

# Flood Risk and Foul Drainage Assessment



## Staplehurst Developments Limited

Marden Road, Staplehurst  
Kent

## Flood Risk and Foul Drainage Assessment

March 2016



# Flood Risk and Foul Drainage Assessment

## Report Control

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# Flood Risk and Foul Drainage Assessment



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# Flood Risk and Foul Drainage Assessment



## EXECUTIVE SUMMARY

### **1. Requirement for a Flood Risk and Foul Drainage Assessment (FRFDA)**

According to flood risk mapping provided by the EA, the entire site is located entirely within Flood Zone 1: i.e. land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability (AEP)), in any one year. The approximate area of the development is 4.0 hectares, therefore in accordance with the National Planning Policy Framework (NPPF) 2012 and the Planning Practice Guidance – Flood Risk and Coastal Change (PPG) a Flood Risk Assessment is required to support the planning application.

The FRFDA has been undertaken in accordance with the guidelines of the Environment Agency Flood Risk Assessment (FRA) Guidance Note 1.

The purpose of the FRFDA has been to assess the existing flood risk to the site and to establish a management regime for surface water run-off.

In line with the EA guidance and PPG, the FRFDA has also considered other potential sources of flood risk, such as sewers, overland flow routes, groundwater flooding, reservoir flooding, canals and minor watercourses not shown on EA flood map .

Due to problems with foul drainage within the local area a foul drainage assessment has been incorporated into the overall FRA report to produce a combined FRFDA. This will set out solutions for the foul water drainage system.

It should be noted that the final design of both the surface water and foul drainage will be developed through the detailed design stage, which will include consultation with the regulatory bodies. Therefore within the FRFDA report preliminary drainage designs are discussed which will set out the required design parameters to be adopted as part of the detailed drainage design.



# Flood Risk and Foul Drainage Assessment

## 2. Existing Sewers and Drainage

Southern Water are the local water authority for water and sewer provision.

The existing drainage situation consists of:

### Foul:

- No existing foul sewers exist within the development site.
- A gravity network within the adjacent residential areas, discharging to a carrier sewer in Marden Road.
- A 150mm VC gravity carrier sewer within verge to the south of Marden Road flowing in a westerly direction.
- Discharge to a pumping station (WPS 101828) located immediately to the north west boundary with Marden Road.
- A 150mm CI rising main discharge from the WPS within the verge to the south of Marden Road flowing in an easterly direction with discharge to the wider Southern Water network believed to be c2km to the north east.
- The location of the foul gravity and rising main sewers are located within the site frontage and likely to be protected by an easement, which may influence the proposed site layout.

### Surface Water:

- No existing surface water sewers exist within the development site.
- A gravity network within the adjacent residential areas, discharging to an underground attenuation tank/soakaway system within a 'green zone' immediately to the north east of the development site, with overflow discharge to the existing foul sewer upstream of the WPS.
- A number of ponds and watercourses exist to the southern boundary of the development site, which will serve as a localised land drainage network.

## 3. Summary of Flood Risk

A review of existing data and reports was undertaken in order to identify existing flood risk to the site from a range of sources.

It was identified that:

- The proposed development is classified as "More Vulnerable" in accordance with Table 2 of the PPG.
- The site is located within Flood Zone 1 and therefore is considered to be at low risk of flooding from fluvial sources.
- A review of the Maidstone Borough Council Strategic Flood Risk Assessment (SFRA) identified the potential existing geology as Weald Clay; this is to be confirmed through a site investigation.
- The SFRA also identified surface flooding due to inadequate drainage systems as the main cause of flooding within Staplehurst.



# Flood Risk and Foul Drainage Assessment

Based on the above and the review undertaken in section 3 of the FRFDA it can be seen that the application site is considered to be at low risk of flooding from fluvial sources, and at low risk of flooding from ordinary watercourses, groundwater sources, overland flows, and reservoir failure. There is some historical evidence of localised surface water and sewer flooding to the site frontage although is likely due to an inefficient drainage system.

In accordance with EA guidance, requirements of the PPG and the guidelines within the Maidstone SFRA, it is essential that the development of the site does not increase the risk of flooding off site.

In line with the current drainage strategy for the site and the adjacent developments it is proposed that surface water runoff is to be drained by utilising existing ponds and a watercourse located to the southern edge of the site.

## 4. Potential Drainage Solutions

### Surface Water:

The application site covers an area of c4ha and is currently estimated to be 0% impermeable. The site is initially expected to be 45% impermeable post development. Table 1 below shows the change in impermeable areas between the pre development and post development scenarios.

Table 1 – Pre and Post Development Areas

	Impermeable Area (ha)	Permeable Area (ha)
Pre Development	0	4.0
Post Development	2.0	2.0

The above proposed post development impermeable areas are approximate and subject to finalisation of the scheme design. For preliminary calculation they have been adopted in assessing the Greenfield runoff rates, the on-site attenuation volumes and sizing of the attenuation ponds.

# Flood Risk and Foul Drainage Assessment

**Table 2 – Proposed Discharge Rates**

Total Site Area (ha)	4.0
Post Development Impermeable Area	2.0
Existing run off rate for entire site (l/s)	17.4
Greenfield Run off rate (Qbar) for Proposed Impermeable Area (l/s)	8.7
<b>Proposed Discharge Rate (l/s)</b>	<b>8.7</b>

From a review of the proposed development areas and existing surface water run-off rates it is proposed to discharge to the exiting ponds under a restricted flow rate of 8.7l/s. This will need to be confirmed with the EA and consent to discharge obtained.

In order to provide an estimation of the future attenuation volumes required, a preliminary assessment using the Micro Drainage modelling programme has been undertaken.

Based on the assumed discharge rate for the site of 8.7l/s an initial assessment has been undertaken as to the preliminary sizing of the required storage capacity.

**Table 3 - Summary of Micro Drainage Quick Storage Calculations**

	Impermeable area (ha)	Allowable discharge rate (l/s)	1 in 30 year storage (m <sup>3</sup> )	Additional storage required to satisfy 1 in 100 (plus 30% CC) exceedance flows (m <sup>3</sup> )	Total storage to satisfy 1 in 100 (plus 30% CC) exceedance flows (m <sup>3</sup> )
Application Site	0.13	8.7	750	667	1417

Initial calculations suggest a storage capacity of 750m<sup>3</sup> will be required to provide attenuation for the 1 in 30 year storm with anything above this being contained and managed on site through the use of additional storage or planned exceedance routes.

This is preliminary sizing and will need to be developed in-line with the site's overall drainage strategy.

A copy of both the calculations and the preliminary surface water drainage strategy are contained within the appendix of the main report.





# Flood Risk and Foul Drainage Assessment

## **Foul:**

Based on the current building proposals the peak foul flow has been assessed as being 5.88 l/s. This is based on the current proposal of up to 130 units based on the daily flow rate of 4000 litres/dwelling/day given in Sewers for Adoption 7<sup>th</sup> Edition.

A level 2 capacity check has been carried out with Southern Water to determine whether there is existing capacity in the network to receive the indicative peak flow rate of 5.88l/s that would be generated from the development.

Through the initial consultation process Southern Water have advised that there is no capacity within the existing sewer network to accommodate the additional development foul discharge without mitigation works being considered.

Southern Water provided the potential options for a foul connection as follows:

### **Connection in Marden Road Scheme 1**

Connection into the existing Foul sewer at connection point TQ77439704 located within Marden Road to the site frontage. In order to cater for the additional flows within the foul system it is proposed to build a 1x2m approx 122m long offline storage tank within the development area with a 150mm flap valve on the outlet, and under arrangement which will provide additional storage capacity within the Southern Water foul system prior to discharge to the WPS.

### **Connection in Marden Road Scheme 2**

Connection into the existing Foul sewer at connection point TQ77439704 located within Marden Road to the site frontage. In order to cater for the additional flows within the foul system it is proposed to upgrade 100m of sewer prior to the WPS from 150mm to 225mm pipe size. An additional 760m of foul sewer from manhole TQ78439803 located in Headcorn Road crossing agricultural land and under the rail line into Staplehurst discharging to the Staplehurst waste water treatment works will need to be upgraded from a 300mm pipe to 375mm pipe size to cater for the additional capacity required.

From continuous dialogue with Southern Water throughout the consultation process it has been suggested there may be technical and or practical difficulties in securing adoption of Scheme 1 due to the complexities of situating a large tank of foul discharge near to residential development. Southern Water's advice is that Scheme 2 is likely to be the preferred option via a requisition under section 98 of the Water Act.

# Flood Risk and Foul Drainage Assessment



## 5. Summary

The FRFDA main report identified the following conclusions:

- The development site is shown on the EA Statutory Flood Maps for Planning as being entirely within Flood Zone 1, thus it is considered to be at low risk of fluvial flooding.
- The application site is of green field use in flood risk terms and classified as "More Vulnerable" in accordance with Table 2 of the PPG.
- There are existing ponds located to the southern boundary of the application site which could serve as a point of discharge for the surface water drainage system.
- From a review of available information it would seem the dominant geology is Weald clay which would not be suitable for infiltration techniques. This will need to be confirmed through a site investigation.
- It is proposed to discharge surface water from the application site to new attenuation ponds with ultimate discharge into the existing ponds and water course to the south of the site at a restricted rate of 8.7l/s. The required storage capacity is approximately 750m<sup>3</sup> for the 1 in 30 year storage and 1417 for the 1 in 100 year + CC. This will need to be confirmed with the EA and consent to discharge to be obtained.
- As the site is to discharge to an existing watercourse via existing ponds it will be necessary for an oil/petrol interceptor to be incorporated into the access drainage system prior to it discharging.
- A preliminary assessment has identified that the peak foul flows from the new development will be 5.8 l/s and these will be discharged by gravity to the adjacent 150mm diameter foul sewer system.
- Following consultation with Southern Water two options for the upgrade of the existing foul sewer network have been provided to allow for the increased capacity requirements. From a adoptable and practical point of view Southern Waters favoured scheme is likely to be option 2 under a section 98 requisition.



# Flood Risk and Foul Drainage Assessment

## INTRODUCTION

### 1.1 PURPOSE OF THE REPORT

Staplehurst Developments Limited have commissioned WYG Engineering Ltd to undertake a Flood Risk Assessment (FRA) and Foul Drainage Assessment (FDA) in respect of a new residential development for up to 130 houses to be located on the south side of Marden Road near Staplehurst. The FRA and FDA have been combined to form a single Flood Risk and Foul Drainage Assessment (FRDA).

The proposed development consists of the construction for up to 130 new houses of varying size together with external landscaped areas, car parking and site access roads.

A plan showing the proposed site layout is contained within Appendix A.

This report has been prepared to accompany an outline planning application.

