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PROPERTY & CONSTRUCTION CONSULTANTS

**DRAINAGE IMPACT ASSESSMENT & DRAINAGE
STRATEGY, HARTS FARM WAY, HAVANT, PO9 1FA**

06 March 2018

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EXECUTIVE SUMMARY

This report explores the drainage impact of the proposed development and outlines the surface water management strategy that can be implemented.

The surface water drainage network has been designed to accommodate the surface water runoff generated by a critical storm from a 1 in 100 year return period. Allowance for climate change has been added which equates to an additional 20%. The foul water will be discharged to the existing foul sewer network.

The Local Authority SUDS Officer Organization (LASOO) through its publication “Non-Statutory Technical Standards for Sustainable Drainage” has set out guidance together with a number of technical standards that can be used to “judge” whether a drainage scheme submitted through the planning process complies with current policy (both national and local).

The table below sets out how this development proposals drainage strategy complies with this guidance and meets the technical standards expected.

Technical Standard	LASOO Strategy Comment	Report Comment
S1	Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control Standards (S2 and S3) and volume control Standards (S4 to S5) need not apply.	Discharge is proposed to existing highway drainage utilising the existing connections. A 50% reduction on the existing discharge rates is offered by the proposed strategy. Refer to Chapter 4.3.
S2	For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.	N/A (Brownfield site)
S3	For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event	A 50% reduction on the existing discharge rates is offered by the proposed strategy. Refer to Chapter 4.3.
S4	Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 years, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.	N/A (Brownfield site)
S5	Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 years, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.	Storage volume associated with a 50% reduction on the existing discharge rates is provided by the proposed strategy. Refer to Chapter 4.3.
S6	Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.	N/A

Technical Standard	LASOO Strategy Comment	Report Comment
S7	The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.	Below ground storage volume for the 1 in 30 year annual probability event is provided for the whole site. Above ground storage is incorporated in the drainage design of Phase 2. Drainage design ensures no flooding to any. Refer to Chapter 4.3.
S8	The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement) or in any utility plant susceptible to water (e.g. pumping station or electricity substation within the development).	Drainage design ensures no flooding to any building. Refer to Chapter 4.3.
S9	The design of the site must ensure that so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.	Flood flow route for events in excess of the 1 in 100 year annual probability event to be provided along the south boundary of the site. Levels design to promote such flood flow route and be developed at detailed design stage. Refer to Chapter 4.3.
S10	Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.	General maintenance requirements are highlighted in this report. Refer to Chapter 4.5.
S11	The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.	To be confirmed at detailed design stage.
S12	Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity	N/A

1. INTRODUCTION

1.1.1. This Drainage Impact Assessment and Drainage Strategy report has been prepared by Ridge on behalf of Salmon Property in support of a planning submission for a commercial development on a parcel of land located in Harts Farm Way, Havant, PO9 1FA.

1.1.2. This report has been prepared to provide the following information on drainage to satisfy planning requirements:

- Assessing the current infrastructure;
- Assessing the capacity and suitability of existing drainage to accommodate additional flows;
- Preliminary assessment of storm water attenuation (SuDS) requirements and volumes;
- Determining the foul and surface water runoff generated by the proposed development;
- Preliminary concept drainage design.

2. SITE INFORMATION

2.1 LOCATION

2.1.1. The site is located in Havant, approximately 120 m south of A27. Site Reference information is included in Table 1.

Table 1 Site Reference

ITEM	DESCRIPTION
Site Name	Plot 4, Hermitage Park, Harts Farm Way, Havant, PO9 1FA
County & Local Council Area	Hampshire County Council (Lead Local Flood Authority) Havant Borough Council (Planning Authority) Southern Water (Water Undertaker)
Survey Grid Ref	470653 105851

2.1.2. The site is delineated by Hermitage Park to the north and east, Harts Farm Way to the south, and an unnamed access road to the west (see Figure 1). The site can be accessed both from Harts Farm Way and Hermitage Park.

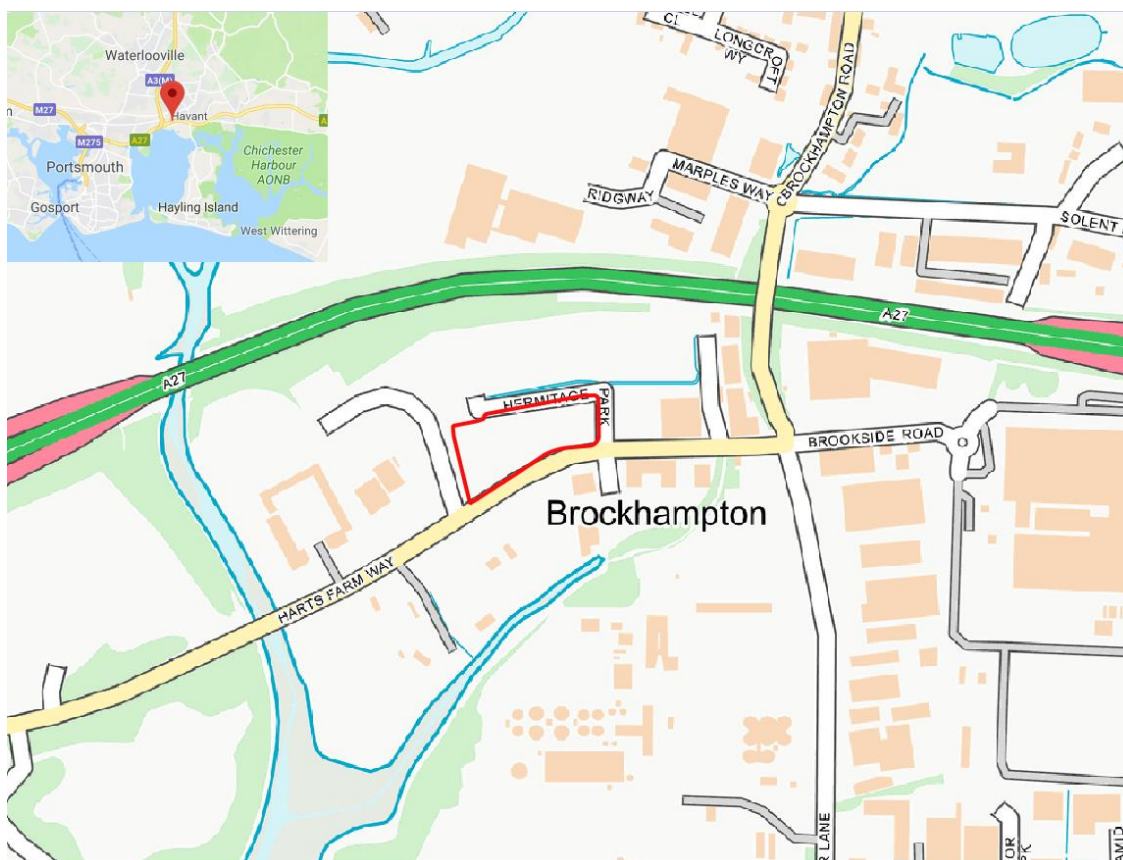


Figure 1 Site Location Plan

2.2 TOPOGRAPHY

- 2.2.1. The topographic Survey¹ indicates that levels generally fall from east to a westerly direction. The highest elevation recorded along the east boundary is 4.00m AOD and along the west boundary is 3.56m AOD. The approximate slope across the site is 1 in 320.
- 2.2.2. The topographic survey indicates the presence of two earth bunds within the southwest and southeast extent of the site. This is understood to be heaped demolition rubble.

