NOT LOCATED ON SURVEY, POSITION NEEDS TO BE IDENTIFIED AND INVERT LEVEL CONFIRMED ON SITE PRIOR TO UNDERTAKING ANY NEW WORK ON PROPOSED FOUL SYSTEM

NEW MANHOLE F11 BUILT ON LINE OF PUBLIC SEWER IF REQUIRED BY YORKSHIRE WATER

LINE OF EXISTING PUBLIC COMBINED SEWER WITH OUTFALL INTO PUMPING STATION, ASSUMED GRADIENT 1/100

COVER LEVEL OF MANHOLE 16.50 ESTIMATED, 4.60M DEEP, INVERT LEVEL 11.900

MIN SLAB LEVEL APPROX 17.80

6M SEWER EASEMENT

LEVELS TO TIE INTO PREVIOUSLY CONSTRUCTED

INDICATIVE DOMESTIC DRAINAGE PIPES TO PICK UP EXISTING PROPERTY, FINAL POSITIONS AND NUMBER TO BE AGRRED ON SITE

ROUTE OF EXISTING RISING MAIN AS DEFINED ON SUBSCAN PLAN

DEPTH OF EXISTING RISING MAIN TO BE CONFIRMED ON SITE BY GLEESON HOMES

ROUTE OF EXISTING RISING MAIN AS DEFINED ON SUBSCAN PLAN

CROWN MODEL REF 122MM VR1M FLOW CONTROL DEVICE LOCATED IN MANHOLE S11 WITH 11.2L/S FORWARD FLOW AS DEFINEDIN FRA

PROPOSED OFFLINE DETENTION BASIN WITH 1M APPROX DEPTH AND 1/5 BANK SLOPES

MEANS OF ACCESS TO THE PROPOSED DETENTION BASIN AND FLOW CONTROL MANHOLE VIA THE EXISTING ACCESS TRACK ALONGSIDE THE SITE BOUNDARY AND VIA THE DRIVEWAY SERVING PLOTS 180/181

WATER LEVEL AT SURVEY DATE 13.115 SAY OUTFALL AT BANK 13.750, SUBJECT TO FLOOD LEVELS OF RIVER DEARNE

EXACT POSITION OF NEW HEADWALL CONSTRUCTED AT OUTFALL TO BE AGREED ON SITE

HEADWALL TO BE ORIENTATED SUCH THAT IT IS BETWEEN 30° AND 60° TO THE RIVER BANK TO MEET EA REQUIREMENTS

River Dearne

General notes :

All work to be in accordance with the current building regulations.

Drains passing through buildings to be protected with lintel over.

No building to take place within 3.000M of an adoptable sewer.

Minimum pipe size for adoptable purposes to be 150mm with flexible mechanical joints.
Highway construction to be in accordance with Barnsley MBC Highways Department.

Private drainage to be in 100mm dia. plastic pipe with granular bed & surround to the satisfaction of the building control officer. Minimum gradient 1/80. If larger pipes are required, these will be defined on the Domestic Drainage Layouts.

Road gullies to be in accordance with road construction details drawing.

Levels marked on dwellings refer to ground floor level.

foul drain

surface water drain

Where adoptable pipes have concrete slab protection, all joints to be provided with 18mm thick flexible filler.

Private drainage connections not direct to a manhole are to be made via a 45 degree junction and not saddles.
Maximum gradient of private driveways to be 1 in 10.

NOTE THAT ALL FENCING AND SCREEN WALLING/FENCING DETAILS TO BE AS DEFINED ON PLANNING DRAWING

Sewers must have 5m minimum clearance from trees and hedges, otherwise they must be provided with concrete slab protection over.

All filled ground to be filled and consolidated under supervision and to the satisfaction of Yorkshire Water prior to any sewer works being carried out.

Sewers to be laid in Class S bedding (150mm granular bed and surround). Where depth of cover to top of sewer is less than 1.20m in highways and verges, then 150mm concrete slab protection is to be provided.
Lengths that require such protection are identified on Long Sections drawing.

