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Flood Risk Assessment

ON

Land at
Dodworth Green Road
Dodworth, Barnsley

For

GREEN ROAD DEVELOPMENTS.

E08/4378/FR001
October 2008

T. Haigh. BSc.,C.Eng.M.I.C.E.

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INTRODUCTION

This report is commissioned to investigate and report on the Flood Risk of this site in accordance with PPS25. The report is based on information supplied by the client and from relevant authorities in both written and verbal format. Some of this information has been given in verbal format only. No liability can be accepted for information supplied by third parties which is subsequently found to be inaccurate or incorrect.

THE SITE

The site is located off Dodworth Green Road, Dodworth, Barnsley, and is situated around Ordnance Survey grid reference SE 31265 04930. A site location plan is shown on Figure 1 in Appendix B.

The site is approximately rectangular in nature, with only a limited frontage to Dodworth Green Road in the north-western corner of the site. The site is partially developed with three large detached houses: two on the northern boundary and another mid way down the western boundary of the site. The total developable area including the existing houses, is approximately 2.22ha.

From the plans provided the site appears to comprise of a mixture of land uses including three residential buildings. The rest of the land is open paddock and overgrown shrubbery.

The site is bound by residential development on three sides. To the north and and east is existing residential development. The western boundary abuts frontage development to Dodworth Green Road. The southern boundary abuts a Water course that separates the site from open country side to the south west.

The site is thought to be underlain by coal measures which will be a mixture of mudstones and sandstones in varying thickness layers. It is likely that clays will be found overlying the bedrock which would probably be unsuitable for infiltration techniques. Once a site investigation report is available this could be verified.

Site levels vary from 133m AOD in the northwest corner down to 113 in the southeast corner. There is a central ridge running through the site that constrains the watercourse crossing the site. Site falls vary from 1 in 13 in the northern part of the site to 1 in 6 in the south. The watercourse abutting the southern site boundary is some 3 4 m below the site levels for much of its length but this reduces to 1.5 at the south-eastern corner of the site.

There are two watercourses on or abutting the site, both are un-named but form part of the Dodworth Dike catchment. The first watercourse crosses the site from west to east in a diagonal north west to south east direction entering the site from the north west and exiting mid way along the eastern boundary. The watercourse serves the housing estates and industrial estates to the north of the site. Its estimated catchment is approx 28ha. The water-course predominantly in culvert for most of its length. The channel through the site is very overgrown and it was not possible to determine inlet and outlet pipe sizes at the time of the site visit. The watercourse flows south eastwards off site through another housing estate fronting onto Stafford Walk. It is believed that this connects into the second watercourse 150m from the site boundary.

The second watercourse abuts the southern boundary and flows south easterly. This runs in a deep cutting with a shallow channel at its base. At its maximum this channel is over 30m wide due to its depth below the site. This reduces as it run away from the site. This watercourse runs in culvert approx 800m away from the site through another residential area

There are substantial areas of roofed buildings and hard paved or concrete yard areas on site, approx. 2000sqm but we do not have any drainage details showing where these areas drain too.

The adjacent ground to the north and north west is slightly higher than the site and the fields to the south west slope towards the site but are separated from it by the watercourse channel. The residential development to the east is generally at lower levels that the site and falls away in a south easterly direction.

There are foul and combined sewers in Dodworth Green Road with depths up to 4.23 m deep. These do not appear to be deep enough to service the whole of the site. There are also foul sewers in the rear gardens of the properties to the east of the site. Whilst these are at shallow depth they may be suitable for foul drainage of the site. Conversely it may be necessary to provide a pumped system for foul water drainage of the site.

PROPOSED DEVELOPMENT

We only have a preliminary copy of the proposed development which shows a series of detached, semidetached and terraced houses accessed off Dodworth Green Road in the north western corner of the site. The proposals are therefore for a mixed use residential development. The proposed development is effectively split by the watercourse across the middle on the site and a green open space area is to be provided in this area.

FLOOD RISK

There are a number of potential flooding mechanisms that PPS25 now requires are evaluated for each proposed development site. Each method of flooding requires an assessment to be made on its probability relative to the site development. The normal requirement of the document is for no flooding of properties for storms up to a 1% probability or a once in a 100 years storm. The risk assessment also includes for flooding both on site and off site, and the effects of the development on the downstream catchment or the flow regime of the watercourse. PPS25 also requires that the effects of severe storms above the normal 1% probability are reviewed together with the effects of climatic change relating to the design life of the development. Each Flood Risk mechanism will be discussed in turn.

