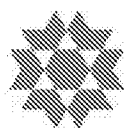


Stiles Harold Williams

Woodgate, West Sussex, Lidsey Road, PO20 3SU

Flood Risk Assessment & Surface Water Drainage Strategy



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Group

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MLM drawing 618719-MLM-ZZ-XX-DR-D-0001 – Drainage Strategy

Catchment Area Plan

MicroDrainage calculations

1 Introduction

MLM Consulting Engineers Limited has been appointed by Stiles Harold Williams to undertake a Flood Risk Assessment (FRA) & Surface Water Drainage Strategy to support a full planning application for the erection of 30 dwellings at Woodgate, West Sussex.

This report has been prepared for the sole use of Stiles Harold Williams and the contents should not be relied upon by others without the express written authority of MLM Consulting Engineers Limited. If any unauthorised third party makes use of this report they do so at their own risk and MLM owes them no duty of care or skill.

This report has been completed in accordance with the National Planning Policy Framework (NPPF) and its accompanying Planning Practice Guidance (PPG) and is an assessment of flood risk to the development, from on and off-site sources, and to off-site receptors caused by the development at the site.

The site is shown on the GOV.UK *Flood map for planning* (see Figure 1) to lie in Flood Zone 1 (low risk). Flood Zone 1 is the area described as having less than a 0.1% annual probability of fluvial or tidal flooding. All land uses are appropriate in this flood zone.