2.3 GEOLOGY

- 2.3.1. A ground condition assessment² has been carried out by Ridge in 2017. The report includes a review on all available historical information regarding the site as well as presents the results of recent site investigation data. The description of underlying geology presented in this chapter is based on the information provided by the above assessment.
- 2.3.2. BGS mapping extract indicate the site to be underlain by superficial deposits of Alluvium over River Terrace Deposits overlying bedrock geology of the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation (undifferentiated).
- 2.3.3. As part of the various ground investigations³ groundwater levels were recorded within the River Terrace Deposits between 1.35m and 2.07mbgl. Given the shallow depth of the groundwater, it is considered that the site is generally unsuitable for the use of soakaways.

2.4 HYDROLOGY

- 2.4.1. The closest watercourses to the site is an unnamed tributary of Brockhampton Stream which flows along the north and west boundary of the site discharging to the stream 160 m south of the site (refer to Figure 2). Both watercourses are classified as Environment Agency (EA) main rivers, therefore any proposed discharge made to the stream and works carried out within 8 m of the top of the river bank requires written consent⁴.

¹ Designbase – Drawing no. DB3192-TOPO – February 2018

² Ridge and Partners LLP – Ground Condition Assessment – October 2017

³ Refer to Table 9.1 of the ground condition assessment report (Ridge 2017)

⁴ In accordance with Flood Risk Activities: Environmental permits [available at <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>] [accessed 26/02/2018]

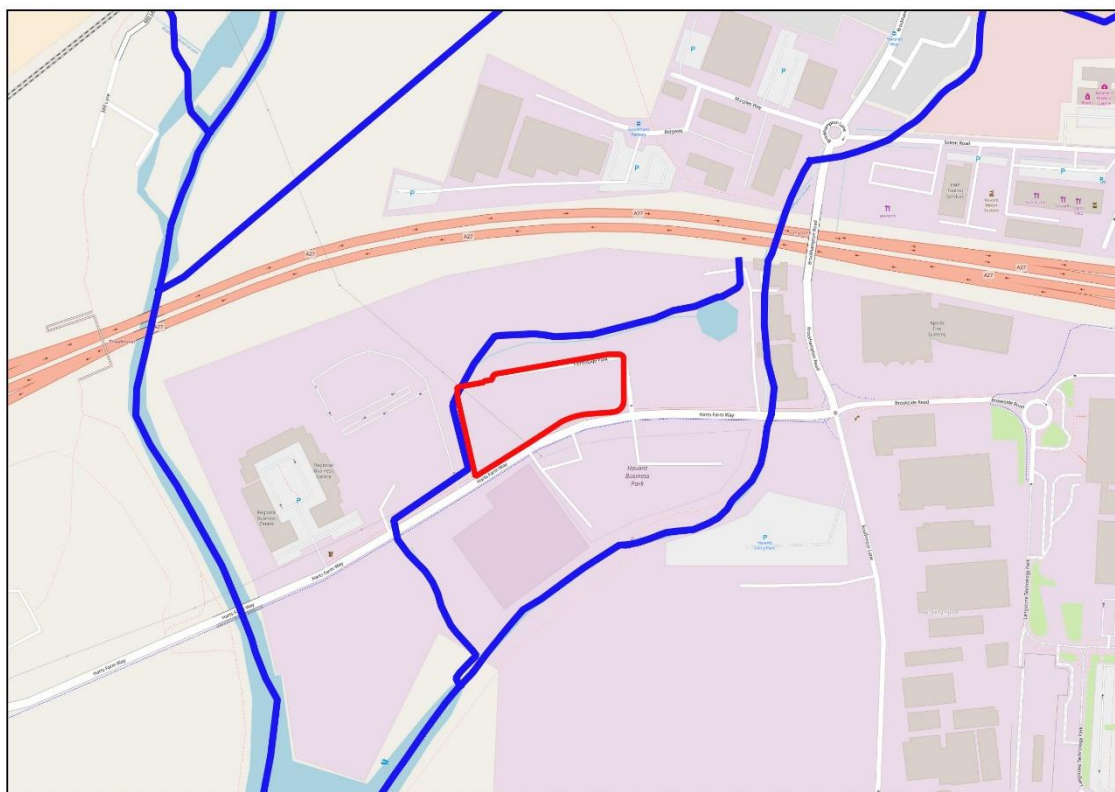


Figure 2 Hydrological Features

2.5 HYDROGEOLOGY

2.5.1. Historic site investigation report⁵ indicate the underlying superficial deposit is classified as a Secondary A aquifer (permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers) and bedrock as a Principal aquifer (layers of rock or drift deposits that have high intergranular and/or fracture permeability providing a high level of water storage).

2.5.2. EA mapping indicate that the site does not lie within a groundwater source protection zone.

2.6 EXSITING SITE

2.6.1. It is understood that the site has been previously developed, however the existing structures were demolished. Currently, the majority of the area is covered by bare ground where the demolished buildings and surfacing had been removed with macadam and concrete associated with access roads and car parking still locally present. The site is overgrown with a number of mature trees to southern and western perimeter (see Figure 3).

⁵ Structural Soils Ltd – Final Report on Site Investigation – August 2013



Figure 3 Existing Site Layout

2.7 PROPOSED DEVELOPMENT

2.7.1. It is proposed to redevelop the site into commercial/industrial uses (50% Class B2 and 50% Class B8) with associated car parking. The proposed site layout is provided in Appendix A, at the rear of this report.

3. SOURCES OF FLOOD RISK

3.1 INTRODUCTION

3.1.1. This section summarises the potential flood risk to the site from various sources. A summary of the flood risk from these sources is given in Table 2.

Table 2 Flood Risk Summary Table

POTENTIAL SOURCE OF FLOODING	OVERALL RISK
Fluvial and Tidal	Low
Surface Water	Low
Groundwater	Medium
Reservoir	Very Low

3.2 FLUVIAL & TIDAL FLOODING

3.2.1. The site is shown by the EA's Flood Zone mapping to be wholly within Flood Zone 1 (Low Risk) (see Figure 4). Flood Zone 1 comprises land assessed as having a 0.1%, or less, Annual Exceedance Probability (AEP) of fluvial or tidal flooding in any given year, equivalent to the 1 in 1,000 year, or more, return period event. As such, the site is concluded to be at a low risk of fluvial & tidal flooding.