PPS 25 requires that each flooding mechanism is addressed and levels of risk evaluated. We consider there are three main risks of flooding to the site the alternative mechanisms are not applicable to this site.

1. Inundation from floodwaters leaving watercourses or rivers entering the site. This can include the effects on culverted watercourses and where the risk of blockage can occur and from breach scenarios.

2. Rainwater falling on the site and not being able to leave the site at sufficient rate to prevent flooding on the site.

3. Overland flows from adjacent land sites due to surcharging of sewerage systems or other watercourses.

4. The impact of the developed site on the existing drainage systems and off-site surface water systems must also be assessed as part of this flood risk assessment.

Each will be discussed in turn.

1. Flood Risk from Watercourses, River & Tidal

The proposed development site appears not to fall within the 1% probability Flood Risk Maps as published by the Environment Agency and not within the 0.1% Flood Risk Area. The site is therefore adjudges to fall with zone 1. The flood risk maps indicate the extent of the flood plain extends around the watercourse to the south east of the site indicating possible flood risks downstream. The site would fall within Zone 1 of the Environment Agency Designation under PPS 25.

The risk of flooding from river or tidal water is therefore considered acceptable for residential development on this site.

The difference of bank to bed level of the watercourse to the southern boundary means that the risk of flooding from this source is remote apart from the south western corner of the site.

The watercourse crossing the site could generate flooding problems if not properly maintained. A blockage of the downstream outlet could result in flooding on site that would build up and eventually flow over its bank to the south. The flows would have

to build up to a maximum depth of 2.5m before leaving via the site boundary. It would be more likely that these flows would pass into the adjacent residential development to the east. This scenario currently exists and is not a result of the proposed development. The development may however alleviate this risk by providing a specially designed inlet structure that would reduce the risk of blockage and allow stormwater flows to pass. It would also be possible to provide some cascade ponds within the open space area to regulate flows albeit very slightly and provide an overflow route to prevent flooding of the development to the east.
If these works are implemented then the flood risk from rivers and watercourses would fall to acceptable levels.

2. Risk of Flooding from overland flows from adjacent land.

The site lies on a sloping site with existing residential development on three sides; two sides falling towards the site and the other falling away from the site. These provide a level of protection due to the existing surface water drainage systems that should normally be capable of catering for storms up to the 30 year return period. For storms in excess of this any surcharge from the sewers would initially flow into Dodworth Green Lane which would channel the flows down to its low point at its junction with Ratten Row to the south west of the site. The majority of the flows would then pass along this road into the watercourse abutting the southern boundary of the site. The risk of overland flooding is therefore considered acceptably low.
The open fields to the west are separated from the site by the watercourse and any overland flows from these would be intercepted by it.

This would leave only a small catchment to develop flows that could pass through the site. This risk would be substantially lower and deemed acceptable subject to the normal flood routing now required by sewers for adoption.

We would suggest that by raising floor levels to 300mm above adjacent road levels will effectively reduce this risk to an acceptable level.

3. Risk of Flooding from Rainwater Falling on Site

The development of the site without any storm-water attenuation would increase flows down stream and increase possible flood risks to downstream properties. It is therefore necessary to eliminate this risk by provision of attenuation systems that will reduce storm water run off to current discharges.

The risk of flooding from water falling on site and not being able to leave in sufficient rates can be managed by the use of above ground or underground storage systems and providing a flow control device to restrict discharges to existing levels.

The site currently has a limited amount of impermeable areas i.e roof and hard-paved areas (2000sqm). A full drainage investigation would be required to determine which areas are positively drained to the watercourse to determine an acceptable discharge rate from the development site. Failing this the discharge rate would have to be limited to agricultural rates of discharge.

Discussions with Yorkshire water and Barnsley MDC Land Drainage Department will be necessary to agree discharge rates but these should result in an allowable discharge of 5 lit/s/ha.

Based on a limited development of approx 50 houses with drives the approximate storage volume required would be 600cu.m to cater for a 100 year storm with climate change for a discharge of 11/sec. and 361cu.m to cater for a 100 year storm with climate change for a discharge of 20l/sec ie the existing run off from paved or roofed areas. This can be provided in a number of forms, an open swale or detention basin being the most sustainable option but this would be difficult to provide on such a steep sloping site.

