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DRAINAGE & FLOOD ASSESSMENT

ON

LAND OFF WHITEHALL ROAD/WHITECHAPEL ROAD
CLECKHEATON
WEST YORKSHIRE

FOR

NEWSMITH FARMS LIMITED

E16/6566/FR01

JANUARY 2016

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

Haigh Huddleston Associates is the trading name of Haigh Huddleston Associates Limited
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1.0 INTRODUCTION

1.1 This report is commissioned to investigate and report on the Flood Risk for this site in accordance National Planning Policy Framework (2012). The proposals are for an industrial/commercial development on the site which is currently open agricultural land. The report is based on information supplied by the client and from relevant authorities in both written and verbal format. Some of this information is in verbal form only. No liability can be accepted for information supplied by third parties which is subsequently found to be inaccurate or incorrect.

2.0 THE SITE

2.1 The site is located to the North of the village of Cleckheaton approx. 4.25miles south of Bradford city centre. It situated around Ordnance Survey grid reference SE177264 (417731, 426414). A site location plan is included in Appendix A.

2.2 The site is trapezoidal in shape and is mixed arable agricultural field and pasture land. The A58 (Halifax to Leeds Road) forms the northernmost boundary of the site. The B6120 forms part of the southern boundary to the site. There are residential developments to the west in the form of Scholes village and further to the south beyond the M62 is Cleckheaton itself. There is a former railway line on an old embankment that forms the eastern boundary of the site. Beyond this is a small wood. To the north of the A58 is Cleckheaton golf club. The overall site area that is proposed to be developed for light industrial and commercial use is approximately 22.7ha.

2.3 The site consists of two separate fields. Access to the site was from Leeds Road via a public footpath which also acts as an access track to the farmhouse. Beyond the eastern boundary there are some mature trees and a dividing hedge runs between the two main fields of the site.

2.4 The site levels vary from a highpoint of approximately 143m AOD located at the south west corner of the site to a low point of approx. 115m in the north east corner of the site. From the highpoint the site falls northwards towards the A58 Leeds Road, but with a low point just before it reaches the road itself. It then has a shallow channel that runs from west to east along the northern boundary. The average grade across the land is 1 in 20 from south to north and approx. 1 in 40 from west to east on the northern boundary.

2.5 The nearest main watercourse is Stubs Beck which runs to the norther side of the A58 but crosses under the A58 close to the former railway bridge crossing to run on the southern side of the A58. This runs away eastwards and becomes part of the River Spen.

3.0 PROPOSED DEVELOPMENT AND CONSTRINTS

3.1 It is understood that the proposed development is for a series of industrial and commercial buildings with associated roads and car parking. A preliminary site layout is included in Appendix B.

3.2 The BGS Digital Geological Map of Great Britain at 1:50,000 scale has been consulted and we would report as follows:-

3.3 The majority of the site is shown to be underlain by Pennine Lower Coal Measures of mudstones siltstones and sand stones. Sherwood Sandstone with a possible overlay of clays and occasional sands and gravels.

3.4 There are numerous fault lines shown crossing and within 500m of the site.

3.5 There are no records of flooding affecting this site although there have been problems with the surrounding downstream area in the recent past during major events.

4.0 FLOOD RISK

4.1 On reviewing the Environmental Agency websites Flood Risk maps, the site currently falls within flood zone 1. The developable area of the site is therefore considered not to be at risk from fluvial flooding from rivers or sea for the 1 in 100 or 1 in 1000 year flood event. The proposed use of the site would be classified as Less Vulnerable in Table 2 of the Technical Guidance to the National Planning Policy Framework March 2012. In accordance with NPPF the proposed development would be considered appropriate.

4.2 The site does appear to have a small area that is shown to be at risk of flooding subject to surface water flooding according to the EA maps but these are two small areas showing within the site which relate to localised shallow depressions on site. The EA Flood Risk map for flooding from fluvial sources does not show flood waters encroaching onto the site.

4.3 The site does not appear to fall within an area subject to flooding from reservoirs according to the EA maps. The site does not fall within a flood warning zone.

4.4 Due to the size of the development over 1Ha it would be necessary to prepare a site Specific Flood Risk Assessment for the site.

4.5 There are a number of potential flooding mechanisms that NPPF 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. NPPF 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.