### 1.2 PROPOSED DEVELOPMENT

The proposed new buildings are up to 130 houses of varying size incorporating external landscaped areas, access roads, parking and public open space. The application site area is currently undeveloped Greenfield land.

The proposed development is classified as "More Vulnerable" in accordance with Table 2 of the PPG.

A plan showing the proposed site layout is contained within Appendix A.

### 1.3 REQUIREMENT FOR FLOOD RISK ASSESSMENT

According to flood risk mapping provided by the EA, the entire site is located entirely within Flood Zone 1: i.e. land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability (AEP)), in any one year. The approximate area of the development is 4.0 hectares, therefore in accordance with the National Planning Policy Framework (NPPF) 2012 and the Planning Practice Guidance – Flood Risk and Coastal Change (PPG) a Flood Risk Assessment is required to support the planning application.

### 1.4 SCOPE OF THE FLOOD RISK ASSESSMENT

The FRA will be undertaken in accordance with the guidelines of the Environment Agency Flood Risk Assessment (FRA) Guidance Note 1.



# Flood Risk and Foul Drainage Assessment

The FRA will assess the existing flood risk to the site and establish a management regime for surface water runoff from the site such that flood risk to adjoining areas is not exacerbated. If not managed properly, surface water runoff from the site could potentially lead to increases in flood risk to other areas or the development itself.

In line with the EA guidance and PPG, the FRA will also consider other potential sources of flood risk, such as sewers, overland flow routes, groundwater flooding, reservoir flooding, canals and minor watercourses not shown on EA flood map.

It should be noted that the final design of both the surface water and foul drainage will not be complete until a later stage. Therefore within this report only preliminary drainage designs are discussed which will set out the required design parameters to be adopted as part of the final drainage design.

## 1.5 FOUL DRAINAGE ASSESSMENT

The Foul Drainage Assessment will review the existing foul water drainage systems within and adjacent to the development site and identify the peak flows from the proposed development.

The foul drainage assessment will also set out the preliminary options for foul drainage of the site incorporating consultation with Southern Water.

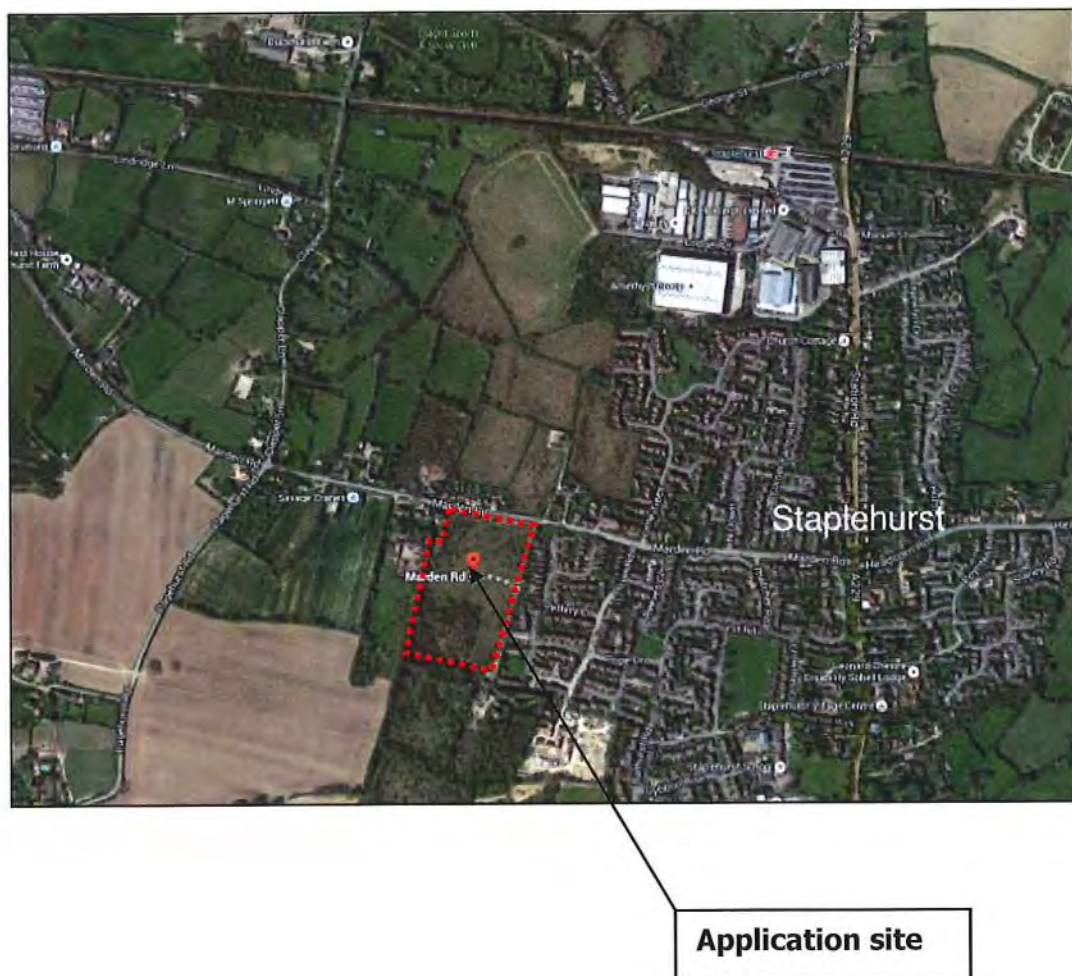
# Flood Risk and Foul Drainage Assessment

## 2 SITE DESCRIPTION

### 2.1 EXISTING SITE

The overall application site covers an area of approximately 4.6 ha and is located within to the south side of Marden Road and to the east of the village of Staplehurst in Kent as shown in Figure 1 and Figure 2 below.

Figure 1 – Site Location<sup>1</sup>



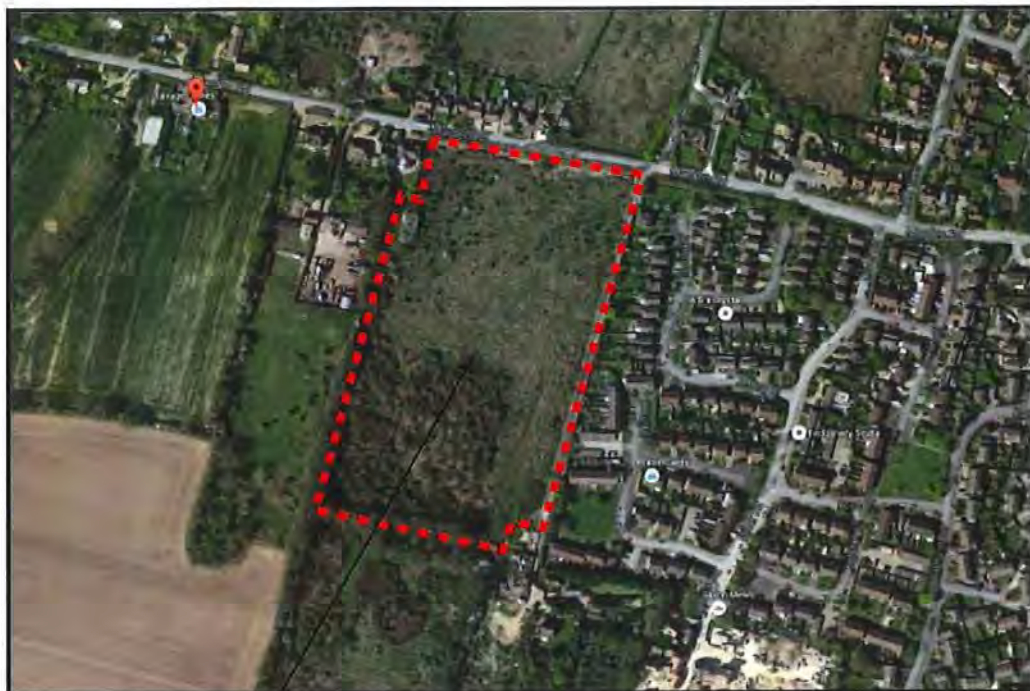


Figure 2 – Site Plan

Application Site

The application site is presently unoccupied Greenfield land.

The application site is bounded to the east and west by existing residential developments and to the north by Marden Road. To the south of the site is more unoccupied Greenfield land although there is potential for further residential development in future.

The topography of the site is currently unknown, however the adjacent residential area falls from south to north by c 4m. There are a number of ponds located to the southern boundary which suggests the land profile may fall partly to the south. This will be verified through a topographical survey.

## 2.2 EXISTING DRAINAGE

### 2.2.1 Main Rivers

The nearest main river to the application site (as listed on the EA Flood Map for Planning) is the River Beult which is located approximately 2.7km to the north-west of the application site.

### 2.2.2 Ordinary and Manmade Watercourses

There are existing ponds located to the southern boundary of the application site which could serve as a point of discharge for the surface water drainage system.



# Flood Risk and Foul Drainage Assessment

## 2.2.3 Sewers

### Foul Sewers

According to the existing sewer records provided by Southern Water no existing foul sewers are within the development site. A gravity network within the adjacent residential areas discharges to a gravity sewer within Marden Road to the site frontage, a 150mm VC sewer within the verge of Marden Road flowing in a westerly direction. A wastewater pumping station (WPS) is located to the north-west of the development which the 150mm VC sewer discharges to. A 150mm rising main discharge from the WPS is located within the verge to the south of Marden Road flowing in a westerly direction with ultimate connection to the Southern Water sewer network.

### Surface Water Sewers

According to sewer records provided by Southern Water there are no existing surface water sewers within the site boundary. The records do however show existing surface water infrastructure to the north-east of the site boundary serving the adjacent residential development, this consists of a gravity network discharging to an attenuation tank/soakaway system with an overflow discharging to the foul sewer network upstream of the WPS.