Conversely further site investigation may prove the underlying sandstones may be at shallow depth and the use of soak-away's may be acceptable. The utilisation of these will need on site testing before details designs could be submitted. This method of storm-water disposal would also reduce the flood risks to downstream properties due to the site development.

It would therefore be prudent to restrict flows from the site to agreed discharge rates and provide storage to cater for storms up to the 1% return probability and add an allowance for climatic change related to the design life of the propose development. This would currently suggest a 20% increase in flood water storage volume requirements.

The development of the site without storm-water attenuation would increase the risk of flooding downstream of the site. There are known problems downstream any increase in discharges to it would accentuate these problems. It is therefore important that on site attenuation is implemented on this site.

We would suggest that detailed designs are submitted at detail planning stage once layouts and extents of development are agreed.

CONCLUSIONS

In our opinion the proposed development site is not at risk of flooding from river or tidal water up to a 0.1% return period. The paddock area to the south of the site south does however fall with Zone 3 and therefore not suitable for residential development. We would suggest house levels are set 300mm above ground levels to cater for modelling anomalies.

There is a very slight risk of flooding from the existing watercourse crossing the site and the inlet to the downstream culvert being blocked or surcharged. We however consider that this can be managed by the use of a new inlet grill and provision of an overflow to the southern watercourse. This should be coupled with managed flood routes and lifting floor levels to 300mm above road centre line levels to ensure no flooding of buildings.

The risk of flooding from overland flows is considered to be acceptable for residential development.

The development of the site without any attenuation of storm-water discharges could create further problems on the downstream watercourse, so attenuation of storm-water flows to agreed or agricultural rates will be required.

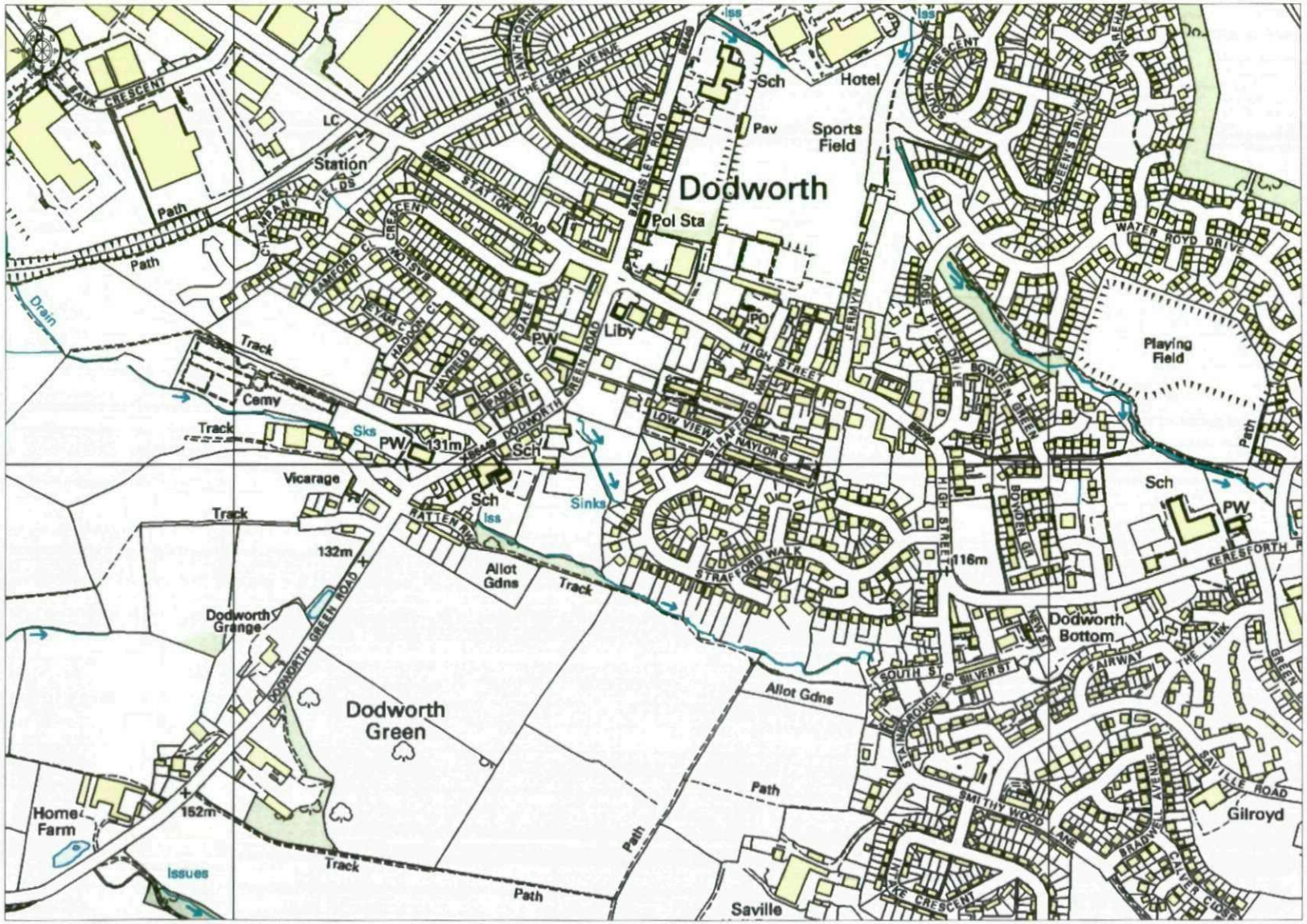
The use of infiltration systems to serve the development is thought to be possible. Further site investigations should be carried out to assess their suitability for this site.