Note that Yorkshire Water policy is not to accept Type C brick manholes and 1050 dia concrete manhole rings. It is preferred to use Type B1 1200 or 1500mm dia concrete manholes with the opening sited centrally over the channel where depth to pipe soffit is between 1.0–1.5m.

Main sewers to be laid in accordance with Sewers for Adoption (6th edition) and to the satisfaction of Yorkshire Water and be kitemarked.

All adoptable sewers to be in Class 120 Concrete or 40KN/m (150ø)/45KN/m (225ø) with class S bedding as specified on Long Sections drawing.

Adoptable manholes to be concrete ring type size as specified in schedules. Manhole covers must/shall have a clear opening of 600mm and shall be Class D400 to BS EN 124. Covers in highways to have 150mm deep frames.

All filled ground to be filled and consolidated under supervision and to the satisfaction of Yorkshire Water prior to any sewer works being carried out.

The adoptable sewers should be a minimum of 1m and manholes 0.5m from kerb faces and service margins.

Sewers must have 5m minimum clearance from trees and hedges, otherwise they must be provided with concrete slab protection.

The chamber size of manholes with more than one connection in them may need to be increased by an increment to accommodate connections and bends.

Yorkshire Water is not obliged to accept filter drain/land drainage run–off into public sewers or adoptable drainage systems (directly or indirectly). An alternative method of disposal of the land drainage run–off will be required to be agreed with the Local Drainage Section.

Cover slabs must carry the BSI kitemark or will be rejected by the Yorkshire Water inspector. Where the clear opening of the kitemarked product is different to that of the cover and frame, a load bearing slab should be fitted above the cover slab to bring the size down to 600mm x 600mm for the Yorkshire Water specified cover size. Please refer to Concrete Pipe Systems Association (CPSA) 'Technical Bulletin' issued Autumn 2004 for kitemarked cover slab opening sizes.

Sulphate resistance cement (C20–DC2) and precast concrete products must be used or a laboratory report provided proving that such precautions are not necessary.

NOTE THAT ALL TREES LOCATED CLOSE TO THE ADOPTABLE ESTATE ROADS TO BE PROVIDED WITH ROOT BARRIER PROTECTION (BY MESSRS GREENLEAF OR SIMILAR)

NOTE THAT IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL WORKS ARE CARRIED OUT TO THE REQUIRED STANDARD STIPULATED BY GLEESON HOMES INCLUDING CURRENT EDITIONS OF THE BUILDING REGULATIONS, SEWER FOR ADOPTION, RELEVANT BRITISH STANDARDS, EUROCODES AND GOOD BUILDING PRACTICE. IF IN DOUBT, REFER TO GLEESON HOMES TECHNICAL DEPARTMENT FOR CLARIFICATION.

GRID– Related to Ordnance Survey using One Point Localisation on Station S1. Orientation at OS Grid North.
LEVEL– Related to Ordnance Survey by connection to the OS Active Network by G.P.S

FLOW CONTROL DATA

DEVICE DIAMETER	122MM
DEVICE MANUFACTURER	CROWN
DEVICE MODEL NO	122–VR1M
DEVICE DESIGN HEAD	1.525M
DEVICE DESIGN DISCHARGE	11.2L/S