4.6 It also requires that the effects of climate change are taken into account together with the impacts of extreme events and flood defence failures. Prior to this the Sequential Test or the Exceptions test as outlined in NPPF, must also be applied to each development site. These are not covered in this report.

4.7 NPPF 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.

4.7.1 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.

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

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

4.7.4 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.

5.0 DISCUSSION OF FLOOD RISKS

5.1 Flood Risk from Watercourses, River & Tidal

5.1.1 The proposed development area does not fall within the 1% probability Flood Risk Maps (Zone 3) as published by the Environment Agency. The site is therefore considered not to be at risk from fluvial flooding for the once in 100 year flood event. We therefore consider the risk of flooding of the site from River and Sea is acceptable for this type of development.

5.2 Risk of Flooding from overland flows from adjacent land.

5.2.1 The site lies on a medium sloping site with residential development to the west but the southern boundary of the site is close to the crest of a shallow hill and therefore the catchment for any overland flows from the south and similarly the south west is very limited. There are open fields to the west which could flow towards the site but these flows would predominantly be adjacent to the A58 on the northern boundary of the site. The land to the north of the A58 does fall towards the site but is intercepted by Stubs Beck which would channel all flows to the east. To the east the site falls away from the site and there is a shallow watercourse that runs adjacent to the A58 which discharges into Stubs Beck once it crosses the A58 in culvert. The surrounding area to the west is all served by public drainage systems and as such the level of risk of flooding from surcharged sewers or drains is considered to be less than 3. We would therefore recommend that an overland flood route is provided through the site to cater for exceedance events as is normal under the sewers for adoption criteria and floor levels are based a minimum of 300mm above existing ground levels.

5.3 Risk of Flooding from Rainwater Falling on Site

5.3.1 The risk of flooding from water falling on site and not being able to leave the site is relatively high. The impermeable area of the site will increase dramatically due to the development and this would increase the run off from the site.

5.3.2 The normal hierarchy for surface water discharge is primarily the use of infiltration systems, in accordance with current policies of the EA and Kirklees MDC. There has not been a site investigation for this site but local knowledge suggests there are the clays on the site overlying impermeable mudstones. It is considered that infiltration systems would not be suitable for the site.

5.3.3 If infiltration systems are not feasible, for the whole site, then storm water attenuation systems should be utilised to ensure the flows from the site to a suitable watercourse, or surface water sewer, are reduced to agricultural run-off rates to avoid increasing the flood risk off site. These can take the form of open swales, ponds, or detention basins but these do tend to take a substantial area of developable land. The systems can also utilise underground tanks and over-sized pipes to store storm water before discharge at agricultural rates to a suitable outfall.

5.3.4 These systems would all have to limit flows down to an acceptable level. At present there is no areas of impermeable surface on the site. The discharge rate for the site would have to reduce to agricultural rates of discharge of around 2.5 lit/s/ha. The provision of open space on the site would probably allow the use of open swales and ponds for such a purpose subject to suitable adoption arrangements. If these cannot be achieved then a storage facility would have to be provided. This could be in the form of a concrete tank or a series of oversized pipes. These may not provide a suitable level of treatment of the run off from the site and biological systems at source may be needed to ensure suitable discharge contaminants are dealt with. The use of open swales and ponds would allow the use of reed beds and other organic systems to be employed so should be considered in the final designs. Primary treatment for the roads would be the use of trapped gullies for all hard standings. Car park areas over 40 number cars may require the use of an interceptor to remove contaminants. The individual companies could install their own attenuation measures with onsite lagoons and swales and the use of rainwater harvesting and grey water recycling should be considered on the site.

5.3.5 The size of the storm water storage facilities would need to be determined accurately in the final detailed designs. These should be all in accordance with the National Planning policy Framework Technical guidance issued in March 2012. The volumes of storage can include flooding to roads and designated areas such as carpark areas or public open space, but must ensure that no buildings are flooded. The most sustainable and economical way of providing this would be in above surface systems such as detention basins, open swales and ponds but these do take up significant areas of land and can be problematical in terms of future maintenance and adoption by the relevant authorities.