If the measures outlined above are implemented we would consider that the requirements of PPS25 can be satisfied.

T.Haigh B.Sc. C.Eng M.I.C.E.

APPENDIX A

LOCATION PLANS



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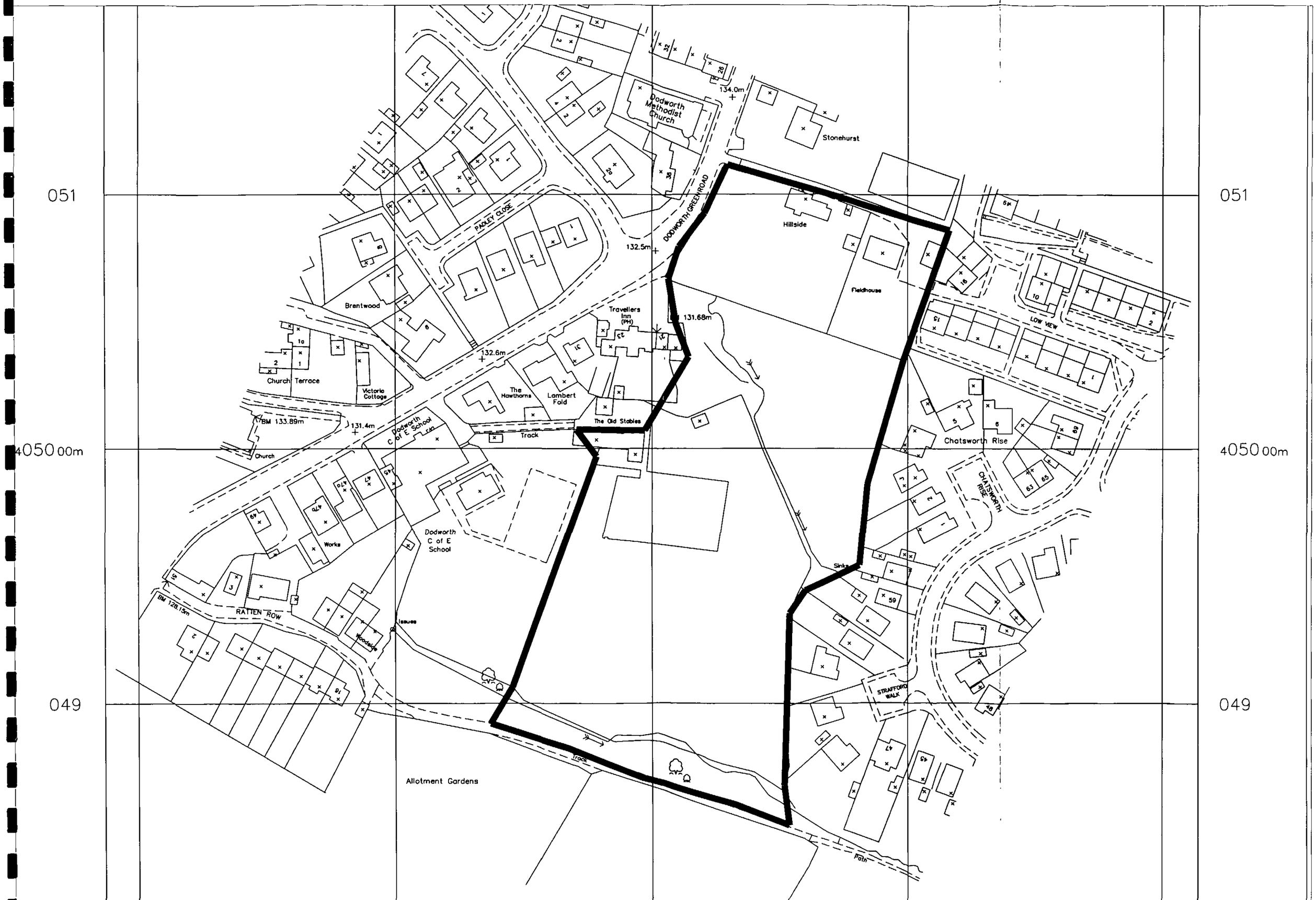
051
051
4050 00m
4050 00m
049
049
Dodworth Methodist Church
134.0m
Stonehurst
PADLEY CLOSE
DODWORTH GREEN ROAD
132.5m
Hillside
Fieldhouse
Brentwood
Travellers Inn (PH)
131.68m
LOW VIEW
132.6m
Church Terrace
Victoria Cottage
The Hawthorns
Lambert Fold
The Old Stables
BM 133.89m
131.4m
Dodworth C of E School
Track
Church
Chatsworth Rise
CHATSWORTH RISE
Works
Dodworth C of E School
Sinks
BM 128.15m
RATTEN ROW
Issues
Woodside
STRAFFORD WALK
Track
Allotment Gardens
Path

