P4558

Chatburn Road, Clitheroe

Flood Risk Assessment

For

Oakmere
CREATING QUALITY HOMES

ISO 9001 REGISTERED FIRM

UK Timber Frame Association

constructionline

CHAS Accredited Contractor www.chas.gov.uk

REPORT VERIFICATION

Report Title	Flood Risk Assessment - Chatburn Road, Clitheroe			
Project Number	P4558			
Revision	Issue	Date	Prepared	Approved
001	Draft	14.05.2013	KW	
002	Revised Issue	20.05.2013	KW	

Table of Contents

1.0 Introduction

Thomas Consulting have been appointed by Oakmere Homes to undertake a detailed assessment of potential flood risk associated with a potential development site located off Chatburn Road, Clitheroe.

The Flood Risk Assessment will be carried out in accordance with the Technical Guidance to the National Planning Policy Framework (March 2012) which has replaced Planning Policy Statement 25: Development and Flood Risk. (PPS 25)

The report will assess both the risk to the site from various forms of flooding and also the risk to adjacent areas as a result of any potential redevelopment of the site.

2.0 The Site

2.1 Site Location

The site is located to the north of the A671 (Chatburn Road) approx. 1.3km to the north east of Clitheroe town centre.

The site area is approximately 2.62Ha (6.47Acres)

2.2 Site Topography

A detailed topographic survey has been provided by the client. General site levels range from 93mAOD along Chatburn Road to approx. 81.5m AOD along the route of the existing watercourse.

The average site slope (from south to north) is approx. 1 in 10.
The watercourse falls from a level of 84m AOD in the north eastern corner of the site to 81.5mAOD at the western end of the site.

The average bed slope of the existing watercourse running through the site is 1 in 100.

A site visit has not been undertaken by Thomas Consulting.

2.3 General Features

The site comprises of a roughly rectangular parcel of land bounded by the A671 to the south, existing residential development to the west, open fields to the east and existing railway lines to the north.

An existing open watercourse is located along the northern portion of the site, running from east to west.

Figure 1 Chatburn Road (Looking east) – Site located to the left of the photo.

3.0 Development Proposals

Detailed development proposals have not been provided, however it is understood that the current proposal solely for residential development and associated infrastructure.

4.0 Flood Risk to the site.

As set out in the National Planning Policy Framework (NPPF), "inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere"

Annex C of Planning Policy Statement 25 (Now superseded) provides a definitive list of the forms of flooding that should be considered in relation to development proposals.

The Technical Guidance to the National Planning Policy Framework (TGNPPF) does not provide definitive advice in respect of specific forms of flooding to be considered, and it is therefore considered appropriate to refer to the forms specified within PPS 25:-

a) Flooding from Streams & Rivers
b) Flooding from groundwater
c) Tidal flooding
d) Sewer flooding
e) Flooding from reservoirs / canals
f) Flood risk due to climate change.

The above sources relate not only to the risk of flooding to the proposed development, but also the potential effects the development proposals may have on flood risk elsewhere.

4.1 Flood Risk vulnerability.

The proposed end use of the site is residential dwellings and associated private garden areas.

Table 2 of the Technical Guidance to the National Planning Policy Framework provides a list of flood vulnerability classes for differing site end uses as detailed below.

The proposed end use for the above site would be classified as "more vulnerable"

Flood Risk Vulnerability Classification
Essential Infrastructure • Essential Transport infrastructure (including mass evacuation routes) which has to cross the area at risk • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations and water treatment works that need to remain operational in times of flood • Wind turbines
Highly Vulnerable • Police stations, Ambulance stations and Fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points • Basement dwellings • Caravans, mobile homes and park homes intended for permanent residential use • Installations requiring hazardous substances consent
More Vulnerable • Hospitals • Residential Institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwellinghouses, student halls of residence, drinking establishments, nightclubs and hotels. • Non residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous wastes. • Sites used for holiday or short let caravans and camping, subject to a specific evacuation plan.
Less Vulnerable • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, Non residential Institutions not included in the "more vulnerable" category, and assembly and leisure • Land and buildings used for agriculture and forestry • Waste treatment (except landfill and hazardous waste) • Minerals working and processing (except sand and gravel workings) • Sewerage treatment plants (if adequate pollution prevention measures are in place)
Water compatible development • Flood control infrastructure • Water transmission infrastructure and pumping stations • Sewerage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD installations • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water based recreation (excluding sleeping accommodation) • Life guard and coastal stations • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan)