# Flood Risk and Foul Drainage Assessment

## 3 FLOOD RISK

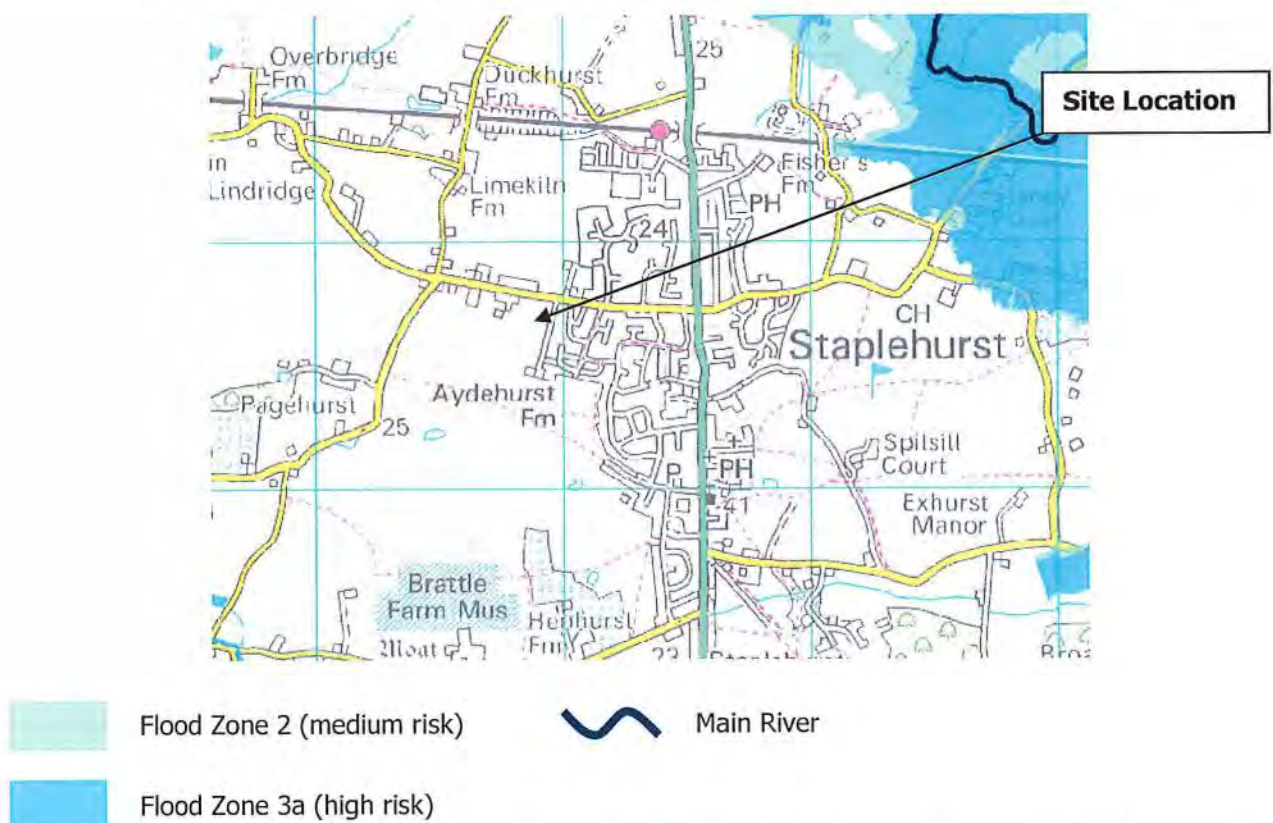
### 3.1 FLUVIAL FLOOD RISK

Fluvial flood risk is the risk arising from rivers and watercourses.

#### 3.1.1 Environment Agency Data Review – Fluvial Flooding

According to Flood Risk Mapping for Planning provided by the EA, the site is located entirely within Flood Zone 1, outside the extent of the 0.1% AEP (1 in 1000) risk of flooding from a major river in any one year. As the site is located in Flood Zone 1, it is considered to be at low risk of flooding from fluvial sources.

Figure 3 - Environment Agency Flood Map for Planning (downloaded 18<sup>th</sup> February 2016)



Since the application site is located within Flood Zone 1, it is not required to issue a pre development consultation to the Environment Agency as responsibility for flood risk is now covered by the Lead Local Flood Authority for the area, this being Maidstone Borough Council.





# Flood Risk and Foul Drainage Assessment

## 3.1.2 Maidstone Borough Council - Consultation

A consultation has been issued to Maidstone Borough Council to secure information which should be considered with respect to the flood risk and drainage proposals for the application site.

However, at the time of preparing this report no response has been received and if once received this provides any additional relevant information regarding flooding then an addendum report will be issued covering the relevant issues.

## 3.1.3 Regional Flood Risk Appraisal for South East England – November 2008

In accordance with National Planning Policy Framework (NPPF), the South East England Regional Assembly produced their Regional Flood Risk Appraisal (RFRA) in November 2008. This is a high level document looking at flood risk and associated strategy, along with flood plain and urban area future growth characteristics to support regional planning. The document sets out a series of guidelines for the production of updated district Strategic Flood Risk Assessment's and when they should be completed.

## 3.1.4 Maidstone Borough Council Strategic Flood Risk Assessment (SFRA) – May 2008

A review of the Maidstone Borough Council Strategic Flood Risk Assessment SFRA (dated May 2008) was undertaken to identify any flood risks associated with the application site that are required to be considered in providing flood mitigation and establishing an adequate surface water drainage strategy.

This review confirmed the following:

- a) The site is located within Flood Zone 1
- b) There are some localised recorded flooding incidents within the area due to both sewer and surface water flooding
- c) The geology of the area consists of Weald Clay formation with low permeability
- d) There is no mention of any groundwater flood risk to the application site as the underlying geology is Weald Clay
- e) Summarising – the main cause of flood incidents in Staplehurst is surface water flooding due to inadequate drainage systems (Drawing in Appendix D)

## 3.1.5 Maidstone Stage 1 Surface Water Management Plan (SWMP) – October 2013

A review of the Maidstone Stage 1 Surface Water Management Plan (dated October 2013) was undertaken by Kent County Council to identify any flood risks associated with the application site that are required to be

# Flood Risk and Foul Drainage Assessment

considered in providing flood mitigation and establishing an adequate surface water drainage strategy. This review highlighted Staplehurst’s propensity for surface water flooding due to inefficient drainage systems during heavy rainfall or as a result of blockages within the surface water.

## 3.2 SEWER FLOODING

It is understood that there are recorded incidents of surface water flooding adjacent to the application site and this will be confirmed by the consultation response.

## 3.3 SURFACE WATER FLOODING

Surface water flooding occurs where high rainfall events exceed the drainage capacity in an area (i.e. sewer system and/or watercourse), leading to flooding.

An extract of the Environment Agency’s Risk of Surface Water Flooding map is shown below in Figure .

**Figure 4 - Extract from the Environment Agency’s Risk of Flooding Surface Water Map**

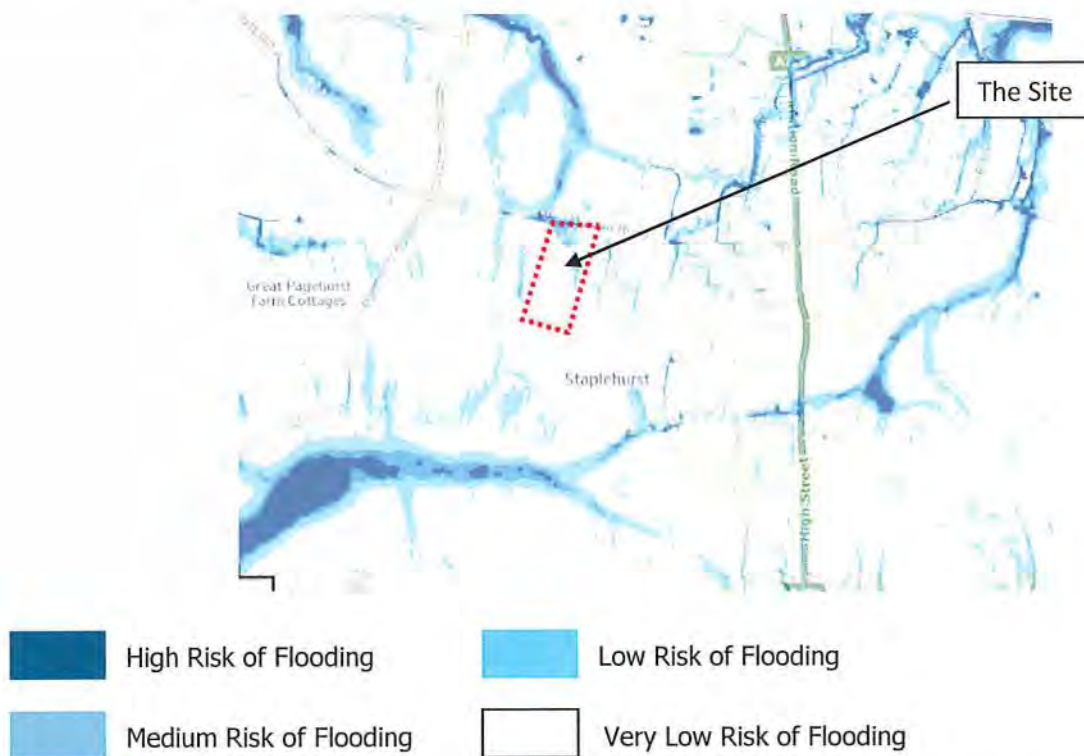


Figure 4 indicates that the application site is at a small risk of surface water flooding to the site frontage. This has been highlighted in the review of existing reports as a problem with the inefficiency of the existing drainage systems within Staplehurst.



# Flood Risk and Foul Drainage Assessment

## 3.4 RUNOFF FROM OVERLAND SOURCES

### 3.4.1 Assessment of Existing Overland Flows into the Site

The land around the application site slopes from south to north although this will be confirmed through a topographical survey. The adjacent areas are developed or Greenfield land and provided with suitable surface water drainage system and therefore the risk of overland flooding is considered low.

## 3.5 GROUND WATER

### 3.5.1 Groundwater Source Protection Zone

A review of the EA's Ground Water Source Protection Zone (GWSPZ) map for the development site location shows that the site is not located within any EA designated groundwater protection zones.

### 3.5.2 Groundwater

A Site Investigation has not yet been undertaken but the Maidstone SFRA dated November 2009 states:

"There is no groundwater flooding in Staplehurst. The underlying geology is Weald Clay which is not an aquifer"

Overall, based on the above, it is concluded that the risk of groundwater flooding is low due to the impermeable nature of the underlying ground.

## 3.6 RESERVOIR FLOODING

Although the probability of a catastrophic dam failure is considered to be extremely low, the consequence of such an event would be severe. A review of the EA online 'Risk of Flooding from Reservoirs' identified that the application site is not located within a zone at risk of reservoir flooding.

## 3.7 SUMMARY OF FLOOD RISK

### 3.7.1 Overview of Flood Risk

Based on the above it can be seen that the application site is considered to be at low risk of flooding from fluvial sources, and at low risk of flooding from ordinary watercourses, groundwater sources, overland flows, and reservoir failure. There is some historical evidence of localised surface water and sewer flooding to the site frontage although is likely due to an inefficient drainage system.

It will be essential to ensure that no increase in flooding occurs downstream of the site as a result of the development and this matter is discussed in more detail within Section 4.



# Flood Risk and Foul Drainage Assessment

## 4 DEVELOPMENT PROPOSALS

### 4.1 PROPOSED DEVELOPMENT

The proposed development consists of up to 130 residential houses with external access, parking and landscaped areas .

The application site area is currently undeveloped.

The proposed development is classified as "More Vulnerable" in accordance with Table 2 of the PPG.

A plan showing the proposed site layout is contained within Appendix A.

