

WATER LANE, ANGMERING
RESERVED MATTERS DRAINAGE STATEMENT

BARRATT DAVID WILSON HOMES

24 JUNE 2020



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Contents

1.0	Introduction	1
2.0	Baseline Environmental Conditions	3
3.0	Drainage Strategy	6

Appendices

Appendix 1 – Calculations

Appendix 2 – Infiltration Report



1.0 Introduction

Context

- 1.1. Abley Letchford Partnership has produced this Drainage Statement with regards to Barratt David Wilson Homes (BDW) interests in respect of the development of Water Lane, Angmering.
- 1.2. It is proposed development will accommodate 175 dwellings (Arun District Council (ADC) planning application reference: A/99/17/OUT). This permission was granted in March 2019.
- 1.3. This statement provides written evidence to support both the Reserved matters (RM) RM submission and the overall site discharge of planning conditions and should be read in conjunction with drawings associated with those packages.
- 1.4. This statement draws upon supporting work undertaken at outline planning stage on landscape, ecology and drainage design and presents a summary of the overall drainage parameters and design.

Sources of Information

- 1.5. A Flood Risk Assessment (FRA) dated May 2017 has been carried out by idom merebrook, Ref: FRA-19495-16-139 Rev R2, to accompany the outline planning application for the site. This has been consulted in order to inform the proposed drainage strategy for the site.
- 1.6. A geotechnical investigation was carried out by idom merebrook alongside further investigations on infiltration and ground water. This has been consulted in order to inform the proposed drainage strategy for the site.
- 1.7. In addition to the above approved outline planning documents, winter infiltration testing was requested by Arun DC, which was carried out in March 2020 by RSK. The results of which are contained within the appendix and have been consulted in order to inform the proposed drainage strategy for the site.
- 1.8. A desktop study of the site was carried out using the sources mentioned previously together with information from the Environment Agency, British Geological Survey, and GOV.uk websites to ascertain local features, geology, hydrology and soil characteristics.
- 1.9. Flood mapping and site characteristics, as published on the Environment Agency's (EA) and the GOV.uk websites, has been used as an information source. Guidance set out within the NPPF, the SFRA, and EA Guidance has also been used as the base for this assessment.

Statement Structure

- 1.10. This statement addresses the requirements of the planning conditions and NPPF and considers the following aspects:
 - Section 2: Baseline Environmental Conditions – a description of the site location, its topography and hydrology.



- Section 3: Drainage Strategy – flood risk from the site and appropriate mitigation measures to protect the site post development including surface water and foul water drainage strategies.



2.0 Baseline Environmental Conditions

Introduction

- 2.1. This chapter provides for a description of the site location, its topography and hydrology.

Site Location

- 2.2. The site is located to the east of the village of Angmering, West Sussex. The site is bordered to the north by Water Lane; to the east by the A280 Angmering By-Pass; to the south by existing residential properties on the eastern end of Angmering High Street; and to the west by three paddocks and Avenals Farm.
- 2.3. A narrow corridor of land connects to the westernmost part of the Site, hereafter the 'Western Parcel' which comprises a smaller parcel of land beyond Avenals Farm and adjacent to Weavers Hill.
- 2.4. Overall the site covers approximately 9.0 hectares (Ha).
- 2.5. The site lies within the administrative area of Arun District Council (Arun DC), with West Sussex County Council (ESCC) being the Lead Local Flood Authority (LLFA).
- 2.6. The National Grid Reference of the site is NGR 507539 104557.

Existing Site

- 2.7. The Site (including the Western Parcel) comprises principally arable agricultural land with some undeveloped land in the north and west, with mature trees, scrub and hedgerows. There is a Main River in the far north of the site
- 2.8. The topography of the main site falls, from a central high point of approximately 18.0m AOD, adjacent to the A280 boundary, both north to south and east to west. The slope east to west is approximately 1 in 120 and therefore relatively flat.
- 2.9. To the north the site falls to a Riverbank level of approximately 13.0m before descending to the river bed at approximately 9.0m – 10.0m AOD. To the south the site falls to a level of approximately 16.5m AOD.
- 2.10. The western parcel has levels in the range of 16.0m to 14.0m AOD falling mainly east to west but also to the northern boundary.
- 2.11. A copy of the topographical survey has been included in design packages.

Existing Drainage

- 2.12. The site currently drains mainly by infiltration with some evaporation and greenfield runoff.
- 2.13. Public sewer records obtained from Southern Water confirm there are no public surface water sewers within, or in the vicinity of, the site.
- 2.14. In addition, there are no ditches or watercourses located in the south or west parcel, or adjacent to these parcels in the immediate location. Therefore, these parcels drain solely by infiltration into the ground. This is reinforced by the geological mapping and surveys, and the infiltration testing that has taken place.