APPENDIX B

DEVELOPMENT PLAN

GREEN ROAD DEVELOPMENT

NORTH

PROPOSED RESIDENTIAL DEVELOPMENT, DODWORTH GREEN ROAD

- architectural design
- town planning
- landscape architecture

JRP

John R Paley Associates

client
Green Road Development

project
Dodworth Green Road

drawing of
Concept Site Layout - option 01

drawing no	rev	date
P05 3544 SK02		23.07.08

scale	drawn	checked by
1:500	JRP	

3 Red Hall Crescent
Paragon Business Village
Wakefield, WF1 2QP

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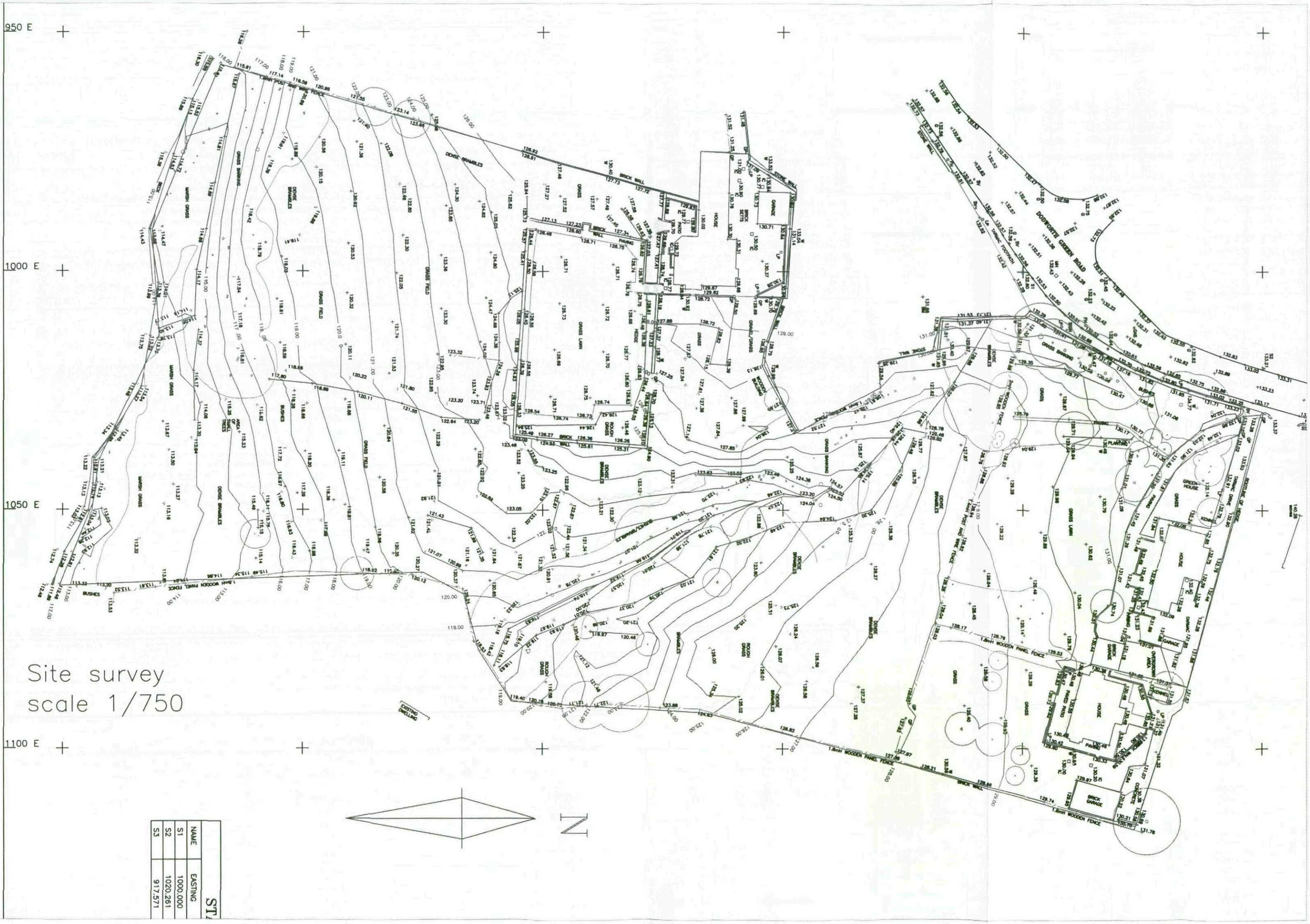