### 4.2 SEQUENTIAL TEST

One of the aims of the PPG is to steer development away from zones of high flood risk towards Flood Zone 1. According to Table 2 of the PPG (Flood Risk & Coastal Change), the development is classified as 'More Vulnerable' and the application site is located entirely in Flood Zone 1 according to the current EA Flood Map for Planning, therefore the proposed development elements are all appropriate in flood risk terms.

Based on the above, it can be shown that the development proposals comply with the requirements of Table 3 of the PPG (Flood Risk & Coastal Change) by locating all development within the Flood Zone 1 areas and therefore the Sequential Test is considered to have been passed and there is no requirement to apply the Exception Test.

### 4.3 DEVELOPMENT AND FLOOD RISK

#### 4.3.1 Flood Risk to the Development

As discussed in Section 3.7.1, the site is considered to be at low risk of flooding from fluvial flooding and at low risk of flooding from pluvial, groundwater sources, sewer flooding and reservoir failure. However, in accordance with the requirements of the PPG and the guidelines within the Maidstone SFRA, it is essential that the development of the site does not increase the risk of flooding off site.

In line with the current drainage strategy for the site and the adjacent developments it is proposed that surface water runoff is to be drained by utilising existing ponds and a watercourse located to the southern edge of the site.

#### 4.3.2 Flood Risk Arising from the Development

The new development will result in the redevelopment of Greenfield land and therefore it is important that there is no increase in surface water runoff from the development.



# Flood Risk and Foul Drainage Assessment

Adequate surface water drainage is therefore to be provided within the application site to ensure that the proposed surface water drainage system does not exacerbate flood risk outside of the extent of the proposed development.

## 4.4 ASSESSMENT OF PRE AND POST DEVELOPMENT AREAS

The application site covers an area of c4ha and is currently estimated to be 0% impermeable. The site is initially expected to be 45% impermeable post development. Table 1 below shows the change in impermeable areas between the pre development and post development scenarios.

Table 4 – Pre and Post Development Areas

	Impermeable Area (ha)	Permeable Area (ha)
Pre Development	0	4.0
Post Development	2.0	2.0

The above proposed post development impermeable areas are approximate and subject to finalisation of the scheme design. For preliminary calculation they have been adopted in assessing the Greenfield runoff rates, the on-site attenuation volumes and sizing of the attenuation ponds.

## 4.5 ASSESSMENT OF PRE & POST SURFACE WATER DISCHARGE RATES

### 4.5.1 Existing Discharge Rates

The ICP SUDs module was used to calculate the existing run off rate for the green field component of the application site. This identified the following discharge rates for the 4ha green field part of the site:

- a) 1 in 1 year = 14.8 l/s
- b) 1 in 30 year = 39.5 l/s
- c) 1 in 100 year = 55.6 l/s
- d)  $Q_{bar} = 17.4$  l/s

The discharge rates per hectare are:

- a) 1 in 1 year = 3.7 l/s/ha
- b) 1 in 30 year = 9.9 l/s/ha

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c) 1 in 100 year = 13.9 l/s/ha

d)  $Q_{bar} = 4.35$  l/s/ha

The green field run off calculation is contained in Appendix E.

## 4.5.2 Proposed Discharge Rates

As stated above, it is proposed to discharge surface water runoff from the application site at the existing green field run off rate for the entire site. The proposed discharge rate is summarized in Table 5 below.

**Table 5 – Proposed Discharge Rates**

Total Site Area (ha)	4.0
Post Development Impermeable Area	2.0
Existing run off rate for entire site (l/s)	17.4
Greenfield Run off rate ( $Q_{bar}$ ) for Proposed Impermeable Area (l/s)	8.7
<b>Proposed Discharge Rate (l/s)</b>	<b>8.7</b>

## 4.6 SURFACE WATER DRAINAGE STRATEGY

As set out within Section 4.3.1 it is proposed to utilise existing ponds and watercourse to drain the proposed new buildings and external paved areas.

It is proposed to drain the surface water runoff primarily from the new buildings to two attenuation ponds to be located near to the existing ponds. The ponds will then discharge under a restricted flow rate to be set at 8.7l/s to the existing ponds. This will need to be confirmed with the EA and consent to discharge to be obtained.

It will also be necessary to contain the exceedance flows due to the 1 in 100 year + 30% climate change storm event on site within the proposed attenuation ponds or through exceedance routes utilising external areas that do not pose a risk to property.

A copy of the preliminary surface water drainage layout is contained within Appendix G.



# Flood Risk and Foul Drainage Assessment

## 4.7 PROPOSED MITIGATION

### 4.7.1 Flood Risk due to Surface Water Runoff from the Site

In order to ensure that surface water runoff from the site does not cause an increase in flood risk, the management of runoff has been considered via a sequential approach, in line with Building Regulations. The following options for the disposal of surface water runoff were considered, in order of preference<sup>1</sup>:

- i) A soakaway or some other infiltration system
- ii) A watercourse
- iii) A sewer

#### *4.7.1.1 Discharge to SUDs*

The preferred method for disposal of surface water runoff from the application site would be via infiltration SUDs methods.

A site investigation report has been commissioned that will look at the viability of SUDs but from a desk top review of existing information from the British Geological Society and surrounding sites it is unlikely that infiltration techniques will be viable as the ground conditions are likely to be Weald clay and therefore not suitable.

#### *4.7.1.2 Discharge to Watercourse*

From a review of the site it can be seen that there are existing ponds located along the southern boundary of the site. It is proposed to discharge the surface water drainage to these existing ponds via new attenuation ponds and a restricted discharge rate. This will be subject to detailed design and agreement with the EA and local flood authority.

#### *4.7.1.3 Discharge to Sewer*

As there are no adjacent surface water sewers to discharge to then this option has not been progressed any further.

### 4.7.2 Preliminary Design of Storage Systems

As stated within Section 1.4, although the planning application is to be an outline planning application and normally a detailed drainage design would be prepared to support the Flood Risk Assessment.

---

<sup>1</sup> Building Regulations H3(3), Rainwater drainage



# Flood Risk and Foul Drainage Assessment

In order to provide an estimation of the future attenuation volumes required, a preliminary assessment using the Micro Drainage modelling programme has been undertaken.

Based on the assumed discharge rate for the site of 8.7l/s an initial assessment has been undertaken as to the preliminary sizing of the required storage capacity.

**Table 6 - Summary of Micro Drainage Quick Storage Calculations**

	Impermeable area (ha)	Allowable discharge rate (l/s)	1 in 30 year storage (m <sup>3</sup> )	Additional storage required to satisfy 1 in 100 (plus 30% CC) exceedance flows (m <sup>3</sup> )	Total storage to satisfy 1 in 100 (plus 30% CC) exceedance flows (m <sup>3</sup> )
Application Site	0.13	8.7	750	667	1417

A copy of the preliminary Micro Drainage Quick Storage calculations is contained within Appendix F.

Initial calculations suggest a storage capacity of 750m<sup>3</sup> will be required to provide attenuation for the 1 in 30 year storm with anything above this being contained and managed on site through the use of additional storage or planned exceedance routes.

## 4.7.3 Minimum Finished Floor Levels & Overland Flood Route

In setting the final external levels for the development it is important to ensure that if flows in exceedance of the 1 in 100 years plus 30% allowance for climate change storm event occur or a failure of the site surface water drainage system occurs, that suitable overland flood routes are provided within the development to ensure no localised flooding of the buildings occurs within the development.

It is therefore proposed that the finished floor levels of the new buildings are to be set 150mm above the average ground level and this will ensure that in the event of extensive overland flows, no flooding of the buildings will occur.

## 4.8 RESIDUAL FLOOD RISK

If the above mitigation measures are provided as part of the development, it is considered that the primary residual failure would be as a result of some type of failure of the site drainage system during the life of the development. Regular, ongoing maintenance will be required to ensure that the capacity of the system is maintained as it has been designed.





# Flood Risk and Foul Drainage Assessment

In addition, as discussed above there remains a residual risk of a storm event that exceeds the capacity of the drainage system, as events beyond the 1 in 100 year plus 30% allowance for climate change storm event will not be catered for explicitly.

## 4.9 FUTURE MAINTENANCE RESPONSIBILITIES

Upon completion of the development the drainage system will look to be adopted under a Section 104 agreement with Southern Water this will be subject to a detailed application being submitted and a statutory consultation process.



# Flood Risk and Foul Drainage Assessment

## 5 SUDS

### 5.1 SUDS AND DESIGN PRINCIPLES

In order to comply with the national guidelines and policies set by the Environment Agency the design of the surface water drainage system should seek to maximise the use of SUDS techniques. Similarly the surface water drainage design should comply with the current Maidenhead Borough Council Planning Policy Sustainable Development Objectives.

As discussed within Section 3, the underlying ground conditions are not considered suitable to utilise infiltration techniques because of the potential Weald Clay formation, although this has to be confirmed by undertaking a ground investigation at the site.

In the absence of incorporating infiltration techniques, other SUDS options should be considered to simulate the natural green field run off characteristics of the site and also to improve the water quality of the surface water discharging into the existing ponds.

It is therefore recommended that during the detailed design phase that consideration is given to utilising permeable paving within any level external car parking areas. In this instance the permeable paving will not act to allow infiltration of the surface water runoff into the underlying strata, but will drain via a sub surface stone layer into the main surface water system. By adopting this method of drainage two levels of water treatment can be provided to remove contaminants from the runoff from the parking areas.

In the event that permeable paving is not adopted and the areas are drained direct to the attenuation ponds, then as the system will be equipped with a oil/petrol interceptor then the required minimum two levels of treatment as set out within Table 3.3. of the SUDS Manual (C753) will be provided.

## 6 FOUL DRAINAGE ASSESSMENT

### 6.1 EXISTING FOUL DRAINAGE

Southern Water are the local water authority for water and sewer provision.

The existing foul drainage situation consists of:

- No existing sewers exist within the development site.
- A gravity network within the adjacent residential areas, discharging to a carrier sewer in Marden Road.
- A 150mm VC gravity carrier sewer within the verge to the south of Marden Road flowing in a westerly direction.
- Discharge to a pumping station (WPS 101828) located to the north west boundary with Marden Road.
- A 150mm CI rising main discharge from the WPS within the verge to the south of Marden Road flowing in an easterly direction with discharge to the wider Southern Water network believed to be c2km to the north east.

### 6.2 PROPOSED POST DEVELOPMENT FLOWS

Based on the current building proposals the peak foul flow has been assessed as being 5.88 l/s. This is based on the current proposal of c127 units based on the daily flow rate of 4000 litres/dwelling/day given in Sewers for Adoption 7<sup>th</sup> Edition.

### 6.3 PROPOSED FOUL DRAINAGE STRATEGY

It is proposed that the foul water from the development is collected in a system of gravity sewers discharging to a pumping station to the west of the site; this will be dependent on the receipt of a topographical survey of the site and a detailed drainage design. From this pumping station flows will be pumped to an existing public sewer where there is sufficient capacity to take the proposed flows from the development.