Figure 2 Flood Risk Vulnerability Classification

4.2 Flood Risk classification

The TGNPPF provides information relating to the compatibility of various development types in relation to individual flood risk zones.

Flood Risk Zoning is universally recognised for ease of reference as falling into three distinct categories ranging from Flood Zone 1 (Low Risk) to Flood Zone 3 (High Risk).

Flood Zone 3 is further differentiated into zones 3a (High Risk) and 3b (functional floodplain).

Development type & flood zone compatibility is summarised in Table 3 below.

Flood Risk Vulnerability classification		Essential Infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone	Zone 1	👍	👍	👍	👍	👍
	Zone 2	👍	👍	Exception test required	👍	👍
	Zone 3a	Exception test required	👍	👎	Exception test required	👍
	Zone 3b functional floodplain	Exception test required	👍	👎	👎	👎

👍 - development is appropriate

👎 - development should not be permitted

Figure 3 Flood Risk compatibility

The proposed site end use falls within the "more vulnerable" category and as such is compatible with Flood Zones 1, 2 and, subject to satisfactory application of the exception test, zone 3a

4.3 Flooding from Streams and Rivers (Fluvial Flooding)

4.3.1 Flooding History

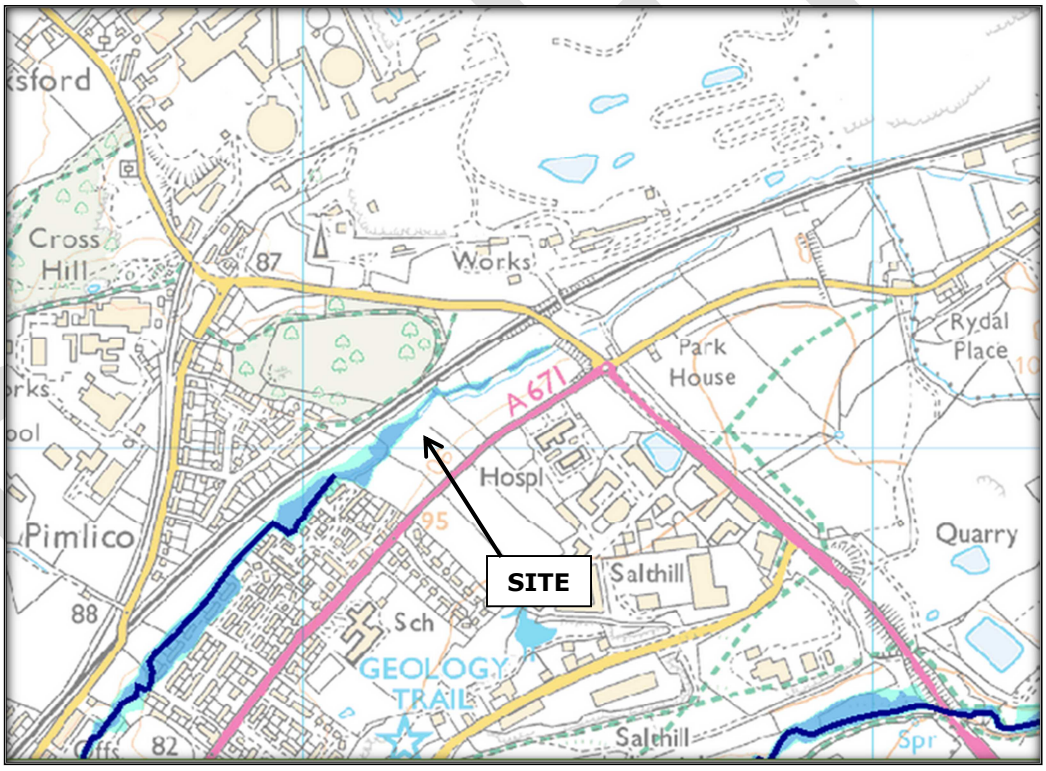
No recorded instances of flooding of the site have been found. Given the semi rural setting of the site, it is likely that any flooding that may have occurred at the site would not have been formally recorded.