- 2.15. To the north of the main site there is a Main River which flows adjacent to Water Lane. Further downstream where the River passes through Angmering it is referred to as the Black Ditch, (also known locally as Patching Stream since it runs from Patching Pond north of the A27 – source; ‘Angmering Neighbourhood Plan 2014 – 2029: 4.06’ page 11. The River is therefore referred to as the Black Ditch in all reports.
- 2.16. Infiltration testing adjacent to the Main River suggested infiltration was not viable in the immediate vicinity, therefore to the far north of the site this area drains by run off into the Black Ditch.

Flood Risk

- 2.17. The majority of the site is located in Flood Zone 1 (Low Probability) - land assessed as having a less than 0.1% (1 in 1000) annual probability of river or sea flooding.
- 2.18. A small portion of the site is located in Flood Zones 2 and 3 which is associated with the Black Ditch. This part of the site is remaining as existing with the exception of the bridge entrance crossing which is not part of this RM submission and report.
- 2.19. The modelled flood level, undertaken by the bridge engineers, is calculated as approximately 11.0m AOD for the extreme event. Therefore, any flood risk to the site itself, which is at a minimum level of approximately 13.0m AOD, is negligible.

Geology

- 2.20. The British Geological Survey record plans for the area, indicates drift deposits to comprise Alluvium (clay, silt, sand and gravel), Head Deposits (clay, silt, sand and gravel), and River Terrace Deposits (sand, silt and clay). Bedrock geology comprises Lambeth Group (clay, silt and sand), Lewes Nodular Chalk Formation (chalk), and Tarrant Chalk Member (chalk) to the south. This is consistent with the inferred geology of the site, from the British Geological Survey 1:50,000 mapping, (via the Geology of Britain on-line viewer).
- 2.21. The geotechnical assessments and infiltration testing confirm the soil and bedrock properties.

Hydrogeological

- 2.22. The Environment Agency has classified the superficial geology as a Secondary Aquifer with the underlying bedrock classified as a Secondary A Principal Aquifer.
- 2.23. There are no active groundwater abstraction licences or potable water abstraction licenses within 500m of the site. There is one active license within 1km (967m) of the site which relates to spray irrigation. The site is not recorded to be within 500m of a Groundwater Source Protection Zone.

Groundwater

- 2.24. The geotechnical investigations carried out as part of the approved outline planning application comprised of winter testing of groundwater. No standing groundwater was encountered in the southern and western parts of the site where infiltration is prevalent.
- 2.25. In addition, all infiltration testing, both at outline planning and recently in March 202, which was during particularly wet weather, no groundwater was encountered during the tests.



Infiltration

- 2.26. Infiltration testing was undertaken as part of the approved outline planning application and recently, by RSK, in March 2020. This recent testing was classified as 'winter testing' and was undertaken in dialogue with Arun DC. The full RSK report is contained within the Appendix.
- 2.27. Testing at outline planning stage resulted in infiltration rates of between 7.2×10^{-3} m/s and 5.8×10^{-5} m/s indicating infiltration is very viable on the site.
- 2.28. Winter testing in March 2020 resulted in infiltration rates of between 2.0×10^{-3} m/s and 4.24×10^{-6} m/s again confirming infiltration is very viable on the site. This was undertaken at a greater range of depths and locations across the site, hence the variations in results.
- 2.29. The results varied across the site with infiltration viable in the south and west and limited in the north adjacent to the Black Ditch.
- 2.30. To this end a suitable infiltration rate has been established to represent the variations across the site, and in regard to the locations of the main SuDS infiltration features. Refer to plan in the Appendix.

RSK Infiltration Testing Summary

Location	Trial Pits Used	Average Infiltration Rate	Notes
Western Parcel	SA1, SA6, SA7	6.387×10^{-5}	Average
Southern Basin	SA3, SA4	2.333×10^{-4}	Worse case figure
South	SA14, SA17	2.748×10^{-5}	Average
Middle South	SA10, SA11	6.427×10^{-6}	Average
Middle North	SA12, SA13	2.122×10^{-5}	Worse case figure
North	SA5, SA6, SA15, SA16	-	No Infiltration



3.0 Drainage Strategy

Introduction

- 3.1. This chapter provides details on an indicative foul and surface water drainage strategy and measures to drain the Development.

Methodology

- 3.2. The drainage strategy has been designed to achieve the requirements of NPPF and utilise a comprehensive Sustainable Drainage System (SuDS).

Management Strategy

- 3.3. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. Changes of land use can have significant downstream impacts where existing drainage systems may not have sufficient capacity for any additional surface water flow.
- 3.4. A surface water management strategy for the development will be required to manage and reduce the flood risk posed by the surface water runoff from the site.
- 3.5. There are three possible options to discharge the surface water runoff in accordance with requirement H3 of the Building Regulations 2010. Rainwater shall discharge to one of the following, listed in order of priority:
- An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
 - a watercourse; or where that is not reasonably practicable,
 - a sewer
- 3.6. Due to the nature of the ground and the existing drainage characteristics of the site it is proposed to discharge surface water runoff from the site into the watercourses that surround the site as infiltration is unsuitable.
- 3.7. Impermeable areas for housing and associated hardstanding areas such as driveways will be calculated individually for each property with an allowance added to each property's total hardstanding area to allow for urban creep. Within the drainage strategy a full 10% allowance has been incorporated although this is associated with a residential dwelling density of less than 25 dwellings per hectare. In detailed design the Urban Creep allowance will be calculated in accordance with the Non-Statutory Technical Standards for Sustainable Drainage.