A level 2 capacity check has been carried out with Southern Water to determine whether there is existing capacity in the network to receive the indicative peak flow rate of 5.88l/s that would be generated from the development. The results of the capacity check and correspondence with Southern Water are located in Appendix C.



# Flood Risk and Foul Drainage Assessment

To facilitate the development there will be the requirement to either upgrade the local network or requisition a new sewer under a S98 agreement to the point at which capacity is available. Capacity is available at the existing Staplehurst Waste Water Treatment Works (WWTW) which is located approximately 1000m north east of the development site.

Southern Water provided the potential options for a foul connection as follows:

## **Connection in Marden Road Scheme 1**

Connection into the existing Foul sewer at connection point TQ77439704 located within Marden Road to the site frontage. In order to cater for the additional flows within the foul system it is proposed to build a 1x2m approx 122m long offline storage tank within the development area with a 150mm flap valve on the outlet, and under arrangement which will provide additional storage capacity within the Southern Water foul system prior to discharge to the WPS.

## **Connection in Marden Road Scheme 2**

Connection into the existing Foul sewer at connection point TQ77439704 located within Marden Road to the site frontage. In order to cater for the additional flows within the foul system it is proposed to upgrade 100m of sewer prior to the WPS from 150mm to 225mm pipe size. An additional 760m of foul sewer from manhole TQ78439803 located in Headcorn Road crossing agricultural land and under the rail line into Staplehurst discharging to the Staplehurst waste water treatment works will need to be upgraded from a 300mm pipe to 375mm pipe size to cater for the additional capacity required.

From continuous dialogue with Southern Water throughout the consultation process it has been suggested there may be technical and or practical difficulties in securing adopting due to the complexities of situating a large tank of foul discharge near to residential development. Southern Water's advice is that Scheme 2 is likely to be the preferred option under the Water act and Section 98 requisition.

Additional surveys have previously been commissioned by Maidstone Borough Council for Halcrow to carry out a Water Cycle Study - June 2010. Part of this report assessed the capacity of a number of WWTW's that have been identified to receive significant additional housing growth above typical windfall rates including Staplehurst. The report concluded there was available headroom for up to 800 households at the Staplehurst WWTW without additional mitigation measures being implemented.

# Flood Risk and Foul Drainage Assessment



## 7 CONSENTS REQUIRED

### 7.1 SECTION 104 AGREEMENT

It is proposed that the Surface water drainage system will be adopted by Southern Water under a section 104 agreement. This is subject to detailed consultation with Southern Water.

### 7.2 SECTION 23, LAND DRAINAGE ACT 1991

Where the new outfall into the existing ponds to the south of the site is proposed, then approval from Kent County Council, who act as the Lead Local Flood Authority, will be required under the Section 23 of the Land Drainage Act 1991.

### 7.3 SECTION 98 REQUISITION

Southern Water will undertake the required upgrade work on the foul sewer network on behalf of the applicant in order to allow development. Southern Water will undertake all consultation with the key stakeholders including: Network Rail, Various Landowners, Local Authority and Highways teams, required to undertake the detailed design and construction of the improvement works.



## 8 CONCLUSIONS & RECOMMENDATIONS

This report has identified the following conclusions:

- The development site is shown on the EA Statutory Flood Maps for Planning as being entirely within Flood Zone 1, thus it is considered to be at low risk of fluvial flooding.
- The proposed development consists of the construction of up to 130 new houses of varying size together with external landscaped areas, car parking and site access roads.
- The application site is of green field use in flood risk terms
- The proposed development is classified as "More Vulnerable" in accordance with Table 2 of the PPG.
- The nearest main river is the River Beult which is located approximately 2.7km to the north-west of the application site.
- There are existing ponds located to the southern boundary of the application site which could serve as a point of discharge for the surface water drainage system.
- According to the records provided by Southern Water adjacent to the site there are several existing foul sewers which traverse Marden Road to the site frontage. A 150mm pipe supplying the WPS and a 150mm rising main heading west from the WPS with eventual discharge at Staplehurst WWTW located to the north east.
- According to the records provided by Southern Water there are no existing surface water sewers within the site boundary. However there is surface water infrastructure located to the north east of the site boundary serving the adjacent residential development.
- A review of all the potential flood risks to the application site has identified that the site is considered to be at low risk of flooding from fluvial sources, and at low risk of flooding from ordinary watercourses, surface water, sewer flooding, groundwater sources, overland flows, and reservoir failure.
- Since the entire site is located in Flood Zone 1 and the development is appropriate in flood risk terms, then the proposed development is considered to have passed the Sequential Test, and there is no need to pass the Exception Test.
- From a review of available information it would seem the dominant geology is Weald clay which would not be suitable for infiltration techniques. This will need to be confirmed through a site investigation.
- It is proposed to discharge surface water from the application site to new attenuation ponds with ultimate discharge into the existing ponds and water course to the south of the site at a restricted rate. This will need to be confirmed with the EA and consent to discharge to be obtained.



# Flood Risk and Foul Drainage Assessment

- As the site is to discharge to an existing watercourse via existing ponds it will be necessary for an oil/petrol interceptor to be incorporated into the access drainage system prior to it discharging.
- A preliminary assessment has identified that the peak foul flows from the new development will be 5.8 l/s and these will be discharged by gravity to the adjacent 150mm diameter foul sewer system.
- Following consultation with Southern Water two options for the upgrade of the existing foul sewer network have been provided to allow for the increased capacity requirements. From a adoptable and practical point of view Southern Waters favoured scheme is likely to be option 2 under a S98 requisition as detailed in section 6.3.

Based on the above, the following recommendations are made:

- As part of the detailed design the use of permeable paving should be considered to maximise the use of SUDS techniques and provide alternative means of achieving good water quality which will potentially remove the need for a separate oil/petrol interceptor.
- The FFL of the new buildings shall be set 150mm above the proposed ground level to ensure that if flows in exceedance of the 1 in 100 years plus 30% allowance for climate change storm event occur or a failure of the site surface water drainage system occurs, that suitable overland flood routes are provided within the development to ensure no localised flooding of the buildings occurs.
- Regular, ongoing maintenance will be required to ensure that the capacity of the system is maintained as it has been designed. Upon completion of the development the drainage system will be submitted for adoption through the Section 104 process.
- The final detailed surface water design will not be available until a later date and it is anticipated that a planning condition will be applied setting out the requirement to provide and approve the final detailed drainage design.
- Confirmation of the preliminary assessment of the peak foul flows is to be confirmed during the detailed design process.
- Further consultation will be required with Southern Water to develop the options for increasing the capacity of the foul system in order to accept the additional capacity. A section 98 requisition may be required in order to provide the extensive upgrade to the existing foul sewer system as detailed in Scheme 2.

# Flood Risk & Foul Drainage Assessment



## Appendix A Proposed Site Layout



Figured dimensions only are to be used. All dimensions to be checked on-site.  
 Differences between drawings and site visits drawings and specifications or bills of quantities to be reported to the PRC Group.

The copyright of the drawings and designs contained therein remains vested in the PRC Group.

Revisions: Drawn/ Chkd: Date:  
 1. 14/08/16 GSG/V 14/08/16  
 2. 14/08/16 GSG/V 14/08/16



Type	Bed/person	Description	Area m2	Area ft2	Private	Shared Equity	Rental	Total No of	Total m2	Total ft2
A	4B/5B/7P	2.5 Storey house	163.5	1760	6			6	981.02	10560
B	4B/8P	3 Storey house	156.5	1685	6			6	939.22	10110
C	4B/8P	2 Storey house	142.7	1536	9			9	1284.25	13824
D	4B/7P	2.5 storey house	139.0	1496	9			9	1250.81	13464
E	4B/7P	2 Storey house (intek)	123.9	1334	4			4	495.71	5336
F	4B/5P	2 Storey house	115.9	1248	2		3	5	579.70	6240
G	3B/5P	2.5/3 storey house	118.3	1252	14			14	1628.35	17528
H	3B/5P	2 Storey house (crank)	93.6	986	8			10	915.99	9860
J	3B/5P	2 Storey house	93.0	1001	7	6	2	19	1766.87	19019
K	3B/5P	2.5 Storey house	124.0	1335	3			3	372.06	4005
L	2B/4P	2 Storey house	79.0	850	7	11	4	22	1737.23	18700
M	1B/2P	FDG	60.9	656			4	3	426.60	4592
2B	2B/2P	Flat	70.0	754				4	288.19	3096
1B	1B/2P	Flat	51.0	549				8	408.02	4392
<b>TOTALS</b>					<b>75</b>	<b>21</b>	<b>30</b>	<b>126</b>	<b>13066.01</b>	<b>140646</b>

Client:  
 STAPLEHURST DEVELOPMENTS LTD (VFUND)



Project:  
 MARDEN ROAD STAPLEHURST

24 Church St West, Staplehurst, Surrey, GU21 0HT  
 01483 454 350  
 info@prc-group.com  
 www.prc-group.com

Drawing Title:  
 PROPOSED SITE PLAN

Scale @ A1: Checked by: Date:  
 1:500 GSG/V AUG 16

Job No: Stage: Drawing No / Rev:  
 10422 PL 02 B

Issue Status:  
 Construction  Preliminary  
 Information  Approval  
 Tender

Architecture  
 Master Planning  
 Urban Design  
 Interiors

Offices  
 Woking  
 London  
 Milton Keynes  
 Worsley

PRC Architecture & Planning

# Flood Risk & Foul Drainage Assessment



## Appendix B

### Existing Drainage Records





## Appendix C

### Correspondence with Southern Water

WYG  
Quay West at Media City UK  
Trafford Wharf Road  
Trafford Park  
Manchester  
M17 1HH

Developer Services  
Southern Water  
Sparrowgrove House  
Sparrowgrove  
Otterbourne  
Hampshire  
SO21 2SW

Tel: **0330 303 0119**  
Email: **[developerservices@southernwater.co.uk](mailto:developerservices@southernwater.co.uk)**

Your Ref:  
CC/002823

Our Ref:  
CC-KENT-00218

Date:  
4<sup>th</sup> March 2016

F.A.O: Mr. Matthew Willis,

**Site: Land South of Marden Road, Staplehurst, Tornbridge, Kent, TN12 0NE.**

Dear Sirs,

Further to your recent application for a level 2 enquiry regarding the above development site.

#### FOUL WATER

Please find enclosed the updated report which details the extent of works required in order for your proposed development site to be accommodated within the local sewerage infrastructure. It should be noted that the report is only a hydraulic solution to provide capacity for the proposed development site. There are other options available to you/ your client in discharging your proposed flows from the site such as making a connection application/requisition to a sewer at a point where capacity is currently available. Section 98 of the Water Industry Act 1991 provides a legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location.

