

Ros Parker

North Barn, Hoe Lane, Flansham



Drainage Strategy Report

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Report no. 11095-01A

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Appendix A 11095-01A Drainage Strategy Plan, 11092-02A Existing Drainage Plan, 1529-04G Site Plan, 1529-02B Block Plan, C2019/274-01 Topographical Survey

Appendix B Southern Water Sewer Records, Southern Water change of use letter, Formpave Drainage Calculations, Formpave Construction Details, E A Surface Water Flood Map, E A Planning Flood Map, Borehole Logs, Soil Analysis, Percolation Test Report

1 Introduction

- 1.1 PT Planning Ltd. (PTP) has been commissioned by Ros Parker to advise on drainage strategy issues associated with a proposal to redevelop with a single residential property with car parking. This report has been prepared to assess the Surface Water and Foul Drainage strategy for the redevelopment of the site.
- 1.2 A Flood Risk Statement (FRS) has been included within this report.
- 1.3 This report will consider existing site drainage and possible drainage options that could be pursued in accordance with the drainage instruction emails dated 08/04/2019.
A drainage strategy layout plan has been provided, showing indicative route, levels and outfalls for the surface water and foul drainage systems.

Limitations

PTP has prepared this report for the sole use of this development by Ros Parker in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of PTP. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

The records search was limited to that provided by others. PTP does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

Area calculations and storage volumes given in the report are preliminary estimates and will need to be verified during detail design.

2 Baseline Conditions

Existing Site

- 2.1 The site is a residential site and involves the conversion of an existing barn to a single dwelling. The site is surrounded by other residential properties and barns and has access from Hoe Lane. The site covers an area of 260m². The existing roof area is 60.8m² and there is 36m² of concrete hard standing behind the barn giving a total impermeable area of 96.8m². The proposed roof area is 80.1m² with an 8.8m² bunded area and a further 68.8m² of proposed external permeable hard standing. The Site Plan and topographical survey is enclosed in **Appendix A**.
- 2.2 The site is almost flat and has a barn slab level of 3.20m AOD. The area around the site is flat and generally drains to a ditch system just north west of Lanes End Barn. Site levels range from 3.2m to the south of the barn to 2.9m AOD on the frontage boundary. The site naturally drains to this low point. There is a slightly lower area in the open ground and lane in front of the development site with levels of 2.9 to 3.0m AOD and surface water ponding has been reported in this area. An external overland flow route from the site to the ditch has maximum ground level of 3.2m AOD.
- 2.3 Southern Water Records are enclosed in **Appendix B**. There is an adopted foul sewer in Hoe Lane and properties adjacent to the site connect to this sewer. There are no adopted surface water sewers indicated on the Southern Water asset plan but there is a 300mm diameter storm water sewer discharging to a local ditch north west of the site. It is reported that local properties discharge to this sewer and under new legislation it could be classed as an adopted lateral. The Southern Water search records that the site is connected to surface water and foul sewers, however the Southern Water letter dated 16/09/17 says there is no adopted surface water sewer. These letters are enclosed in **Appendix B**
- 2.4 If the storm sewer from MH2 is an adopted lateral an alternative outfall for the site would be to requisition an outfall to this sewer.
- 2.5 The topographical survey picks up inspection covers and manholes. It records below ground pipework picked up by sond electronic detection and CCTV survey. There are external rainwater downpipes draining to MH1. The 150mm discharge pipe from MH1 picks up the rainwater pipe from East Barn. The outfall from MH1 enters a cross chamber that connects into a large buried brick chamber with water level 2.08m AOD. The chamber has an invert level of 1.73m AOD and the outfall was not located. The

chamber straddles the site boundary and the adjacent land owner will not allow further access to CCTV the offsite sewers. This chamber was reportedly built to resolve flooding problems at Doves Barn.