LATERAL MANHOLE SCHEDULE

REF	EASTING	NORTHING	APP COVER LEVEL	INVERT LEVEL	DEPTH	SIZE	TYPE	PIPE SIZE	BACK DROP
SURFACE WATER									
PS1	446026.326	402319.781	19.20	17.75	1.45	500	PPIC	150	
PS2	446018.527	402345.895	19.70	18.00	1.70	500	PPIC	150	
PS3	446029.272	402343.529	19.55	17.90	1.65	500	PPIC	150	
PS4	446016.292	402408.240	21.20	19.80	1.40	500	PPIC	150	
PS5	446012.947	402396.372	21.50	20.00	1.50	500	PPIC	150	
PS6	446064.467	402401.334	19.80	17.50	2.30	1050	CONC	150	18.25
PS7	446090.524	402371.211	18.70	17.20	1.50	500	PPIC	150	
PS8	446083.554	402356.733	18.75	17.25	1.50	500	PPIC	150	
PS9	446113.682	402357.947	18.05	16.82	1.23	500	PPIC	150	
PS10	446138.530	402358.549	17.60	16.70	0.90	500	PPIC	150	
PS11	446139.560	402350.768	17.70	16.67	1.03	500	PPIC	150	
PS11A	446121.462	402348.018	18.00	16.82	1.18	500	PPIC	150	
PS12	446074.504	402444.406	20.28	18.93	1.35	500	PPIC	150	
PS13	446106.977	402448.593	19.30	17.90	1.40	500	PPIC	150	
PS14	446138.641	402451.927	18.60	17.20	1.40	500	PPIC	150	
PS15	446107.202	402413.641	18.90	17.40	1.50	500	PPIC	150	
PS16	446146.963	402415.139	18.20	16.85	1.35	500	PPIC	150	
PS17	446132.199	402404.811	18.50	17.00	1.50	500	PPIC	150	
PS18	446188.435	402425.699	17.70	16.78	0.92	500	PPIC	150	
PS19	446157.424	402365.789	17.60	16.65	0.95	500	PPIC	150	
FOUL WATER									
PF1	446017.142	402340.532	19.55	17.50	2.05	500	PPIC	150	
PF2	446030.178	402338.710	19.50	17.50	2.00	500	PPIC	150	
PF3	446026.784	402391.705	20.95	17.25	3.70	1050	CONC	150	18.75
PF4	446032.654	402403.715	20.90	17.30	3.60	1050	CONC	150	18.50
PF5	446051.952	402387.865	20.40	16.85	3.55	1050	CONC	150	18.00
PF6	446083.638	402353.885	18.80	16.60	2.20	500	PPIC	150	
PF7	446076.151	402403.745	19.50	16.50	3.00	1050	CONC	150	17.60
PF8	446128.535	402416.041	18.55	16.15	2.40	500	PPIC	150	
PF9	446130.094	402403.545	18.50	16.15	2.35	500	PPIC	150	
PF10	446165.538	402393.769	17.90	15.65	2.25	500	PPIC	150	
PF11	446202.221	402447.514	17.60	15.33	2.27	500	PPIC	150	

RISK ASSESSMENT : SIGNIFICANT RISKS THAT CANNOT BE DESIGNED OUT		
RISK	LEVEL OF RISK (H/M)	SUGGESTED ACTION
DEEP EXCAVATIONS ASSOCIATED WITH NEW DRAINAGE WORKS.	HIGH	ENSURE ALL EXCAVATIONS HAVE ADEQUATE TRENCH SUPPORTS.
HANDLING LARGE DIAMATER MANHOLE RINGS	HIGH	USE CORRECT LIFTING EQUIPMENT AND ENSURE OPERATIVES WEAR APPROPRIATE PROTECTIVE CLOTHING/HARD HATS.
CONTACT WITH SEWAGE.	MED	OPERATIVES TO USE CORRECT BREATHING EQUIPMENT.
NOISE.	MED	OPERATIVES TO USE CORRECT EAR PROTECTION.
DRAINAGE EXCAVATIONS ADJACENT EXISTING BOUNDARY STRUCTURES AND CREATING PROPOSED POND/DETENTION BASIN.	HIGH	ENSURE CORRECT SUPPORTS ARE PROVIDED TO TRENCHES AND BUILDINGS WHERE REQUIRED.
EXCAVATION IN PUBLIC HIGHWAY.	HIGH	ENSURE CORRECT USE OF TRENCH SUPPORTS IN EXCAVATION AND SCREEN BARRIERS TO PROTECT MEMBERS OF THE PUBLIC.
MAINTAIN ACCESS TO ADJACENT PROPERTIES AND OCCUPIERS.	HIGH	ENSURE WORKS ARE PROTECTED WITH BARRIERS AND SIGNS TO GUIDE THE PUBLIC AWAY FROM THE WORKS.
CARRYING OUT EXCAVATIONS NEAR TO EXISTING SERVICES	HIGH	ENSURE ALL EXCAVATIONS WITHIN EASEMENT AREAS ARE CARRIED OUT USING CORRECT MECHANICAL EQUIPMENT. SIGNAGES, TRENCH SUPPORTS AND BARRIERS TO BE ERECTED TO PROTECT THE PUBLIC.
EXCAVATIONS ASSOCIATED WITH NEW SURFACE WATER OUTFALL AND WORKING ADJACENT TO FAST FLOWING RIVER.		ENSURE ALL EXCAVATIONS HAVE ADEQUATE TRENCH SUPPORTS AND CORRECT BARRIERS ARE USED TO PROTECT OPERATIVES.
IT IS ASSUMED THAT WORKS ASSOCIATED WITH THIS DESIGN WILL BE UNDERTAKEN BY A PERSON OR PERSONS WHO ARE COMPETENT AND HAVE THE REQUIRED LEVEL OF EXPERIENCE AND EXPERTISE		