As you are aware the owner or occupier of the premises or private sewer or drain must give the sewerage undertaker notice of the proposed works. Upon receipt of the notice the undertaker may, within 21 days, refuse to allow him to make the connection if it considers that the mode of construction or the condition of the connecting sewer or drain either does

not satisfy the standards reasonably required by the undertaker, or is such that the making of the communication would be prejudicial to its sewerage system.

The right of refusal is limited to these criteria alone and the undertaker cannot refuse to allow the connection on the grounds that the sewerage system is inadequate to take the extra liquid that the connection will discharge into it. This is a matter that should be dealt with at the planning stage.

Yours faithfully

### **Developer Services**

#### **Please note: -**

The information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.



INFRASTRUCTURE ASSESSMENT FOR  
FOUL DRAINAGE AT

LAND SOUTH OF MARDEN ROAD

STAPLEHURST

TONBRIDGE

KENT

TN12 ONE

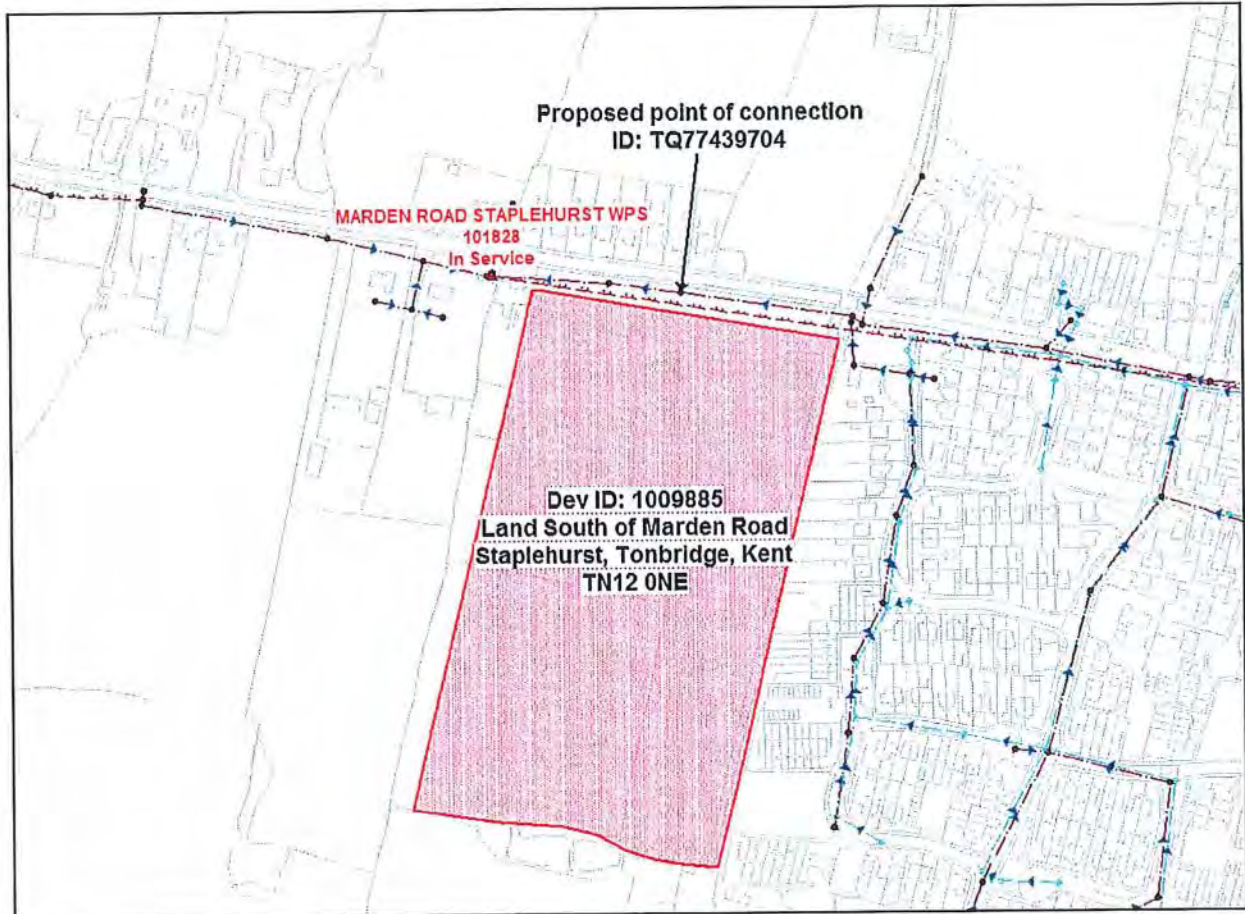
3<sup>rd</sup> MARCH 2016

REQUESTED:  
WYG

## I. Development Details:

The proposal is to discharge of foul flow from the development site to the local foul sewerage system at manhole reference TQ77439704 which is located in Marden Road.

Figure 1 - Proposed Development



## II. Results and Conclusions:

### Foul Water:

There is currently inadequate capacity within the local foul sewerage network to accommodate the additional flow to the proposed manhole reference TQ77439704. The proposed development would increase flows to the local network and as a result existing properties and land may be subject to a greater risk of flooding. The upgrade works required are shown in Figure 2 and detailed in Table 1 (Option 1) and Figure 3, Table 2 (Option 2).



Figure 2- Option 1 - Proposed Improvements – Foul system

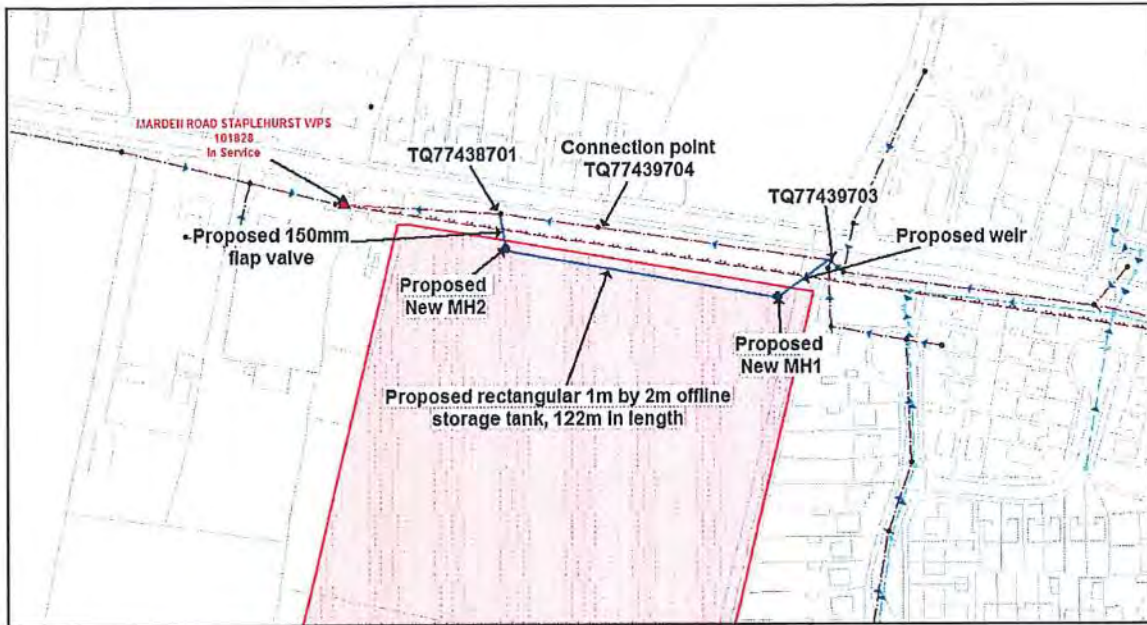


Table 1 – Option 1 - Proposed Improvements Schedule (Foul)

U/S Manhole	D/S Manhole	Sewer Diameter (mm)		Avg. Depth (m)	Length (m)
		Existing	Proposed		
TQ77439703	New MH1	-	weir	2.41	5
New MH1	New MH2	-	1m by 2m offline storage tank	2.89	122
New MH2	TQ77438701	-	150 Flap Valve	2	

Figure 3- Option 2 - Proposed Improvements – Foul system

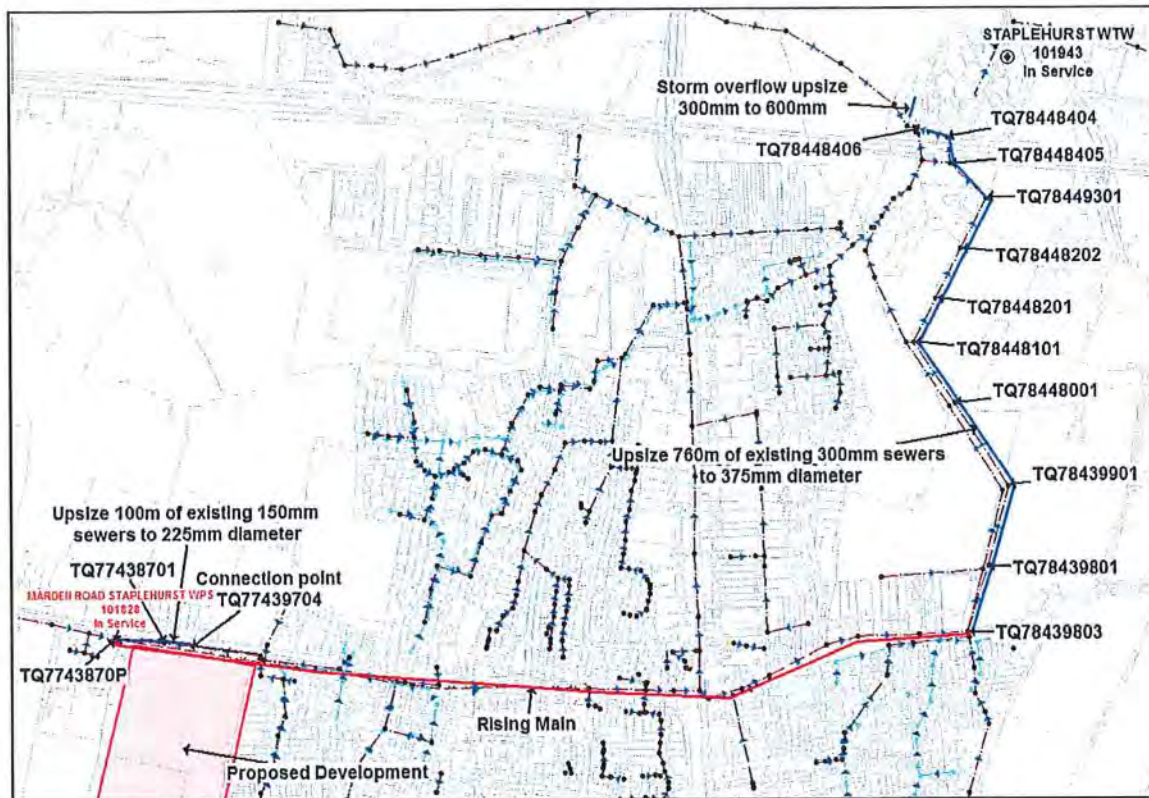


Table 2 – Option 2 - Proposed Improvements Schedule

U/S Manhole	D/S Manhole	Sewer Diameter (mm)		Avg. Depth (m)	Length (m)
		Existing	Proposed		
TQ77439704	TQ77438701	150	225	1.96	37
TQ77438701	TQ7743870P	150	225	1.99	63
Marden Road Staplehurst WPS		19 l/s	24 l/s		
TQ78439803	TQ78439801	300	375	2	88.5
TQ78439801	TQ78439901	300	375	1.98	105
TQ78439901	TQ78448001	300	375	1.76	125
TQ78448001	TQ78448101	300	375	1.79	94
TQ78448101	TQ78448201	300	375	1.6	62
TQ78448201	TQ78448202	300	375	1.62	72
TQ78448202	TQ78449301	300	375	1.52	71
TQ78449301	TQ78448405	300	375	1.7	66
TQ78448405	TQ78448404	300	375	2.12	32
TQ78448404	TQ78448406	300	375	2.12	17
Storm overflow		300	600		
Staplehurst WTW		109l/s	134l/s		