4.3.2 Environment Agency

Publicly available flood mapping data indicates that the site is located within an area of land lying identified as having a mixture of fluvial flood risk zones.

The existing watercourse located on site is not designated "main river" until it exits the site boundary.

The extents of flooding / flood risk associated with this watercourse are indicated on the plan below.



Key:-

Flood Zone 3- Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded: from a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year.

Flood Zone 2- Light blue shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.

Figure 4 Environment Agency Flood Map data

On the basis of the above information alone, the site would presently be classified as falling into Flood Zones 1, 2 and 3.

Detailed Site specific Flood modelling information is included below.

The information provided by the Environment Agency indicates that the modelled 1 in 100 year flood level to the East of the site is 86.71m AOD.

The modelled node is located at Park House Bridge. Due amount of fall on the existing watercourse, the above level is not relevant to the actual site topography.

The plan below has however been superimposed upon the site survey and the 1 in 100 year level for the site extents is shown to range from 83.10m AOD in the western corner of the site to 84.50m AOD in the east.

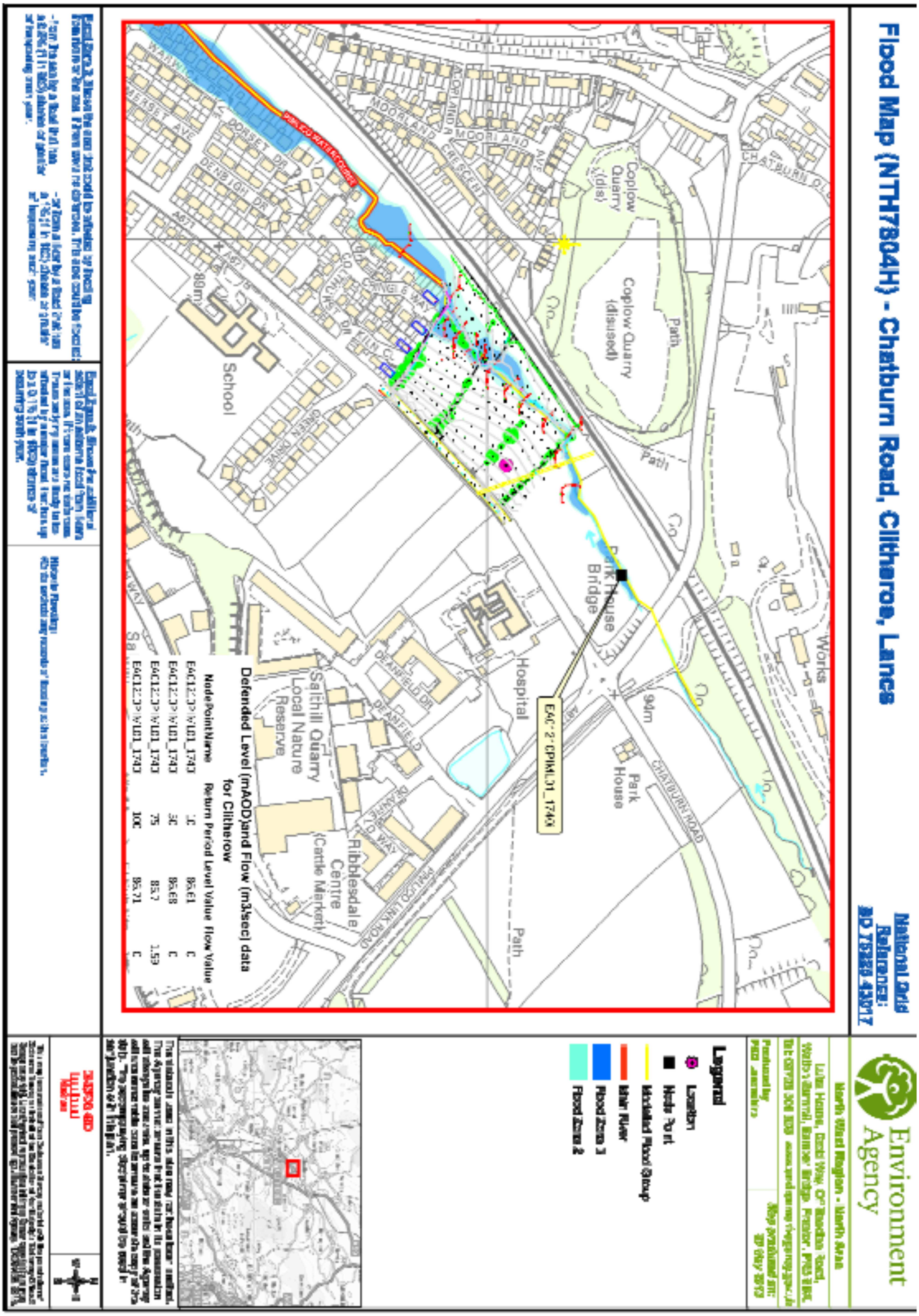


Figure 5 Site Specific EA model Sheet

4.3.3 Local Authority (Ribble Valley Borough Council)

A Level 1 Strategic Flood Risk Assessment has been produced by the local authority[1]. This does not contain any additional information specific to the site.

On the basis of the above information, the risk of flooding to the site from fluvial sources would be considered to be low for all areas designated as being in flood zone 1.

Due to the proximity of flood zones 2 and 3 (based on topography) as shown on Fig 4, it is considered appropriate to treat all areas not within flood zone 1 as being at High Risk of flooding.

4.4 Flooding from Groundwater

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive regional aquifers (e.g. chalk or sandstone) or localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding occurs as a result of water rising from the underlying rocks or from water flowing from abnormal springs.

