Our ref: *18-2830*
Your ref:

Date: 13th February 2018

stl
Projects Limited
CHARTERED
STRUCTURAL
ENGINEERS

1 Barkers Lane
Sale
Cheshire
M33 6RP

t. 0161 969 3218

info@stlprojectsltd.co.uk
www. stlprojectsltd.co.uk

Drainage Calculations for:
New Development
at
The Tudor
Peel Hall Road
Manchester
for
Peel Hall Park GB Ltd.

Company Reg No. 07280496

Registered Address:
1 Barkers Lane, Sale,
Cheshire, M33 6RP.

Directors
Jonathan Hayes
Belinda Hayes

Associate
Mohammed Rawat

STL Projects Limited
Chartered Structural Engineers

Construction (Design & Management) Regulations 2015.

Under the C(D&M) Regs the designer's responsibility is limited to the reasonably foreseeable risks to persons involved in the construction, maintenance and repair of a structure from hazards that arise from the design. Therefore, this DRA only assesses the possible hazards that may arise from the specific structural design at this stage of the project. Should any alterations to the structure be carried out without the knowledge of the designer then no responsibility can be attributed.
It is the Contractors responsibility to use this document for the construction and future maintenance of the building as designed at this stage. This is not a Method Statement.
Under the C(D&M) Regulations 2015 it is the clients responsibility to ensure that every person designing the structure and every contractor who has been or may be appointed to work on the project is promptly provided with sufficient pre-construction information to ensure so far as is reasonably practicable the health and safety of all persons engaged in the construction work, liable to be affected by the way in which it is carried out, and who will use the structure in future.

Designers Risk Analysis.

Considerations to be given are:
During initial construction.

Noise and vibrations. Not only consider the effects these may have on workers but also neighbours.
Contamination. Where ground may be contaminated may need to consider substructure works that do not allow leaching through surface etc.
Falls from height, generally over 2m. These include around edges of deep excavations, upper floor and roof edges.
Collapse of the structure under both temporary and permanent imposed loads.
Handling of structural elements. Consideration must be given to the weight of elements specified and whether mechanical handling is feasible. Otherwise consider splicing beams and columns etc or the use of lightweight masonry if acceptable.
Fire. Although on site welding may be necessary, using this near combustible materials is not wise.

Long term.

Falls from height, generally over 2m. Consideration should be given for the future maintenance of the building such as ladder restraint to upper walls.
Collapse of the structure under the permanent imposed loads. The structural elements should be clearly marked on the drawings.

Drainage Design

The proposal is to replace an existing public house with surrounding hardstandings of tarmac and concrete pavings with 10 new traditional built semi detached dwellings incorporating permeable pavement and road construction where possible although some paved hardstandings will be used.

Catchment areas.
Existing building. Roof area = $336m^2$
Existing car park and paved hardstandings = $1645m^2$

Proposed houses, Types A&B = $110m^2$ per pair
Associated hardstandings = $30m^2$
Type C = $100m^2$
Associated hardstandings = $12m^2$
Type D = $65m^2$
Associated hardstandings = $13m^2$

Total new impermeable area = $3(110 + 30) + 2(165 + 25) = 800m^2$

This is less than 50% the original impermeable area of the site so we have drastically reduced the surface water runoff into the existing sewer, thus satisfying the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA requirements.

From the recently undertaken site investigations, it has been shown that the underlying soil conditions are of a cohesive nature and theoretically we could divert all the surface water runoff into the sewers, however as this could lead to localised flooding we suggest attenuation of this surface water runoff is provided to slow down the discharge and assist in preventing flooding to the surrounding area.

Surface water runoff flow rates from roof with 30% climate change:

	Storm Duration (Mins)		
Return Period (Years)	15	30	60
1	5.6 l/s	3.6 l/s	2.4 l/s
30	13.7 l/s	8.8 l/s	5.6 l/s
100	17.8 l/s	11.6 l/s	7.3 l/s

ATTENUATION DESIGN

In accordance with CIRIA publication C753 - The SUDS Manual

Tedds calculation version 1.0.03

EA_Defra method

Site characteristics

Location	Manchester
Hydrological region	10
Soil type (Wallingford Procedure W.R.A.P map)	4
Standard percentage runoff	SPR = **0.47**
Average annual rainfall	SAAR = **880** mm
5 year return period rainfall of 60 minute duration	M5_60min = **18.0** mm
Ratio 60-minute to 2 day rainfalls of 5 year return	r = **0.36**
Rainfall intensity increase due to global warming	$p_{climate}$ = **30**%
Impervious area req. attenuation storage	α = **100.0** %

