Flood Risk Assessment for Precious ideals

Proposed

Housing development at Oakhill, Whalley

The site is in zone 1 on the environment agency map which is enclosed with this assessment, the site has been designed with 3.5litre per second run off into the stream on site, this is the equivalent of grassland run off and designed to mitigate the impact of the development on Whalley which has previous suffered major flooding. The scheme has also been designed with a 40% allowance for future climate change, again to help mitigate its impact.

Each property will be provided with attenuation sized in accordance with the calculations provided with this assessment; the attenuation will be created using either buried crates or a pond in the rear gardens to the houses. The attenuation for the roadway will be via oversized pipes buried under the roadway. The attenuation has again been sized with a run off rate of 3.5 litres per second and 40% allowance for climate change

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
Oakhill	**373822/436916**	**3 Dec 2018 12:03**

Your selected location is in flood zone 1, an area with a low probability of flooding.

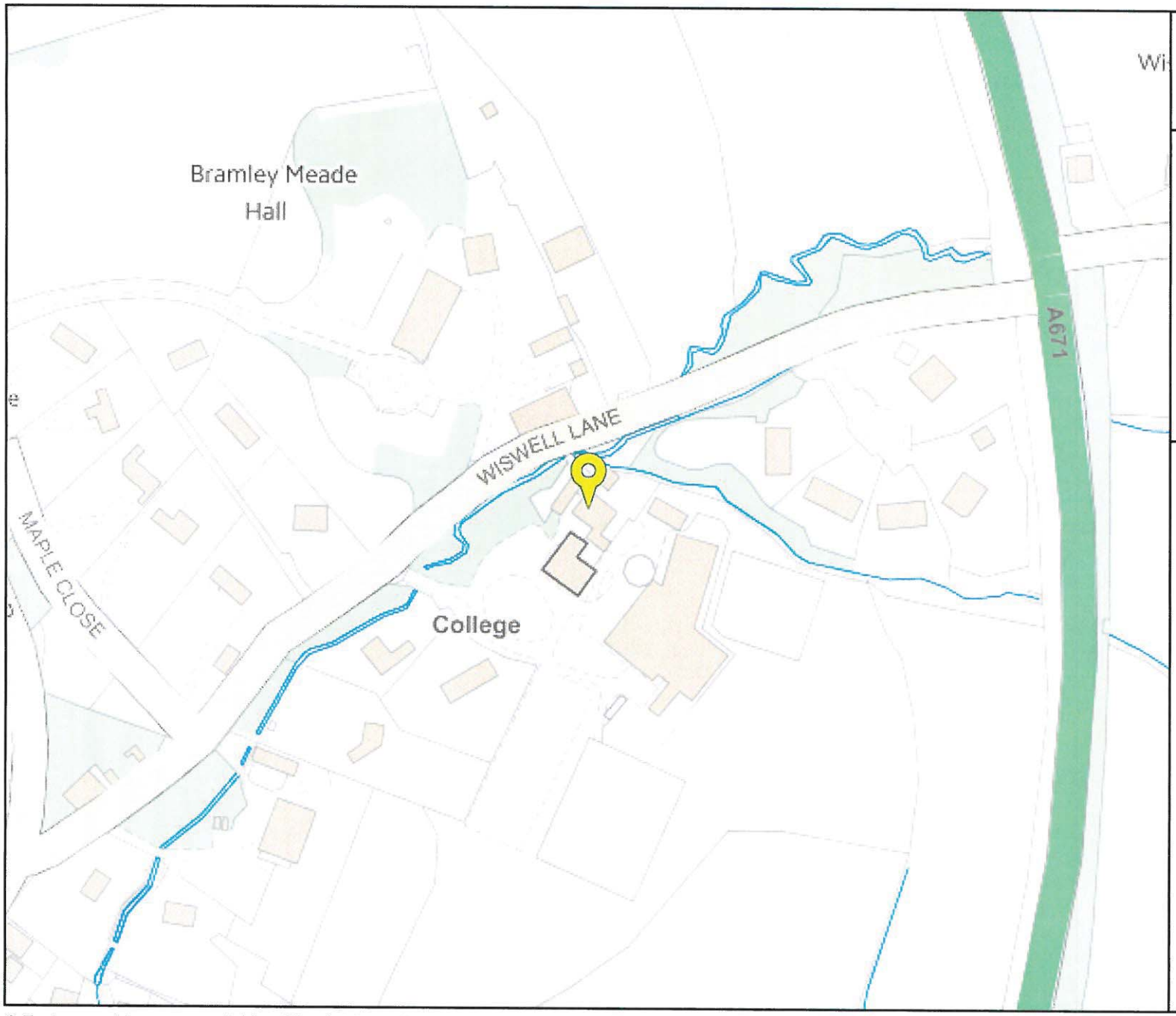
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Oakhill