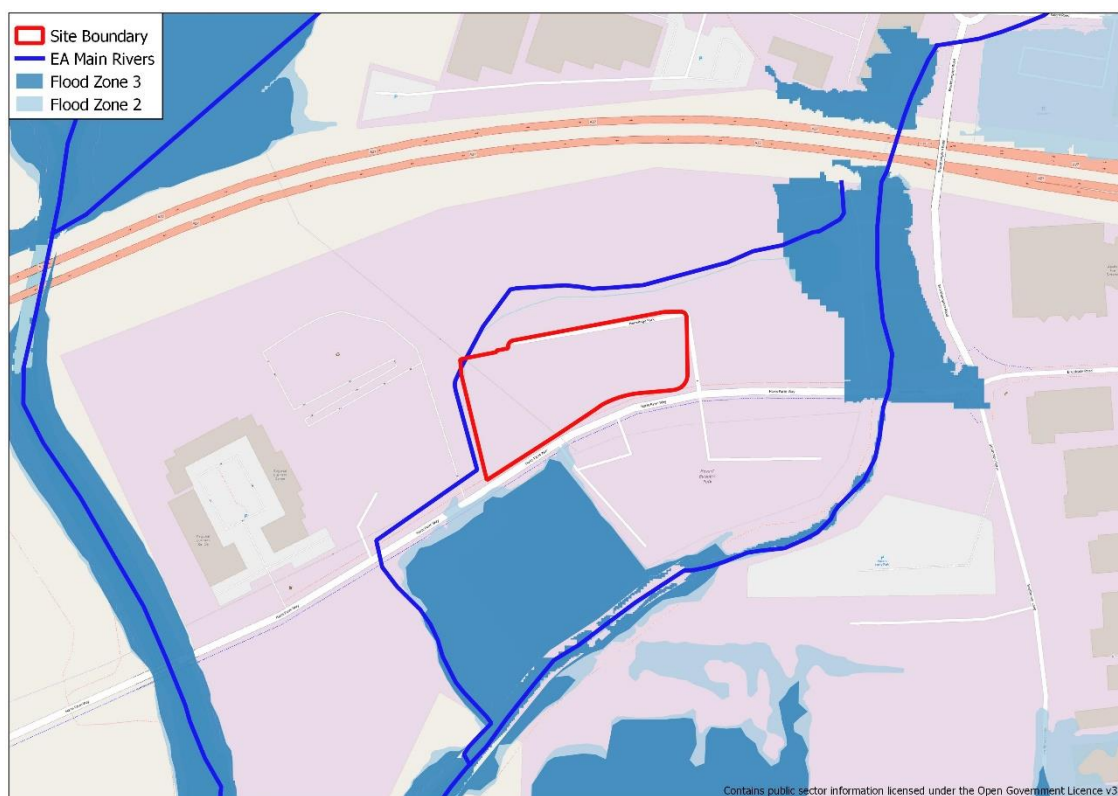


Figure 4 Risk of Flooding from Rivers and Sea

3.3 SURFACE WATER FLOODING

- 3.3.1. Surface water flooding occurs as the result of an inability of intense rainfall, or overland flows, to infiltrate to ground. This often happens when the maximum soil infiltration rate or storage capacity is reached. Such flows either drain into existing land drainage features or follow the general topography which can concentrate flows and lead to localised ponding/flooding.
- 3.3.2. The EA Surface Water Flooding Map (Figure 5) shows that the majority of the site is at a very low risk of flooding from this source (less than 1 in 1,000 (0.1%) annual probability of flooding). There are however, small areas of the site that are shown to be at a low risk (between 1 in 1,000 (0.1%) and 1 in 100 (1%) annual probability), that are assumed to be a result of localised depression areas post demolition.

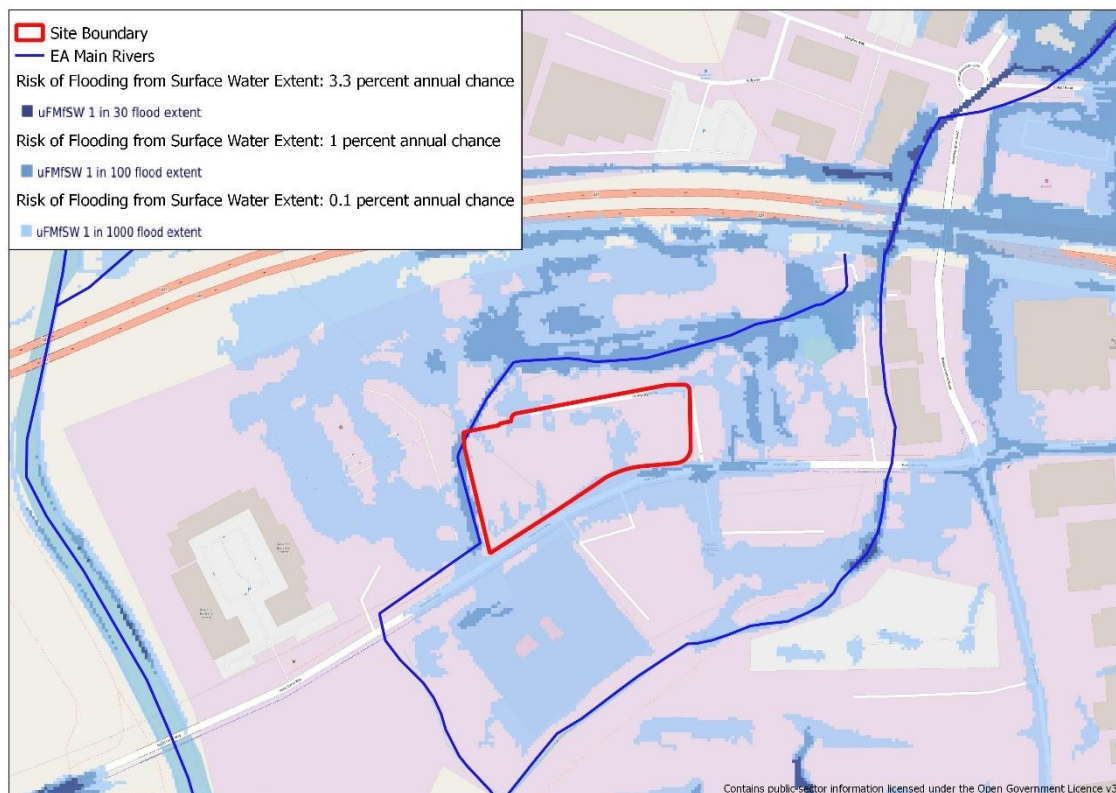


Figure 5 Risk of Flooding from Surface Water

- 3.3.3. Adequate levels and drainage design will eliminate the residual risk of flooding from surface water to the site.

3.4 GROUNDWATER FLOODING

- 3.4.1. PUSH mapping indicates high bedrock permeability underneath the site. The Strategic Flood Risk Assessment⁶ (SFRA) update states that Havant has historically been susceptible to groundwater

⁶ PUSH – Strategic Flood Risk Assessment – Havant Borough Council – 2016 update

flooding. The key risks to new developments in the Havant Borough come from increases in flows in the Lavant Stream as a result of high groundwater levels emerging in East Hampshire District.

3.4.2. The site is located outside the Lavant catchment which was identified to have high risk of groundwater flooding. Considering the historic information and underlying ground conditions, the overall risk to the site is considered to be medium.

3.5 FLOODING FROM RESERVOIRS

3.5.1. Based on EA indicative mapping the site is not at risk of flooding from reservoirs.

4. SURFACE WATER DRAINAGE

4.1 EXISTING SURFACE WATER DRAINAGE

4.1.1. Google earth image from 1999 indicate the presence of existing buildings and associated access road, car park and landscaping within the site boundary. The EA main river mapping shows that the unnamed tributary flows from east to a south-west direction to the north of the site, crossing it on the north-west corner and flowing southwards along the west boundary (refer to Figure 6).



Figure 6 Site Layout in 1999

4.1.2. It is understood that the main river has been diverted along Hermitage Park to the north of the site in 2015⁷. Runoff from this road is collected via gullies and discharged to the unnamed tributary via 3No. outfalls.

4.1.3. The utility survey⁸ indicates that the car park within the western extent of the site is drained via a network of linear drainage channels and gullies. Runoff from the remaining hard paved areas are collected via gullies. There are two existing connection points to the highway drainage in Harts Farm Way. Final discharge point is unknown, however considering the proximity to an open watercourse it is assumed that the highway drain outfalls to the unnamed tributary. For the layout of the existing drainage features refer to Figure 7.