Sustainable Drainage (SuDS)

- 3.8. Sustainable water management measures should be used to control the surface water runoff from the proposed development site therefore, managing the flood risk to the site and surrounding areas from surface water runoff.



3.9. Current guidance, CIRIA (2004) Report C609, provides that a hierarchy of techniques should be identified, namely:

- **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
- **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).
- **Regional Control** – management of runoff from several sites, typically in a detention pond or wetland.

3.10. In 2015 CIRIA published The SuDS Manual (C753) providing best practice guidance on the planning, design, construction, operation and maintenance of SuDS.

3.11. The SuDS Manual provides guidance to ensure SuDS are planned and designed to maximise the opportunities and benefits of surface water management.

3.12. The four main categories of benefits that can be achieved by SuDS, referred to as the four pillars of SuDS design, are:

- **Water quantity** – control the quantity of runoff to support the management of flood risk, and maintain and protect the natural water cycle
- **Water quality** – manage the quality of the runoff to prevent pollution
- **Amenity** – create and sustain better places for people
- **Biodiversity** – Create and sustain better places for nature

3.13. Given that infiltration type SuDS devices are not be feasible on the site the following SuDS components applicable to the site could include:

- **Pervious surfacing systems** – structural surfaces that allow water to penetrate thus providing storage and treatment, e.g. pervious paving.
- **Conveyance systems** – components that convey flows to downstream storage systems, e.g. swales, filter drains.
- **Storage systems** – components that control flows, and possibly volumes, by storing water and releasing it slowly, e.g. ponds, wetlands and detention basins.
- **Treatment systems** – components that remove or facilitate the degradation of contaminants present in runoff, e.g. filter strips, proprietary treatment systems.

Pre and Post Development Surface Areas

3.14. The existing site is predominantly Greenfield. Therefore, any development will increase the impermeable area and surface water runoff.



- 3.15. Post development impermeable areas have been calculated using the layout masterplan to determine the area of the proposed roads, dwellings and hardstanding.

Greenfield Run Off Rates

- 3.16. In accordance with the approved FRA all surface water run off from the site, where there is a positive offsite discharge, will be limited to 3.6 l/s/ha (mean annual runoff QBAR) for all events up to the annual probability 1 in 100 year storm event plus 40% climate change. This provides considerable benefit in overall run off rates both in the short and long term with an allowance made for climate change.
- 3.17. The Greenfield run off rates in accordance with the approved FRA are:
- QBAR – 3.6 l/s/ha
 - 1 in 1 Year – 3.0 l/s/ha
 - 1 in 30 Year – 8.1 l/s/ha
 - 1 in 100 Year – 11.4 l/s/ha

Surface Water Treatment Improvements

- 3.18. Notwithstanding the requirement to provide improvements in water quality due to proposed development, the location of the site in respect to the adjacent sensitive receptors, such as the Black Ditch, necessitates additional consideration.
- 3.19. CIRIA report C753 The SuDS Manual outlines the methodology for assessing water quality risks associated with new development. This is a simple index approach which provides a high level scoping analysis of the land usage and gives guidelines for appropriate treatment stages.
- 3.20. This process identifies features necessary to provide adequate substance removal in line with Environment Agency requirements. This is a three step process of Allocation, Mitigation and Review.
- 3.21. Surfaces generating runoff are 'graded' on their potential to contribute to various harmful pollutants and gives each surface a risk of pollution from each element.
- 3.22. Historically, PPG3 documentation would recommend that pollutants were removed utilising oil separators, but since its superseding, more recent guidance has shifted to the use of SuDS features to remove pollutants; thereby providing significant improvements in treatment. The use of non-mechanical features also decrease the requirements for maintenance and increase natural biodiversity.
- 3.23. Without adequate treatment, the pollutants could cause damage if they were to enter the watercourse or water table in large volumes. The use of SuDS features to slow down and degrade these pollutants is critical to the provision of an acceptable drainage scheme.

SuDS Features

- 3.24. The surface water strategy proposes utilising a number of Sustainable Drainage System techniques (SuDS) to attenuate surface water runoff. The selection of the most appropriate SuDS needs to consider existing constraints, ownership and maintenance issues. To that end, the most suitable SuDS features that could be incorporated into this site are:



- Swales and granular filter strips, with or without underground attenuation;
- Bioretention system within other SuDS features; and
- Detention/Infiltration basins.