Catchment details

Subcatchment	Name	Area (ha)	PIMP (%)	Impermeable. area (ha)
1;	tudor inn;	0.06;	100.0	0.08;
	Total	0.06;	100.0	0.08;

Greenfield runoff rates

Catchment area	AREA = **50.00** hectare
Greenfield runoff rate (50 hectare site)	$\bar{Q}_{rural} = 0.00108 m^3/s \times (AREA/1km^2)^{0.89} \times (SAAR/1mm)^{1.17} \times SPR^{2.17}$ = **315.5** l / s
Greenfield runoff rate	$\bar{Q}$ = $\bar{Q}_{rural}$ / AREA × A = **0.4** l / s
Greenfield runoff rate per unit area	$\bar{Q}_A$ = $\bar{Q}$ / A = **6.3** l / s / hectare

Estimated site discharges

FSR growth rate (1 year)	FSR_{1yr} = **0.87**
Discharge (1 year)	Q_{1yr} = $\bar{Q} \times FSR_{1yr}$ = **0.3** l/s
FSR growth rate (30 year)	FSR_{30yr} = **1.70**
Discharge (30 year)	Q_{30yr} = $\bar{Q} \times FSR_{30yr}$ = **0.6** l/s
FSR growth rate (100 year)	FSR_{100yr} = **2.08**
Discharge (100 year)	Q_{100yr} = $\bar{Q} \times FSR_{100yr}$ = **0.7** l/s

Estimated attenuation volume - 1 year

Attenuation storage vol (fig A7.1 - A7.8)	$Uvol_{1yr}$ = **124.3** m^3 / hectare
Basic storage volume	$BSV_{1yr} = Uvol_{1yr} \times \alpha \times A$ = **6.96** m^3
FEH rainfall factor (figs A11.1, A6.1.1 - A6.3.4)	FF_{1yr} = **1.00**
Storage volume ratio (fig A8.1 - A8.8)	SVR_{1yr} = **1.42**
Adjusted storage volume	$ASV_{1yr} = SVR_{1yr} \times BSV_{1yr}$ = **9.86** m^3
Hydrological regional volume ratio (fig A9.1)	HR_{1yr} = **1.00**
Final estimated attenuation storage	$Vol_{1yr} = HR_{1yr} \times ASV_{1yr}$ = **9.87** m^3

Library item: Estimated attenuation output

Estimated attenuation volume - 30 year

Attenuation storage vol (fig A7.1 - A7.8)	$Uvol_{30yr}$ = **284.7** m^3 / hectare
Basic storage volume	$BSV_{30yr} = Uvol_{30yr} \times \alpha \times A$ = **15.94** m^3
FEH rainfall factor (figs A11.1, A6.1.1 - A6.3.4)	FF_{30yr} = **0.95**
Storage volume ratio (fig A8.1 - A8.8)	SVR_{30yr} = **1.52**
Adjusted storage volume	$ASV_{30yr} = SVR_{30yr} \times BSV_{30yr}$ = **24.31** m^3
Hydrological regional volume ratio (fig A9.1)	HR_{30yr} = **1.08**
Final estimated attenuation storage	$Vol_{30yr} = HR_{30yr} \times ASV_{30yr}$ = **26.23** m^3

Library item: Estimated attenuation output

Estimated attenuation volume - 100 year

Attenuation storage vol (fig A7.1 - A7.8)	$Uvol_{100yr}$ = **364.7** m^3 / hectare
Basic storage volume	$BSV_{100yr} = Uvol_{100yr} \times \alpha \times A$ = **20.42** m^3
FEH rainfall factor (figs A11.1, A6.1.1 - A6.3.4)	FF_{100yr} = **0.90**
Storage volume ratio (fig A8.1 - A8.8)	SVR_{100yr} = **1.64**
Adjusted storage volume	$ASV_{100yr} = SVR_{100yr} \times BSV_{100yr}$ = **33.59** m^3
Hydrological regional volume ratio (fig A9.1)	HR_{100yr} = **1.12**
Final estimated attenuation storage	$Vol_{100yr} = HR_{100yr} \times ASV_{100yr}$ = **37.66** m^3

Library item: Estimated attenuation output

Attenuation storage required

Vol. increase due to head-discharge relationship	p_{hydro} = **1.25**
Maximum attenuation storage required	$V_{req\_max} = Vol_{30yr} \times p_{hydro}$ = **32.8** m^3

Interception storage

Interception rainfall depth	d_{int} = **5** mm
Volume of interception storage required	$V_{int\_req} = 0.8 \times A_{imp} \times d_{int}$ = **2.24** m^3