⁷ Upton McGougan – Drawing no. 034.0036-2100 – As built issue 21/07/2015

⁸ DesignBase – Topo Survey of Harts Farm Way, Havant – Drawing no. 03 DB3192-TOPO_USP-520842485 – February 2018

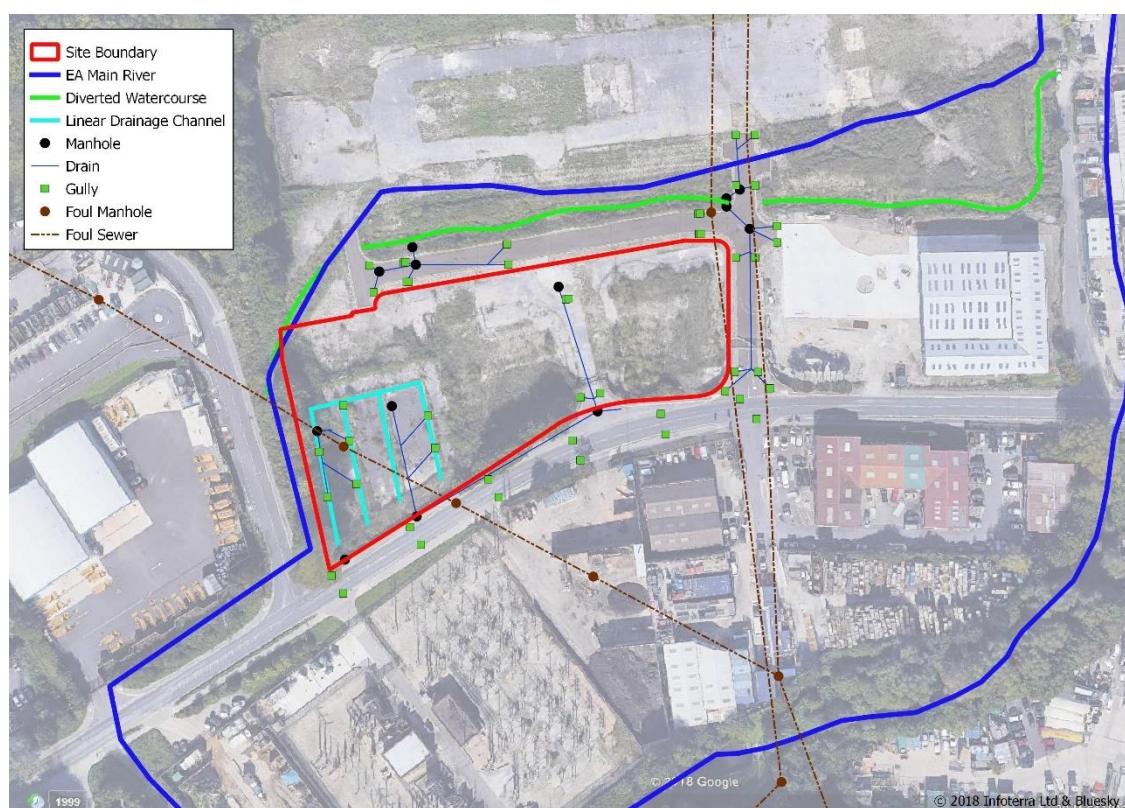


Figure 7 Existing Drainage Features

4.1.4. The site area is approximately 0.9 ha. Based on the historic layout 94% of the site is impermeable⁹. Runoff from the site is assumed to be unrestricted. Existing peak discharge rates were calculated based on the Wallingford Procedure and Modified Rational Method and presented in Table 3. Detailed calculations are provided in Appendix B, at the rear of this report.

Table 3 Existing Runoff Calculations

RETURN PERIOD	1 IN 1	1 IN 2	1 IN 10	1 IN 30	1 IN 100
Peak runoff rate (l/s)	66	86	132	162	209

4.2 DESIGN CALCULATIONS

4.2.1. The proposed site is considered to be 100% impermeable. The design life of industrial/commercial developments is considered to be 60 years. Peak post-development runoff rates were calculated based on the Wallingford Procedure and Modified Rational Method (refer to Table 4). In accordance with the EA climate change allowances guidance¹⁰ the anticipated change in peak rainfall intensity by 2078 is between 20% (central) and 40% (upper end). Considering that the site is located in close proximity to the final discharge point to the sea, the central climate change allowance was applied throughout the calculations. Detailed calculations are provided in Appendix C, at the rear of this report.

⁹ Total site area is 8992 m². Extent of existing landscaping is 845 m². Calculations were performed in QGIS 2.18.15.

¹⁰ Environment Agency – Guidance Flood risk assessments: climate change allowances – February 2016 (last updated February 2017)

Table 4 Post-Development Runoff Calculations

RETURN PERIOD	1 IN 1	1 IN 2	1 IN 10	1 IN 30	1 IN 100
Peak runoff rate including 20% allowance for climate change (l/s)	88	114	177	217	282

4.2.2. The Surface Water Management Plan (SWMP)¹¹ states that surface water arising from a developed site should, as far as practicable, be managed in a sustainable manner in order to replicate greenfield runoff rates arising from the site prior to the proposed development. Measures to manage surface water runoff from proposed developments should also reduce the flood risk to the site itself and downstream receptors, whilst taking into account climate change.

4.3 PROPOSED SURFACE WATER DRAINAGE STRATEGY

4.3.1. The topographic survey indicates that Harts Farm Way is drained via gullies (refer to Figure 7). Runoff from the road is assumed to discharge to Brockhampton Stream, south of the development site, however this is not confirmed by the survey.

4.3.2. The site is understood to drain unrestricted and discharged to the highway drain in Harts Farm Way. It is proposed to provide 50% betterment on the 1 in 1 annual probability peak flow rates, therefore the runoff from the site is to be restricted to 33 l/s. This measure ensures that flood risk is reduced to downstream receptors.

4.3.3. Due to the lack of infiltration potential on the site, as a result of high groundwater table, runoff generated from the site will need to be stored within the site boundary. The storage volume required providing 50% betterment on the existing flow rates equates to 385 m³ for up to the 1 in 100 year annual probability events including 20% allowance for climate change¹². The storage volume estimates were calculated in MicroDrainage Source Control Modul. The output is provided in Appendix D, at the rear of this report.

4.3.4. The development is planned to be constructed in two phases and subsequently the buildings will be occupied by separate tenants who will be responsible for the maintenance of the drainage network. Due to the phased construction, the required storage volumes are provided for Phase 1 and 2 separately on an area proportion bases.

Phase 1

4.3.5. Phase 1 covers approximately 63% of the total site area. Runoff from all hard standings are to be collected via private drains.

¹¹ Hampshire County Council – Surface Water Management Plan Strategic Assessment and Background Information – August 2012

¹² Estimated volume only to allow for a discharge rate of 33 l/s for all storm events – final volume to be established at detailed design stage.

4.3.6. It is proposed to provide below ground attenuation for up to the 1 in 100 year annual probability events including 20% allowance for climate change underneath the car parking. The required storage volume equates to 243 m³. No above ground storage to be provided within Phase 1.

4.3.7. Discharge is to be made via gravity to the highway drain via the existing connection.

Phase 2

4.3.8. Phase 2 covers approximately 37% of the total site area. Runoff from all hard standings are to be collected via private drains.

4.3.9. It is proposed to provide below ground attenuation for up to the 1 in 30 year annual probability events including 20% allowance for climate change underneath the car parking area located in the north-west of the site. The required storage volume equates to 99 m³.

4.3.10. Rainfall events between the 1 in 30 and 1 in 100 annual probability events to be stored above ground within the south-west extent of the site. The required storage volume equates to 43 m³. The average maximum depth of surface water ponding across the designated area is to be no greater than 50 mm.