C. 04/01/19 amended to latest YW comments & outfall sewer route amended (MB/GH)
B. 31/10/17 amended to suit YW requirements (CW)
A. 19/08/16 F14–F5 deleted in road 36 (PS)
Revision.

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A0

Client. Gleeson Homes

Site. Lowfield Road,
Bolton on Dearne – Phase 3.

Title. Engineering Layout

Date: Aug 2016 | Scales. 1/500 | Drawing No. 16/664/7907C

APPENDIX D

Surface water run-off calculations: Tables D1 to D6

Table D1: Rapid response run-off from 3.3% A.E.P. rainfall event: existing condition

Duration	Rainfall	Area (m^2)			Volume (m^3)		
	at Site	Impervious	Pervious	Total	Impervious	Pervious	Run-off
hours	mm	Area (ha)	Area (ha)	Area (ha)	Area	Area	Volume
		C_v	SPR HOST				
		90.0%	25.4%				
0.0	0.0	0.00	2.55	2.55	0.00	0.00	0.00
0.5	15.8	0.00	2.55	2.55	0.00	102.26	102.26
1.0	21.7	0.00	2.55	2.55	0.00	140.44	140.44
2.0	28.6	0.00	2.55	2.55	0.00	185.10	185.10
3.0	33.2	0.00	2.55	2.55	0.00	214.87	214.87
4.0	36.8	0.00	2.55	2.55	0.00	238.17	238.17
6.0	42.3	0.00	2.55	2.55	0.00	273.76	273.76
8.0	46.6	0.00	2.55	2.55	0.00	301.59	301.59
12.0	53.3	0.00	2.55	2.55	0.00	344.95	344.95
18.0	62.6	0.00	2.55	2.55	0.00	405.14	405.14
24.0	70.2	0.00	2.55	2.55	0.00	454.33	454.33
36.0	82.2	0.00	2.55	2.55	0.00	531.99	531.99
48.0	91.9	0.00	2.55	2.55	0.00	594.77	594.77
72.0	99.2	0.00	2.55	2.55	0.00	642.01	642.01
96.0	104.6	0.00	2.55	2.55	0.00	676.96	676.96
144.0	112.7	0.00	2.55	2.55	0.00	729.39	729.39
192.0	118.7	0.00	2.55	2.55	0.00	768.22	768.22

Table D2: Rapid response run-off from 1% A.E.P. rainfall event: existing condition

Duration	Rainfall	Area (m^2)			Volume (m^3)		
	at Site	Impervious	Pervious	Total	Impervious	Pervious	Run-off
hours	mm	Area (ha)	Area (ha)	Area (ha)	Area	Area	Volume
		Cv 90.0%	SPR HOST 25.4%				
0.00	0.0	0.00	2.55	2.55	0.00	0.00	0.00
0.50	23.2	0.00	2.55	2.55	0.00	150.15	150.15
1.00	31.2	0.00	2.55	2.55	0.00	201.92	201.92
2.00	40.3	0.00	2.55	2.55	0.00	260.82	260.82
3.00	46.3	0.00	2.55	2.55	0.00	299.65	299.65
4.00	50.8	0.00	2.55	2.55	0.00	328.77	328.77
6.00	57.7	0.00	2.55	2.55	0.00	373.43	373.43
8.00	63.0	0.00	2.55	2.55	0.00	407.73	407.73
12.00	71.1	0.00	2.55	2.55	0.00	460.15	460.15
18.00	82.6	0.00	2.55	2.55	0.00	534.58	534.58
24.00	91.8	0.00	2.55	2.55	0.00	594.12	594.12
36.00	106.2	0.00	2.55	2.55	0.00	687.32	687.32
48.00	117.6	0.00	2.55	2.55	0.00	761.10	761.10
72.0	125.4	0.00	2.55	2.55	0.00	811.58	811.58
96.0	131.2	0.00	2.55	2.55	0.00	849.12	849.12
144.0	139.6	0.00	2.55	2.55	0.00	903.48	903.48
192.0	145.7	0.00	2.55	2.55	0.00	942.96	942.96