- 2.6 There is a 100mm storm sewer entering MH2 from Flansham Farm. The sewer passes through the property of Dukes Meadow to outfall as a 300mm pipe at the ditch adjacent to Lanes End Barn. MH2 is an open chamber with a lower removable cover. Neighbours report that this chamber drains the ditched area of land in front of the site. Surface flooding has been reported for this area but this was resolved when a blockage at the stream outfall was repaired. The exceptional rainfall during the winter of 2019 did not cause surface flooding of this area.
- 2.7 The survey records adopted foul manholes MH3, MH4 and MH5 in Hoe Lane. There is a foul spur on the east flank of East Barn which discharges to the adopted sewer in Hoe Lane.
- 2.8 There is no evidence of any surface water balancing on the existing site.
- 2.9 There have been two trial holes excavated on site and the soil analysis document 229 is included in **Appendix B**. This records silty clay with occasional fine gravel at a depth of 1m. DOC 230 in **Appendix B** gives details of BGS borehole SE 27-8133 some 400m east of the site. This shows 0.4m of topsoil over 2.4m of Clay over 1.9m of silt over Chalk at a depth of 4.7m. The BGS borehole and trial holes record Clay and it is unlikely that soakaways will be viable for this site.
- 2.10 Ground water monitoring and infiltration testing was carried out between 29/02/20 and 31/03/20 and the percolation test results are enclosed in **Appendix B**. Due to the high water levels Arun District Council has agreed that infiltration will not be a drainage option.
- 2.11 The Environment Agency planning flood map shows the site to be within Flood Zone 1 with low risk of flooding, less than the 1000 year event. The Environment Agency Surface Water flood map enclosed in **Appendix B** shows generally low flood risk with medium risk of surface flooding recorded for the lower area in front of the property. Local residents have reported local ponding of surface water but there is no record of flooding above the slab level of the barn. It is reported that the property Doves Barn has to pump surface water at basement level and a high water table is expected.
- 2.12 E A maps show no evidence of groundwater flooding.
The site is not a groundwater source protection zone.

3 Proposed Development

- 3.1 The site will be redeveloped with a single story residential property with parking and patio.
- 3.2 The site covers an area of 260m². The existing roof area is 60.8m² and there is 36m² of concrete hard standing behind the barn giving a total impermeable area of 96.8m². The proposed roof area is 80.1m² with an 8.8m² bunded area and a further 68.8m² of proposed external permeable hard standing. The Site Plan and topographical survey is enclosed in **Appendix A**.
- 3.3 For the purpose of this report we have assumed that the surface water from roofs and hard standing can be discharged to the existing gravity sewers using existing outfall pipes. Surface water balancing will be provided in granular media below a porous paving car park with an allowable discharge to MH1 subject to agreement with the LLFA
- 3.4 Planning conditions prevent the raising of the existing slab level and to give further flood protection to external doors it is proposed to install bunded patios. If the outfall becomes surcharged the patio gullies will discharge to the emergency pumping station PS2 via a weir overflow. PS2 is independent from the normal gravity system and will only operate if there is external flooding.
- 3.5 The foul drainage will discharge to the foul sewer spur adjacent to the east flank of East Barn subject to consent to discharge from Southern Water. The Client has agreement to use this sewer spur. The sewer spur has a depth of 300mm and the discharge from the new property will be pumped via a small package pumping station PS1 with a 50mm rising main to a shallow sewer laid below East Barn.

4 Flood Risk Statement

- 4.1 No records were found to indicate that the site has flooded in the past from any watercourse. The Environment Agency Planning Flood Map in **Appendix B** shows that the site lies within flood Zone 1 which is low risk with an annual probability of flooding of less than 1:1000.
- 4.2 The site is not recorded as a groundwater protection zone.
- 4.3 The Environment Agency Surface Water flood map enclosed in **Appendix B** shows medium flood risk for the shallow depression in front of the property. This has an annual probability of flooding between 1:100 and 1:30.
- 4.4 The site is almost flat and has a barn slab level of 3.20m AOD. The area around the site is flat and generally drains to a ditch system just north west of Lanes End Barn. Site levels range from 3.2m to the south of the barn to 2.9m AOD on the frontage boundary. There is a slightly lower area in the open ground and lane in front of the development site with levels of 2.9m to 3.0m AOD and surface water ponding has been reported in this area. An external overland flow route from the site to the ditch has maximum ground level of 3.2m AOD and this flow route has been shown on Dwg 11059-02A.
- 4.5 There is a 100mm storm sewer entering MH2 from Flansham Farm. The sewer passes through the property of Dukes Meadow to outfall as a 300mm pipe at the ditch adjacent to Lanes End Barn. MH2 is an open chamber with a lower removable cover. Neighbours report that this chamber drains the dished area of land in front of the site. Surface flooding has been reported for this area but this was resolved when a blockage at the stream outfall was repaired. The exceptional rainfall during the winter of 2019 did not cause surface flooding of this area.
- 4.6 There are no reservoirs, canals or other artificial sources of flooding within 1KM of the site.
- 4.7 The development proposed for the site will substantially reduce the rate of surface water run off from the site by use of surface water storage to reduce the flood risk to downstream properties. Allowable discharge will be limited to the QBar average run off rate for the site and surface water balancing will be provided for the 1:100 year storm return plus 40% climate change.
- 4.8 No flooding above existing building slab levels has previously been recorded on site but we would recommend that the new proposed floor level is protected with a 150mm

concrete upstand integral with the floor slab. This will give additional protection against surface flooding.

