

FLOOD RISK ASSESSMENT ADDENDUM

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

AT

COLT INTERNATIONAL

HAVANT

Client

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1.0 Introduction

1.1 Brief

- 1.1.1 WFBA have been instructed by Drew Smith Ltd to provide a Flood Risk Assessment Addendum (FRAA) for the residential scheme at Colt International, Havant. This addendum is to the original Flood Risk Assessment and Drainage Strategy produced by White Young Green (WYG) dated 24.08.2018.
- 1.1.2 The site is located to the north of Havant town centre. It is surrounded by residential developments to the north, church and recreation to the west, and industrial/commercial developments to the east and south. The site was previously used as a factory. This has now been demolished.
- 1.1.3 The purpose of this report is to demonstrate the design amendments between outline and reserved matters stage of the planning application.
- 1.1.4 The structure of this report is summarised as follows:
- Section 2: Describes the outline strategy as produced by WYG;
 - Section 3: Provides commentary on how the design has been amended to resolve issues uncovered during the detailed design stage;
 - Section 4: Describes how Sustainable Drainage will be incorporated into the wider drainage network;
 - Section 5: Presents a summary of the report and identifies the main conclusions that can be drawn.

2.0 Original Planning Drainage Strategy

2.1 Existing Conditions

- 2.1.1 The site is located to the north of Havant town centre. It is surrounded by residential developments to the north, church and recreation to the west, and industrial/commercial developments to the east and south.
- 2.1.2 The site was previously used as a manufacturing factory by Colt International. The site was vacated in September 2017 and demolition of the main structure was completed in 2019.

2.2 Site Topography

- 2.2.1 The site generally falls from 28mAOD in the north-west, to 16mAOD in the south-east. The majority of the site slopes from north-west to south-east. A copy of the topographical survey is included within **Appendix A**.

2.3 Site Hydrology

- 2.3.1 The Environment Agency maps show the habitable areas of the site to be entirely within Flood Zone 1.
- Flood Zone 1 means the risk of flooding from river and sea sources is less than 1 in 1000. There are also areas of Flood Zone 2 & 3 on the site.
 - Flood Zone 2 signifies the land has between a 1 in 100 and 1 in 1000 annual probability of river flooding or land having between a 1 in 200 and 1 in 1000 annual probability of sea flooding.
 - Flood Zone 3 signifies the land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding.
- 2.3.2 The nearest EA Main River is the Lavant Stream which is less than 100m to the east of the site at its closest point.

2.4 Proposed Development

- 2.4.1 The development options will be proposed to consist of up to 95 dwellings, along with associated access roads, open spaces and required infrastructure. A copy of the masterplan is included within **Appendix B**.

2.5 Drainage Strategy

- 2.5.1 WYG compiled the original drainage strategy during the outline planning stage on behalf of Homes England. Their Flood Risk Assessment and Drainage Strategy accompanied the outline planning application in August 2018.

- 2.5.2 The strategy proposed to use a restricted runoff rate set at greenfield values and attenuate the excess flows within underground attenuation tanks. The original planning drainage strategy considered the site, incorporating both the employment and residential areas
- 2.5.3 The planning drainage strategy split the site into 3 areas, Area 1, Area 2, Area 3. Each area was assigned a discharge rate and accommodated its own excess flows within underground attenuation tanks. Each area was restricted to greenfield runoff rate.
- 2.5.4 All 3 areas discharged into the existing monsoon drain located within the site. This drain collected surface water from the previous buildings on the site and discharges into Lavant Stream.
- 2.5.5 The site is located within a groundwater source protection zone 1c. Due to this combined with the history of groundwater flooding within Havant, infiltration is not a feasible option of disposal for surface water. This was the justification used for using a water course as a means of disposal for the surface water

3.0 Changes to Outline Planning Strategy

3.1 Introduction

- 3.1.1 WFBA were instructed by Drew Smith Ltd to progress the detailed design of the WYG planning strategy to a sufficient level of detail to satisfy a reserved matters application. WFBA have only been instructed to design the residential portion of the development, the employment development strategy is to be undertaken by others.
- 3.1.2 The proposed drainage strategy by WFBA covers development areas 1 & 2 from the original WYG strategy.