Table D3: Rapid response run-off from 3.3% A.E.P. rainfall event: post development condition

Duration	Rainfall	Area (m^2)			Volume (m^3)			
	at Site	Impervious	Pervious	Total	Impervious	Pervious	Run-off	% increase
hours	mm	Area (ha)	Area (ha)	Area (ha)	Area	Area	Volume	in run-off volume
		Cv	SPR HOST					
		90.0%	25.4%					
0.0	0.0	1.27	1.27	2.55	0.00	0.00	0.00	
0.5	15.8	1.27	1.27	2.55	181.16	51.13	232.29	127%
1.0	21.7	1.27	1.27	2.55	248.81	70.22	319.03	127%
2.0	28.6	1.27	1.27	2.55	327.93	92.55	420.48	127%
3.0	33.2	1.27	1.27	2.55	380.67	107.43	488.11	127%
4.0	36.8	1.27	1.27	2.55	421.95	119.08	541.03	127%
6.0	42.3	1.27	1.27	2.55	485.01	136.88	621.89	127%
8.0	46.6	1.27	1.27	2.55	534.32	150.80	685.11	127%
12.0	53.3	1.27	1.27	2.55	611.14	172.48	783.61	127%
18.0	62.6	1.27	1.27	2.55	717.77	202.57	920.34	127%
24.0	70.2	1.27	1.27	2.55	804.91	227.16	1032.08	127%
36.0	82.2	1.27	1.27	2.55	942.51	266.00	1208.50	127%
48.0	91.9	1.27	1.27	2.55	1053.73	297.38	1351.11	127%
72.0	99.2	1.27	1.27	2.55	1137.43	321.01	1458.43	127%
96.0	104.6	1.27	1.27	2.55	1199.34	338.48	1537.83	127%
144.0	112.7	1.27	1.27	2.55	1292.22	364.69	1656.91	127%
192.0	118.7	1.27	1.27	2.55	1361.01	384.11	1745.12	127%

Table D4: Rapid response run-off from 1% A.E.P. rainfall event: post development condition

Duration	Rainfall	Area (m^2)			Volume (m^3)			
	at Site	Impervious	Pervious	Total	Impervious	Pervious	Run-off	% increase
hours	mm	Area (ha)	Area (ha)	Area (ha)	Area	Area	Volume	in run-off volume
		C_v 90.0%	C_v 25.4%					
0.00	0.0	1.27	1.27	2.55	0.00	0.00	0.00	
0.50	23.2	1.27	1.27	2.55	266.01	75.07	341.09	127%
1.00	31.2	1.27	1.27	2.55	357.74	100.96	458.70	127%
2.00	40.3	1.27	1.27	2.55	462.08	130.41	592.49	127%
3.00	46.3	1.27	1.27	2.55	530.88	149.82	680.70	127%
4.00	50.8	1.27	1.27	2.55	582.47	164.39	746.86	127%
6.00	57.7	1.27	1.27	2.55	661.59	186.71	848.30	127%
8.00	63.0	1.27	1.27	2.55	722.36	203.87	926.22	127%
12.00	71.1	1.27	1.27	2.55	815.23	230.08	1045.31	127%
18.00	82.6	1.27	1.27	2.55	947.09	267.29	1214.38	127%
24.00	91.8	1.27	1.27	2.55	1052.58	297.06	1349.64	127%
36.00	106.2	1.27	1.27	2.55	1217.69	343.66	1561.35	127%
48.00	117.6	1.27	1.27	2.55	1348.40	380.55	1728.95	127%
72.00	125.4	1.27	1.27	2.55	1437.84	405.79	1843.63	127%
96.00	131.2	1.27	1.27	2.55	1504.34	424.56	1928.90	127%
144.00	139.6	1.27	1.27	2.55	1600.65	451.74	2052.39	127%
192.00	145.7	1.27	1.27	2.55	1670.60	471.48	2142.08	127%