4.3.11. Discharge is to be made via gravity to the highway drain via the existing connection.

4.3.12. For the proposed layout of the alternative surface water drainage design refer to Figure 8.

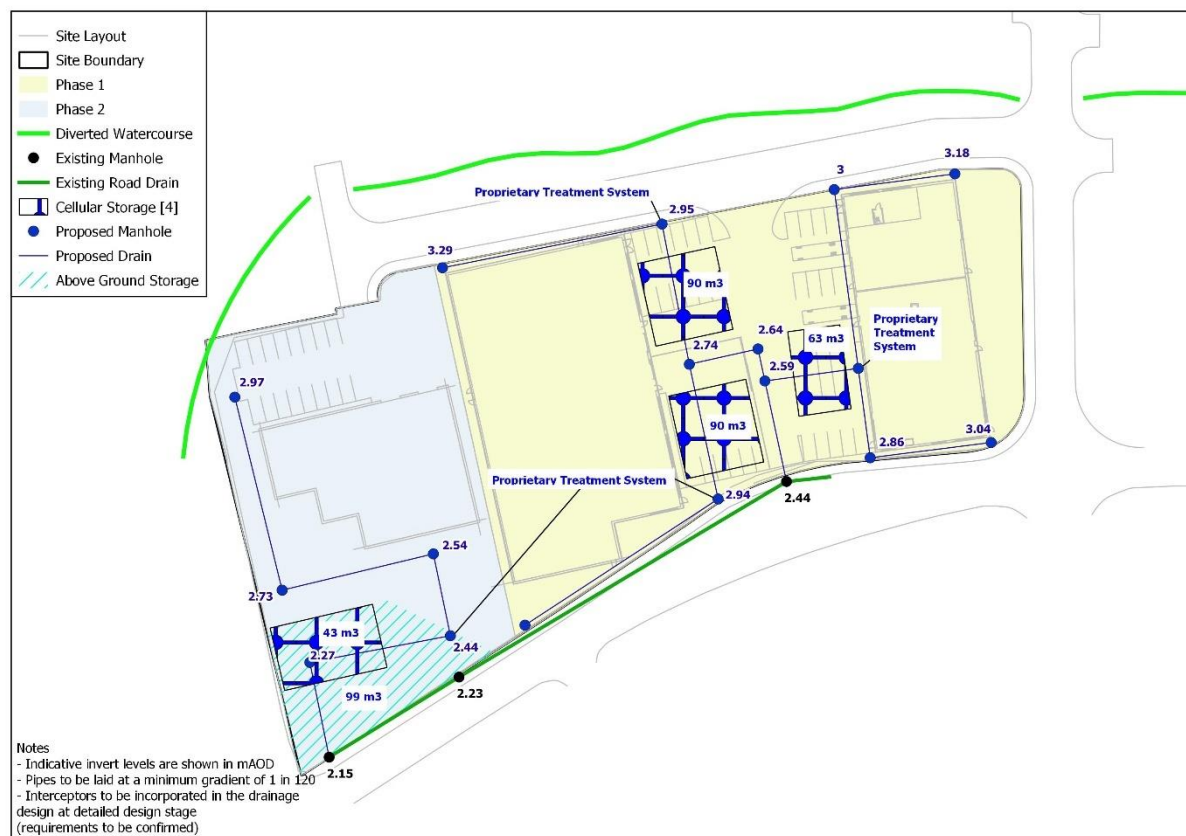


Figure 8 Proposed Surface Water Drainage Design

4.3.13. The combined surface water and foul drainage strategy layout is provided in Appendix F, at the rear of this report.

4.4 WATER QUALITY

4.4.1. The effects of the proposed development on local water quality has been assessed quantitatively adapting the SUDS simple index approach for contamination mitigation defined in the CIRIA Report C753 "The SUDS Manual" (refer to Chapter 26).

4.4.2. The proposed development areas are classified under two land uses: other roofs (commercial/ industrial roofs), and commercial yard/delivery areas. In accordance with Table 4.3 of "The SUDS Manual" roofs have a low pollution hazard level index, and commercial yards have a medium pollution hazard level.

Table 5 CIRIA C753 Pollution Hazard Indices for Different Land Use Classification

LAND USE	POLLUTION HAZARD LEVEL	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
Other Roofs	Low	0.3	0.2	0.05
Commercial Yard	Medium	0.7	0.6	0.7

4.4.3. Below ground attenuation for the management of surface water runoff is proposed across the application site. Connection from the private drainage system is to be made to the highway drainage which is assumed to discharge into the watercourse adjacent to the site.

4.4.4. According to CIRIA C753 guidelines (Chapter 26) the SUDS features applied within the drainage strategy, mentioned above, are allocated SUDS mitigation indices for discharge to surface water. These are summarised in Table 6 below.

Table 6 Indicative SUDS Mitigation for Discharges to Surface Water

TYPE OF SUDS COMPONENT	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
Cellular Storage	n/a	n/a	n/a
Proprietary Treatment Systems	Design to demonstrate they can address each contaminant type to acceptable levels for frequent events up to approximately the 1 in 1 year return period event		

4.4.5. To deliver adequate treatment, the SUDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index. Based on 'The SUDS Manual' below ground cellular storage does not provide significant removal of pollutants, therefore a proprietary treatment system is

to be applied. In accordance with PPG¹³ where there is risk of regular contamination of surface water runoff with oil and risk of larger spills (vehicle maintenance area, goods vehicle parking or vehicle manoeuvring) a full retention separator with alarm is required to be incorporated in the drainage design (Class 1 due to subsequent discharge to surface water body).

- 4.4.6. To ensure appropriate levels of treatment are met, as part of the drainage strategy for the Proposed Development proprietary treatment/interceptors have been specified upstream of each attenuation tank to filter hydrocarbons and other pollutants as primary methods of treatment. The exact type of proprietary treatment system is to be specified at detailed design.

4.5 MAINTENANCE

- 4.5.1. Once the site becomes operational regular inspection and maintenance of trapped gullies, channel drain sumps, catchpits, attenuation tanks, proprietary treatment systems, and hydro-brake flow control chambers, will be required. The proprietary treatment systems, attenuation tanks and hydro-brake flow control chambers will be supplier design, with suitable access for inspection and future maintenance.
- 4.5.2. Maintenance is proposed to be in accordance with Table 14.2 and 21.3 of the SUDS manual CIRIA 753 as shown below. A full Operation and Maintenance Manual will be required for the site to include all details of the drainage scheme.

¹³ EA/SEPA/EHSNI – Pollution Prevention Guidelines (PPG) 3 Use and design of oil separators in surface water drainage systems – 2006

TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Figure 9 General Maintenance Requirement Schedule

4.5.3. Maintenance of the overall drainage network will be the responsibility of the tenants.

4.5.4. Should a pumped solution be preferred to allow direct discharge to the surface water, regular inspection of the pump station will be required by the tenants. The detailed maintenance requirements of the surface water pump station to be provided by the manufacturer.

5. FOUL WATER DRAINAGE

5.1.1. There are no existing buildings located within the boundary, therefore it is understood that currently there is no foul flow from the site.

5.1.2. Internal layouts and the number of sanitary appliances incorporated in the scheme were provided to Southern Water. Subsequently the post-development foul flow rate from Phase 1 was established to be 0.05 l/s by Southern Water (see Appendix E). Determining the flow rate associated with Phase 2 of the scheme is in abeyance. Confirmation with regards to the available capacity of the public sewer to accept the additional flows is yet to be obtained.

5.1.3. Foul water from the buildings to be collected via private drains. It is proposed to discharge foul flows from the new buildings to Southern Water public sewers. Connections from the new buildings to be made via gravity downstream of manhole no. 6802 and a new connection between manhole no. 7902 and 7701. The proposed foul drainage layout is provided in Figure 10.