3.2 Brownfield Runoff Rates

- 3.2.1 Due to the nature of the previous development, WFBA have proposed to use brownfield runoff rates as opposed to greenfield rates. This is due to the site having previously being developed as a factory site. Area 1 was previously 100% impermeable with a tarmac surface. Area 2 was 95% impermeable due to the factory and surrounding service roads. The previous discharge rates for areas 1 & 2 for a 1 in 1-year 60-minute storm were:
- Area 1 – 20.91l/s
 - Area 2 – 71.90l/s
- 3.2.2 The Pitt Report was published in June 2008 as review of the floods in 2007. The report was tasked with carrying out a review of flood risk management, the resilience and vulnerability of critical infrastructure, the emergency response, emergency planning and the recovery phase. The report totalled 92 recommendations to help improve flood risk management, one of which was the better management of surface water drainage.
- 3.2.3 The Pitt Report recommends a 30% reduction is used on the 1 in 1 year 60-minute storm for brownfield developments. This would mean the required flow rates for areas 1 & 2 of:
- Area 1 – 14.64l/s
 - Area 2 – 50.33l/s
- 3.2.4 These flow rates would be used for all storms up to and including the 1 in 100 year +40% climate change storm event. These flow rates would provide a betterment of 84% and 85% for areas 1 & 2 respectively over the 1 in 100 year + 40% climate change storm event. A copy of the calculations used to calculate these values are included within **Appendix C**.

3.3 Attenuation

- 3.3.1 The WFBA drainage strategy proposes to use tanked permeable paving as the main form of attenuation for the main access roads. Permeable paving will provide water cleansing at the source for all surface water to remove Suspended Solids, Hydrocarbons and Heavy Metals without the need for petrol interceptors.
- 3.3.2 In addition to the permeable paving, cellular storage tanks will be used to increase the attenuation capacity downstream of the permeable paving. A copy of the site wide Microdrainage Network calculations are included within **Appendix D**.

3.4 Outfall Locations

- 3.4.1 The discharge points for the two areas will remain the same, the monsoon drain will continue to be used to discharge water from the site into Lavant Stream. The permeable paving will be tanked to ensure water does not discharge into the aquifer below the site.
- 3.4.2 The increased flow rates proposed by the WFBA strategy will provide benefits to the ongoing maintenance of the monsoon drain over the WYG strategy. The flow rates proposed by WYG will not allow the monsoon drain to be self-cleansing due to how low the velocity and quantity of the water will be. This will increase the chances of blockages from silting up. An increased quantity and velocity of water will allow the monsoon drain to continue to be self cleansing.
- 3.4.3 A copy of the updated drainage strategy by WFBA is included within **Appendix E**.

4.0 SuDS Assessment

4.1 SuDS Introduction

- 4.1.1 Sustainable Drainage (SuDS) as described in the SuDS manual are drainage systems designed to maximise the opportunities and benefits we can secure from surface water management. They can provide benefits in 4 main areas, Water Quantity, Water Quality, Amenity, and Biodiversity.
- 4.1.2 SuDS should be chosen to reflect the environment that surrounds them. Not all SuDS are compatible in all locations and care should be taken to ensure that when used they enhance as many of the 4 main areas as possible.
- 4.1.3 In order to comply with the national guidelines and local policies set by Hampshire County Council, an assessment of the possible use of Sustainable Drainage techniques within the proposed surface water drainage design is required.

4.2 SuDS Options

- 4.2.1 There are currently no infiltration results available for the application site. Due to the ground make up and it is assumed infiltration will not be a suitable method of surface water disposal.
- 4.2.2 Where it is possible, it is proposed to incorporate a fully compliant SuDS strategy where economically viable and reasonable in relation to the discharge of surface water drainage from the proposed development.
- 4.2.3 This section will seek to identify some of the SuDS systems and techniques which are to be considered and reviewed as part of the proposed detailed surfacewater drainage design and subsequent planning application for the development site.
- 4.2.4 The accepted SuDS management train consists of three elements:
 - Source Control – Features that capture surface water as close to where it lands such as water butts, green roofs, permeable pavements.
 - Site Control – Features that collect surface water from an area such as a small housing development or commercial development such as swales, ponds and wetlands.
 - Regional Control – Features that take water from large areas such as basins, ponds and wetlands.
- 4.2.5 To select the best method on a site by site basis, a review should be undertaken to see how each could be incorporated into the surface water drainage design. A review for this site has been undertaken below in **Table 4.2.5** for Source Control and **Table 4.2.6** for Site Control methods:

Type of SuDS	Description	Applicability to the Site
Water Butts	Small storage tanks on each housing plot	This application may be appropriate to the site
Green Roofs	Water collected from roofs and reused	Unlikely to be appropriate for this site.
Filter Drains	Linear drains or trenches filled with granular material that allow infiltration to the surrounding ground	Unlikely to be appropriate due to the lack of potential infiltration
Permeable Pavement	Surface that allow surface water inflow to underlying surfaces	This application may be appropriate to the site
Swales	Vegetated channels to convey, store and treat runoff	This application is unlikely to be appropriate for the site due to space constraints.
Shallow Basin/Pond	Shallow areas of open space that temporarily hold water and collect silt	This application is unlikely to be appropriate for the site due to space constraints.

Table 4.2.5 Source Control Measures

Type of SuDS	Description	Applicability to the Site
Swales	Vegetated channels to convey, store and treat runoff	This application is unlikely to be appropriate for the site due to space constraints.
Infiltration Devices	Generally granular trenches or soakaways that store water and allow infiltration into the ground	Unlikely to be appropriate due to the lack of potential infiltration
Shallow Basin/Pond	Shallow areas of open space that temporarily hold water and collect silt	This application is unlikely to be appropriate for the site due to space constraints.

Table 4.2.6 Site Control Measures

- 4.2.6 Due to the size of the site, regional methods have not been considered.
- 4.2.7 It is proposed to use tanked permeable paving for this site. The roads will be constructed using a permeable surface course with the attenuation storage being provided within the construction materials of the road. The road construction will be wrapped in an impermeable membrane which will hold the water in the system similar to a tank. This approach will allow for open spaces to be maximised with amenity spaces and used at all times of year.

- 4.2.8 The drainage system will use a restricted outfall at the discharge location. This restricted outfall will allow the permeable pavement to store the water in times of rainfall above a 1 in 1 year storm.
- 4.2.9 The permeable paving will provide water cleansing at the source. This is done by using the filtration layer within the permeable to catch hydrocarbons, heavy metals and suspended solids to prevent them from ending up in the local watercourses. This is discussed more in section 4.3.

4.3 Water Quality

- 4.3.1 Land use is the primary influencing factor in the quality of urban surface water runoff and is used to assess the pollution hazard posed by the development. In accordance with CIRIA SuDS Manual (C753), it is proposed that the Simple Index Approach is used to assess pollution risk based upon land use:

TABLE 26.1 Approaches to water quality risk management			
Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)

- 4.3.2 CIRIA C753 assigns the site as having a Very Low/Low risk of pollution due to the residential nature of the development. This risk is from Suspended Solids, Metals and Hydrocarbons. Pollution mitigation methods will be implemented accordingly. To deliver adequate treatment, the selected SuDS components will have a total pollution index that equals or exceeds the total pollution hazard index (by contaminant type). Tables 26.2 and 26.3 from C753 show the pollution and mitigation indices:

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

- 4.3.3 As can be seen in **Table 4.3.3** the proposed SuDS component mitigation indices exceed those produced.

Area	Total Indices	Mitigation Measures	Mitigation Indices	Acceptable?
Individual property driveways and low traffic roads	1.3	Permeable Paving	2.0	Yes

Table 4.3.3 Pollution and Mitigation Indices

4.4 Additional Modelling

- 4.4.1 WFBA met with Hampshire County Council in their role as the Lead Local Flood Authority to discuss the proposed changes to the original Outline Drainage Strategy. A copy of the minutes of this meeting are included in **Appendix F**.
- 4.4.2 This meeting discussed the changes to the proposed strategy and the reasoning behind them. HCC were broadly in agreement with the proposals but requested some additional modelling was undertaken. This modelling was to review the capacity of the monsoon drain with the two specified outfalls from the site and to review the impact of a surcharged outfall at the monsoon drain outfall.
- 4.4.3 WFBA have complied with the first request by including the monsoon drain within the site wide Microdrainage model. A copy of these results have been included within **Appendix D**.
- 4.4.4 For the second request from HCC, WFBA have added a 240 minute surcharge during a 1 in 100 year storm event to see the effect this would have on the wider network. This would cause minor amounts of flooding around the site.