Long term storage

Proportion of paved area draining in to network	α = **1.0**
Proportion of pervious area draining in to network	β = **0.5**

Rainfall depth for 100years, 6 hour event	RD = M100_360 = **74.1** mm
Extra runoff vol of dev.runoff over greenfield runoff	Vol_{xs} = max(RD × A × (PIMP × α × 0.8 + ((1 - PIMP) × β × SPR) - SPR), 0m^3) = **13.70** m^3

Treatment volume

Treatment volume (assume 80% runoff)	T_{vol} = 0.8 × A × 15mm × PIMP = **6.72** m^3

ATTENUATION TANK

USE 2.0 x 7.0 x 1.075m DEEP ATTERBURGH PLUVIAL CUBE MODULAR STORAGE UNITS

Overland Flooding Routes

From the Environment Agency Flood Risk Maps,

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
The Tudor Inn	383590/386684	19 Jan 2019 7:13

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

This means:

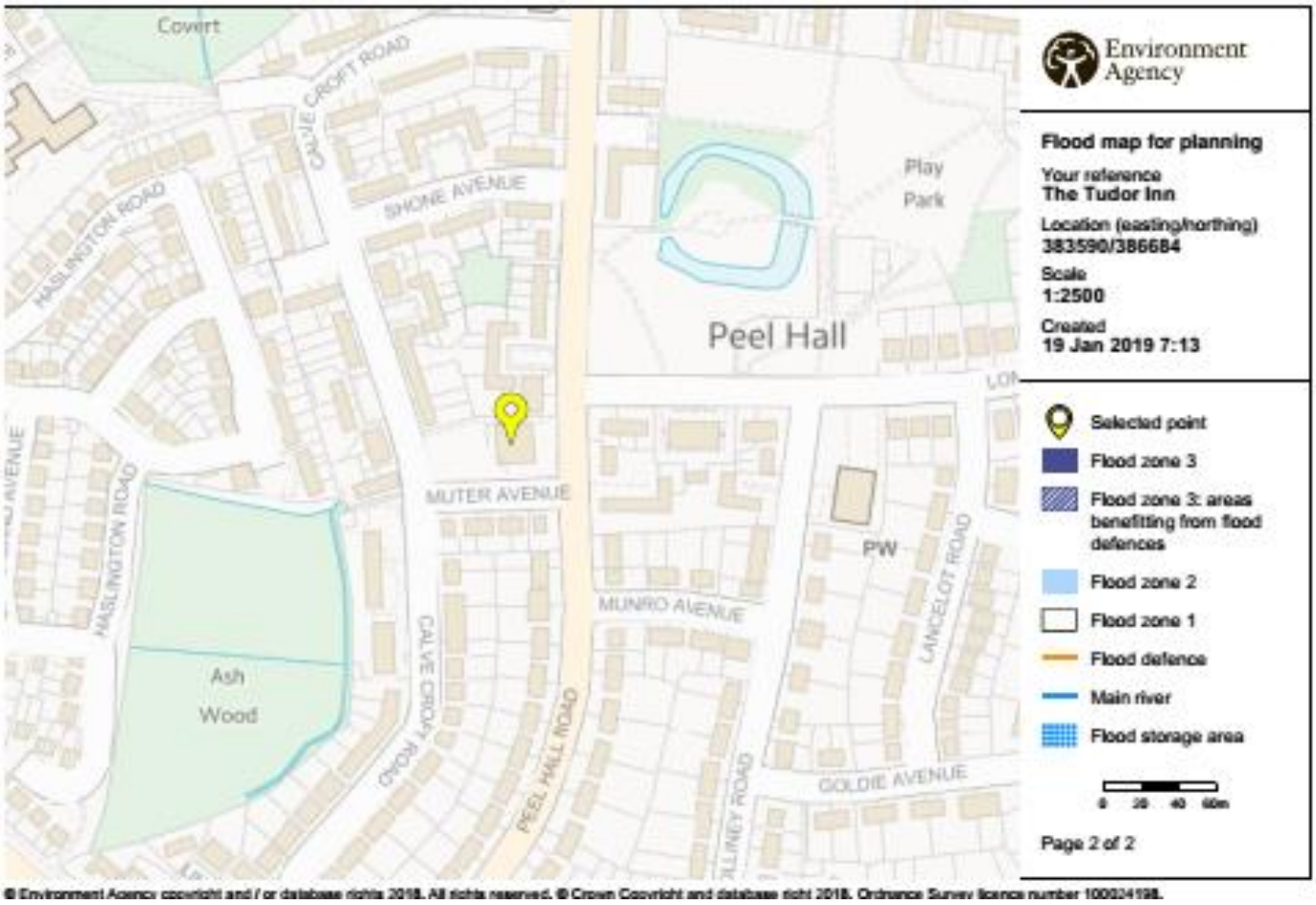
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage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