- 4.9 Environment Agency maps show that the site is not a source protection zone.

Climate Change

- 4.10 The effect of climate change is to increase the likelihood of flooding from most sources including river, surface water and sewers. The flood risk from these sources to the proposed development will be minimised through the use of SUDS systems.

Sequential Test

The development on this site will be located within Flood Zone 1 and is therefore compliant with the sequential test.

5 Surface Water Drainage Strategy

- 5.1 A Drainage Strategy Plan, Dwg 11095-01A and Existing Drainage Plan 11095-02A, are enclosed in **Appendix A**. These plans should be used as reference for this report.
- 5.2 The proposed development is based on Architect site plans enclosed in **Appendix A**.
- 5.3 There has been recent correspondence with Arun District Council regarding the drainage strategy. It has been agreed to use tanked Formpave because of the high winter ground water levels. The existing outfall from MH1 will be reused but further investigation of the off site drainage is hindered because of sewer access being denied by the adjacent land owners. If the outfall were to surcharge the natural overland flow route is to the open topped MH2 which discharges to the off site ditch. It was suggested that in case of surcharge a weir outfall from MH1 is connected to a shallow drain along the northern site boundary to transfer allowable discharge along the existing overland flow route from the site. On closer inspection, if the outfall does surcharge, the Formpave will fill and overflow along the low edge at the northern boundary provided there is no kerb upstand. This will achieve the same objective. It was agreed to further protect the property from possible surface water flooding with bunded door patios protected by an emergency pumping station PS2 independent of the gravity drainage.
- 5.4 For the purpose of this report we have assumed that the surface water from roofs and hard standing can be discharged to the existing gravity sewer using existing outfall pipes. Due to the expected high water table we propose that surface water balancing will be provided in shallow 30% void granular medium below the patio and car parking area. This paving can be Formpave or similar with porous surfacing. The Formpave construction will be tanked with an impermeable membrane because of the high water table. The rainwater discharge from the roof will flow to existing MH1 via the Formpave storage and the control chamber MH S1 will limit allowable discharge to 0.7 l/s. Typical details for the Formpave construction are shown in **Appendix A**.
- 5.5 The developer has rights to maintain and repair the existing surface water drainage outfall should this be required.
- 5.6 The existing site has an impermeable area of 96.8m² and the proposed development has an impermeable area of 88.9m² giving a net reduction of impermeable area.
- 5.7 Surface water calculations for the Formpave using an allowable QBar discharge of 0.7 l/s for a 100 year storm return plus 40% climate change are enclosed in **Appendix B**.

- 5.8 The Micro Drainage calculations give a storage volume of 5.0m³ which can be accommodated under 79.2m² of Formpave with a 250mm granular sub base. This gives a minimum Formpave construction depth of 360mm.
- 5.9 Planning constraints prevent raising the existing floor level of 3.2m AOD. The off site overland flow route to the ditch shown on Dwg 11095-02A has a maximum level of 3.2mAOD. If the land drainage to the ditch via MH2 become blocked the site will be protected to this level. To provide additional flood protection, the front and rear doors will be protected against flooding with an external 150mm bunded patio integral with the floor slab. In normal circumstances the patio gullies will discharge directly to the frontage Formpave via inspection chamber S3. S3 will be fitted with a float non return valve on the outlet pipe. When the Formpave is flooded the non return valve will close and the rainwater from the patios will pass to a small storm water package pumping station PS2 with a rising main to the frontage Formpave. The pump will only operate when the Formpave is flooded with a pump start TWL of 3.0m AOD.
- 5.10 This proposal will reduce the flow from the existing site to Qbar rates and substantially reduce the flow rate to the existing sewer.

Design Principles

- 5.11 Sewers will be designed to take flows with no surcharge at the 1:2 year design standard, with capacity to resist above ground surcharge at the 1:30 year design standard. A 40% margin will be added to allow for climate change
- 5.12 Balancing features will be designed to cater for a 100 year storm return period plus 40% climate change.

The impermeable area of the site has been reduced and the run off rate from the site has been reduced by the introduction of surface water storage with controlled discharge. This will substantially reduce surface water runoff rate from the site and will improve flood protection to downstream properties.

Maintenance

The porous paving blocks should be cleaned every spring and autumn to keep them free of silt and detritus. The blocks should be re-laid after 25years if they become blocked by silt.

All outlets must be kept clear of debris and blockages in accordance with manufacturer's instructions.

Manholes and flow control chambers should be inspected and cleaned every spring and autumn to keep them free of silt and detritus.

The rainwater pipe outfalls from the roofs will pass through silt traps and these should be inspected annually, and any silt removed.