5.3.6 Utilising the ADAS systems and Windes source control modelling the estimated agricultural discharge rates for the site are 5.9lit/s/ha for the 1 in 2 year storm, 10.3lit/s/ha for the 1in 30 year event and 15.3 lit/s/ha for the 100 year event. At present there are no distinct outfalls from the site but there appears to be some sort of culvert beneath the old railway embankment that allows the flows from the site to pass into the shallow channel adjacent to the A58 and thence into Stubs Beck. It is therefore proposed to collect the flows from the site, attenuate these flows down to an agreed agricultural discharge level and provide storage on site.

5.3.7 The estimated volumes of storage required for each of the storm profiles based on not exceeding the current agreed discharge of 2.5 lit/s for the whole site which has been agreed in the area previously with Kirklees Council Land drainage department. This is well below the normal accepted agricultural discharge rates but is limited by the capacities of the downstream systems and it is important that downstream flood risk problems are not increased by this development. Based on this criteria, the estimated volumes of storage required are 13281cu.m for the 1 in 30 year storm, 19838cu.m for the 1 in 100 year storm which rises to 3874cu.m when 30% increase due to climatic effects, is taken into account.

5.3.8 The proposed discharge point and discharge rates from the site needs to be formally agreed with Yorkshire Water and the Local Land Drainage Authority, prior to a detail design being undertaken. It is possible that an offsite requisition of a surface water sewer to connect to Stubs Beck under the A58 may be required.

5.4 **Impact on existing drainage systems.**

5.4.1 If the site is developed with attenuation systems and an agreed discharge rate reduced to agricultural rates of discharge, there would be no increase in the flood risk to properties off site or in the drainage networks downstream of the site. In real terms there would be slight reduction in flood risk to adjacent land due to the attenuation provided for the 1 in 100 year storms with the discharge rate cut to below the 1 in 1 year storm discharge rate.

6.0 FOUL DRAINAGE

6.1 The site can be drained to the north east corner using normal gravitational systems but may require a foul pumping station at this point to enable connections to the public foul sewers. Agreement will have to be reached with Yorkshire Water regarding the point of connection for foul flows from the site.

7.0 CONCLUSIONS

7.1 The area of the site to be developed currently falls within Flood Zone 1 as defined by the EA Flood maps. The area of the site to be developed is not at risk of flooding from river or tidal water up to a 1% return period. The flood risk is considered to be acceptable for commercial light industrial development.

7.2 The development of the site utilising infiltration techniques is not considered to be feasible. The use of attenuation systems to reduce the run-off from the site to agricultural discharge rates would be required in the final site designs to ensure there is no increase in flood risk to the downstream catchment.

7.3 The risk of overland flows entering the site is considered to be very low due to the topography of the area around the site and the drainage systems to the previously developed areas to the west. The risk can be further minimised by providing a flood water route through the site to ensure flood water flows are directed away from the existing and proposed buildings.

7.4 The site is shown to be at risk of flooding from surface water in a small area of the site. We consider this to be an extreme condition and whilst occupiers should be informed of the risk it is considered to be very low. The floor levels of the proposed buildings should be a minimum of 300mm above the existing ground level.

[redacted]

Trevor Haigh B.Sc., C.Eng., M.I.C.E.

APPENDIX A

LOCATION PLAN

N

Land ownership

Newsmith Farms Ltd
Fountain Works
Child Lane
Roberttown
Liversedge
WF15 7PH

298
Whitechapel Road
Cleckheaton
BD19 6HW

Revisions:

No.	Comment	Date	By

Drawing Status:

■ Preliminary ☐ Planning Permission ☐ Building Regulation ☐ Tender ☐ Construction

MWA Martin Walsh Architectural
architecture ■ planning ■ engineering
Firth Buildings, 99-103 Leeds Road, Dewsbury, WF12 7BU
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w www.martinwalsh.co.uk

Job Title

Proposed Industrial Development at land between Whitechapel Road and Whitehall Road, Cleckheaton

Drawing Title

Location Plan - Land Ownership

Client

Newsmith Farms Ltd

Drawn	Checked	Date	Scale	Sheet Size	Drawing No.	Rev.
MJR		11/15	1:2000	A1	3/K15/5925/01	

APPENDIX B

SKETCH MASTERPLAN

Revisions:
No. Comment Date By

Drawing Status:
Preliminary ⌗ Planning Permission ⌗ Building Regulation ⌗ Tender ⌗ Construction