Location (easting/northing)
373822/436916

Scale
1:2500

Created
3 Dec 2018 12:03

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

AJH Associates 21 Deanfield Court, Clitheroe	Oak hill housing plot 1			
			Revision	
	Job No:	3440	Page:	C/01
Section: SUDS drainage scheme attenuation tank size	Prepared By:	TH	Date:	30/11/2018

GENERAL DATA	
site location:	England and Wales
60 min rainfall depth of 5 year return period 'R' *[mm]* =	20
M5-60 to M5-2d rainfall ratio 'r' =	0.40
proposed discharge rate 'v_1' *[litre/s]* =	3.50
proposed discharge rate 'v_2' *[litre/s]* =	10.00
allowance for climate change:	40%

SUMMARY OF CALCULATIONS		
required storage volume for discharge rate 'v_1' =	35.38	m^3
required storage volume for discharge rate 'v_2' =	24.61	m^3

AREA DATA		impermeability *[%]*	effective area *[m^2]*
impermeable area 'A_1' *[m^2]* =	349	100.00	349
landscaping and/or green roof area 'A_2' *[m^2]* =	881	80.00	704.8
other partially permeable area 'A_3' *[m^2]* =	282	20.00	56.4
AREA DRAINED TO ATTENUATION TANK =			1110.2 m^2

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_1

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D			M20-D			M30-D			outflow from attenuation tank *[m^3]*	required storage *[m^3]*
			Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*		
5	0.37	7.47	1.20	12.59	13.98	1.38	14.47	16.07	1.46	15.24	16.92	1.05	15.87
10	0.52	10.47	1.22	17.90	19.88	1.41	20.70	22.98	1.49	21.88	24.30	2.10	22.20
15	0.63	12.67	1.23	21.82	24.23	1.43	25.29	28.07	1.51	26.77	29.72	3.15	26.57
30	0.80	16.07	1.24	27.89	30.97	1.44	32.44	36.01	1.53	34.42	38.21	6.30	31.91
60	1.00	20.00	1.24	34.72	38.55	1.45	40.60	45.07	1.54	43.21	47.98	12.60	**35.38**
120	1.21	24.13	1.24	41.90	46.51	1.44	48.71	54.08	1.54	51.86	57.58	25.20	32.38
240	1.45	28.93	1.22	49.59	55.06	1.42	57.69	64.05	1.52	61.47	68.25	50.40	17.85
360	1.60	32.07	1.21	54.49	60.50	1.41	63.38	70.36	1.50	67.51	74.94	75.60	0.00
600	1.79	35.87	1.20	60.38	67.03	1.40	70.12	77.85	1.49	74.61	82.84	126.00	0.00
1440	2.24	44.80	1.18	74.03	82.19	1.36	85.35	94.75	1.44	90.58	100.57	302.40	0.00

** Z2 is a growth factor from M5 rainfalls*

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_2

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D			M30-D			M50-D			outflow from attenuation tank *[m^3]*	required storage *[m^3]*
			Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*		
5	0.37	7.47	1.20	12.59	13.98	1.46	15.24	16.92	1.60	16.77	18.62	3.00	15.62
10	0.52	10.47	1.22	17.90	19.88	1.49	21.88	24.30	1.65	24.25	26.92	6.00	20.92
15	0.63	12.67	1.23	21.82	24.23	1.51	26.77	29.72	1.68	29.73	33.01	9.00	24.01
30	0.80	16.07	1.24	27.89	30.97	1.53	34.42	38.21	1.71	38.38	42.61	18.00	**24.61**
60	1.00	20.00	1.24	34.72	38.55	1.54	43.21	47.98	1.73	48.44	53.78	36.00	17.78
120	1.21	24.13	1.24	41.90	46.51	1.54	51.86	57.58	1.72	58.17	64.58	72.00	0.00
240	1.45	28.93	1.22	49.59	55.06	1.52	61.47	68.25	1.70	69.03	76.64	144.00	0.00
360	1.60	32.07	1.21	54.49	60.50	1.50	67.51	74.94	1.69	75.76	84.11	216.00	0.00
600	1.79	35.87	1.20	60.38	67.03	1.49	74.61	82.84	1.66	83.60	92.81	360.00	0.00
1440	2.24	44.80	1.18	74.03	82.19	1.44	90.58	100.57	1.61	101.05	112.19	864.00	0.00