- 3.25. The banks of the SuDS features are designed with a maximum gradient of 1 in 4 and an appropriate freeboard above the maximum water level. This allows landscaping of both wetland and wildflower mixes to provide an appropriate landscape context in the vicinity of the features. However, during detailed design, it is possible that a maximum gradient of 1 in 3 could be utilised near to hedgerows and inaccessible areas with a shallower gradient of 1 in 4 or 5 incorporated on the development side. This provides aesthetic interest to the features as well as assisting in maintenance. Where basins are deeper, due to the sloping ground, a 1m berm, above the maximum water level, has been provided. This enables a shelf for planting and respite should personnel or objects enter the basin
- 3.26. Open SuDS features are designed so as not to compromise the safety of residents, visitors and their property. Generally open boundaries are provided, and perimeter planting could be utilised to define the extents of the features.
- 3.27. Open larger basins are designed with forebays, to provide a sedimentation bay, and permanent treatment areas.
- 3.28. The drainage basins are sized to accommodate all storms up to and including the 1 in 100 year event with a 40% allowance for climate change with an appropriate freeboard.
- 3.29. The proposals draw reference to the DEFRA document *Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems* March 2015, as well as CIRIA C753 *The SuDS Manual*. In addition, all designs would be in accordance with best practice as stipulated in EA Report SC030219 '*Rainfall Runoff Management for Developments*'.
- 3.30. The utilisation of Sustainable Drainage Systems (SuDS) provides not only the benefit of controlling waters at source and online treatment of collected waters but also allows enhanced aesthetics and biodiversity.

Adoption and Ownership

- 3.31. The drainage system is designed to the appropriate standards including Sewers for Adoption, the Building Regulations and the requirement of the National Planning Policy Framework
- 3.32. The intention of adoption and ownership of drainage and SuDS is as follows:
- Surface water sewers within development parcels to be offered for adoption to Southern Water under the Section 104 process of the Water Industry Act.
 - Surface water highway drains, gullies and leads within adopted roads to be maintained by the Highway Authority.
 - Foul sewers within development parcels to be offered for adoption to Southern Water under the Section 104 process of the Water Industry Act.



- Above ground attenuation within development parcels (i.e. swales and basins) to be maintained by a private maintenance company funded by residential properties, or, subject to agreement offered and maintained by Arun District Council.

SuDS Maintenance Strategy

- 3.33. For the water treatment effects of SuDS features to remain effective, a comprehensive maintenance strategy will be implemented.
- 3.34. During construction, maintenance of SuDS features will be undertaken by the Contractor. Upon completion, the assets will be passed over to the Management Company or community group commissioned to maintain the features in perpetuity.
- 3.35. A regular maintenance regime will be created, which consists of several primary measures required to ensure the longevity of the system. These should be undertaken on a regular basis to ensure consistent performance. Typical maintenance activities consist of:
- Inspecting and reporting; relatively regular review of the condition identifying issues and providing resolutions. Periodic review from the maintenance contractor;
 - Litter and debris removal;
 - Grass trimming, overall cutting and localised strimming preventing blockages;
 - Weed and evasive plant control;
 - Shrub management;
 - Aquatic and shoreline vegetation management;
 - Sweeping pervious surfaces; and
 - Oil removal from proprietary systems.
- 3.36. A remedial maintenance schedule will be recommended as part of the handover of the SuDS features. Remedial maintenance is required to provide repairs to the system and monitor long term damage ensuring the system remains consistently productive. The schedule would consist of;
- Structure rehabilitation and repair;
 - Infiltration surface rehabilitation;
 - Scarifying to remove “Thatch”;
 - Spiking or Tining the soil;
 - Air pressure treatment.
- 3.37. The maintenance schedule contents and timing will depend upon multiple factors including usage, contents of water utilising the system, location and biology. To this end, it is suggested that the schedule be finalised as part of detailed design; ensuring the most comprehensive maintenance schedule is incorporated for the phase in hand.



- 3.38. Community outreach can be undertaken as part of the development, which will raise awareness on the importance of SuDS to both flood risk and water quality in the local area. Imparting the new residents with knowledge on the risks associated with pollution to the surface water drainage system is key, as is the direct effect their actions may have on water quality and biodiversity in the area.