MWA Martin Walsh Architectural
architecture ⌗ planning ⌗ engineering
Firth Buildings, 99-103 Leeds Road, Dewsbury, WF12 7BU t 01924 464342
e info@martinwalsh.co.uk w www.martinwalsh.co.uk

Job Title
Proposed Industrial Development at land between Whitechapel Road and Whitehall Road, Cleckheaton

Drawing Title
Sketch Masterplan

Client
Newsmith Farms Ltd

Drawn	Checked	Date	Scale	Sheet Size	Drawing No.	Rev.
MJR		11/15	1:2000	A1	3/K15/5925/05	

APPENDIX C

FLOOD RISK MAPS

Environment Agency

Enter a postcode or place name: WF1 1AD Go

Other topics for this area... Flood Map for Planning (Rivers and Sea)

Flood Map for Planning (Rivers and Sea)

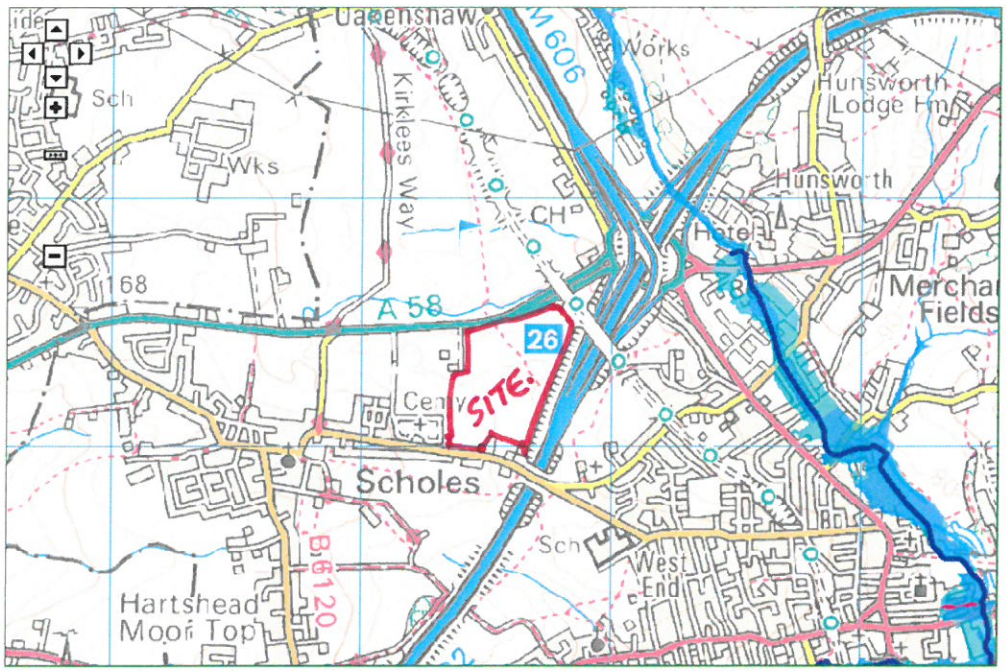
Map legend

Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

- Flood Map for Planning (Rivers and Sea)
  - Flood Zone 3
  - Flood Zone 2
  - Flood defences (Not all may be shown*)
  - Areas benefiting from flood defences (Not all may be shown*)
- Main River Line
  - Main River Line
- Other national environmental organisations
  - Natural Resources Wales Area of responsibility
  - Scottish Environment Protection Agency Area of responsibility

X: 417,571;Y: 426,437 at scale 1:20,000

Other maps Data search Text only version



More about flooding:

Understanding the Flood Map for Planning (Rivers and Sea)

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

Current flood warnings

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

*** Legend Information:** Flood defences and the areas benefiting from them are gradually being added through updates. Please contact your local environment agency office for further details.

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Author: Environment Agency | wiybysupport@environment-agency.gov.uk
Last updated: 21st January 2016

Environment Agency

Enter a postcode or place name: Other topics for this area...

Go | Risk of Flooding from Surface Water | View other Interactive Maps

Risk of Flooding from Surface Water

Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

The shading on the map shows the risk of flooding from surface water in this particular area.

