Foul and Surface Water Drainage Strategy

Chartway Group Ltd
Thanet Way, Whitstable, Kent, CT5 3DG
August 2020

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Quality Assurance

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

Client name: Chartway Group Ltd

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Prepared by: Alasdair Rowlands

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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".

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 2 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 2 and 3 of the development which comprises of 321 residential dwellings with associated infrastructure in the form of estate roads and foul and surface water drainage. Works to the existing highway (Thanet Way) in the form of a new roundabout and public open space are covered by thee separate report concerning RM1

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

3.3 The foul water drainage comprises of gravity 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.

3.4 The North east side of RM2 is to be drained into the infrastructure drainage of RM1. An allowance was made within the approved RM1 infrastructure capacity for these flows however due to the layout and topography additional capacity has been added to the RM1 infrastructure and the calcs have been revised to show this can be accommodated with minimal design changes which include:

3.5 Minor routing changes to accommodate additional drainage from the north of road 1 which now discharges directly into the basin. The calculations show that these flows discharge before the bulk flows fills to the pond, this allows the network to cater for the additional area without significant effect to the RM1 drainage network. Resulting in no alterations to the pond design or the discharge rate.

3.6 One further slight amendment to the RM1 design shows the northern half of Road 7 has been re-routing in to Road 1 which again has been included in the MicroDrainage calculations.

3.7 The volume of attenuation in Tanks 3 and 5 have increased to accommodate the omission of Tank 4 to rationalize the design

3.8 Previously specified 525mm diameter pipes where increased to 600mm due to ease of procurement resulting in a reduction in the size of Tanks 1 and 2.

3.9 The balance of RM2 and RM3 is drained to the northern corner of the site where surface water will be attenuated and water quality measures will be provided prior to a restricted discharge in to the existing watercourse at the boundary. All site water is to be discharged by pipe conduit to an attenuation basin (2m depth with an approximate 300mm freeboard) the discharge is controlled by a vortex flow control at the outfall before discharging at 22 l/s (less than the 1:1 greenfield rate for the full site and of RM2/3) Greenfield runoff rate calculated using HR Wallingford Greenfield runoff rate. Due to the topography of the site, flooding has been reduced to a minimum with only 1 pipe flooding in a 1:100+40%cc storm event (0.15m³) which can be controlled within the road and may be eliminated in detailed design.

All drainage routes have been designed to follow the topography of the site to reduce the depth of drainage runs as much as possible, although there are a few instances where deeper elements are present that are unavoidable.

Additional attenuation crates have been provided at various locations around the site to accommodate short, high intensity storms.

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 3 proposed cellular crate attenuation storage tanks located throughout RM2/RM3, which vary in size. These have been designed to hold surface water in heavy rainfall events at strategic locations with a flow controls within downstream, which has manholes designed to restrict the flow of surface water to within the green field run off rate and 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 CON597-3509 & 3510, S104 Agreement Plans and also in the associated Storm Water Microdrainage calculations.

4.7 **Surface water retention pond** – The basin of 2.3m depth with 2m designed storage depth and 0.3m of freeboard along with 1:4 gradient banks 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. Most of the surface water drainage within Phase 2/3 has been designed to be routed through the attenuation basin, with the North East Section of the Phase 2 drainage to be routed into the Phase 1 infrastructure drainage. The attenuation basins will provide surface water treatment prior to discharging at a restricted rate into the outfall ditch. A flow control device has been proposed post each attenuation basin, ensuring the full capacity of the basin is utilised. The two proposed basins have been designed to incorporate 1in4 batters with an allowable freeboard of 300mm. In order to mitigate erosion, a gabion mattress has been proposed at the inlet headwalls of the basin. Safety fencing will be provided around both ponds in accordance with the approved landscaping proposals for the development. Safety / Informative signage is also proposed a prominent locations at each pond.

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

- CON597-3509 Section 104 Agreement Plan Sheet 1 of 2
- CON597-3501 Section 104 Agreement Plan Sheet 2 of 2
- CON597-3309 Pond Cross Sections

5 Existing Highway Drainage

Site investigations

5.1 Investigates were carried out on the existing drainage features.

(Photo to be found in appendix C)

- Denoted on Drawing as EX DH9 – MH flowing, no obvious flow from land drain.
- Photo 134741 MH3 Outlet 600mm
- Photo 134749 MH3 Orange pipe 225mm Land drain lines up with QB4 (V1)
- Photo 134800 MH3 Inlet 450mm lines up with ditch running up to Thanet Way
- Photo Land Drain - broken and repaired at slip trench

This show the existing manhole proposed for be connecting the culverted highway drainage, the 600mm pipe with be the outfall. The 450mm connection to the ditch to be repurposed for the culverted pipe taking the same flows. The 225 show to be a plastic land drainage pipe to be caped and abandoned as the land drainage will not require due to the proposed positive drainage network across the site.

- Denoted on Drawing as Flooded MH – complete silted up and full of water
- Photo 134950 MH Chamber Flooded we have cleared out over 1m of silt appears disused
- Photo 134957 MH Chamber Flooded we have cleared out over 1m of silt appears disused
- Photo Salt Glaze Pipe – 150mm Runs up fence line towards old farm building
- There does not seem to be a connection between these manholes.

The other manhole and pipes on the site are abandoned /out of use. There used to serve as land-drainage and drainage for the abandon barn. These no longer connect to the highway drainage and are obsolete as the land drainage will not require due to the proposed positive drainage network across the site and the bar is to be removed.

Highway calculations

5.2 For the site investigations above the only drainage discharging from the highway drain is from Thanet Way. Drawing 'Contributing Area Plan Highway Drainage Sheet 1' (CON597 – 3517) show the area drained The plan shows the constituting area discharging to the highway drain. information about the existing highway network was gathered from;

- MKSURVEYS Ref:24819-PTP S278
- Drainage layout Ref: 106-11084
- UPTON McGOUGAN topo Ref: 1090060-S1

5.3 Simulation on micro-drainage shows the existing highway drainage system along Thanet Way has exceedance flows In extreme events. It is likely that it was designed to a less stringent criteria at time of construction.

5.4 However even in the greater storm events 1 in 100+40%cc the proposed culverted 450mm section of network has No exceedance flow and accommodates all flows from the highway to the 600mm existing piped network through the proposed development.

6 Maintenance and Management

Maintenance Responsibility

6.1 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.

6.2 The proposed primary surface and foul water drainage systems within the new estate roads will be adopted under a S104 agreement or similar. Chartway Group Ltd will be responsible for the maintenance of the main drainage network until the adoption process is complete.

6.3 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.

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

6.5 Maintenance Regime

6.6 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.

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 / Infrastructure 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

6.7 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.

7 Conclusion

7.1 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 and attenuation basins. All surface water will be treated via the attenuation basins prior to discharging in to the existing ditch. The final discharge rate for phase 2/3 surface water has been restricted to better the current greenfield run-off rate of 22.0 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".

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Appendix A

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Appendix C