The Open Government Licence sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

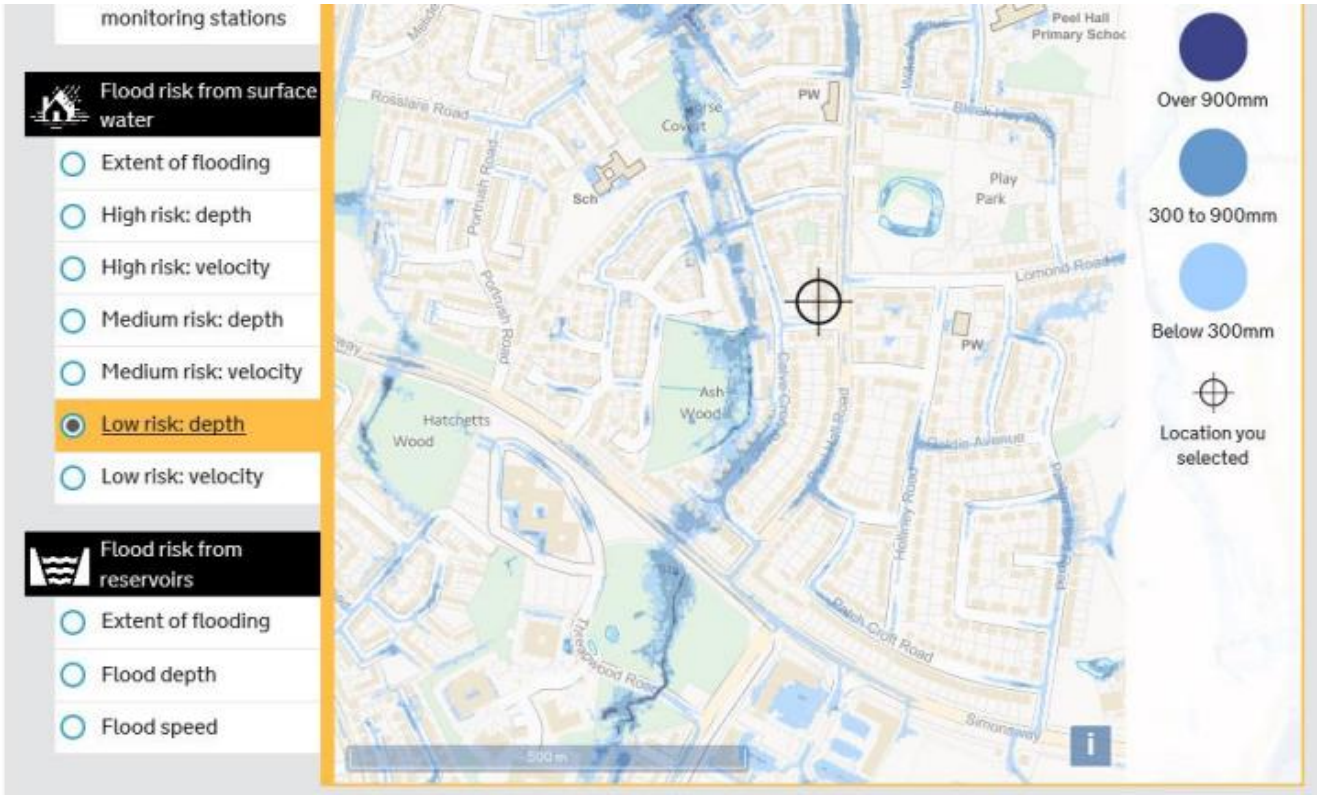


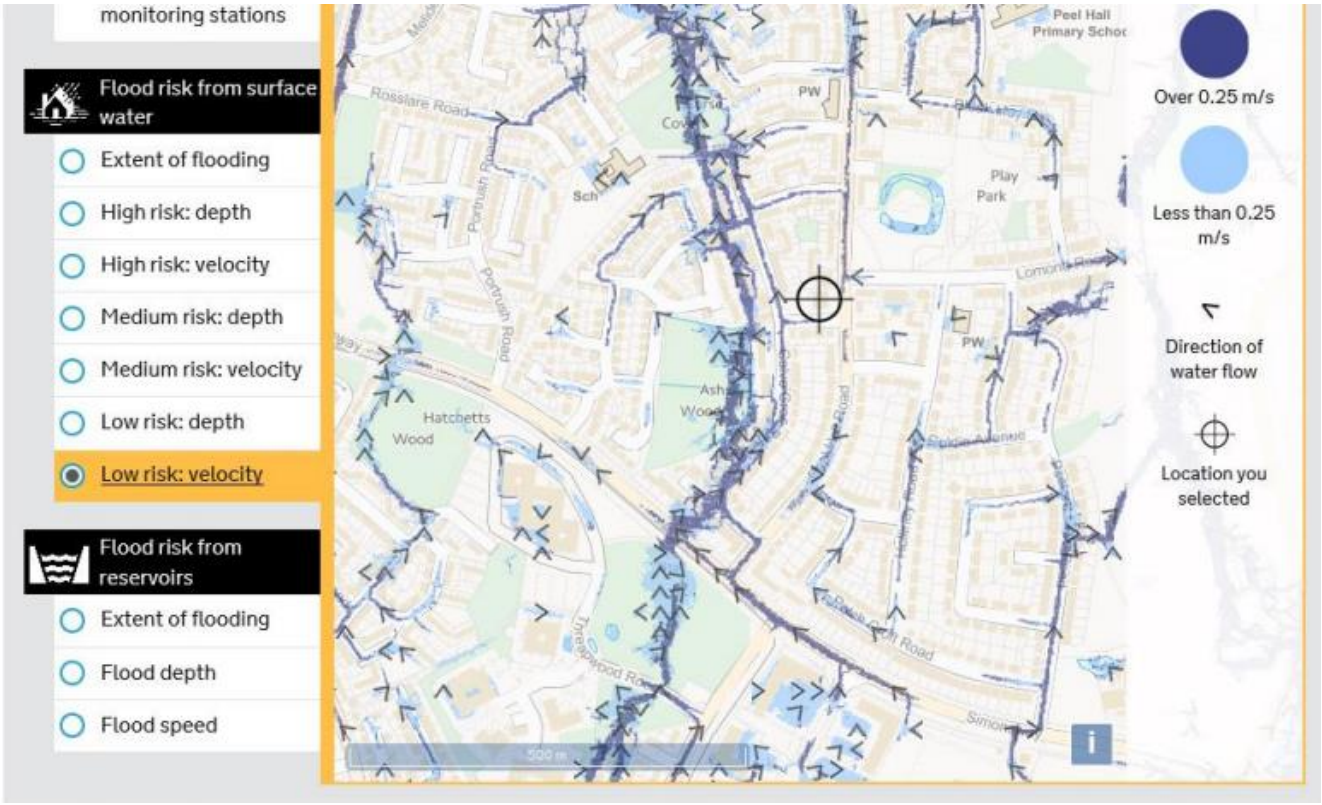
© Environment Agency copyright and / or database rights 2018. All rights reserved. © Crown Copyright and database right 2018. Ordnance Survey licence number 100024198.

This is shown further from the more detailed flood risk maps:

Flooding from Rivers and Seas;
Zero flood risk

Flooding from Surface Water
No high risk of flooding
No medium risk of flooding
Some low risk of flooding – as below


monitoring stations
Flood risk from surface water
Extent of flooding
High risk: depth
High risk: velocity
Medium risk: depth
Medium risk: velocity
Low risk: depth
Low risk: velocity
Flood risk from reservoirs
Extent of flooding
Flood depth
Flood speed
Over 900mm
300 to 900mm
Below 300mm
Location you selected
Rosslare Road
Portrush Road
Hatchetts Wood
Ash Wood
Play Park
Lomond Road
Simonsway
Peel Hall Primary School
500 m


monitoring stations
Flood risk from surface water
Extent of flooding
High risk: depth
High risk: velocity
Medium risk: depth
Medium risk: velocity
Low risk: depth
Low risk: velocity
Flood risk from reservoirs
Extent of flooding
Flood depth
Flood speed
Over 0.25 m/s
Less than 0.25 m/s
Direction of water flow
Location you selected
Rosslare Road
Portrush Road
Hatchetts Wood
Ash Wood
Play Park
Lomond Road
Simonsway
Peel Hall Primary School
500 m

This is shown as less than 300mm depth to the west of Muter Ave and along Calvecroft Road with 0.25l/s all heading northwards away from the site.

We are therefore satisfied that the site is in a low risk area of flooding but we will allow for this in Plots 1-4 by raising the ground levels and finished floor level up above the 300mm potential water depth.