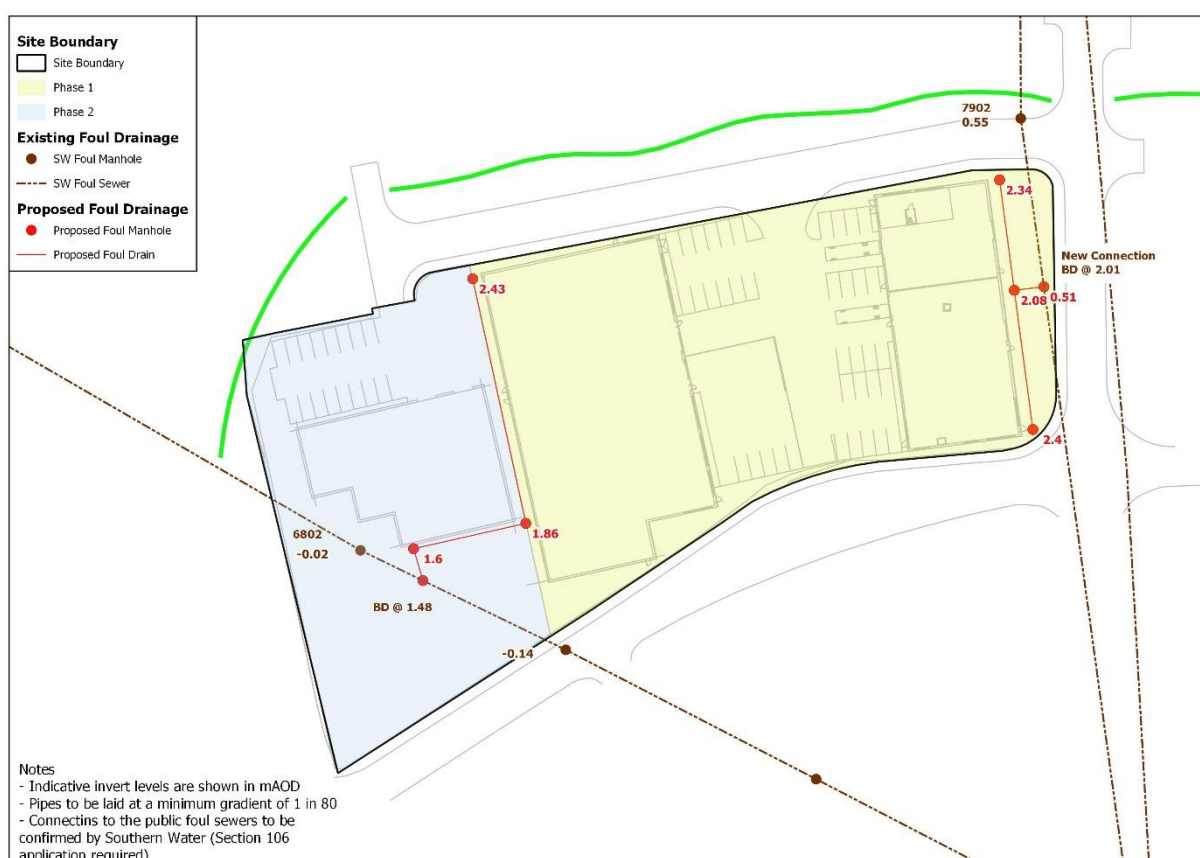


Figure 10 Proposed Foul Water Drainage

5.1.4. The combined surface water and foul drainage strategy layout is provided in Appendix F, at the rear of this report.

6. CONCLUSIONS

- 6.1.1. The site is currently brownfield and has been previously developed. The majority of the area is covered by bare ground where the demolished buildings and surfacing had been removed. For the drainage design purposes, it is understood that 94% of the site is impermeable.
- 6.1.2. It is proposed to redevelop the site into commercial/industrial uses (50% Class B2 and 50% Class B8) with associated car parking.
- 6.1.3. The groundwater level underlying the site is between 1.35 and 2.07 mbgl. Given the shallow depth of the groundwater, it is considered that the site is generally unsuitable for the use of soakaways.
- 6.1.4. An existing EA main river flows from east to a south-west direction to the north of the site, crossing it on the north-west corner and flowing southwards along the west boundary. This watercourse has been diverted along Hermitage Park road to the north of the site in 2015.
- 6.1.5. Existing drainage features on site were recorded as part of the topographic survey. There are two connection points from the site to the highway drain in Harts Farm Way.
- 6.1.6. It is proposed to provide 50% betterment on the existing surface water runoff rates from the site. Storage volume is to be provided via a combination of below ground attenuation tanks and above ground storage. Discharge is proposed to the existing highway drain in Harts Farm Way, and subsequently to the adjacent watercourse. Consent for discharging into a main river is required from the EA.
- 6.1.7. In accordance with guidelines in The SUDS Manual it is proposed to incorporate proprietary treatment systems within the surface water drainage network for contamination mitigation as per the simple index approach.
- 6.1.8. There are no existing buildings located within the boundary, therefore it is considered that currently there is no foul flow from the site. Post-development foul flows of Phase 1 are predicted to increase to 0.05 l/s. It is proposed to collect foul water via private drains and discharge via gravity to Southern Water public sewers. A Level 1 capacity check was submitted to confirm that the proposed additional flows can be accommodated within the Southern Water public network. Official response yet to be obtained.

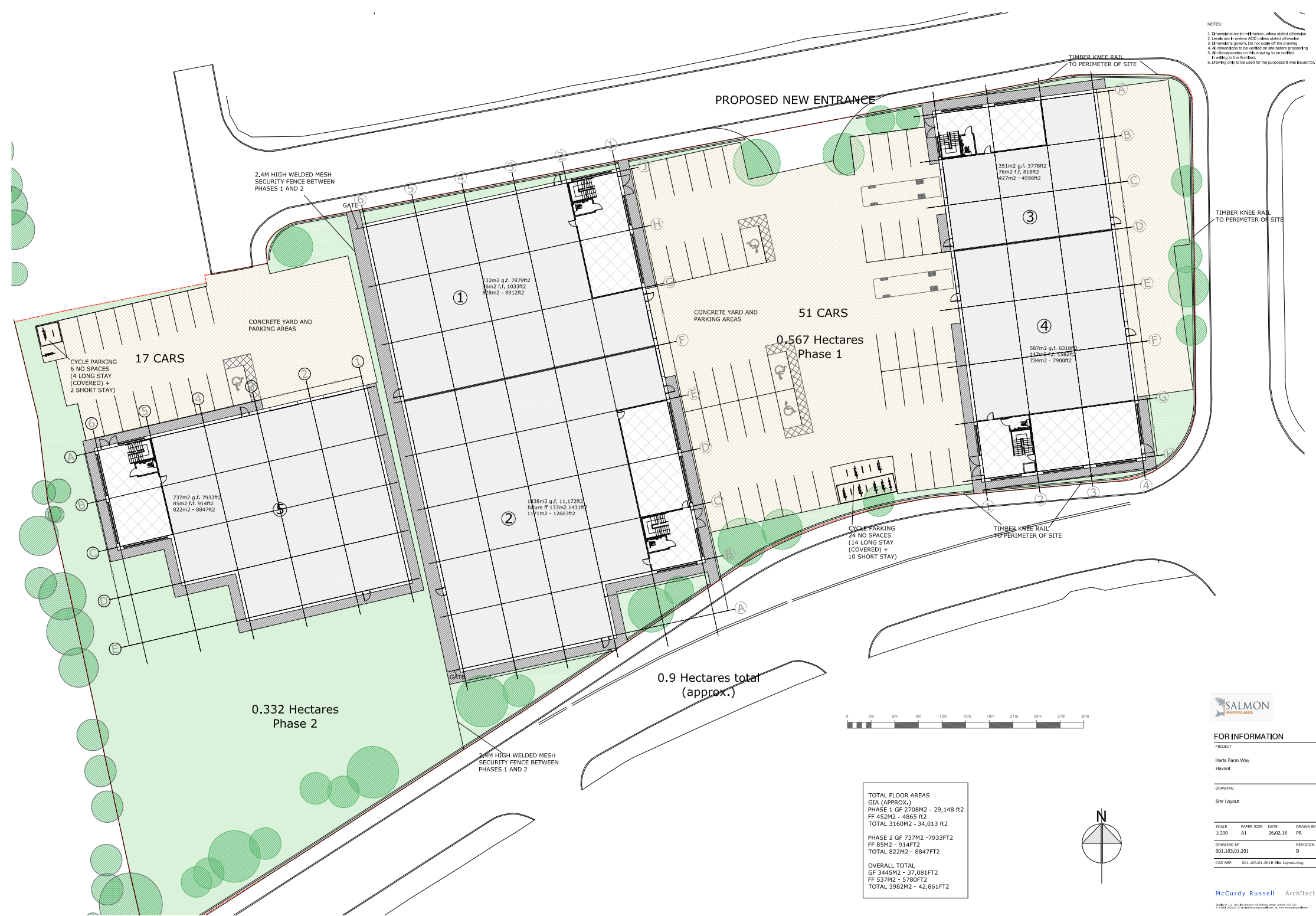
APPENDICES



APPENDIX A

PROPOSED SITE LAYOUT

- NOTES:
1. Dimensions are in millimetres unless stated otherwise
 2. Levels are in meters ACD unless stated otherwise
 3. Dimensions given. Do not scale off the drawing
 4. All dimensions to be verified on site before proceeding
 5. All dimensions on this drawing to be verified in writing to the Architect
 6. Drawing only to be used for the purposes it was issued for.