Package pumping station PS2 to be inspected and maintained to manufacturer's recommendations and the float non return valve at MH3 is to be checked annually.

6 Foul Drainage Strategy

- 6.1 Drainage Strategy Plan, Dwg 11095-01 is enclosed in **Appendix A**. This plan should be used as reference for this report.
- 6.2 Southern Water Sewer Records are enclosed in **Appendix B**. There is a 100mm adopted foul sewer in Hoe Lane running from MH3 to MH5.
- 6.3 The frontage land owners will not allow access to this adopted sewer but there is an agreement to connect to a foul sewer to the rear of the property.
- 6.4 The foul drainage will discharge to the foul sewer spur adjacent to the east flank of East Barn subject to consent to discharge from Southern Water. The Client has agreement to use this sewer spur. The sewer spur has a depth of 300mm and the discharge from the new property will be pumped via a small package pumping station PS1 with a 65mm rising main to a shallow sewer laid below East Barn.
- 6.5 Sewers For Adoption 7th Edition estimates a domestic foul design flow of 0.046 l/s for a single property.
- 6.6 The existing foul outfall will be subject to a Section 106 connection agreement with Southern Water.

7 Summary

- 7.1 No records were found to indicate that the site has flooded in the past from any watercourse. The Environment Agency Planning Flood Map in **Appendix B** shows that the site lies within flood Zone 1 which is low risk with an annual probability of flooding of less than 1:1000
- 7.2 The Environment Agency planning flood map shows the site to be within Flood Zone 1 with low risk of flooding, less than the 1000 year event. The Environment Agency Surface Water flood map enclosed in **Appendix B** shows medium flood risk for the shallow depression in front of the property. This has an annual probability of flooding between 1:100 and 1:30. E A maps show no evidence of Groundwater flooding.
- 7.3 For the purpose of this report we have assumed that the surface water from roofs and hard standing can be discharged to the existing gravity sewer using existing outfall pipes. Due to the expected high water table we propose that surface water balancing will be provided in shallow 30% void granular medium below the patio and car parking area. This paving can be Formpave or similar with porous surfacing. The Formpave construction will be tanked with an impermeable membrane because of the expected high water table. The controlled discharge from the roof will discharge to existing MH1 via the Formpave storage
- 7.4 The existing site has an impermeable area of 96.8m² and the proposed development has an impermeable area of 88.9m² giving a net reduction of impermeable area.
- 7.5 Surface water calculations for the Formpave using an allowable QBar discharge of 0.7 l/s for a 100 year storm return plus 40% climate change are enclosed in **Appendix B**.
- 7.6 The Micro Drainage calculations give a storage volume of 5.0m³ which can be accommodated under 79.2m² of Formpave with a 250mm granular sub base.
- 7.7 Planning constraints prevent raising the existing floor level of 3.2m AOD. The off site overland flow route to the ditch shown on Dwg 11095-02A has a maximum level of 3.2mAOD. If the land drainage to the ditch via MH2 become blocked the site will be protected to this level. To provide additional flood protection, the front and rear doors will be protected against flooding with an external 150mm bunded patio integral with the floor slab. In normal circumstances the patio gullies will discharge directly to the frontage Formpave via inspection chamber S3. S3 will be fitted with a float non return valve on the outlet pipe. When the Formpave is flooded the non return valve will close

and the rainwater from the patios will pass to a small storm water package pumping station PS2. The pump will only operate when the Formpave is flooded with a pump start TWL of 3.0m AOD.

- 7.8 This proposal will reduce the flow from the existing site to Qbar rates and substantially reduce the flow rate to the existing sewer.
- 7.9 Sewers will be designed to take flows with no surcharge at the 1:2 year design standard, with capacity to resist above ground surcharge at the 1:30 year design standard. A 40% margin will be added to allow for climate change.
- 7.10 Balancing features will be designed to cater for a 100 year storm return period plus 40% climate change.
- 7.11 The impermeable area of the site has been reduced and the run off rate from the site has been reduced by the introduction of surface water storage with controlled discharge. This will substantially reduce surface water runoff rate from the site and will improve flood protection to downstream properties.
- 7.12 The foul drainage will discharge to the foul sewer spur adjacent to the east flank of East Barn subject to consent to discharge from Southern Water. The Client has agreement to use this sewer spur. The sewer spur has a depth of 300mm and the discharge from the new property will be pumped via a small package pumping station PS1 with a 65mm rising main to a shallow sewer laid below East Barn.
- 7.13 Sewers For Adoption 7th Edition estimates a domestic foul design flow of 0.046 l/s for a single property.
- 7.14 The existing foul outfall will be reused and will be subject to a Section 106 connection agreement with Southern Water.

Appendix A

Appendix B