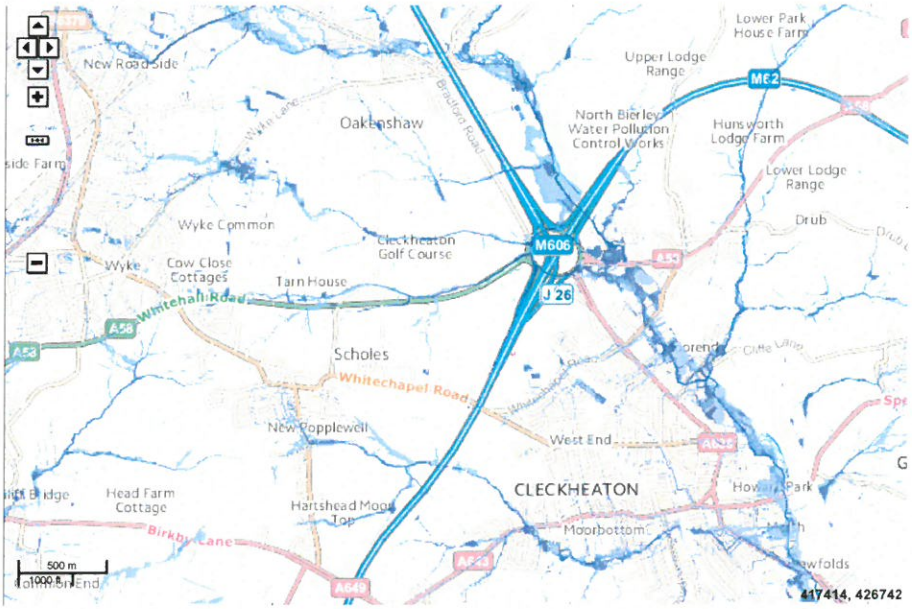
Click on the map for a more detailed explanation.

Map of X: 417,571; Y: 426,437 at scale 1:20,000

Data search

Map legend

- Risk of Flooding from Surface Water
  - High
  - Medium
  - Low
  - Very Low
- Other national environmental organisations
  - Natural Resources Wales Area of responsibility
  - Scottish Environment Protection Agency Area of responsibility



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Author: The Environment Agency | enquiries@environment-agency.gov.uk
Last updated: 27 January 2016

Environment Agency

Enter a postcode or place name: Other topics for this area...

Go | Risk of Flooding from Reservoirs | View other Interactive Maps

Risk of Flooding from Reservoirs

Reservoir flooding is extremely unlikely to happen.

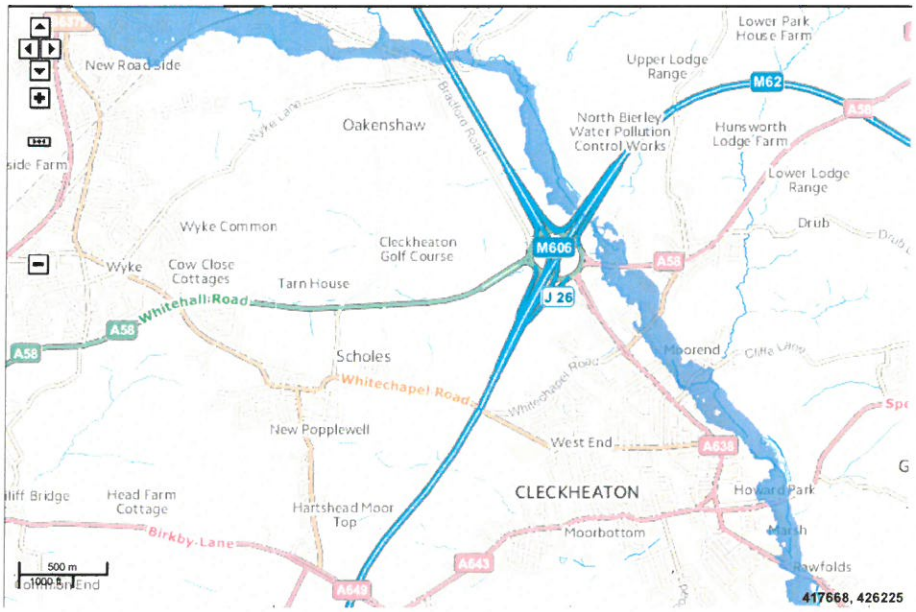
The shading on the map shows the area that could be flooded if a large reservoir were to fail and release the water it holds. A large reservoir is one that holds over 25,000 cubic metres of water, equivalent to approximately 10 Olympic sized swimming pools. Since this is a worst case scenario, it's unlikely that any actual flood would be this large.