Table D5: Post-development rapid response run-off from impervious area (3.3% A.E.P. rainfall event including CCA)

Duration	Rainfall	Area (m^2)			Volume (m^3)			Controlled run off	Tangent
	at Site	Impervious	Pervious	Total	Impervious	Pervious	Run-off	m^3	
hours	mm	Area (ha)	Area (ha)	Area (ha)	Area	Area	Volume		m^3
		C_v	C_v					Controlled rate (l/s)	
		90.0%	0.0%					11.2	
0.0	0.0	1.27	1.27	2.55	0.00	0.00	0.00	0.00	390.00
0.5	20.5	1.27	1.27	2.55	235.51	0.00	235.51	20.16	410.16
1.0	28.2	1.27	1.27	2.55	323.46	0.00	323.46	40.32	430.32
2.0	37.2	1.27	1.27	2.55	426.31	0.00	426.31	80.64	470.64
3.0	43.2	1.27	1.27	2.55	494.87	0.00	494.87	120.96	510.96
4.0	47.8	1.27	1.27	2.55	548.53	0.00	548.53	161.28	551.28
6.0	55.0	1.27	1.27	2.55	630.52	0.00	630.52	241.92	631.92
8.0	60.6	1.27	1.27	2.55	694.61	0.00	694.61	322.56	712.56
12.0	69.3	1.27	1.27	2.55	794.48	0.00	794.48	483.84	873.84
18.0	81.4	1.27	1.27	2.55	933.10	0.00	933.10	725.76	1115.76
24.0	91.3	1.27	1.27	2.55	1046.39	0.00	1046.39	967.68	1357.68
36.0	106.9	1.27	1.27	2.55	1225.26	0.00	1225.26	1451.52	1841.52
48.0	119.5	1.27	1.27	2.55	1369.84	0.00	1369.84	1935.36	2325.36
72.00	129.0	1.27	1.27	2.55	1478.66	0.00	1478.66	2903.04	3293.04
96.00	136.0	1.27	1.27	2.55	1559.15	0.00	1559.15	3870.72	4260.72
144.00	146.5	1.27	1.27	2.55	1679.88	0.00	1679.88	5806.08	6196.08
192.00	154.3	1.27	1.27	2.55	1769.32	0.00	1769.32	7741.44	8131.44
								Total Storage Requirement (m^3)	390.00

Table D6: Post-development rapid response run-off from impervious area (1% A.E.P. rainfall event including CCA)