APPENDIX C

SITE SURVEY



Site survey
scale 1/750

STA		
NAME	EASTING	
S1	1000.000	
S2	1020.261	
S3	917.571	

APPENDIX D

ENVIRONMENT AGENCY FLOOD PLAIN MAPS

Flooding

Enter postcode or place name:

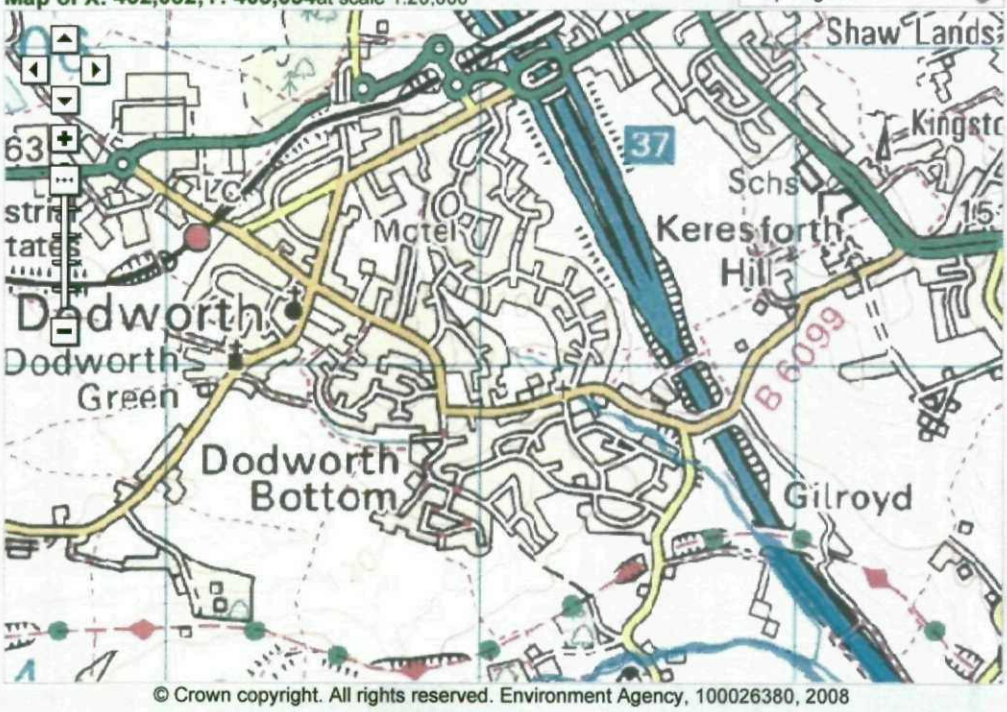
S60 1AN

Search

Overview map:

Map of X: 432,082;Y: 405,054 at scale 1:20,000

Map Legend



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A more detailed explaination to help you understand the flood map shown above.