Surface Water Drainage Strategy

- 3.39. A surface water management strategy for the proposed development has been developed to manage and reduce the flood risk posed by the surface water runoff from the site. The drainage system for the proposed development will manage and reduce the flood risk posed by the surface water runoff from the site.
- 3.40. All designs would be in accordance with best practice as stipulated in EA Report SC030219 'Rainfall Runoff Management for Developments'.
- 3.41. In the first instance a traditional network of trapped gullies and pipes collect surface water run-off from roads, roofs and driveways. A traditional drainage system for the impermeable areas has been utilised to provide a system that can be checked, cleaned and maintained efficiently. Trapped gullies provide for the first flush of contaminants thus providing a high level of initial treatment.
- 3.42. All surface water drainage pipes have been designed to cater for the 1 in 30 year storm event, in accordance with industry standard, with all attenuation features designed to allow for the 1 in 100 year storm event plus 40% climate change allowance.
- 3.43. The traditional pipe system works in combination with swales, bioretention and attenuation/infiltration basins to provide treatment and attenuation storage, and high water quality benefits, with flow restricted by a proprietary device (e.g. Hydrobrakes) to ensure waters are released at the correct Greenfield rate.
- 3.44. The SuDS features are a mixture of swales, attenuation and infiltration basins designed to fill in excess storms.
- 3.45. For the northern parcel a permanently wet attenuation basin is proposed. This provides additional ecological and biodiversity benefits. At low flows the water will be controlled by the Hydrobrake and kept generally in the piped system, or routed through low flow channels in the online basins. For the larger storms water will back up, into the basin and fill accordingly. Once the storm has subsided flow will drain out through the pipe into the control manholes and the Hydrobrake and subsequent outfall. The outfall will drain, by a small ditch to the Black Ditch.
- 3.46. The discharge from the northern basin has been restricted to 5.4 l/s for all storms up to and including the 1 in 100 year storm event plus 40% climate change. This is in accordance with the impermeable area of the catchment utilising the QBAR discharge rate agreed at outline planning approval.
- 3.47. For the southern parcel an infiltration basin is proposed. All storms will drain into the basin and infiltrate into the ground. The basin has been designed to half drain in less than 24 hours in accordance with standard. For the majority of the time the basin will be dry and only be wet in periods of inclement weather. This basin could be used for areas of play in dry weather.



- 3.48. In addition to the basins swales are also provided in the central green space to provide infiltration at source and assist in water quality, ecology and biodiversity. These swales will drain into the ground and again only be wet in periods of inclement weather.
- 3.49. The western parcel will drain to a swale with underground storage, again wholly infiltrating into the ground. The above ground swale will infiltrate and store surface water run off, provide a surface SuDS feature, whilst also directing run off to the underground attenuation storage. In addition to this swale a small area of permeable paving with infiltration into the ground is located to the north east of the western parcel to drain a small enclave of dwellings. This provides filtration at source and resilience to the downstream feature.
- 3.50. Calculations to show the proposed drainage scheme and SuDS features are able to accommodate excess flows from storm events up to and including the 1 in 100 year event with a 40% allowance for climate change are provided in the appendix. The drainage strategy is shown on ALP drawings A290-RM-501, 502 and 503.
- 3.51. Flows in excess of the above design storms, which may flood from the network for storms in excess of the 1 in 30 year storm, will be directed along the highway routes to adjacent Greenfield areas, or into the attenuation features. This ensures recharging of the ground in the Greenfield areas and that no onsite or offsite residential units are affected by flood waters.
- 3.52. The basins in the strategic Greenspaces have in excess of 300mm freeboard and therefore are able to accept flood water from manholes upstream in very extreme events and not compromise off site flow.

Resilience

- 3.53. The surface water strategy and RM design has been undertaken in accordance with all approved documents. However, it is prudent to provide resilience to the design and test for extreme circumstances.
- 3.54. Currently the scheme provides calculations for all drainage entering the three discharge points. As described above swales are provided in the central greenspace although they are not used in the design modelling. This provides additional measures during detailed design and provides resilience to the design.
- 3.55. In addition, it is highly likely that some areas of private infiltration will be available in detailed design. Some dwellings may drain to their own private soakaways within their own curtilage. Again, these have not been included at this time and again provide resilience to the design and spread out the possible infiltration techniques.
- 3.56. Urban Creep is the allowance for the future design of small extensions and the paving over of greenspaces within new developments and is based on the density of the development as well as the ability for Urban Creep to occur, and can be as much as 10% increase in private impermeable area in large low density developments.
- 3.57. The scheme has been tested to assess Urban Creep and there is a small increase in flood risk in the larger storm events i.e. the 1 in 100 year event with a 40% allowance for climate change. However, as stated above, with the resilience already built into the system, and potential further drainage being introduced at detailed design, such as private soakaways, it is wholly reasonable to assume that Urban Creep will not be detrimental in any way.



Foul Water Drainage Strategy.

