Foul and Surface Water Drainage Strategy

Chartway Group Ltd
Thanet Way, Whitstable, Kent, CT5 3DG
December 2019

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Quality Assurance

Site name: Thanet Way, Whitstable, Kent, CT5 3DG

Client name: Chartway Group Ltd

Type of report: Foul and Surface Water Drainage Strategy

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V.01	December 2019	Draft issue for external review	RB	NR
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Relevant Drawings & Calculations

- CON597-3500-C2 Section 104 Agreement Plan Sheet 1 of 2
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- CON597-3502-C2 Impermeable Plan
- CON597-3511-T2 Exceedance Flow Plan Sheet 1
- CON597-3512-T2 Exceedance Flow Plan Sheet 2
- Foul & Surface Water Microdrainage Calculations

1 Introduction

1.1 Barter Hill Consulting Engineers have been commissioned by Chartway Group Ltd to prepare a Foul and Surface Water drainage Strategy Report. The aim of this report is to detail all the foul and surface water drainage and surface water SuDS elements to enable discharge of the following pre-commencement conditions 12 and 15 relating to planning reference 15/01296 and 18/01664.

Condition 12 states:

"No development other than demolition shall commence until a detailed surface water drainage scheme for the site based on sustainable drainage principles and an assessment of the hydrological and hydrogeological context of the development has been submitted to and approved in writing by the LPA".

Condition 15 states:

"No development within a phase of the development (other than demolition and save for the new roundabout access onto the A2990 Thanet Way and save for any phase of development) within the Duncan Down extension land) shall commence until details of the proposed means of foul sewerage disposal for that phase of development have been submitted to and approved in writing by the LPA, in consultation with Southern Water".

2 Site Location

2.1 The site is located between Thanet Way and St Luke's Close/St Andrew's Close, Whitstable, Kent. Thanet Way is to the south east and St Luke's Close/St Andrews Close to the north west. The proposed development is bounded to the south west by arable farmland and to the north east by an existing residential development at Millstrood Road and Golden Hill. The National Grid Coordinates for the proposed development are: NGR: 611400, 165200. The site location is shown below (Figure 2.1).

KEY

Site Grid Reference: 611400, 165200

Site Postcode: CT5 3DG

Approximate Site Boundary

Approximate Phase 1 Site Boundary

3 Description of Works

3.1 The works comprise of a residential development which will be developed in multiple phases. This report will focus on phase 1 of the development which comprises of 80 residential dwellings with associated infrastructure in the form of both private and adoptable estate roads, private and adoptable foul and surface water drainage, works to the existing highway (Thanet Way) in the form of a new roundabout and public open space.

3.2 This report will focus on the onsite foul and surface water drainage and the surface water SuDS features.

The foul water drainage comprises of adoptable sewers and the site will be discharged by gravity to the existing adopted foul water sewer network. The existing foul water network is located to the north of the site within the road at the junction of St Luke's Close and St Vincent's Close. A section 106 application will need to be made to Southern Water to obtain approval to connect to the existing sewer network.

3.3 The surface water drainage strategy comprises of a cumulative restricted discharge rate of 15.9 l/s to an existing ditch located to the north west of the proposed development. Prior to discharging into the outfall ditch, the surface water is attenuated and treated on site through the use of SuDS features including an attenuation basin and a swale. The attenuation basin has been designed to provide on-site storage, accommodating attenuation for all storm events up to and including the critical 1 in 100 year plus 40% climate change with an additional 8% allowance for urban creep. The developable area of the site is 5.11Ha, of which 2.281Ha with assumed urban creep is hard standing, totalling 44.6% of the developable area. Refer to Drawing CON597-3502-C2, Impermeable area Plan. Additional storage has been provided on-site through the use of cellular storage crates, which have been designed to be located beneath private roads or in public open space. The final surface water discharge rate has been calculated via a rural run-off calculation using Microdrainage and the results can be seen on the Microdrainage calculations. The discharge rate has been calculated for the entire developable area of Phase 1 and this has been agreed and confirmed in discussions with the Lead Local Flood Authority (LLFA). It is important to note that this discharge rate is applicable so long as the entirety of the surface water passes through the attenuation basin and or swale (on-site SuDS features). The hobby court, football pitch and road leading to the allotment areas to the west of the site have been considered in the drainage strategy, as well as within the associated Microdrainage calculations. The existing highway drainage, which currently runs through part of the proposed phase 2 has been incorporated into the drainage design for phase 1, partially re-routing the highway drainage through phase 1, in order to accommodate the proposed phase 2 future works.

