

REPORT N° 1 REVISION 3

RICHMOND PARK WHITFIELD, DOVER

FOUL WATER DRAINAGE DETAILS

ON BEHALF OF HALSBURY HOMES LTD

JUNE 2017

RICHMOND PARK
FOUL WATER DRAINAGE DETAILS
HALSBURY HOMES LTD

Project no: 70013822
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TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	FOUL WATER DRAINAGE	3
3	RISING MAINS	5

FIGURES

FIGURE 1	SITE LOCATION.....	1
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APPENDICES

A P P E N D I X A WSP | PB FW DRAINAGE DETAILS DRAWING

A P P E N D I X B WSP | PB FW DRAINAGE CALCULATIONS

A P P E N D I X C PUMPING STATION DETAILS, INCLUDING:

**COMPOUND GENERAL ARRANGEMENT
SECTIONS**

PHASING PLANS

EMERGENCY STORAGE TANK

ELEVATIONS

LOCATION AND LANDSCAPING PLAN

APPENDIX D SOUTHERN WATER LETTER DATED 15 JUNE 2017

1 INTRODUCTION

1.1 PREAMBLE

1.1.1 WSP | Parsons Brinckerhoff (WSP | PB) were commissioned by Halsbury Homes Ltd to develop the foul water drainage strategy and details for Richmond Park which forms Phase 1 of the Whitfield Urban Extension.

1.1.2 This document has been prepared by WSP | Parsons Brinckerhoff to clarify the foul water drainage proposals and the associated pumping station detail for Phase 1 of the Whitfield Urban Extension. The proposed pumping station is to be implemented in such a way that it can accommodate the relatively low flow rates generated by the first phase of 94 units, whilst possessing sufficient inherent flexibility to deal with the total anticipated flows from the whole of Phase 1 and a portion of Phase 2. The total number of residential units to be accommodated within the design is 1933.

1.1.3 This document will set out the details for foul water drainage and the general design parameters used in the design of the pumping station, including flow rates, emergency storage and the general layout of the pumping station compound, building on the strategy approved by Dover District Council on 26 May 2016 when planning condition 51 was partially discharged.

1.2 SITE LOCATION

1.2.1 The area allocated to the Whitfield Urban Extension (WUE) lies to the north of the A2, and is immediately adjacent to the village of Whitfield on its west, north and east sides.

Phase 1 of the WUE lies to the east of Whitfield and is bounded by the A2 to the south, the A256 to the east and Archers Court Road to the west. The location of Phase 1 is shown in Figure 1 below, along with its relationship to the future phases of the WUE.



Figure 1 Site Location

1.3 EXISTING DRAINAGE

- 1.3.1 The nearest foul water public sewer is located in Archers Court Road to the west of Phase 1. This existing drain is 150mm in diameter.
- 1.3.2 Discharge from Phase 1A will be via a pumped rising main into the sewer in Archers Court Road, and it is proposed to control the flow from this main by radio link between the existing Southern Water Sandwich Road pump station and the new Phase 1 pumping station. The wet well at the Sandwich Road pump station will be used to ascertain the incoming sewer level - upon reaching a pre-set high level an alarm signal will be transmitted to the Phase 1 pump station to shut down the pumps. Once levels have dropped sufficiently to a pre-set low level, the pumps will reactivate and discharge will recommence.
- 1.3.3 Due to the control on flow, it is likely that there will be periods of time when the incoming flow to the new pump station cannot be discharged to the public sewer. In these circumstances the incoming flow will be stored temporarily at the pump station, initially within the sump which will have a capacity of 29m³ (a volume equivalent to the Sewers for Adoption emergency storage for 181 units), then in the storage tank provided for Phase 1 of 285m³ (a volume equivalent to the emergency storage for 1,781 units).
- 1.3.4 Southern Water have indicated that the connection point for the wider Phase 1 development will also be to the Sandwich Road pump station. They have confirmed in a letter to Halsbury Homes Ltd dated 15 June 2017 that the permanent solution for Phase 1 will comprise a balance tank constructed by Southern Water in the vicinity of Sandwich Road.