- 3.58. Southern Water (SW) Sewer records indicate that there is a network of foul water sewers within the locality of the Application Site.
- 3.59. A 150mm diameter foul water sewer is located to the south of the site in High Street. The nearest manhole is MH5301.
- 3.60. A 150mm diameter foul water sewer is located to the west of the site in Weavers Hill. The nearest manhole is MH2302.
- 3.61. There is a further network located to the north of the site at Water Lane although this is some way from the site and only accessible through the entrance bridge.
- 3.62. A foul water Impact study undertaken by Southern Water, at outline planning stage, identified that foul sewer improvements would need to be undertaken to the foul sewer network to accommodate the increased foul flows created by the development. This was on the basis of all units connecting to MH5301 in High Street.
- 3.63. Due to the topography of the site a foul water pumping station would be required in the north of the site to drain the northern parcel, irrelevant of where the final discharge point is located. This is due to the existing invert levels of the existing network. To this end Southern Water were contacted to discuss the various options available for connection.
- 3.64. It is proposed that the foul drainage for the western parcel discharges via gravity into the aforementioned Southern Water foul sewer in Weavers Hill at MH2302. Southern Water modelling and correspondence has stated that no offsite reinforcements will be required to facilitate this connection.
- 3.65. The northern parcel will drain to the proposed pumping station to be pumped back to the southern parcel network. This pumped flow, alongside the southern parcel will drain by gravity to the aforementioned Southern Water foul sewer in High Street at MH5301. Southern Water modelling and correspondence has stated that no offsite reinforcements will be required to facilitate this connection.
- 3.66. Section 104 technical approval alongside a Section 106 connection approval will be gained with Southern Water to these connections as detailed above.

Site Drainage Summary

- 3.67. It has been demonstrated that surface water from the site can be managed such that flood risk to and from the site following development is not increased.
- 3.68. It has been demonstrated that foul water from the site can be managed such that it does not have a detrimental effect to the foul sewer network.



Appendices



Appendix 1 – Calculations

Drainage Simulation Calculations

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<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for STORM WEST</u> Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>5</td><td>PIMP (%)</td><td>100</td></tr><tr><td>M5-60 (mm)</td><td>19.000</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>Ratio R</td><td>0.350</td><td>Minimum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Maximum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Design Depth for Optimisation (m)</td><td>1.200</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Vel for Auto Design only (m/s)</td><td>1.00</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr></table> Designed with Level Soffits												Return Period (years)	5	PIMP (%)	100	M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0	Ratio R	0.350	Minimum Backdrop Height (m)	0.000	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																																																			
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Ratio R	0.350	Minimum Backdrop Height (m)	0.000																																																																																																																																																																																																																							
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000																																																																																																																																																																																																																							
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200																																																																																																																																																																																																																							
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00																																																																																																																																																																																																																							
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																																																																																							
<u>Network Design Table for STORM WEST</u> <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>S1.000</td><td>36.615</td><td>0.282</td><td>130.0</td><td>0.031</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.001</td><td>21.470</td><td>0.160</td><td>134.2</td><td>0.028</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.002</td><td>59.509</td><td>0.593</td><td>100.4</td><td>0.016</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.000</td><td>3.984</td><td>0.039</td><td>102.1</td><td>0.006</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S3.000</td><td>6.742</td><td>0.087</td><td>77.5</td><td>0.009</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.003</td><td>6.568</td><td>0.330</td><td>19.9</td><td>0.047</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S4.000</td><td>9.976</td><td>0.067</td><td>150.0</td><td>0.011</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S5.000</td><td>6.570</td><td>0.144</td><td>45.6</td><td>0.015</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr></table> <u>Network Results Table</u> <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>S1.000</td><td>50.00</td><td>5.53</td><td>15.473</td><td>0.031</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.15</td><td>45.5</td><td>4.2</td></tr><tr><td>S1.001</td><td>50.00</td><td>5.85</td><td>15.191</td><td>0.059</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.13</td><td>44.8</td><td>8.0</td></tr><tr><td>S1.002</td><td>50.00</td><td>6.61</td><td>15.031</td><td>0.075</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.31</td><td>51.9</td><td>10.2</td></tr><tr><td>S2.000</td><td>50.00</td><td>5.07</td><td>14.552</td><td>0.006</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.99</td><td>17.6</td><td>0.7</td></tr><tr><td>S3.000</td><td>50.00</td><td>5.10</td><td>14.600</td><td>0.009</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.14</td><td>20.2</td><td>1.2</td></tr><tr><td>S1.003</td><td>50.00</td><td>6.65</td><td>14.438</td><td>0.137</td><td>0.0</td><td>0.0</td><td>0.0</td><td>2.95</td><td>117.2</td><td>18.5</td></tr><tr><td>S4.000</td><td>50.00</td><td>5.20</td><td>14.250</td><td>0.011</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.82</td><td>14.5</td><td>1.5</td></tr><tr><td>S5.000</td><td>50.00</td><td>5.07</td><td>14.327</td><td>0.015</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.49</td><td>26.4</td><td>2.0</td></tr></table> ©1982-2020 Innovyze												PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	S1.000	36.615	0.282	130.0	0.031	5.00	0.0	0.600	o	225	Pipe/Conduit		S1.001	21.470	0.160	134.2	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit		S1.002	59.509	0.593	100.4	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit		S2.000	3.984	0.039	102.1	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit		S3.000	6.742	0.087	77.5	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit		S1.003	6.568	0.330	19.9	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit		S4.000	9.976	0.067	150.0	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit		S5.000	6.570	0.144	45.6	0.015	5.00	0.0	0.600	o	150	Pipe/Conduit		PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	S1.000	50.00	5.53	15.473	0.031	0.0	0.0	0.0	1.15	45.5	4.2	S1.001	50.00	5.85	15.191	0.059	0.0	0.0	0.0	1.13	44.8	8.0	S1.002	50.00	6.61	15.031	0.075	0.0	0.0	0.0	1.31	51.9	10.2	S2.000	50.00	5.07	14.552	0.006	0.0	0.0	0.0	0.99	17.6	0.7	S3.000	50.00	5.10	14.600	0.009	0.0	0.0	0.0	1.14	20.2	1.2	S1.003	50.00	6.65	14.438	0.137	0.0	0.0	0.0	2.95	117.2	18.5	S4.000	50.00	5.20	14.250	0.011	0.0	0.0	0.0	0.82	14.5	1.5	S5.000	50.00	5.07	14.327	0.015	0.0	0.0	0.0	1.49	26.4	2.0
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design																																																																																																																																																																																																															
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S5.000	50.00	5.07	14.327	0.015	0.0	0.0	0.0	1.49	26.4	2.0																																																																																																																																																																																																																