4 Local Planning Policies and SuDS Features

4.1 A review of the Kent County Council (KCC) Drainage and Planning Policy Statement (June 2017) raised the following relevant sustainability policies incorporated within this drainage strategy.

'KCC require that the drainage design accommodates the 1 in 100 year storm event with a 20% allowance for climate change, with an additional analysis undertaken to understand the flooding implication for a greater climate change allowance of 40%.

The analysis must determine if the impacts of the 40% allowance are significant and lead to any unacceptable flood risk (it is not normally expected that the site would not flood in this scenario, only that if this storm were to occur the impacts would be minimal). The design may need to be modified to avoid any unacceptable risks, but may also need additional mitigation allowances, for example a higher freeboard on attenuation features or provision of exceedance routes. This will tie into designing for exceedance principles.

Flooding of the highway may not be permitted in exceptional circumstances for rainfall events between 1 in 30 year and 1 in 100 year events provided.

- *Depths do not exceed the kerb height.*
- *No excessive or prolonged ponding, so that the highway primarily operates as a conveyance route to another attenuation feature (not a highway system).*
- *Emergency access and egress is not impacted, i.e. not all intersections are impacted.*
- *Within site boundaries.'*

In addition to the above KCC stipulate that allowance be made to accommodate an additional 8% be applied to the impermeable area within the property curtilage according to the proposed development density for urban creep.

4.2 The topography of the site is very steep with a proposed level to the south of the site at 35.700 A.O.D to a proposed level to the north (where the detention pond is located) of 21.250 a difference in level of 14.55m. Due to the extreme difference in level across the site the strategy has been designed using the upper 40% climate change allowance as the 20% allowance is just not feasible as surface water, in an extreme event, would not remain within the site boundaries and would have the potential to flood off site.

4.3 This drainage strategy has been produced in accordance with the National Planning Policy Framework (NPPF, February 2019) and the NPPF Technical Guidance document, Department as the Local Authority SuDS Officer Organisation (LASOO) Non-Statutory Technical Standards for Sustainable Drainage Practice Guidance.

4.4 The CIRIA 753 SuDS manual states the surface water design should meet the following discharge hierarchy (with acceptable justification for moving between levels):

- Infiltration to ground to the maximum possible extent that is practical.
- Discharge to surface waters (ditch or watercourse).
- Discharge to surface water sewer.
- Discharge to combined sewer (this is to be the last resort).

4.5 The development will incorporate SuDS that suit the site conditions and location. It has been identified within a ground investigation report, produced by Geo-Environmental dated October 2016, that the geology of the site comprises of London Clay Formation. Trial pit soakage testing in line with BRE365, in addition to soakage tests for SuDS assessment was undertaken within 12 trial pit locations. No infiltration was recorded over a 90 minute period therefore it is deemed that the use of soakaways is not viable and alternative surface water drainage systems will be utilised and these are as follows.

4.6 **Surface water cellular crate attenuation** – There are 5 proposed cellular crate attenuation storage tanks located throughout the site, which vary in size. These have been designed to hold surface water in heavy rainfall events and the largest tank connects to a flow control manhole downstream, which has been designed to restrict the flow of surface water to a calculated rate, in order to utilise the storage tank to the maximum capacity. The locations and dimensions of the proposed storage tanks can be seen on drawings CON597-3500-C2 & 3501-C3, S104 Agreement Plans and also in the associated Storm Water Microdrainage calculations.

- Surface water swale – To the north west of the site, adjacent to the outfall ditch, there is a shallow surface water swale. This has been designed to accept surface water from a small section of the proposed highway. This swale is filled with stone which provides a proprietary form of water treatment prior to discharging into the ditch. An additional swale has been provided adjacent to the football pitch in order to collect all surface water run-off from the pitch. The purpose of the swale is both to convey the surface water run-off to an attenuation basin and to be a proprietary form of treatment for the surface water run-off.

4.7 **Surface water detention pond** – There is one large detention basin located to the north of Phase 1. The basin has been designed to accommodate all storm events up to and including 1in100 year +40% climate change, with an additional 8% allowance for urban creep. The whole of the surface water on site has been designed to be routed through the attenuation basin, apart from the small section of proposed highway previously mentioned. The attenuation basin will provide surface water treatment prior to discharging at a restricted rate into the outfall ditch. A flow control device has been proposed post the attenuation basin, ensuring the full capacity of the basin is utilised. The basin has been designed to incorporate 1in3 batters with an allowable freeboard of 389mm. In order to mitigate erosion, a gabion mattress has been proposed at the inlet headwalls of the basin. In order to ensure the basin is easily accessible for future maintenance works, a 1.0m footpath has been designed along the top edge of the basin. An additional attenuation basin has been provided adjacent to the proposed football pitch. The surface water run-off from the swale adjacent to the football pitch is to be conveyed to this attenuation basin and the surface water run-off from Road 3 is to be collected by gullies and routed via a piped network to the attenuation basin. The attenuation basin provides additional treatment to the surface water and has been sized appropriately to suit a worst case storm event, 1 in 100year +40% climate change and the discharge from the attenuation basin has been restricted to a suitable discharge rate of 2l/s, in order to utilise the full capacity of the attenuation basin, whilst still maintaining 339mm freeboard.