2 FOUL WATER DRAINAGE

2.1 DESIGN ASSUMPTIONS

- 2.1.1 Phase 1A comprises 94 units, whilst the completed Phase 1 has outline planning permission for up to 1300 units. The topography surrounding Phase 1 lends itself to a portion of Phase 2 to be collected by the Phase 1 drainage system, therefore a conservative assessment has been made of the number of units which could potentially discharge to the Phase 1 system. Allowance has been in the calculations for an additional 633 units from Phase 2, therefore the total number of units included in the calculation is 1933.
- 2.1.2 The calculation to generate the design (or peak) flow rate is described in Sewers for Adoption 7th Edition (SfA7) as 4000 l/dwelling/day. Using this formula for Phase 1A generates a flow rate of 4.35 l/s, for Phase 1 60 l/s and for 1933 units 89.5 l/s.
- 2.1.3 The peak flow rate for the 1933 units has been accommodated within the design, and this is demonstrated by the Windes calculation results included as Appendix B. The pipe sizes incorporated within the Phase 1A drainage networks are sized in accordance with the calculations, and will therefore accommodate the flows from the wider Phase 1 development and the Phase 2 contribution of 633 units.
- 2.1.4 A drawing has been produced to show the foul water drainage details for Phase 1, excluding the detailed sub-phase layouts which will be prepared alongside the housing layouts for each sub-phase. A copy of the drawing is included as Appendix A.
- 2.1.5 The flow rates from the pumping station (PS) will therefore need to be varied according to the level of development programmed for construction. It is not feasible to construct a 'final' solution for the 1933 units as part of the planned Phase 1A development, as the difference in magnitude of the incoming flow rates and the required outgoing flow rate in the rising main between 94 units and 1933 units is too great. It is therefore proposed to construct the PS such that it has the flexibility to be upgraded to cater for the higher flow rates generated as development proceeds.
- 2.1.6 Stage 1 will comprise the full PS compound, pump sump and emergency storage tank. Initially smaller pumps will be fitted, discharging via a 125mm diameter rising main to the existing sewer in Archers Court Road. For Stage 2, the final stage, the pumps will be replaced with the full capacity pumps which will discharge via a 250mm diameter rising main to the Southern Water network in the vicinity of Archers Court Road upstream of their Sandwich Road pumping station. The two stages are illustrated on drawings 3822-D-4030 and 3822-D-4305 included within Appendix C.
- 2.1.7 Drawings which detail access to the pumping station, sections through the pump sump and valve chamber and a detailed plan of the sump are included within Appendix C as drawings 3822-D-4031 C2, 3822-D-4302 C1 and 3822-D-4303 C1 respectively. The details confirm that there is no footpath link to the PS compound, and that the vehicle access route is to be formed using cellular units infilled with topsoil and seed. A 'Blue Rope' system is proposed for removal of the pumps, a gantry system is not envisaged being necessary, and the 'compound' is to be in the form of a building constructed using a brick type and roof tiles to match the nearby housing.
- 2.1.8 The initial flows from Phase 1A will be pumped to Archers Court Road, with the timing of the pumps controlled via telemetry. If the downstream sewers are running at or near to capacity, the telemetry installed by Southern Water at their Sandwich pumping station will communicate to the new pump station and switch off the pumps. They will only be reactivated once levels in Southern Water's Sandwich Road pumping station have dropped sufficiently to accept the flow from Phase 1A.