FOR INFORMATION

PROJECT
Harts Farm Way
Havant

DRAWINGS
Site Layout

SCALE	PAPER SIZE	DATE	DRAWN BY
1:200	A1	26.02.18	PR
DRAWING NO	REVISION		
001.103.01.201	B		
CAD REF.	001.103.01.201B Site Layout.dwg		

McCurdy Russell Architects

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APPENDIX B

EXISTING RUNOFF RATE CALCULATIONS

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 1 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 0 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min = 11.9 mm
Factor Z2 (Wallingford procedure)	Z2 = 0.61
Rainfall for 15min storm with 1 year return period	M1_15min = Z2 × M5_15min _i = 7.3 mm
Design rainfall intensity	I _{max} = M1_15min / D = 29.2 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8147 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 66.1 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 2 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 0 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min = 11.9 mm
Factor Z2 (Wallingford procedure)	Z2 = 0.79
Rainfall for 15min storm with 2 year return period	M2_15min = Z2 × M5_15min _i = 9.4 mm
Design rainfall intensity	I _{max} = M2_15min / D = 37.8 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8147 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 85.5 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 10 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 0 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min = 11.9 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.23
Rainfall for 15min storm with 10 year return period	M10_15min = Z2 × M5_15min _i = 14.6 mm
Design rainfall intensity	I _{max} = M10_15min / D = 58.4 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8147 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 132.3 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 0 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min = 11.9 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.50
Rainfall for 15min storm with 30 year return period	M30_15min = Z2 × M5_15min _i = 17.9 mm
Design rainfall intensity	I _{max} = M30_15min / D = 71.6 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8147 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 162.0 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 0 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min = 11.9 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.94
Rainfall for 15min storm with 100 year return period	M100_15min = Z2 × M5_15min _i = 23.1 mm
Design rainfall intensity	I _{max} = M100_15min / D = 92.4 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8147 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 209.1 l/s

APPENDIX C

POST-DEVELOPMENT RUNOFF CALCULATIONS

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 1 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 20 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 14.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 0.62
Rainfall for 15min storm with 1 year return period	M1_15min = Z2 × M5_15min _i = 8.8 mm
Design rainfall intensity	I _{max} = M1_15min / D = 35.3 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8992 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 88.3 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 2 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 20 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 14.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 0.80
Rainfall for 15min storm with 2 year return period	M2_15min = Z2 × M5_15min _i = 11.4 mm
Design rainfall intensity	I _{max} = M2_15min / D = 45.6 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8992 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 113.9 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project				Job no.	
	Harts Farm Way				5004378	
	Calcs for				Start page no./Revision	
	Salmon Property				1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	RH	12/02/2018	KS	15/02/2018		

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 10 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 20 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 14.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.24
Rainfall for 15min storm with 10 year return period	M10_15min = Z2 × M5_15min _i = 17.7 mm
Design rainfall intensity	I _{max} = M10_15min / D = 70.7 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8992 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 176.5 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project Harts Farm Way				Job no. 5004378	
	Calcs for Salmon Property				Start page no./Revision 1	
	Calcs by RH	Calcs date 12/02/2018	Checked by KS	Checked date 15/02/2018	Approved by	Approved date

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 20 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 14.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.52
Rainfall for 15min storm with 30 year return period	M30_15min = Z2 × M5_15min _i = 21.7 mm
Design rainfall intensity	I _{max} = M30_15min / D = 86.9 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8992 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 217.1 l/s

 Ridge and Partners LLP Partnership House Moorside Road, Winchester SO23 7RX	Project				Job no.	
	Harts Farm Way				5004378	
	Calcs for				Start page no./Revision	
	Salmon Property				1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	RH	12/02/2018	KS	15/02/2018		

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Other
Storm duration	D = 15 min
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.3 mm
Increase of rainfall intensity due to global warming	p _{climate} = 20 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 14.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.98
Rainfall for 15min storm with 100 year return period	M100_15min = Z2 × M5_15min _i = 28.3 mm
Design rainfall intensity	I _{max} = M100_15min / D = 113.0 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 8992 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 282.3 l/s

APPENDIX D

STORAGE VOLUME CALCULATION



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Variables

FSR Rainfall

Return Period (years)

Region

Map

M5-60 (mm)

Ratio R

Cv (Summer)

Cv (Winter)

Impermeable Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr)

Safety Factor

Climate Change (%)

100

England and Wales

19.300

0.350

0.750

0.840

0.899

33.0

0.00000

2.0

20



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Results

Global Variables require approximate storage of between 236 m³ and 385 m³.

These values are estimates only and should not be used for design purposes.



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Variables

FSR Rainfall

Return Period (years)

Region

Map

M5-60 (mm)

Ratio R

Cv (Summer)

Cv (Winter)

Impermeable Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr)

Safety Factor

Climate Change (%)

30

England and Wales

19.300

0.350

0.750

0.840

0.899

33.0

0.00000

2.0

20



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Results

Global Variables require approximate storage of between 158 m³ and 269 m³.

These values are estimates only and should not be used for design purposes.



APPENDIX E

SOUTHERN WATER FOUL FLOW RATES

Rita Hegedus

To: Rita Hegedus
Subject: RE: SWS-HANTS-CC-003894 Harts Farm Way - capacity check response query

From: Ward, Stuart <Stuart.Ward@southernwater.co.uk>
Sent: 10 May 2018 18:27
To: Rita Hegedus <RHegedus@ridge.co.uk>
Subject: RE: SWS-HANTS-CC-003894 Harts Farm Way - capacity check response query

Afternoon Rita

The modelling team will rerun the assessment on 0.05 l/s which is the equivalent flow from 5 dwellings. We should have the answer next week Friday, if I get the results before that I will let you know.

Kind Regards

Stuart Ward
Technical Manager



03303030119 www.southernwater.co.uk

Southern Water, Southern House, Sparrowgrove, Otterbourne, SO21 2SW

From: Rita Hegedus [<mailto:RHegedus@ridge.co.uk>]
Sent: 04 May 2018 16:00
To: Ward, Stuart <Stuart.Ward@southernwater.co.uk>
Subject: RE: SWS-HANTS-CC-003894 Harts Farm Way - capacity check response query

Hi Stuart,

Based on the latest internal floor plans issued to us I believe that the total number of discharge units is 5 x wash hand basins and 5 x toilets. I am not aware of any other sanitary units located within the proposed buildings, however I have asked for clarification from the Architect. Could you please review the capacity assessment on the basis of the 5 toilets and 5 wash basins? Will get back to you in case any other appliances are proposed (although I would doubt that considering that the main uses of the site will be storage).