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We provide flood warnings online 24 hours a day. Find out the current flood warning status in your local area.

» **Sign up to our flood warning service**
We can't always stop rivers from flooding, but we can tell you when it's going to happen. Our free service provides flood warnings direct to you by telephone, mobile, fax or pager.

» **Flood risk and home insurance**
I am in a floodplain, will this affect my insurance?

» **Flood map - your questions answered**
Answers to commonly asked questions about the flood map.

Other topics for this area...

- » River Quality
- » Drinking Water
- » Coastal Waters
- » Flooding
- » Environment Agency Offices
- » Waste
- » Water Framework Directive
- » Flood Warning
- » Air Pollution
- » Pollution

Regional information » Anglian | Midlands | North East | North West | South West | Southern | Thames | Wales

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APPENDIX E

STORMWATER STORAGE CALCULATIONS

Client

Site Dodworth Green Lane

Design storm 100 M5-60 19 mm
r 0.35
Site area sq m. 22200
Imp Area sq m. 10000
T of Conc min 4 Time to Flow
Allow Discharge 11 Lit / sec Imp Ratio 0.45

Storm Duration Mins	Intensity mm/hr	Depth mm	Vol In cu.m	Vol Out cu.m	Storage cu.m.	Q	t	100 year storm Intensit mm/hr	Depth mm	Vol In cu.m	Vol Out cu.m	Storage cu.m.	100year plus climate Intensity mm/hr	Depth mm	Vol In cu.m	Vol Out cu.m	Storage cu.m.
10	81.8	13.63	136.33	9.11	127.22	227.40	0.2	101.27	16.88	168.78	9.11	159.67	111.25	18.54	185.41	9.11	176.30
20	59.8	19.93	199.33	15.67	183.67	166.24	0.3	74.03	24.68	246.77	15.67	231.11	81.33	27.11	271.09	15.67	255.43
30	47.6	23.80	238.00	22.22	215.78	132.33	0.3	58.93	29.46	294.64	22.22	272.42	64.74	32.37	323.68	22.22	301.46
50	34.4	28.67	286.67	35.34	251.33	95.63	0.5	42.59	35.49	354.89	35.34	319.56	46.78	38.99	389.87	35.34	354.53
60	30.3	30.30	303.00	41.90	261.10	84.23	0.5	37.51	37.51	375.11	41.90	333.22	41.21	41.21	412.08	41.90	370.18
120	18.7	37.40	374.00	81.28	292.72	51.99	0.8	23.15	46.30	463.01	81.28	381.73	25.43	50.86	508.64	81.28	427.36
180	14.1	42.30	423.00	120.70	302.30	39.20	1.1	17.46	52.37	523.67	120.70	402.97	19.18	57.53	575.28	120.70	454.58
240	11.5	46.00	460.00	160.13	299.87	31.97	1.4	14.24	56.95	569.48	160.13	409.35	15.64	62.56	625.60	160.13	465.47
300	9.8	49.00	490.00	199.57	290.43	27.24	1.6	12.13	60.66	606.62	199.57	407.05	13.33	66.64	666.40	199.57	466.83
360	8.7	52.20	522.00	239.04	282.96	24.19	1.8	10.77	64.62	646.24	239.04	407.20	11.83	70.99	709.92	239.04	470.88
420	7.9	55.30	553.00	278.52	274.48	21.96	2.0	9.78	68.46	684.61	278.52	406.10	10.74	75.21	752.08	278.52	473.56
480	7.5	60.00	600.00	318.05	281.95	20.85	2.1	9.29	74.28	742.80	318.05	424.75	10.20	81.60	816.00	318.05	497.95
540	6.9	62.10	621.00	357.53	263.47	19.18	2.3	8.54	76.88	768.80	357.53	411.27	9.38	84.46	844.56	357.53	487.03
600	6.38	63.80	638.00	397.00	241.00	17.74	2.5	7.90	78.98	789.84	397.00	392.84	8.68	86.77	867.68	397.00	470.68
				Storage	**302.30**						**Storage**	**424.75**				**Storage**	497.95