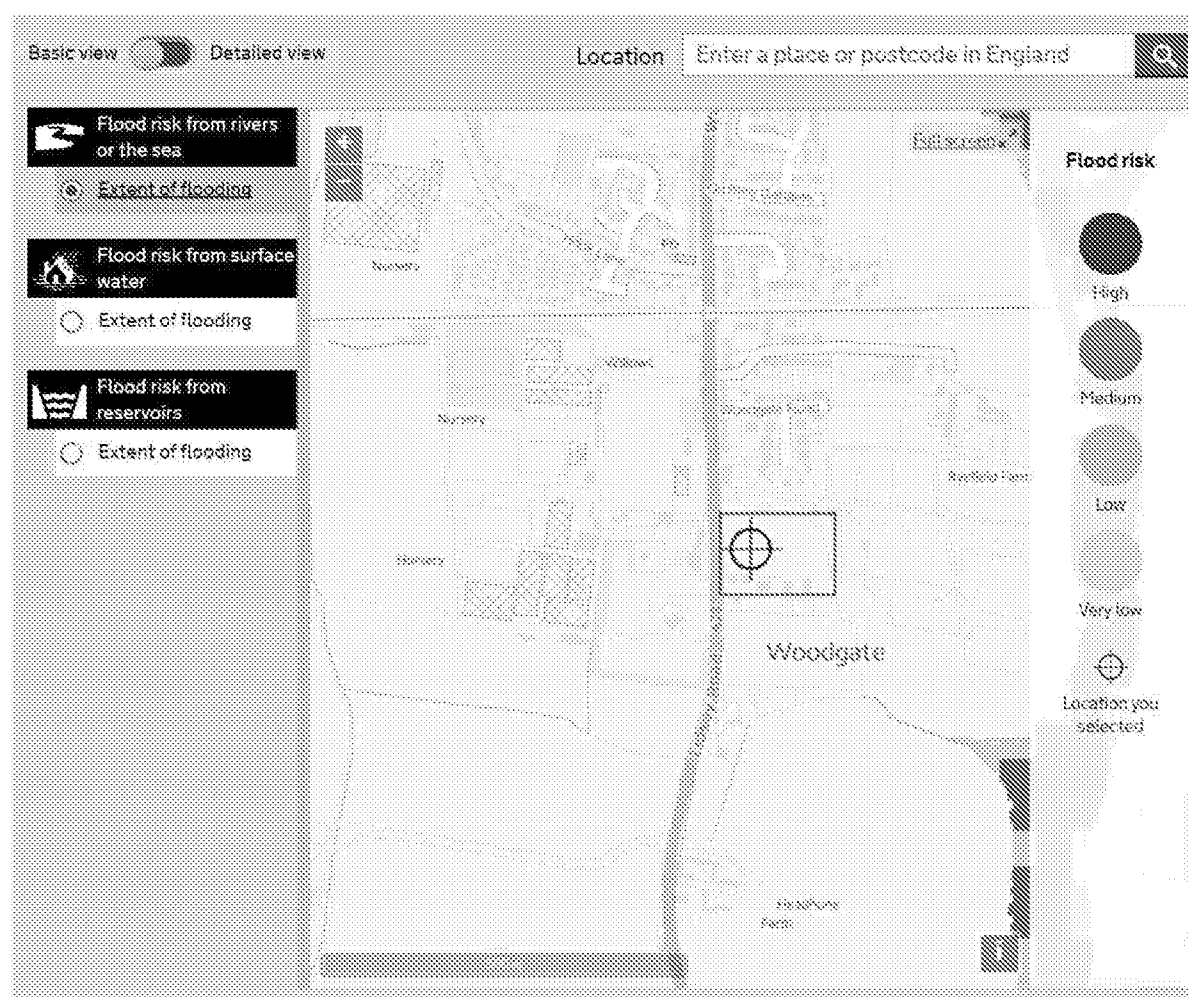


Figure 1

This report includes a surface water drainage strategy for the site which sets out how the proposals will not increase off-site flood risk. The report also discusses the use of SuDS features at the site for the attenuation and removal of pollutants prior to discharge. The surface water drainage strategy has been prepared in accordance with the guidelines set out in the DEFRA guidance *Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems* dated March 2015 and CIRIA 753 *The SuDS Manual* (C753).

The report concludes that in flood risk context, the proposals are safe and appropriate and do not cause increased on or off-site flood risk.

2 Site Description

2.1 Existing site

The site lies to the south of Westergate in a predominantly residential area. The site extends to approximately 1.5 hectares (ha) and is centred on Ordnance Survey (OS) grid reference SU938040.

The site is bound by rural/residential development, to the east of Lidsey Road is the entrance for Willows Caravan Park.

The site comprises green field space. The caravan park is presented directly to the east of the site, to the north, south and west is rural and residential area.

A review of OS mapping and the topographical survey shows the site to fall towards the southeast corner. Ground levels in the northwest are circa 8.00 metres above Ordnance datum (mAOD) falling to circa 6.50 mAOD in the southeast. The topographical survey also shows the stream to flow in a southerly direction and has a bed level of approximately 5.30 mAOD.

The site is classified as 'Less vulnerable' in accordance with *Table 2: Flood Risk Vulnerability Classification* of the PPG.



Photograph 1 – Site shown, stream running on the eastern side of the site



Photograph 2 – Site shown, elevation to the south

2.2 Proposed site

Site proposals comprise of a housing development of around 30 new dwellings, with associated access roads off the A29 Lidsay Road. (see drawing 618718-DWG-CIV-0002-Location_Plan in Appendix A).

The proposed residential site classification is 'More Vulnerable' in accordance with the PPG *Table 2: Flood Risk Vulnerability Classification*. As the site is located in Flood Zone 1, the proposed development is shown to be appropriate in accordance with *Table 3: Flood risk vulnerability and flood zone 'compatibility'* of the PPG and no Exception Test is required.

3 Flood Risk

3.1 Tidal & fluvial flooding

The site is shown on the GOV.UK *Flood map for planning* (see Figure 1) to lie in the low probability flood zone (Flood Zone 1).

1.1 Figure 1 shows that there is no risk of flooding.

1.2 The Sequential Test, the aim of which is to steer new development to the areas with the lowest probability of flooding, is met; the Exception Test is not required as the site is located within Flood Zone 1.

The site is not at any significant risk of flooding from this source.

3.2 Surface Water from off-site

There is always a potential risk of surface water flooding from very high intensity rainfall events exceeding the capacity of drainage systems and causing flooding, especially in urban areas. Surface water run-off can be channeled either by natural features such as valley lines or by artificial features such as highways, to low points in the topography. If surface water is not able to flow away from the low points then pluvial flooding can occur.

Land to the north of the site is at a higher elevation than the site and as such surface water could be shed towards the site from this direction. Surface water is most likely to be intercepted by natural/existing drainage features before reaching the site.

Land to the south of the site is at a lower elevation than the site and should not pose any flood risk to the site.

The GOV.UK *Flood risk from surface water – Extent of flooding* map (see Figure 2) shows that the majority of the site is at a low risk of flooding with small areas to the north east of the site to have a high risk of flooding from surface water. The potential flood water appears to follow the natural contours of the land and when compared to the topographical survey; it can be seen that whilst there are localised low points in these areas, surface water run-off would flow south eastwards through the site and into the stream adjacent to the site.