Click on the shading to see details of reservoirs that could cause flooding in this area.

Map legend

- ☑ Risk of Flooding from Reservoirs
- Maximum extent of flooding
- ☑ Other national environmental organisations
- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

Map of X: 417,571; Y: 426,437 at scale 1:20,000 **Data search**



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Environment Agency

Enter a postcode or place name: Other topics for this area...

Go | Risk of Flooding from Rivers and Sea | View other Interactive Maps

Risk of Flooding from Rivers and Sea

River flooding happens when a river cannot cope with the amount of water draining into it from the surrounding land. Sea flooding happens when there are high tides and stormy conditions.

The shading on the map shows the risk of flooding from rivers and the sea in this particular area.

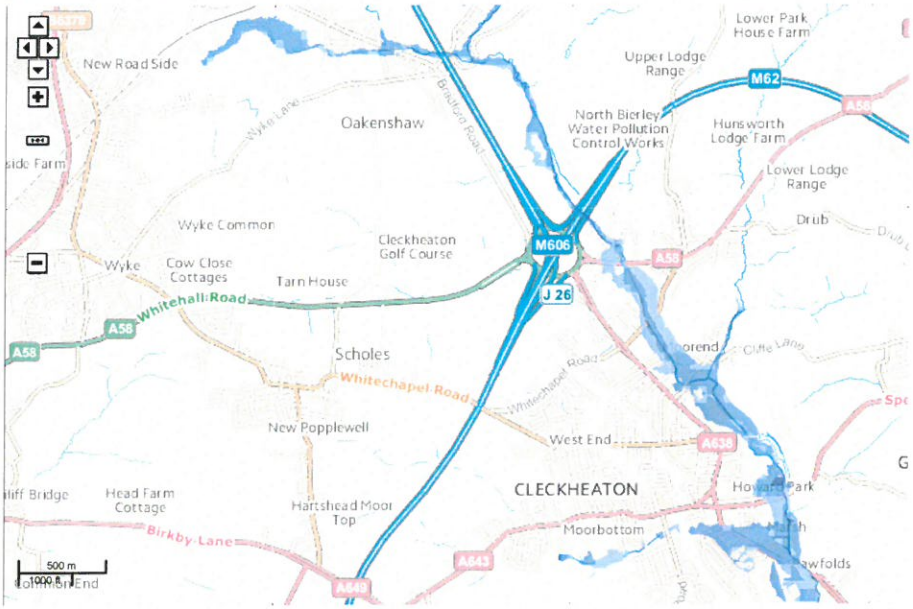
Click on the map for a more detailed explanation.

Map of X: 417,571; Y: 426,437 at scale 1:20,000

Map legend

- ☑ Risk of Flooding from Rivers and Sea
  - High
  - Medium
  - Low
  - Very Low
- ☑ Other national environmental organisations
  - Natural Resources Wales Area of responsibility
  - Scottish Environment Protection Agency Area of responsibility

Data search



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Last updated: 27 January 2016

APPENDIX D

STORM WATER STORAGE CALCULATIONS

Haigh, Huddleston Associates **Stormwater Storage Calculations** May 2009

Client **Newsmith Farms Ltd**

Site **Whitehall Road, Cleckheaton** **E15/6566**

Design storm	100	M5-60	19	mm			
		r	0.35				
Site area sq m.	227719				Annual peak flow	3058	
Imp Area sq m.	220000				70% Peak flow	2140.6	
T of Conc min	4	Time to Flow					
Allow Discharge	57	Lit / sec	Imp Ratio	0.97			