This tends to occur after long periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low.

A study of available BGS data[2] indicates that the drift geology is likely to comprise of Glacial Till (Clays and Silts)

The underlying solid geology is indicated as Sedimentary bedrock forming the "Clitheroe Limestone and Hodder Mudstone" formations.

Such rocks may well be water bearing and the Environment Agency has classified the solid geology underlying the site as a "Secondary A aquifer"

There is no available information regarding incidences of groundwater flooding in the area of the site.

The risk of groundwater flooding, unless highlighted elsewhere is generally considered to be low due to the relative impermeability of the overlying drift deposits.

[1] Ribble Valley Borough Council – level 1 Strategic Flood Risk Assessment (May 2010)
[2] British Geological Society – Geology of Britain Viewer

4.5 Flooding from Sewers or Highway Drains

No information has been provided regarding incidences of flooding associated with sewers or highway drains. An examination of United Utilities adopted sewer network indicates that there is an adopted 225mm dia foul water / combined sewer running along Chatburn road.

The adjacent residential development (to the west) is noted to discharge surface water directly to the existing watercourse downstream of the proposed development site.

Foul water from the existing development discharges via a foul water pumping station to the existing sewer in Chatburn Road, again, downstream of the proposed site.

Whilst the proposed development site is lower than the existing sewer within Chatburn Road, it is considered likely that a pumped foul water connection would be required. The risk of flooding associated with a non-gravity connection is considered to be low.

4.6 Flooding from Canals, Reservoirs and Other Artificial Sources

Publicly available information provided by the Environment Agency indicates that the site is not at risk of flooding associated with Reservoirs or Canals.
No other artificial sources have been identified.