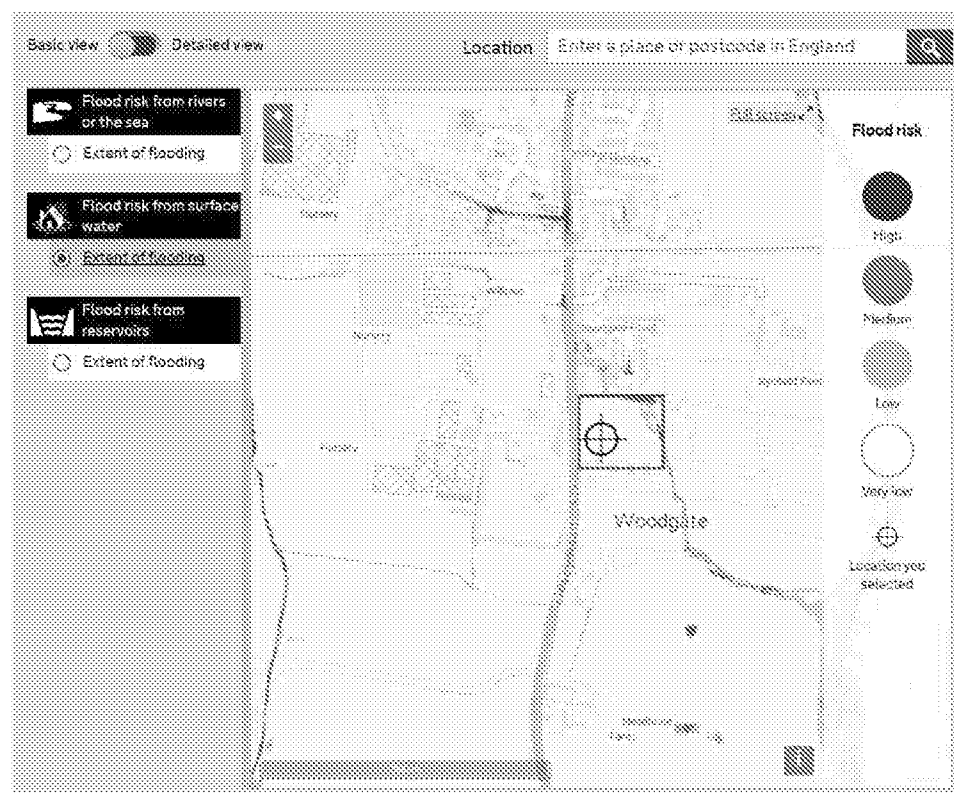


Figure 2 (target denotes site location)

Some small areas to the east of the site are also shown to be at a high risk of flooding, however, the site is elevated above these areas (see Photograph 1) and as such they should pose no risk to the site.

Proposed building finished floor levels should adhere to normal good practice and be raised above surrounding ground level with falls away from buildings. This should minimise the risk of any minor localised ponding or overland surface water flow from entering the proposed buildings.

No flooding is shown in the area of the site where the proposals are located (south/south-west) and as such the site is considered to be at low risk of flooding from this source.

3.3 Surface water from on-site

Careful design of levels should be carried out to ensure that any overland flows are directed away from and around the proposed building and by ensuring that any low ground levels adjacent to the buildings have a suitable overland flood flow route and do not rely entirely on piped drainage systems.

It is proposed that surface water run-off from the proposed switch house will be collected and disposed of on-site by utilising the use of a surface water attenuation pond (see Section 4 for further information on the surface water drainage strategy). There will be no uncontrolled off-site discharge.

Provided that these measures are implemented then the site will be at low risk of flooding from this source.

3.4 Infrastructure flooding

If surcharging or blockage of the sewers/drains on or off-site did occur it is possible that there may be localised surface flooding in areas surrounding the site. This risk is similar to that described above and mitigation measures carried out would provide the same protection from this source.

The Southern Water (SW) asset plans (see Appendix B) shows sewers located on Lidsay road and to the north of the site.

The existing Willows caravan site has a foul water pumping station and rising main, which is located along the northern boundary of the site, the exact location of the main will need to be confirmed on site. It is anticipated that in accordance with building regulation requirements an emergency storage is provided in the event of pump failure.

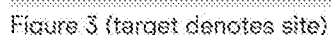
Should infrastructure failure occur then any flood water would be diverted away from the site by the natural topography.

The site is considered to be at low risk of flooding from infrastructure failure.

3.5 Water bodies

There are no significant water bodies (lakes, large ponds, reservoirs etc.) within the immediate vicinity of the site that appear likely to pose a risk to the site.