4.8 The above SuDS features and the locations can be seen on the following drawings:

- CON597-3500-C2 Section 104 Agreement Plan Sheet 1 of 2
- CON597-3501-C3 Section 104 Agreement Plan Sheet 2 of 2
- CON597-3502-C2 Impermeable Plan

5 Maintenance and Management

Maintenance Responsibility

5.1 The maintenance and repair of the existing public sewer network surrounding the site is the responsibility of Southern Water and is outside the control of the developer or the future occupants.

5.2 The proposed primary surface and foul water drainage systems within the new estate roads will be offered for adoption to a statutory undertaker. Chartway Group Ltd will be responsible for the maintenance of the main drainage network until the adoption process is complete. A Private Management Company shall be responsible for any parts of the drainage system that the statutory undertaker do not adopt.

5.3 The maintenance of the non adoptable foul and surface water drainage and SuDS will be the responsibility of a private management company. The maintenance and management company are yet to be appointed.

5.4 Gullies located within adoptable highways will be offered to Kent County Council under a Section 38 Agreement. A Private Management Company shall be responsible for any parts of the adoptable highway & drainage systems that statutory undertaker do not adopt including S38 road gullies.

5.5 The maintenance of the private / shared drainage will be the responsibility of the plot owners and will be conveyed during the legal handovers.

5.6 Maintenance Regime

5.7 The recommended maintenance regime (based on the criteria within CIRIA C753) for the chosen surface water SuDS drainage system is set out in Table 2.1, Table 2.2, Table 2.3, Table 2.4 and Table 2.5 below. The maintenance of the adoptable system will follow Southern Water protocols and requirements, although a recommended regime is included and outlined below:

Table 2.1 Private Drainage Pipes Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from inspection chambers and flow control chambers.	Annually
	Cleaning of gutters and any filters on downpipes.	Annually
	Remove any root ingress.	As required
Occasional Maintenance	CCTV survey of drains to check alignment, cracking and joint displacement.	10-year intervals

Table 2.2 Adoptable Drainage Pipes Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from inspection chambers and flow control chambers.	Annually
	Remove any root ingress.	As required
Occasional Maintenance	CCTV survey of drains to check alignment, cracking and joint displacement.	10 year intervals

Table 2.4 Attenuation Tank Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for the first 3 months, then annually
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Where rainfall infiltrates into the tank from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Annually, or as required
	Remove sediment from pre-treatment structures (catchpit/silt traps) 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

Table 2.5 Ponds, Ditches and Wetlands Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (Spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at the start, then as required)
	Inspect inlets, outlets, banksides. Structures, pipework, ect for evidence of blockage and/or physical damage	Monthly
	Inspect water body for sings of poor water quality	Monthly (May-October)
	Inspect silt accumulation rate in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half Yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before the growing season	Annually
	Remove sediment from any forebay	1-5 years or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required

5.8 The maintenance regime recommended above is put in place to minimise the risk of blockages occurring and to prevent water surcharging from the inspection chambers and manholes. If flooding from the drainage system occurs, then the cause should be identified immediately and dealt with by the maintenance company and if considered appropriate, the maintenance regime should be adapted to ensure the cause of flooding does not occur again in the future.

6 Conclusion

6.1 As demonstrated in this report, we conclude that we have provided robust foul and surface water drainage strategies.

The proposed foul water strategy will discharge the entire site's foul water by gravity, to an existing adoptable foul water manhole off-site, under a S106 application.

The proposed surface water strategy collects and treats the entire site's surface water run-off on-site. All surface water run-off will be attenuated on site via the cellular storage tanks, attenuation basins and swales. All surface water will be treated via the attenuation basin and /or swale prior to discharging in to the existing ditch. The final discharge rate for the surface water has been restricted to the current greenfield run-off rate of 15.9 l/s for all storm events. All aspects of the foul and surface water drainage have been designed in accordance with "Sewers for Adoption 6th Edition".