4.7 Tidal Flooding

The site is unaffected by Tidal Flooding.

4.8 Climate Change

Current modelling information provided by the Environment Agency does not include climate change scenarios.

Projected increases in peak storm intensity and peak river flows likely as a result of climate change are detailed below:

Parameter	1990 To 2025	2025 To 2055	2055 To 2085	2085 To 2115
Peak Rainfall Intensity	+5%	+10%	+20%	+30%
Peak River Flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Figure 6 Climate Change effects.

Whilst climate change scenarios are likely to increase peak flows within the existing watercourse on site it is noted that the site is located at the head of the watercourse. Climate change increases are likely to be limited to increases in peak rainfall intensity only.

Where detailed climate change information is unavailable, current Environment agency guidance suggests that an increase in peak flood levels of 300mm should be allowed.

5.0 Flood Risk From the Site

5.1 Surface Water

The site is currently undeveloped greenfield land.

Proposed development of the site would result in an alteration to the peak flow rate within the existing watercourse.

It is noted that several properties downstream of the site are noted as being at high (greater than 1% annual probability) of fluvial flooding. (See below)

The relatively impermeable drift deposits overlying the site are unlikely to be suitable for the incorporation of SUDS based drainage solutions.

Surface water discharges from the site could be directed to the existing watercourse, however to ensure that the flood risk to adjacent properties as a result of development does not increase, peak surface water discharge rates would require restricting to the current greenfield flow rate.

Excess flows from the site would be required to be stored on site in suitably sized attenuation tanks.