The GOV.UK *Flood risk from reservoirs – Extent of flooding* (see Figure 3) shows that the site is not at risk of flooding from reservoir failure.



3.6 Groundwater

The site is not considered to be at significant risk of flooding from groundwater.

The site is considered to be at a low risk of flooding from all sources.

4 Surface Water Drainage Strategy

4.1 Proposed surface water drainage

Discharge of surface water run-off from the site should be restricted to greenfield run-off rates in accordance with C753 and if it were discharged from site.

The greenfield run-off discharge rate has been calculated using the IOP SuDS method within MicroDrainage (see Greenfield Calculations in Appendix C). The greenfield rates applicable to the site are based on the proposed impermeable area of 0.674 ha and are summarised in Table 3.

Table 3: Greenfield run-off rates

AEP	Greenfield Discharge Rate (l/s)
100%	0.6
Qbar	0.7
5.5%	1.5
1%	2.5

The SuDS hierarchy requires that surface water run-off is controlled and preferably re-used wherever possible. In the event that it cannot be re-used it should be disposed of to a receptor in the order described in Building Regulations Part H and C753:

- Via infiltration,
- To watercourse, and finally,
- To sewers

The surface water drainage strategy (see Appendix C) shows the use of water gardeners, permeable paving roads and bio-swale and pond.

Microdrainage calculations demonstrating the size of the pond is included in Appendix C. The infiltration feature has been sized to cater for rainfall events up to and including the 1% AEP event inclusive of climate change. In order to reduce the risk of blockage to the control structure, the discharge rate is modelled with a larger orifice, hence the higher rate of 4.9l/s.

Table 4 (below) discusses types of SuDS (taken from C753) and whether they could be utilised at this site.

Table 4: SuDS site suitability

SuDS Component	Site Suitability	Comments
Green roof	✗	Not suitable due to nature/use of site.
Soakaway	✗	Not suitable due to low soil permeability.
Rainwater harvesting system	✓	Could be utilised for W.C. flushing etc to reduce the use of potable water for the development, subject to financial viability.
Filter strip	✗	Not suitable due to site layout.
Filter trench	✗	Not suitable due to site layout.
Infiltration trench	✗	Not suitable due to low soil permeability.
Swale	✓	Could be incorporated into the layout.
Bioretention	✗	Not suitable due to nature/use of site.
Pervious pavement	✓	Could be used with positive outfall to pond.
Geocellular system	✓	Suitable but not preferred.
Infiltration basin	✗	Not suitable due to flow infiltration rates.
Detention basin	✓	Suitable.
Pond	✓	Suitable.
Stormwater wetlands	✗	Not suitable due to size of development.
Proprietary device	✓	Suitable but not preferred.
Rain garden	✓	Suitable.

The final choice of SuDS treatment train elements will be decided at detailed design and will incorporate a number of sub-features to improve water quality and reduce the rate of run off to the stream.

To ensure that the SuDS features remain optimised and fully functional during the life time of the development, thus preventing an increase in the flood risk both within the site and elsewhere, maintenance of the system is crucial across the short, medium and long term timescales. It is proposed that the SuDS features are to be maintained by the site owner as part of the on-going maintenance regime of the site.

5 Conclusions

The site is shown to lie in the low probability flood risk area (Flood Zone 1) according to the GOV.UK flood maps.

Other flood risks to the site have been assessed as low and the site is therefore considered to be at low risk from all sources of flooding.

Surface water will be attenuated on-site and drain to an existing water course.

Further opportunities should be investigated to incorporate SuDS into the development where practicable. These can provide the benefits of slowing the discharge of surface water run-off, removal of pollutants from the run-off and providing ecological benefits to the development.

Careful thought should be given to the levels design on the site in accordance with normal good practice to ensure that there is no likely flooding caused by overland flow and that any overland flow is directed around buildings in the event of a failure to the piped drainage system.

The surface water can be collected via the pond on site which is then discharged into an existing water course off site.

Appendix A - Existing & Proposed Site

1428 Existing Site Plan-- Site Layout Plan

1428-P-100-Proposed Plan

Appendix B - Southern Water

618719_D10_7_2017_T7_26_11_433_R1413_I13895136- Utilities Survey

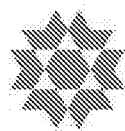
Appendix C - Surface Water Drainage Strategy

Greenfield calculations

MLM drawing 618719-MLM-ZZ-XX-DR-C-0001 – Drainage Strategy

Catchment Area Plan

MicroDrainage calculations



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