- 2.1.9 The emergency storage requirements stipulated in SfA7 are 160 l/dwelling, which for 1933 units equates to 309.3m³. The pumping station chamber is proposed as being 3.0m diameter, and this will provide an emergency storage volume of 29m³. The remaining 280m³ of emergency storage will be provided by way of an underground storage tank of 285m³, designed and installed to Southern Water's requirements. This tank is to be installed as part of Stage 1 of the pump station construction.
- 2.1.10 Preliminary details of a suitable storage tank have been prepared by Weholite, comprising 2.2m diameter welded polyethylene pipework. A plan area of approximately 13.8 x 12.5m is required to accommodate the tank, and it will be installed as part of Stage 1 of the pumping station construction. A drawing showing the layout of the underground tank is included in Appendix C, the drawing includes details of the low flow channel which will be incorporated into the 'on-line' section of the tank to allow normal dry weather flows to pass through the tank at acceptable velocities.
- 2.1.11 It is permissible to utilise the upstream sewer network including chambers for emergency storage, therefore the 285m³ volume quoted is a worst case figure as the lengths of drain immediately upstream of the pumping station will also be available to provide additional emergency storage volume.
- 2.1.12 The entire Phase 1 foul water drainage network and pump station installation are being constructed to Sewers for Adoption standards, and to assist with this Southern Water have been inspecting the Phase 1A drainage during construction to check for compliance with their standards. It is noted that a number of the sewer lengths proposed do not achieve the minimum self-cleansing velocities stated within Sewers for Adoption (0.75 m/s at one third design flow). These lengths are generally the smaller pipes (100 & 150mm diameter) located at the upstream ends of the system, and where this is the case the sewers will be compliant with SfA as they accord with Section B4 paragraph 9 of the document.
- 2.1.13 As mentioned above it is the intention to offer the completed foul water drainage system and PS to Southern Water for adoption. In the interim the system will remain private and will be maintained by Halsbury or via a management company and a service charge levied on residential properties or through such other alternative suitable arrangement such as an Inset Agreement with another Water Company.
- 2.1.14 The location of the off-site connection point will not affect the pumping station or the gravity drainage network currently under construction, as these are on the whole influenced by the topography of the site and the housing layout.

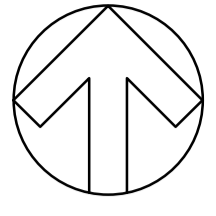
3 RISING MAINS

- 3.1.1 As described in 2.1.2 the flow rates generated by the development will increase as additional units are occupied, and this increase will at some future stage require a new larger rising main to be installed to discharge the flows off-site. It has therefore been necessary to assess the flow rates and devise a solution which works from both a design and an economic perspective.
- 3.1.2 It is not feasible to utilise the same diameter rising main for Phase 1A as that required for the completed Phase 1 and Phase 2 allowance. The pumping rate typically would be set at 3 DWF (Dry Weather Flow) for a pumping station of this type, therefore for the full development a flow rate of 44.7 l/s would be the minimum rate required. This is approximately ten times the design flow generated by Phase 1A (4.35 l/s), and would require a rising main which would be of too large a diameter to be feasible for usage at the lower flow rate.
- 3.1.3 The solution proposed is to use two rising mains, a smaller one for use during the early stages of the development and a larger one which will accommodate the full allowance of 1933 units.
- 3.1.4 The initial rising main proposed for installation is of 125mm diameter, which will accommodate flow rates from approximately 6 l/s minimum up around 11 l/s, depending upon the velocity chosen. It will be possible therefore to increase the discharge rate by increasing the velocity at which the pumps operate.
- 3.1.5 The minimum flow rate is slightly above the design flow for Phase 1A, which could possibly lead to longer retention times within the sump, however any potential septicity issues associated with the longer retention can be dealt with by way of chemical dosing.
- 3.1.6 The initial rising main's maximum flow rate of 11 l/s will accommodate up to around 475 units using SfA7 criteria, and Southern Water have provided their confirmation that they will accept this number of units into their sewer in Archers Court Road.
- 3.1.7 With the flow control mentioned in para. 2.1.8 in place Southern Water have confirmed that the sewer network and existing pumping station downstream of the Phase 1A connection point in Archers Court Road will be protected from overload from the discharge from Phase 1A. SW have also confirmed in their letter dated 15 June 2017 that they will be adding sufficient capacity at the Sandwich Road pumping station to cater for additional units above the 475 number.
- 3.1.8 As development proceeds towards 475 units it will be necessary to install the larger rising main. Preliminary calculations suggest that a 250 OD rising main will be required to cater for up to 1933 units. It will be necessary therefore to install the larger rising main, replace the valvework in the valve chamber and upgrade the pumps.
- 3.1.9 The larger 250OD rising main can be installed independently of the pumping station upgrades, and can therefore be fully installed in readiness for the switchover.