** Z2 is a growth factor from M5 rainfalls*

AJH Associates 21 Deanfield Court, Clitheroe	Oak hill housing plot 2			
			Revision	
	Job No:	3440	Page:	C/01
Section: SUDS drainage scheme attenuation tank size	Prepared By:	TH	Date:	30/11/2018

GENERAL DATA	
site location:	England and Wales
60 min rainfall depth of 5 year return period 'R' *[mm]* =	20
M5-60 to M5-2d rainfall ratio 'r' =	0.50
proposed discharge rate 'v_1' *[litre/s]* =	3.50
proposed discharge rate 'v_2' *[litre/s]* =	10.00
allowance for climate change:	40%

SUMMARY OF CALCULATIONS		
required storage volume for discharge rate 'v_1' =	23.61	m^3
required storage volume for discharge rate 'v_2' =	16.62	m^3

AREA DATA		impermeability *[%]*	effective area *[m^2]*
impermeable area 'A_1' *[m^2]* =	349	100.00	349
landscaping and/or green roof area 'A_2' *[m^2]* =	550	80.00	440
other partially permeable area 'A_3' *[m^2]* =	245	20.00	49
AREA DRAINED TO ATTENUATION TANK =			838 m^2

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_1

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D			M20-D			M30-D			outflow from attenuation tank *[m^3]*	required storage *[m^3]*
			Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*		
5	0.39	7.80	1.21	13.18	11.04	1.39	15.16	12.70	1.46	15.97	13.38	1.05	12.33
10	0.54	10.80	1.22	18.49	15.50	1.41	21.39	17.93	1.50	22.62	18.95	2.10	16.85
15	0.65	13.00	1.23	22.42	18.79	1.43	25.99	21.78	1.51	27.52	23.06	3.15	19.91
30	0.82	16.40	1.24	28.47	23.86	1.44	33.13	27.76	1.53	35.16	29.46	6.30	23.16
60	1.00	20.00	1.24	34.72	29.10	1.45	40.60	34.02	1.54	43.21	36.21	12.60	**23.61**
120	1.19	23.80	1.24	41.32	34.62	1.44	48.06	40.27	1.54	51.17	42.88	25.20	17.68
240	1.38	27.60	1.23	47.51	39.81	1.43	55.24	46.29	1.52	58.85	49.31	50.40	0.00
360	1.51	30.20	1.22	51.56	43.20	1.42	60.00	50.28	1.51	63.94	53.59	75.60	0.00
600	1.68	33.60	1.21	56.88	47.67	1.41	66.12	55.41	1.50	70.40	58.99	126.00	0.00
1440	2.03	40.60	1.19	67.57	56.62	1.38	78.30	65.62	1.46	83.21	69.73	302.40	0.00

** Z2 is a growth factor from M5 rainfalls*

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_2

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D			M30-D			M50-D			outflow from attenuation tank *[m^3]*	required storage *[m^3]*
			Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*	Z2	rainfalls *[mm]*	inflow *[m^3]*		
5	0.39	7.80	1.21	13.18	11.04	1.46	15.97	13.38	1.61	17.59	14.74	3.00	11.74
10	0.54	10.80	1.22	18.49	15.50	1.50	22.62	18.95	1.66	25.07	21.01	6.00	15.01
15	0.65	13.00	1.23	22.42	18.79	1.51	27.52	23.06	1.68	30.58	25.62	9.00	**16.62**
30	0.82	16.40	1.24	28.47	23.86	1.53	35.16	29.46	1.71	39.22	32.87	18.00	14.87
60	1.00	20.00	1.24	34.72	29.10	1.54	43.21	36.21	1.73	48.44	40.59	36.00	4.59
120	1.19	23.80	1.24	41.32	34.62	1.54	51.17	42.88	1.72	57.39	48.09	72.00	0.00
240	1.38	27.60	1.23	47.51	39.81	1.52	58.85	49.31	1.71	66.06	55.36	144.00	0.00
360	1.51	30.20	1.22	51.56	43.20	1.51	63.94	53.59	1.70	71.83	60.19	216.00	0.00
600	1.68	33.60	1.21	56.88	47.67	1.50	70.40	58.99	1.68	78.95	66.16	360.00	0.00
1440	2.03	40.60	1.19	67.57	56.62	1.46	83.21	69.73	1.64	93.01	77.94	864.00	0.00

** Z2 is a growth factor from M5 rainfalls*

AJH Associates 21 Deanfield Court, Clitheroe	Oak hill housing plot 3			
			Revision	
	Job No:	3440	Page:	C/01
Section: SUDS drainage scheme attenuation tank size	Prepared By:	TH	Date:	30/11/2018