Length of 1800	118.80						
Length of 1500	171.08	Culvert	2.4*1.5m	83.97	Pond 900mm deep	335.89	30 year
Length of 1200	267.29	culvert	3.6*1.8m	46.65		471.948	100 year
Length of 1050	349.08	490.48				553.281	100 year plus climatic
Length of 900	475.32	667.85					
Length of 750	683.94	960.98					

Client

Site Dodworth Green Lane

Design storm 100 M5-60 19 mm
r 0.35
Site area sq m. 22200
Imp Area sq m. 10000
T of Conc min 4 Time to Flow
Allow Discharge 20 Lit / sec Imp Ratio 0.45

Storm Duration Mins	Intensity mm/hr	Depth mm	Vol In cu.m	Vol Out cu.m	Storage cu.m.	Q	t	100 year storm Intensit mm/hr	Depth mm	Vol In cu.m	Vol Out cu.m	Storage cu.m.	100year plus climate Intensity mm/hr	Depth mm	Vol In cu.m	Vol Out cu.m	Storage cu.m.
10	81.8	13.63	136.33	16.38	119.96	227.40	0.4	101.27	16.88	168.78	16.38	152.40	111.25	18.54	185.41	16.38	169.04
20	59.8	19.93	199.33	28.22	171.11	166.24	0.5	74.03	24.68	246.77	28.22	218.55	81.33	27.11	271.09	28.22	242.87
30	47.6	23.80	238.00	40.07	197.93	132.33	0.6	58.93	29.46	294.64	40.07	254.57	64.74	32.37	323.68	40.07	283.61
50	34.4	28.67	286.67	63.80	222.87	95.63	0.8	42.59	35.49	354.89	63.80	291.10	46.78	38.99	389.87	63.80	326.07
60	30.3	30.30	303.00	75.66	227.34	84.23	0.9	37.51	37.51	375.11	75.66	299.45	41.21	41.21	412.08	75.66	336.42
120	18.7	37.40	374.00	146.95	227.05	51.99	1.5	23.15	46.30	463.01	146.95	316.06	25.43	50.86	508.64	146.95	361.69
180	14.1	42.30	423.00	218.35	204.65	39.20	2.0	17.46	52.37	523.67	218.35	305.32	19.18	57.53	575.28	218.35	356.93
240	11.5	46.00	460.00	289.80	170.20	31.97	2.5	14.24	56.95	569.48	289.80	279.68	15.64	62.56	625.60	289.80	335.80
300	9.8	49.00	490.00	361.28	128.72	27.24	2.9	12.13	60.66	606.62	361.28	245.34	13.33	66.64	666.40	361.28	305.12
360	8.7	52.20	522.00	432.83	89.17	24.19	3.3	10.77	64.62	646.24	432.83	213.41	11.83	70.99	709.92	432.83	277.09
420	7.9	55.30	553.00	504.43	48.57	21.96	3.6	9.78	68.46	684.61	504.43	180.19	10.74	75.21	752.08	504.43	247.65
480	7.5	60.00	600.00	576.20	23.80	20.85	3.8	9.29	74.28	742.80	576.20	166.60	10.20	81.60	816.00	576.20	239.80
540	6.9	62.10	621.00	647.80	-26.80	19.18	4.2	8.54	76.88	768.80	647.80	121.00	9.38	84.46	844.56	647.80	196.76
600	6.38	63.80	638.00	719.39	-81.39	17.74	4.5	7.90	78.98	789.84	719.39	70.46	8.68	86.77	867.68	719.39	148.29
				Storage	227.34						Storage	316.06				Storage	361.69

Length of 1800	89.34					
Length of 1500	128.66	Culvert	2.4*1.5m	63.15	Pond 900mm deep	252.6 30 year
Length of 1200	201.01	culvert	3.6*1.8m	35.08		351.176 100 year
Length of 1050	262.52	364.96				401.874 100 year plus climatic
Length of 900	357.45	496.95				
Length of 750	514.34	715.06				