Abley Letchford Partnership Ltd										Page 2	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM WEST											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.004	16.840	0.100	169.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.000	5.343	0.338	15.8	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	4.953	0.029	169.0	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.000	9.478	0.445	21.3	0.036	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.000	7.032	0.351	20.0	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	4.953	0.029	169.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.000	3.252	0.242	13.4	0.028	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.007	38.886	0.208	187.0	0.007	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.000	4.013	0.223	18.0	0.026	5.00	0.0	0.600	o	150	Pipe/Conduit	
S11.000	7.319	0.139	52.7	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.008	6.718	0.063	106.6	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S1.004	50.00	6.93	14.108	0.163	0.0	0.0	0.0	1.00	39.9	22.1	
S6.000	50.00	5.03	14.422	0.010	0.0	0.0	0.0	2.55	45.0	1.3	
S1.005	50.00	7.01	14.008	0.201	0.0	0.0	0.0	1.00	39.9	27.2	
S7.000	50.00	5.07	14.499	0.036	0.0	0.0	0.0	2.19	38.7	4.9	
S8.000	50.00	5.05	14.406	0.013	0.0	0.0	0.0	2.26	39.9	1.8	
S1.006	50.00	7.09	13.979	0.251	0.0	0.0	0.0	1.00	39.9	34.0	
S9.000	50.00	5.02	14.267	0.028	0.0	0.0	0.0	2.76	48.8	3.8	
S1.007	50.00	7.66	13.875	0.286	0.0	0.0	0.0	1.15	81.0	38.7	
S10.000	50.00	5.03	14.040	0.026	0.0	0.0	0.0	2.39	42.2	3.5	
S11.000	50.00	5.09	13.956	0.017	0.0	0.0	0.0	1.39	24.6	2.3	
S1.008	50.00	7.73	13.667	0.365	0.0	0.0	0.0	1.52	107.6	49.5	
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Abley Letchford Partnership Ltd										Page 3	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM WEST											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S12.000	3.420	0.189	18.1	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.009	16.231	0.161	100.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S13.000	6.778	0.097	69.9	0.060	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.010	6.166	0.060	102.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.011	7.966	0.025	321.0	0.022	0.00	0.0	0.600	o	375	Pipe/Conduit	
S14.000	4.638	0.179	25.9	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.012	10.959	0.034	321.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.013	13.286	0.041	321.0	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	
S15.000	6.778	0.282	24.0	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.000	12.749	0.406	31.4	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.014	6.852	0.021	321.0	0.027	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.015	4.848	0.015	321.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S12.000	50.00	5.02	13.943	0.012	0.0	0.0	0.0	2.38	42.0	1.6	
S1.009	50.00	7.90	13.604	0.377	0.0	0.0	0.0	1.57	110.7	51.1	
S13.000	50.00	5.09	13.690	0.060	0.0	0.0	0.0	1.20	21.3	8.2	
S1.010	50.00	7.97	13.443	0.437	0.0	0.0	0.0	1.55	109.6	59.2	
S1.011	50.00	8.10	13.308	0.459	0.0	0.0	0.0	1.01	111.1	62.2	
S14.000	50.00	5.04	13.687	0.019	0.0	0.0	0.0	1.99	35.1	2.6	
S1.012	50.00	8.28	13.283	0.478	0.0	0.0	0.0	1.01	111.1	64.7	
S1.013	50.00	8.50	13.249	0.495	0.0	0.0	0.0	1.01	111.1	67.0	
S15.000	50.00	5.05	13.715	0.027	0.0	0.0	0.0	2.06	36.5	3.7	
S16.000	50.00	5.12	13.839	0.032	0.0	0.0	0.0	1.80	31.9	4.4	
S1.014	50.00	8.62	13.207	0.582	0.0	0.0	0.0	1.01	111.1	78.7	
S1.015	50.00	8.70	13.186	0.582	0.0	0.0	0.0	1.01	111.1	78.7	
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Abley Letchford Partnership Ltd		Page 4
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
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Manhole Schedules for STORM WEST