- 3.1.10 The switchover to the larger diameter rising main can be facilitated by isolation of the pumping station from incoming flows via the penstock in the inlet chamber. Once flow has been prevented from entering the sump the pumps can be replaced and works undertaken to the valve chamber to remove the valvework and install the appropriately sized fittings.
- 3.1.11 During the switchover the incoming flows will be stored in the emergency storage tank - the level in the tank will be monitored and effluent tankered away should this become necessary. It is estimated that these works should take in the region of four to six weeks to complete, with the works comprising replacement of the pumps, connecting pipework between the sump and the valve chamber and the valvework itself. There will be no works necessary on the inlet (gravity) side of the pump sump as the drainage pipes and emergency storage tank to suit the full Phase 1 and part of Phase 2 will have been installed within the Stage 1 pumping station works.
- 3.1.12 The 125mm diameter rising main will be abandoned in-situ and grouted up once the switchover to the 250mm diameter main has taken place.

Appendix A

WSP | PB FW DRAINAGE DETAILS DRAWING



PROPOSED 125Ø RISING MAIN FROM PROPOSED PUMP STATION TO SERVE PHASE 1A

PROPOSED GRAVITY CONNECTION TO EXISTING SOUTHERN WATER MANHOLE REF 7101 (CL 119.79 - IL 118.52 PIPE DIA. 150mm.) FROM RECORDS

PROPOSED 125Ø RISING MAIN FROM PUMP STATION TO RUN WITHIN THE SPINE ROAD

NEW MANHOLE AND EXTENT OF 125 OD (CL 119.79 - IL 118.52 PIPE DIA. 150mm.) FROM RECORDS

ONLINE WEHOLITE STORAGE TANKS

FOUL PUMPING STATION FOR PHASE 1A AND ADJOINING DEVELOPMENT INITIALLY THE PROPOSED RISING MAIN 1250D WILL DISCHARGE TO EXISTING MANHOLE ON ARCHERS COURT ROAD.

FUTURE 250Ø RISING MAIN FROM PROPOSED ADOPTABLE PUMP STATION SERVING 1933 UNITS. ROUTE TO BE DETERMINED.

A255 WHITEFIELD BYPASS

HONEYWOOD PARKWAY

A2

REV	DATE	BY	DESCRIPTION	CHK	APP
P1	18/07/2017	GRU	FUTURE RISING MAIN ROUTE AMENDED		
P2	18/07/2017	GRU	FUTURE RISING MAIN ROUTE AMENDED		
P3	29/02/2016	JM	NOTE TO 125Ø RISING MAIN AMENDED		
P4	13/06/2016	WSP	PUMP STATION LOCATION AMENDED TO SUIT STORAGE TANK, OUTFALL CL & IL ADDED		
P5	11/12/2016	CL	WATERPLAN UPDATED		
P6	28/02/2017	LMW	DRAINAGE NETWORK EXTENDED		

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CLIENT:	HALSBURY HOMES
PROJECT:	WHITFIELD - PHASE 1
ARCHITECT:	
TITLE:	PHASE 1 - FOUL WATER DRAINAGE DETAILS

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CAD FILE:	70013822-D-2000-2001-2002	DESIGNER:	MAC	DATE:	February 17
PROJECT NO.:	70013822	DRAWING NO.:	3822-D-2001	REV.:	P7

WORK IN PROGRESS					
SCALE 1:800	1:250	CHECKED:	PDC	APPROVED:	
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