	30 year storm								100 year storm						100year plus climate					
Storm Duration	**Intensity**	**Depth**	**Vol In**	**Vol Out**	**Storage**	**Q**	**t**		**Intensity**	**Depth**	**Vol In**	**Vol Out**	**Storage**		**Intensity**	**Depth**	**Vol In**	**Vol Out**	**Storage**
Mins	**mm/hr**	**mm**	**cu.m**	**cu.m**	**cu.m.**				**mm/hr**	**mm**	**cu.m**	**cu.m**	**cu.m.**		**mm/hr**	**mm**	**cu.m**	**cu.m**	**cu.m.**
10	81.8	13.63	2999.33	47.72	2951.61	5002.89	0.0		101.27	16.88	3713.17	47.72	3665.45		111.25	18.54	4079.09	47.72	4031.37
20	59.8	19.93	4385.33	81.87	4303.47	3657.37	0.1		74.03	24.68	5429.04	81.87	5347.18		81.33	27.11	5964.05	81.87	5882.19
30	47.6	23.80	5236.00	116.01	5119.99	2911.22	0.1		58.93	29.46	6482.17	116.01	6366.16		64.74	32.37	7120.96	116.01	7004.95
50	34.4	28.67	6306.67	184.31	6122.36	2103.90	0.1		42.59	35.49	7807.65	184.31	7623.34		46.78	38.99	8577.07	184.31	8392.76
60	30.3	30.30	6666.00	218.46	6447.54	1853.15	0.1		37.51	37.51	8252.51	218.46	8034.05		41.21	41.21	9065.76	218.46	8847.30
120	18.7	37.40	8228.00	423.40	7804.60	1143.69	0.2		23.15	46.30	10186.26	423.40	9762.87		25.43	50.86	11190.08	423.40	10766.68
180	14.1	42.30	9306.00	628.38	8677.62	862.36	0.3		17.46	52.37	11520.83	628.38	10892.45		19.18	57.53	12656.16	628.38	12027.78
240	11.5	46.00	10120.00	833.37	9286.63	703.34	0.3		14.24	56.95	12528.56	833.37	11695.19		15.64	62.56	13763.20	833.37	12929.83
300	9.8	49.00	10780.00	1038.38	9741.62	599.37	0.4		12.13	60.66	13345.64	1038.38	12307.26		13.33	66.64	14660.80	1038.38	13622.42
360	8.7	52.20	11484.00	1243.41	10240.59	532.09	0.4		10.77	64.62	14217.19	1243.41	12973.78		11.83	70.99	15618.24	1243.41	14374.83
420	7.9	55.30	12166.00	1448.47	10717.53	483.16	0.5		9.78	68.46	15061.51	1448.47	13613.04		10.74	75.21	16545.76	1448.47	15097.29
480	7.5	60.00	13200.00	1653.58	11546.42	458.70	0.5		9.29	74.28	16341.60	1653.58	14688.02		10.20	81.60	17952.00	1653.58	16298.42
540	6.9	62.10	13662.00	1858.63	11803.37	422.00	0.5		8.54	76.88	16913.56	1858.63	15054.92		9.38	84.46	18580.32	1858.63	16721.69
600	6.38	63.80	14036.00	2063.68	11972.32	390.20	0.6		7.90	78.98	17376.57	2063.68	15312.89		8.68	86.77	19088.96	2063.68	17025.28
1440	3.45	82.80	18216.00	4934.78	13281.22	211.00	1.08		4.27	102.51	22551.41	4934.78	17616.62		4.69	112.608	24773.76	4934.7845	19838.976
				Storage	**13281.22**							**Storage**	**17616.62**					**Storage**	**19838.98**
Length of 1800		5219.17						Length of 1800		6922.8685				Length of 1800		7796.19			
Length of 1500		7516.25	Culvert	2.4*1.5m	3689.23			Length of 1500		9969.7926				Length of 1500		11227.5			
Length of 1200		11742.90	culvert	3.6*1.8m	2049.57			Length of 1200		15576.148				Length of 1200		17541.1			
Length of 1050		15336.28						Length of 1050		20342.52				Length of 1050		22908.7			
Length of 900		20882.41						Length of 900		27699.09				Length of 900		31193.4			
Length of 750		30048.00						Length of 750		39856.61				Length of 750		44884.6			
Length of 600		46930.09						Length of 600		62249.55				Length of 600		70102.4			

	sq.m	
Pond 900mm deep	14756.9	30 year
	19574	100 year
	22043.3	100 year plus climatic