The nearest point where capacity is currently available is at Staplehurst Waste Water Treatment works located approximately 2 km north east of the proposed development site. Section 98 of the Water

Industry Act 1991 provides a legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location.

**Surface Water:**

As a surface water capacity check has not been requested it is assumed that Surface Water will be disposed of by alternative means i.e. Soakaway or any local drainage watercourses, subject to all interested parties approval.

Before any connections are made, an application form needs to be completed and approved by Southern Water Services.

Please note: - The information provided above does not grant approval for any designs /drawings submitted for the capacity analysis. The results are an indicative hydraulic assessment and should not be used as a basis for design. The results quoted above are only valid for 12 months from the date of issue of this letter.

**From:** Marshall, David [David.Marshall@southernwater.co.uk]  
**Sent:** 25 February 2016 15:03  
**To:** matthew.willis  
**Subject:** RE: Marden Road, Staplehurst

Mathew

Sorry I would not be involved in any S98 proposals, It just seems a bit pointless having a foul water sewage storage tank in the development site, my conclusion on seeing the proposal was that it may be better to alter the existing system instead It may result in a cheaper and better solution in the end.

David Marshall  
Technical Co-ordinator  
Developer Services  
Southern House, Sparrowgrove, Otterbourne, Hants SO21 2SW  
Tel: 03303030119  
Email: [david.marshall@southernwater.co.uk](mailto:david.marshall@southernwater.co.uk)  
Web: [www.southernwater.co.uk](http://www.southernwater.co.uk)

---

**From:** matthew.willis [<mailto:matthew.willis@wyg.com>]  
**Sent:** 25 February 2016 14:41  
**To:** Marshall, David  
**Subject:** RE: Marden Road, Staplehurst

David,

Thanks for your reply following our phone conversation, as we are going through the flood risk and foul drainage assessment process we will need to have viable solutions to present for planning. If we were to request a S98 requisition for works on the foul drainage system what are the most likely improvement works to be undertaken? would we be looking at improvement works to the pumping station located to the north-west of the site?

Cheers,

**Matthew Willis** MEng (Hons)  
Graduate Engineer

**WYG**  
Quay West at MediaCityUK, Trafford Wharf Road, Trafford Park, Manchester, M17 1HH  
**Tel:** +44 161 874 4669  
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---

**From:** Marshall, David [<mailto:David.Marshall@southernwater.co.uk>]  
**Sent:** 25 February 2016 12:51  
**To:** matthew.willis  
**Subject:** Marden Road, Staplehurst

Foul Water

Matthew as we discussed earlier today the Capacity Check carried out by Modelling group purely gives a hydraulic solution, which in many cases may not be a practical solution for which a S98 sewer requisition may ultimately be required. Were a S104 application submitted showing a storage tank on the foul water system I would be minded to refuse the application. To my mind it would not be a good idea to have a tank full of septic sewage located adjacent to a residential development due to the risk of odour problems for one thing.

Surface Water Your proposals would seem to be more reasonable but ultimately a S104 application would need to be submitted with a design package for consideration we would also require a letter giving a consent to discharge in perpetuity from the site

David Marshall  
Technical Co-ordinator  
Developer Services  
Southern House, Sparrowgrove, Otterbourne, Hants SO21 2SW  
Tel: 03303030119  
Email: [david.marshall@southernwater.co.uk](mailto:david.marshall@southernwater.co.uk)  
Web: [www.southernwater.co.uk](http://www.southernwater.co.uk)

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**From:** Marshall, David [David.Marshall@southernwater.co.uk]  
**Sent:** 09 March 2016 12:14  
**To:** matthew.willis  
**Subject:** FRA Staplehurst [Filed 09 Mar 2016 12:22]  
**Attachments:** CC-KENT-00218 - Covering Letter-V2.doc; CC-KENT-00218 - Response to Customer-V2.doc; CC-KENT-00218 Sewer Plan.pdf

Matthew

Following our original conversation I asked modelling group to look at the Capacity Check carried out again. I enclose the revised response I received today. I will however take the opportunity to repeat that a Capacity Check is purely a hydraulic Solution which is not necessarily either practical or realistic a S98 requisition may ultimately be required to achieve a workable solution.

David Marshall  
Technical Co-ordinator  
Developer Services  
Southern House, Sparrowgrove, Otterbourne, Hants SO21 2SW  
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If you receive this e-mail by mistake, please delete it then advise the sender immediately by reply e-mail to "Marshall, David" <[David.Marshall@southernwater.co.uk](mailto:David.Marshall@southernwater.co.uk)>.

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**From:** Bland, Chantal [Chantal.Bland@southernwater.co.uk]  
**Sent:** 26 February 2016 15:29  
**To:** matthew.willis  
**Cc:** Marshall, David  
**Subject:** RE: FRA Staplehurst Kent

Hi Matthew,

I checked with Dave and apparently our colleague who has been coordinating the capacity checks has coincidentally sent off a query to the modeller this afternoon regarding the Staplehurst application site.

As soon as we receive feedback, one of us will relay this to you.

Kind regards,

**Chantal Bland**  
Technical Co-ordinator



T. 0330 303 0119 Option 5  
[www.southernwater.co.uk](http://www.southernwater.co.uk)

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**From:** matthew.willis [<mailto:matthew.willis@wyg.com>]  
**Sent:** 26 February 2016 14:59  
**To:** Bland, Chantal  
**Cc:** Marshall, David  
**Subject:** RE: FRA Staplehurst Kent

Chantal,

David has informed me that the original solution proposed by southern water in the Level 2 assessment, an offline storage tank located within the highway but more than likely the site frontage due to issues with construction in the highway, would likely not be an acceptable solution. Could the modelling team revisit the Level 2 assessment to provide a viable solution potentially in the form of improvement works to the pumping station etc. A site adjacent to ours with similar problems had improvement works to the pumping station recommended as a solution.

Many Thanks,

Matt

**Matthew Willis** MEng (Hons)  
Graduate Engineer

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**Fax:** +44 161 872 3193

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**From:** Bland, Chantal [<mailto:Chantal.Bland@southernwater.co.uk>]  
**Sent:** 26 February 2016 13:23  
**To:** matthew.willis  
**Cc:** Marshall, David  
**Subject:** RE: FRA Staplehurst Kent

Good afternoon Matthew,

No, I was not aware that you have made contact with Dave Marshall - you are in good hands, no need for me to get involved as well!

Have a good weekend,  
Kind regards,

**Chantal Bland**  
Technical Co-ordinator



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---

**From:** matthew.willis [<mailto:matthew.willis@wyg.com>]  
**Sent:** 26 February 2016 13:17  
**To:** Bland, Chantal  
**Subject:** RE: FRA Staplehurst Kent

Afternoon Chantal,

I have been speaking with one of your colleagues David Marshall I believe, are you up to date with the foul issues concerning the site and the issues that have arisen with the Level 2 capacity check?

We are developing the Flood risk and Foul drainage assessment for the site so will develop an outline surface water drainage proposal to go with it taking into account Southern Water guidance with regard to SUDs etc.

Many Thanks,

**Matthew Willis** MEng (Hons)  
Graduate Engineer

**WYG**

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**From:** Bland, Chantal [<mailto:Chantal.Bland@southernwater.co.uk>]  
**Sent:** 26 February 2016 13:05  
**To:** matthew.willis  
**Subject:** FW: FRA Staplehurst Kent

Dear Matthew,

I am awaiting feedback from the modeller with regards your foul drainage queries, which I will relay to you once he comes back to me.

In answer to your question regarding the surface water system, it very much depends on where the existing ponds are in relation to the application site. I would need to see the plans (including flow directions and preferably level information) to be sure. In general, Southern Water does not adopt SUDS, and they need to be lined and at least 5m away from the nearest sewer. We need to be certain to exclude the possibility of ground- and surface water ingress into adoptable sewers.

Kind regards,

**Chantal Bland**  
Technical Co-ordinator



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---

**From:** matthew.willis [<mailto:matthew.willis@wyg.com>]  
**Sent:** 19 February 2016 10:16  
**To:** Developer Services  
**Subject:** FRA Staplehurst Kent

To whom it may concern

I am emailing with regard to the Foul drainage assessments we have undertaken for the Marden Road Staplehurst development and which I have attached.

As part of the scheme development WYG are undertaking a Flood Risk & Foul Drainage Assessment for the new residential development at Marden Road as shown on the attached site location plan.

### **Foul Drainage**

In respect to foul flows the anticipated peak foul flows to be accepted are 2.16 l/s (based on the Hydraulic assessment Southern Water have performed). From reviewing the sewer records we are proposing to discharge the foul flows into the existing Foul sewer manhole ref TQ77439704 located to the north of the site. Can you confirm if this will be an acceptable point of discharge?

From the response to our Level 2 Foul drainage assessment it is likely we will require a storage tank, this was initially proposed to be located within the adjacent highways but due to the complications with undertaking this we would propose to locate the storage tank within our site boundary. Can you also confirm that this would be acceptable? The proposed storage tank was approx 1mx2mx122m in size; this design will be refined along with the detailed system design at a later date.

Due to the potential complexity of the foul drainage design it may be beneficial to arrange a meeting with Southern Water prior to completion of the FRA and Foul Drainage Assessment to flush out any additional problems. Can you confirm if Southern Water would be available to meet?