GENERAL DATA		
site location:	England and Wales	
60 min rainfall depth of 5 year return period 'R' *[mm]* =	20	
M5-60 to M5-2d rainfall ratio 'r' =	0.50	
proposed discharge rate 'v_1' *[litre/s]* =	3.50	
proposed discharge rate 'v_2' *[litre/s]* =	10.00	
allowance for climate change:	40%	

SUMMARY OF CALCULATIONS		
required storage volume for discharge rate 'v_1' =	28.45	m^3
required storage volume for discharge rate 'v_2' =	20.05	m^3

AREA DATA		impermeability *[%]*	effective area *[m^2]*
impermeable area 'A_1' *[m^2]* =	349	100.00	349
landscaping and/or green roof area 'A_2' *[m^2]* =	676	80.00	540.8
other partially permeable area 'A_3' *[m^2]* =	301	20.00	60.2
AREA DRAINED TO ATTENUATION TANK =			950 m^2

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_1

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D Z2	M10-D rainfalls *[mm]*	M10-D inflow *[m^3]*	M20-D Z2	M20-D rainfalls *[mm]*	M20-D inflow *[m^3]*	M30-D Z2	M30-D rainfalls *[mm]*	M30-D inflow *[m^3]*	outflow from attenuation tank *[m^3]*	required storage *[m^3]*
5	0.39	7.80	1.21	13.18	12.52	1.39	15.16	14.40	1.46	15.97	15.17	1.05	14.12
10	0.54	10.80	1.22	18.49	17.57	1.41	21.39	20.32	1.50	22.62	21.49	2.10	19.39
15	0.65	13.00	1.23	22.42	21.30	1.43	25.99	24.69	1.51	27.52	26.14	3.15	22.99
30	0.82	16.40	1.24	28.47	27.05	1.44	33.13	31.47	1.53	35.16	33.40	6.30	27.10
60	1.00	20.00	1.24	34.72	32.98	1.45	40.60	38.57	1.54	43.21	41.05	12.60	**28.45**
120	1.19	23.80	1.24	41.32	39.25	1.44	48.06	45.66	1.54	51.17	48.61	25.20	23.41
240	1.38	27.60	1.23	47.51	45.14	1.43	55.24	52.48	1.52	58.85	55.90	50.40	5.50
360	1.51	30.20	1.22	51.56	48.98	1.42	60.00	57.00	1.51	63.94	60.75	75.60	0.00
600	1.68	33.60	1.21	56.88	54.04	1.41	66.12	62.81	1.50	70.40	66.88	126.00	0.00
1440	2.03	40.60	1.19	67.57	64.19	1.38	78.30	74.39	1.46	83.21	79.05	302.40	0.00

** Z2 is a growth factor from M5 rainfalls*

REQUIRED STORAGE VOLUME PER RAINFALL DURATION FOR DISCHARGE RATE v_2

rainfall duration *[min]*	rainfall factor Z1	M5-D rainfalls *[mm]*	M10-D Z2	M10-D rainfalls *[mm]*	M10-D inflow *[m^3]*	M30-D Z2	M30-D rainfalls *[mm]*	M30-D inflow *[m^3]*	M50-D Z2	M50-D rainfalls *[mm]*	M50-D inflow *[m^3]*	outflow from attenuation tank *[m^3]*	required storage *[m^3]*
5	0.39	7.80	1.21	13.18	12.52	1.46	15.97	15.17	1.61	17.59	16.71	3.00	13.71
10	0.54	10.80	1.22	18.49	17.57	1.50	22.62	21.49	1.66	25.07	23.82	6.00	17.82
15	0.65	13.00	1.23	22.42	21.30	1.51	27.52	26.14	1.68	30.58	29.05	9.00	**20.05**
30	0.82	16.40	1.24	28.47	27.05	1.53	35.16	33.40	1.71	39.22	37.26	18.00	19.26
60	1.00	20.00	1.24	34.72	32.98	1.54	43.21	41.05	1.73	48.44	46.02	36.00	10.02
120	1.19	23.80	1.24	41.32	39.25	1.54	51.17	48.61	1.72	57.39	54.52	72.00	0.00
240	1.38	27.60	1.23	47.51	45.14	1.52	58.85	55.90	1.71	66.06	62.76	144.00	0.00
360	1.51	30.20	1.22	51.56	48.98	1.51	63.94	60.75	1.70	71.83	68.23	216.00	0.00
600	1.68	33.60	1.21	56.88	54.04	1.50	70.40	66.88	1.68	78.95	75.00	360.00	0.00
1440	2.03	40.60	1.19	67.57	64.19	1.46	83.21	79.05	1.64	93.01	88.36	864.00	0.00

** Z2 is a growth factor from M5 rainfalls*