Just to confirm that the strategy submitted for planning was that unit 3 – 4 (containing 2no. toilets and 2no. wash basins) is to connect to the sewer between manhole no. 7802 and 7701 and Unit 1, 2, and 5 (containing 3no. toilets and 3no. wash basins) to manhole no. 6802.

Best Regards,

Rita Hegedus
Civil Engineer
For Ridge and Partners LLP

Tel: 01962 834407 **Office:** 01962 834 400 **Mobile:** 07818523086
[Winchester office rhegedus@ridge.co.uk](mailto:rhegedus@ridge.co.uk) www.ridge.co.uk [social media](#)
[email disclaimer](#)



From: Ward, Stuart <Stuart.Ward@southernwater.co.uk>
Sent: 04 May 2018 15:29
To: Rita Hegedus <RHegedus@ridge.co.uk>
Subject: RE: SWS-HANTS-CC-003894 Harts Farm Way - capacity check response query

Afternoon Rita

Please could you confirm that the total numbers of discharge units are as below? Could you confirm that there is no other proposed discharge units not mentioned below? If this is the only discharge we could revisit the results of the previous capacity assessment.

7 x toilets
5 x wash hand basins
0 x showers
0 X canteen facilities
0 X vehicle wash down?
0 x Trade flow
0 X washing machine

Kind Regards

Stuart Ward
Technical Manager



03303030119 www.southernwater.co.uk

Southern Water, Southern House, Sparrowgrove, Otterbourne, SO21 2SW

From: Rita Hegedus [<mailto:RHegedus@ridge.co.uk>]
Sent: 03 May 2018 09:30
To: Ward, Stuart <Stuart.Ward@southernwater.co.uk>
Subject: FW: SWS-HANTS-CC-003894 Harts Farm Way - capacity check response query
Importance: High

From: Rita Hegedus
Sent: 27 April 2018 17:07
To: 'Stuart Ward' (stuart.ward@southernwater.co.uk)' <stuart.ward@southernwater.co.uk>

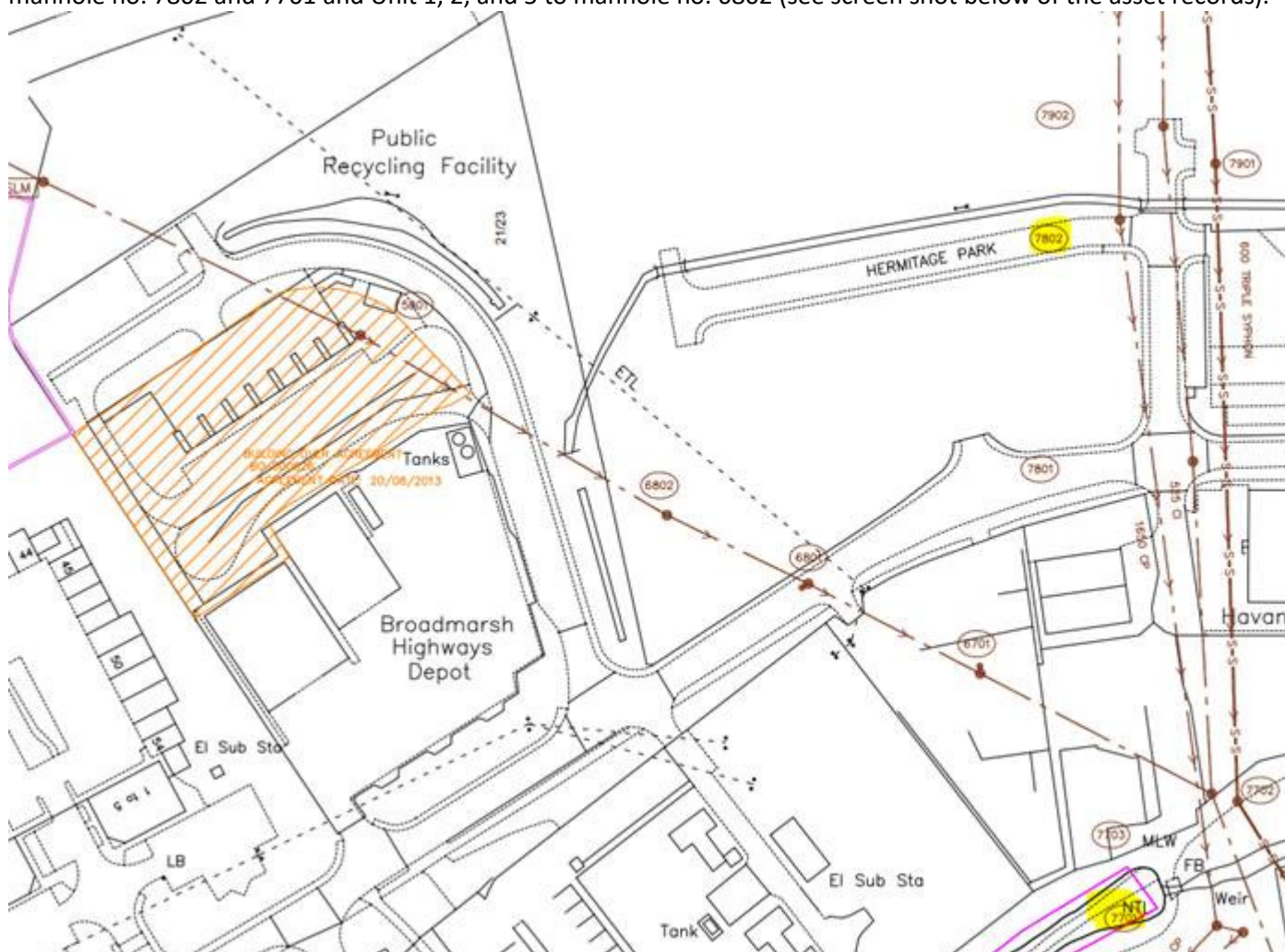
Subject: SWS-HANTS-CC-003894 Harts Farm Way - capacity check response query

Importance: High

Good Afternoon,

Following up on our recent phone conversation please find attached the capacity check response signed by Geoffrey Hall that was received with regards to the Harts Farm Way commercial development dated 18 April 2018.

I have attached the site layout plan showing the location for Unit 1 – 5 along with the proposed floor plans. In line with our drainage design it is proposed to connect Unit 3 – 4 to the public sewer via a lateral connection between manhole no. 7802 and 7701 and Unit 1, 2, and 5 to manhole no. 6802 (see screen shot below of the asset records).



The site is proposed to be utilised for office and storage purposes. I have attached the proposed floor layout. It is my understanding that Unit 3 – 4 includes 2No. toilets and 2No. wash basins and Unit 1, 2, and 5 3No. toilet and 3No. wash basin. There are no showers/canteens/laundry facilities associated with the development.

The predicted foul flows I have submitted were based on Sewers for Adoption 7th Edition due to the unknown internal layout, and therefore was subsequently calculated to be in the order of 0.66 l/s for Unit 1,2,5 and 0.33 l/s for Unit 3-4.

It is my understanding that the proposed floor layout suggests that the actual peak foul flows should be significantly lower than what was calculated in accordance with Sewers for Adoption 7th Edition. Could you please review the above information and advise whether revised assumed lower flows (based on your internal calculation methodology) could be accommodated within the sewer network without offsite upgrade works/ sewer requisition?

I am in the office all day on Monday and would be more than happy to further discuss this case over the phone as this is an urgent matter for the developer with regards to the construction timescales for the scheme.

Best Regards,

Rita Hegedus
Civil Engineer
For Ridge and Partners LLP

Tel: 01962 834407 Office: 01962 834 400 Mobile: 07818523086
Winchester office rhegedus@ridge.co.uk www.ridge.co.uk [social media](#)
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APPENDIX F

DRAINAGE STRATEGY