Duration	Rainfall at Site	Area (m^2)			Volume (m^3)			Controlled run off	Tangent
hours	mm	Impervious Area (ha)	Pervious Area (ha)	Total Area (ha)	Impervious Area	Pervious Area	Run-off Volume	m^3	m^3
		C_v 90.0%	C_v 0.0%					Controlled rate (l/s) 11.2	
0.00	0.0	1.27	1.27	2.55	0.00	0.00	0.00	0.00	620.00
0.50	30.2	1.27	1.27	2.55	345.81	0.00	345.81	20.16	640.16
1.00	40.6	1.27	1.27	2.55	465.06	0.00	465.06	40.32	660.32
2.00	52.4	1.27	1.27	2.55	600.70	0.00	600.70	80.64	700.64
3.00	60.2	1.27	1.27	2.55	690.14	0.00	690.14	120.96	740.96
4.00	66.0	1.27	1.27	2.55	757.21	0.00	757.21	161.28	781.28
6.00	75.0	1.27	1.27	2.55	860.06	0.00	860.06	241.92	861.92
8.00	81.9	1.27	1.27	2.55	939.07	0.00	939.07	322.56	942.56
12.00	92.4	1.27	1.27	2.55	1059.80	0.00	1059.80	483.84	1103.84
18.00	107.4	1.27	1.27	2.55	1231.22	0.00	1231.22	725.76	1345.76
24.00	119.3	1.27	1.27	2.55	1368.35	0.00	1368.35	967.68	1587.68
36.00	138.1	1.27	1.27	2.55	1583.00	0.00	1583.00	1451.52	2071.52
48.00	152.9	1.27	1.27	2.55	1752.92	0.00	1752.92	1935.36	2555.36
72.00	163.0	1.27	1.27	2.55	1869.19	0.00	1869.19	2903.04	3523.04
96.00	170.6	1.27	1.27	2.55	1955.64	0.00	1955.64	3870.72	4490.72
144.00	181.5	1.27	1.27	2.55	2080.85	0.00	2080.85	5806.08	6426.08
192.00	189.4	1.27	1.27	2.55	2171.78	0.00	2171.78	7741.44	8361.44
								Total Storage Requirement (m^3)	620.00

APPENDIX E

IH 124 estimate of mean annual runoff rate

14/032: Lowfield Road, Bolton upon Dearne

IH 124 Estimate of greenfield run off rate

	East	North
NGR:	446094	402399

From IH 124 Eqn 7.1:

$Qbar_{rural} = 0.00108AREA^{0.89}SAAR^{1.17}SOIL^{2.17}$

where:

$Qbar_{rural}$: Catchment mean annual peak flow rate (m^3/s)

AREA: Catchment area (km^2)

SAAR: Standard annual average rainfall

SOIL: Soil index

Soil Class	1	2	3	4	5
SOIL Index	0.15	0.3	0.4	0.45	0.5

Site area	2.548	ha	From topographical survey
AREA:	0.5	km^2	Initial estimate based on 50ha
SAAR	699	mm	FEH CD ROM
Soil Class	4	Wallingford Map 1.4.1	
SOIL	0.45	Soil W.R.A.P. Class for Site NGR: 4	

$Qbar_{rural}$ is estimated for a catchment of 50ha and adjusted to site area:

$Qbar_{rural}$ =	0.219	m^3/s
=	219.29	l/s
Rate per ha	4.39	l/s
Mean annual site run-off	11.2	l/s

APPENDIX F

LLFA correspondence

John O'Connor

From: Atkins , Wayne [WayneAtkins@barnsley.gov.uk]
Sent: 27 August 2019 08:47
To: John O'Connor; HighwayDrainage
Subject: RE: Lowfield Road, Bolton upon Dearne

John,

I can confirm I have no objection in principal to the discharge rate of 11.2 l/s to the River Dearne. However, as the River Dearne is classified as Main River at this location and the outfall drain would run through areas in EA Flood Zone please confirm the acceptability of this arrangement with the Environment Agency.

Regards

Wayne Atkins
Principal Engineer – Asset Management
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

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From: John O'Connor [mailto:john@jocconsultants.co.uk]
Sent: 22 August 2019 14:15
To: HighwayDrainage
Cc: Atkins , Wayne
Subject: Lowfield Road, Bolton upon Dearne
Importance: High

FAO Wayne Atkins

Dear Wayne,

We are currently updating a flood risk assessment, originally prepared in 2014-15 for a development of 97 houses on the site outlined in red on the attached plan.

It is proposed to have a controlled surface water discharge to the River Dearne limited to the greenfield mean annual runoff rate (Q-bar) of 11.2 l/s. An attenuation storage basin will be provided upstream of the outfall in the land immediately to the east of the site.

As the River Dearne is Main River, our client will need the consent of the Environment Agency to construct an outfall, but I understand that it is the LLFA that oversees surface water discharge rates. I am therefore requesting approval of the proposed discharge rate of 11.2 l/s, the derivation of which is shown in the attached IH124 calculation.

Your earliest response will be appreciated.

Kind regards,

John O'Connor

End of Report