### **Surface Water**

In respect to surface water it is proposed to drain under a gravity fed system to existing ponds and watercourse located to the southern edge of the site, this will be developed at a later date.

Can you please confirm the following:

- 1 Your agreement to the proposed drainage ideology
- 2 Provide any details of any historical flooding you may hold for the area and to the locality of the site
- 3 Any other issues which you believe should be considered in undertaking our Flood Risk Assessment

We are in consultation with the EA and Local Authority to obtain and other information

If you wish to discuss any issue relating to the above please contact me on 0161 874 4669.

Regards,

**Matthew Willis** MEng (Hons)  
Graduate Engineer

### **WYG**

Quay West at MediaCityUK, Trafford Wharf Road, Trafford Park, Manchester, M17 1HH

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**Fax:** +44 161 872 3193

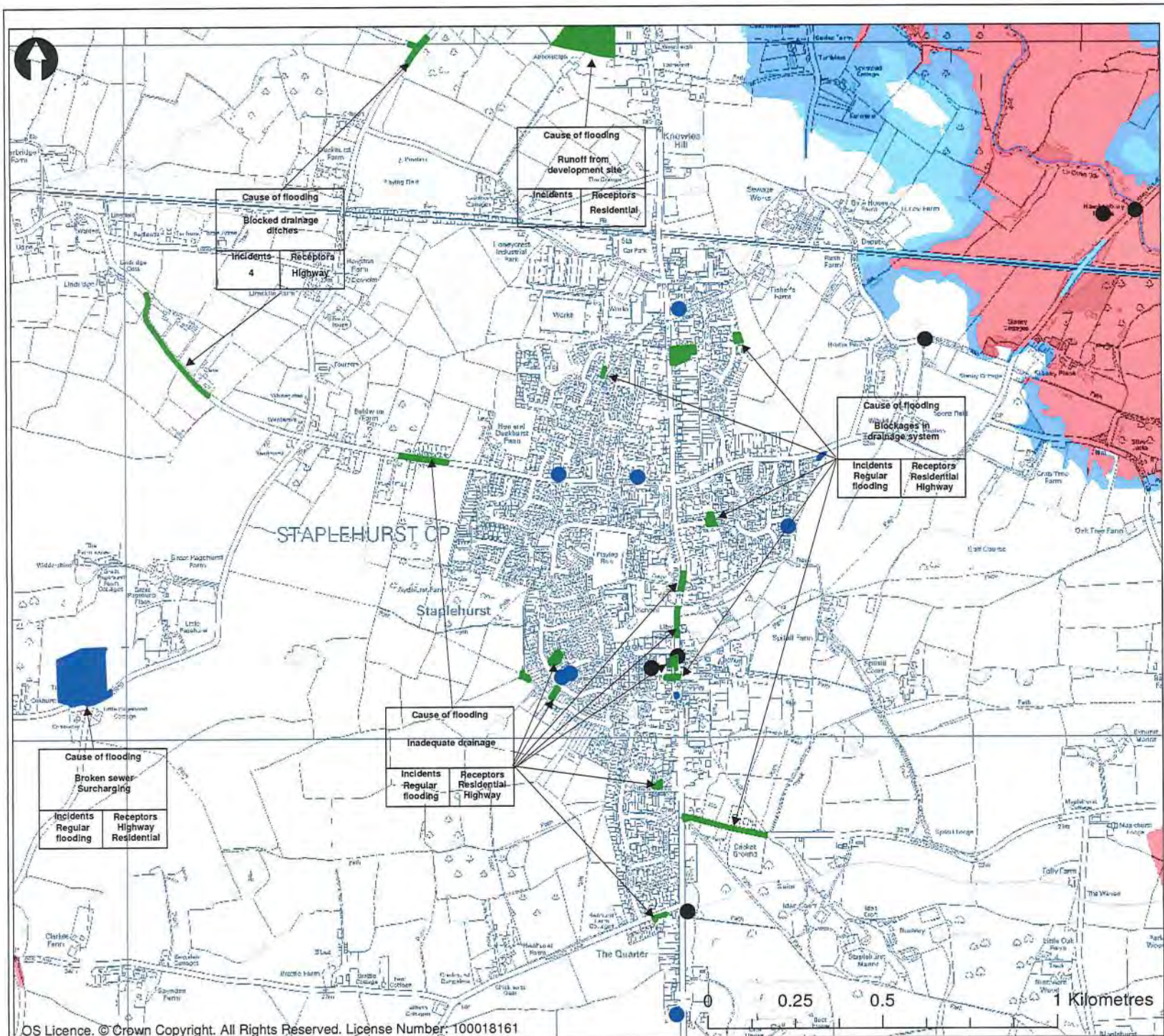
[www.wyg.com](http://www.wyg.com)





## Appendix D

### Mott MacDonald surface water flooding drawing



**Legend**

- EA Main Rivers —
- IDB Drains - - -
- 1 in 1000 year Flood Extent ■
- 1 in 100 year plus Climate Change Flood Extent ■
- Functional Floodplain (1 in 20 year plus 20 % extent of River Beult) ■

**Source of Flooding**

- Sewer Flooding ●
- Surface Water Flooding ●
- Groundwater Flooding ●
- Unknown Source ●

Scale 1:10,500

**Maidstone Borough SFRA**


**Figure 6.14  
Staplehurst Flood Risk  
Including Climate Change**

May 2008

# Flood Risk & Foul Drainage Assessment



## Appendix E Greenfield Run-off Calculation

White Young Green		Page 1
Regatta House Clippers Quay Salford M5 2XP		
Date 10/03/2016 16:20 File	Designed by matthew.willis Checked by	
Micro Drainage	Source Control 2014.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	4.000	Urban	0.000
SAAR (mm)	694	Region Number	Region 7

Results 1/s

QBAR Rural 17.4  
QBAR Urban 17.4

Q1 year 14.8

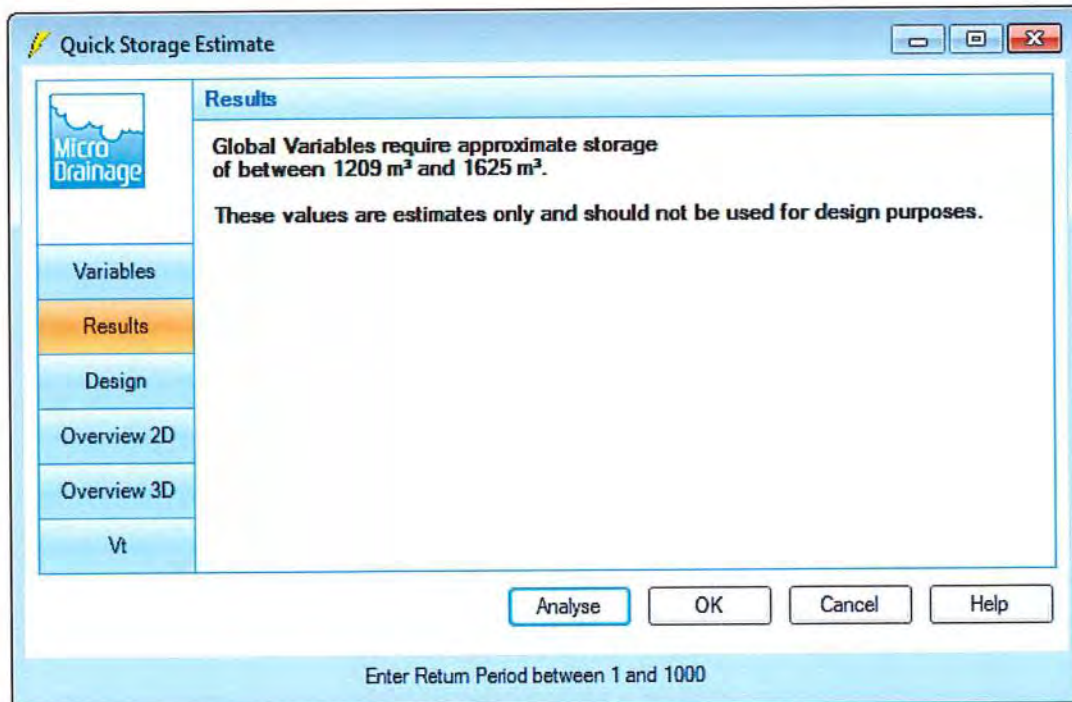
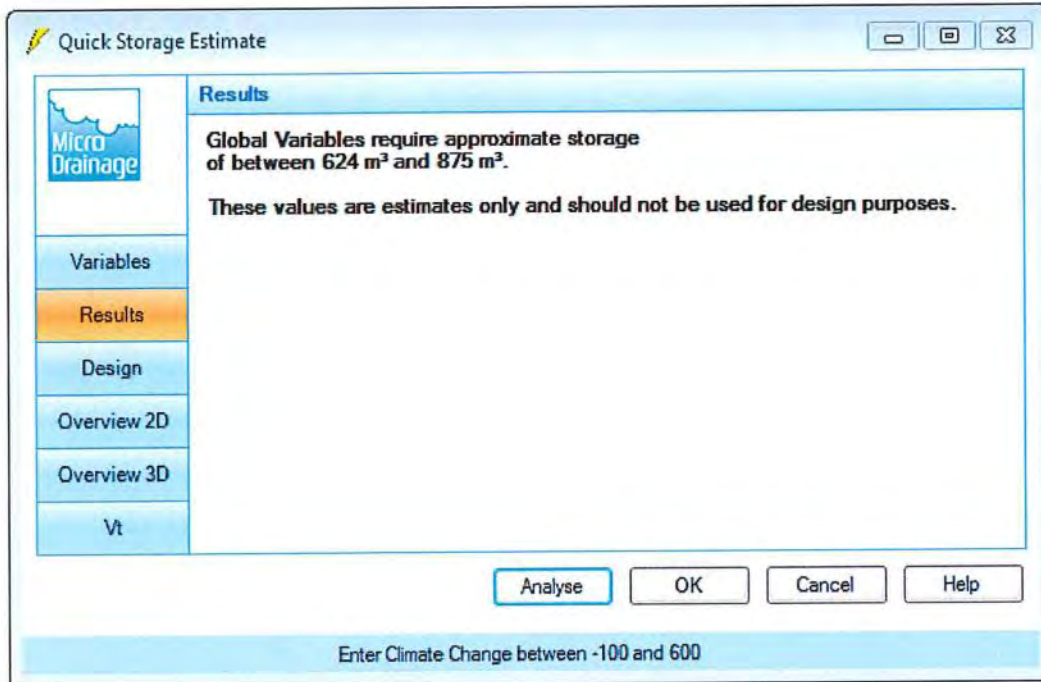
Q1 year 14.8  
Q30 years 39.4  
Q100 years 55.5



## Appendix F

### MicroDrainage Quick Storage Calculations







## Appendix G

### Preliminary Surface Water Drainage Layout