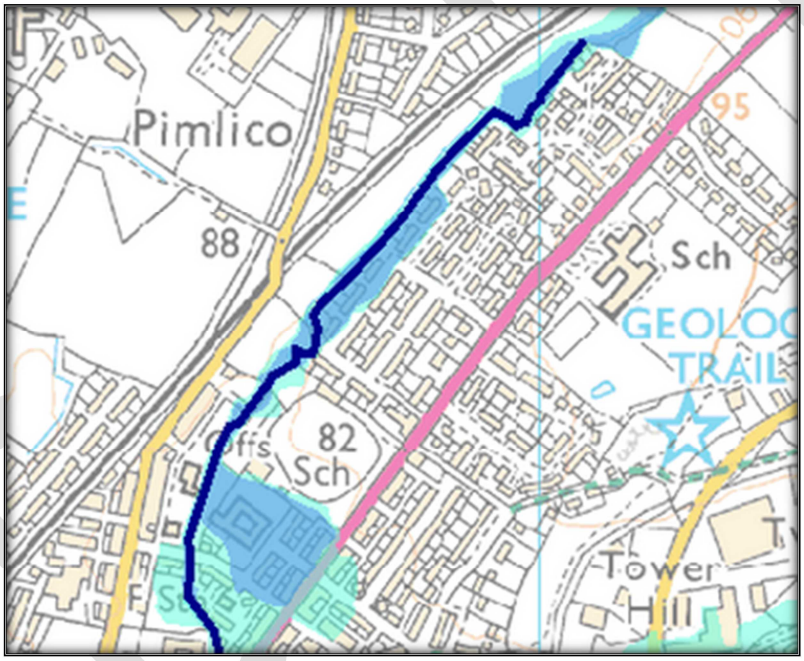


Figure 7 Properties at Risk of Flooding downstream of site

Greenfield runoff rates for the site are calculated below:-

Greenfield Runoff Estimation for Sites			
Site name: Chatburn Road **Site location: Clitheroe** **Site coordinates** **Latitude: 53.88241 deg N** **Longitude: 2.37873 deg W**			
This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments" (2005), W5-074/A/TR1/1 rev. D and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that detailed design of any drainage scheme uses hydraulic modelling software to finalise runoff requirements before construction takes place.			
• **Site Characteristics:**			
Total site area		2.62	ha
Significant public open space			ha
Area positively drained		2.62	ha
• **Methodology:**			
Greenfield runoff method		IH 124	
• **Hydrological Characteristics:**	**Automatic values**	**Editable values**	
HOST	24	24	
SPRHOST	0.397	0.397	
SAAR	1241	1241	mm
M5-60 Rainfall Depth	20	20	mm
'r' Ratio M5-60/M5-2 day	0.2	0.2	
FEH/FSR conversion factor	0.87	0.87	
Hydrological region	10	10	
Growth curve factor: 1 year	0.87	0.87	
Growth curve factor: 30 year	1.7	1.7	
Growth curve factor: 100 year	2.08	2.08	
• **Greenfield Runoff Rates:**			
Qbar	**17.14**	**17.14**	l/s
1 in 1 year	**14.91**	**14.91**	l/s
1 in 30 years	**29.13**	**29.13**	l/s
1 in 100 years	**35.64**	**35.64**	l/s
Please note that a minimum flow of 5 l/s applies to any site			
HR Wallingford Ltd, the Environment Agency and any local authority are not liable for the performan of a drainage scheme which is based upon the output of this report.			

Figure 8 HR Wallingford Greenfield runoff estimate.

A restriction in peak runoff rates to the Qbar (mean annual greenfield peak flow) rate would result in a net betterment (reduction in flood risk) to properties downstream of the site for extreme flooding events – notably the 1 in 100 year flood event.

It is estimated that restricting peak discharge to 17L/sec would require an on site storage volume of approx.250Cu.m (subject to detailed design verification).

5.2 Foul Water

The proposed number of new properties is not known at present, however, standard daily foul water flow rates in accordance with current standards[3] would equate to 0.04L/Sec/dwelling.

It is however likely that foul water flows will be pumped from the site and therefore will be periodic and with an increased flow rate from that shown above.

Exact peak flow rates would be subject to detailed design, but are unlikely to result in increased flood risk elsewhere.

6.0 Summary

6.1 A summary of flood risk to the site

Source of Flooding	Flood Risk TO the site	Mitigation Measures	Comments
Streams & Rivers (Fluvial)	Varies	Development within the currently highlighted flood risk areas should be avoided.	Alteration to ground levels within the current flood risk area should not be undertaken.
Groundwater	Low	None Required	
Tidal	Low	None Required	
Sewers – Foul	Low	None Required	
Sewers – Surface water	Low	None Required	
Reservoirs / Canals	Low	None required	
Overland Flows (Pluvial)	Low	None required	
Climate Change	Low	None Required	

Figure 9 Flood Risk Summary

[3] BS EN 752:2008

7.0 Conclusions

Areas of the site in close proximity to the existing watercourse are noted as being at high (greater than 1% annual probability) risk of flooding. The relatively steeply sloping banks to the watercourse indicate that this zone of flood risk is relatively constrained within the lower portion of the site.

In order to ensure that any development proposals would not be at an unacceptable level of fluvial flood risk, proposed dwellings should be limited to the areas of the site not currently falling within flood zones 2 and 3.

Detailed layout proposals should ensure that the current extents of flood zones 2 and 3 remain unaltered by any proposed earthworks on site, however there may be scope to extend private gardens into the areas of the site designated as being within flood zone 2.

Surface water discharges from the site are likely to be directed to the existing watercourse, subject to the agreement of the local Sustainable Urban Drainage Approval Body[4]

In order to ensure that the risk of flooding to properties downstream is not increased, surface water discharges should be attenuated to greenfield flow rates.

The underlying soil type for the site results in relatively high peak discharges at Greenfield rates. As such, it is recommended that peak flow rates be limited to the calculated Qbar value.

Such a restriction would effectively provide a net reduction in flood risk downstream of the site for extreme (greater than 1 in 30 year) storm events.

On the basis of the above observations, subject to the above recommendations Thomas Consulting would consider that the development proposals would be acceptable form a Flood Risk perspective.

[4] Flood & Water Management Act 2010