This flooding amounts to just over 3m³ cumulatively and does not threaten habitable spaces. This flooding would be temporary and be drain away over the next few hours. A copy of these calculations are included within **Appendix D.**

5.0 Conclusions and Summary

- 5.1.1 WFBA have been appointed by Drew Smith Ltd to prepare a Flood Risk Assessment Addendum (FRAA) in support of a reserved matters application for the proposed development at Colt International, New Lane, Havant.
- 5.1.2 The developable area is located within Flood Zone 1 and at little or no risk of fluvial or tidal flooding. The EA Risk of Surface Water Flooding Map shows there is very low risk of flooding within the site.
- 5.1.3 Planning policy in England encourages development in Flood Zone 1, and this FRA proves that the site will not increase risk of flooding elsewhere.
- 5.1.4 The original greenfield runoff rate has been replaced with a reduced brownfield runoff rate.
- 5.1.5 A SuDS based attenuation approach has been proposed to previous non SuDS based strategy.
- 5.1.6 The outfall rate will be restricted to this rate for all storm events up to and including a 1 in 100-year storm event + 40% climate change allowance.
- 5.1.7 Separate foul and surface water networks will be utilised by this development.
- 5.1.8 The development proposals are duly presented in terms of flood risk and in line with the guidance set out in the TGNPPF and the requirements of the Environment Agency and Lead Local Flood Authority.

Appendix A

Topographic Survey

DETECTION SURVEY REPORT

GENERAL
This survey was carried out in accordance with PAS 128:2014 (Publicly Available Specification from BS) After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2014. The survey boundary has been shown on the drawing; please see final site section of the survey for reference.

DESKTOP UTILITY REPORT
Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. Record information was at the time of the survey less than 90 days old in accordance with the requirements of the PAS 128:2014. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the attachments page of the desktop utility report.

DETECTION SURVEY
DRAINAGE
Drainage was traced with pipe sizes and invert levels recorded. Wherever possible the chamber sizes have been recorded and positioned on the drawing. Assumed connection between MH43 and MH42 through internal drainage, not surveyed. All connections from gullies, external manholes and sewer lines have been recorded wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed until proven otherwise. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labeled as G4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A.
WATER
Water was located utilizing EML and GPR methods to quality level Q2. The supply to the site could not be located and has been transcribed to the drawing from the supplied record information through any relevant water furniture to quality level Q2A.
GAS
Gas services located using EML methods to quality level Q2. Gas supply to the site were located. Where completed services meant that we could no longer induce a signal onto the pipe in Bartons Road, record information has been transcribed to the drawing to quality level Q2A.
ELECTRICITY
Electricity cables located utilizing EML and GPR methods to quality level Q2, where GPR results confirmed EML findings the quality level has been upgraded to Q3. While every effort is made to detect all underground cables it is not always possible, but ended cables being particularly difficult to locate. Extreme care should be taken when undertaking all excavations. The LV loop supplying the lamp posts in the rear car park is an assumed route and labeled Q2A accordingly.

TELECOM
Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber boxes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly.

CATV
CATV was located utilizing EML and Gpr methods to quality level Q2. Where possible the fibre optic ducting has been located along Bartons Road, where it could not be located the information has been transcribed to the drawing to quality level Q2A.

UNKNOWN
An unknown service located along New Lane, recommend trial excavations to confirm the location, depth and nature of the service. An unknown service was located across New Lane, this could be due to the site entrance, this could be the water supply to the site. Recommend trial excavations to confirm location, depth and nature of the service in critical areas. An unknown service located crossing the old rear entrance to the car park, recommend trial excavations to confirm location, depth and nature of the service in critical areas.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

Utility Type	Provider Details	Date Acquired
Drainage	Southern Water	06/09/2017
Water	Princes Water	13/09/2017
Gas	SGN	31/08/2017
Electricity	Scottish and Southern	31/08/2017
Telecom	Openreach	31/08/2017
CATV	Virgin Media	09/09/2017

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Electricity	Scottish and Southern	31/08/2017
Telecom	Openreach	31/08/2017
CATV	Virgin Media	09/09/2017

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Drainage	Southern Water	06/09/2017
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Gas	SGN	31/08/2017
Electricity	Scottish and Southern	31/08/2017
Telecom	Openreach	31/08/2017
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