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	16.898	1.425	Open Manhole	1200	S1.000	15.473	225				
S2	16.667	1.475	Open Manhole	1200	S1.001	15.191	225	S1.000	15.191	225	
S3	16.456	1.425	Open Manhole	1200	S1.002	15.031	225	S1.001	15.031	225	
S4	15.749	1.197	Open Manhole	600	S2.000	14.552	150				
S5	15.950	1.350	Open Manhole	600	S3.000	14.600	150				
S6	15.863	1.425	Open Manhole	1200	S1.003	14.438	225	S1.002	14.438	225	
								S2.000	14.513	150	
								S3.000	14.513	150	
S7	15.499	1.249	Open Manhole	1200	S4.000	14.250	150				
S8	15.677	1.350	Open Manhole	600	S5.000	14.327	150				
S9	15.812	1.704	Open Manhole	1200	S1.004	14.108	225	S1.003	14.108	225	
								S4.000	14.183	150	
								S5.000	14.183	150	
S10	15.772	1.350	Open Manhole	600	S6.000	14.422	150				
S11	15.639	1.631	Open Manhole	1200	S1.005	14.008	225	S1.004	14.008	225	
								S6.000	14.084	150	1
S12	15.849	1.350	Open Manhole	600	S7.000	14.499	150				
S13	15.756	1.350	Open Manhole	600	S8.000	14.406	150				
S14	15.594	1.615	Open Manhole	1200	S1.006	13.979	225	S1.005	13.979	225	
								S7.000	14.054	150	
								S8.000	14.055	150	1
S15	15.617	1.350	Open Manhole	600	S9.000	14.267	150				
S16	15.549	1.674	Open Manhole	1200	S1.007	13.875	300	S1.006	13.950	225	
								S9.000	14.025	150	
S17	15.417	1.377	Open Manhole	600	S10.000	14.040	150				
S18	15.306	1.350	Open Manhole	600	S11.000	13.956	150				
S19	15.166	1.500	Open Manhole	1200	S1.008	13.667	300	S1.007	13.667	300	
								S10.000	13.817	150	
								S11.000	13.817	150	
S20	15.293	1.350	Open Manhole	600	S12.000	13.943	150				
S21	15.103	1.500	Open Manhole	1200	S1.009	13.604	300	S1.008	13.604	300	
								S12.000	13.754	150	
S22	15.040	1.350	Open Manhole	600	S13.000	13.690	150				
S23	14.943	1.500	Open Manhole	1200	S1.010	13.443	300	S1.009	13.443	300	
								S13.000	13.593	150	
S24	14.882	1.575	Open Manhole	1350	S1.011	13.308	375	S1.010	13.383	300	
S25	15.037	1.350	Open Manhole	600	S14.000	13.687	150				
S26	14.863	1.580	Open Manhole	1350	S1.012	13.283	375	S1.011	13.283	375	

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Abley Letchford Partnership Ltd		Page 5
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions Network 2020.1		

Manhole Schedules for STORM WEST

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S27	14.920	1.671	Open Manhole	1350	S1.013	13.249	375	S14.000	13.508	150	
S28	15.065	1.350	Open Manhole	600	S15.000	13.715	150	S1.012	13.249	375	
S29	15.189	1.350	Open Manhole	1200	S16.000	13.839	150				
S30	15.063	1.855	Open Manhole	1350	S1.014	13.207	375	S1.013	13.207	375	
								S15.000	13.433	150	1
								S16.000	13.433	150	1
S31	15.170	1.984	Open Manhole	1350	S1.015	13.186	375	S1.014	13.186	375	
S	15.099	1.928	Open Manhole	0		OUTFALL		S1.015	13.171	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	507453.240	104484.843	507453.240	104484.843	Required	
S2	507417.319	104477.750	507417.319	104477.750	Required	
S3	507399.830	104490.204	507399.830	104490.204	Required	
S4	507339.150	104491.127	507339.150	104491.127	Required	
S5	507345.494	104482.936	507345.494	104482.936	Required	
S6	507340.391	104487.342	507340.391	104487.342	Required	
S7	507330.933	104490.905	507330.933	104490.905	Required	
S8	507329.535	104482.063	507329.535	104482.063	Required	
S9	507336.098	104482.370	507336.098	104482.370	Required	

Abley Letchford Partnership Ltd						Page 6
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering			
Date 26/05/2020 File NETWORK 1 V1.MDX			Designed by SL Checked by SL			
XP Solutions			Network 2020.1			
<u>Manhole Schedules for STORM WEST</u>						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S10	507342.028	104466.999	507342.028	104466.999	Required	
S11	507336.886	104465.548	507336.886	104465.548	Required	
S12	507343.353	104458.983	507343.353	104458.983	Required	
S13	507330.554	104467.414	507330.554	104467.414	Required	
S14	507334.188	104461.394	507334.188	104461.394	Required	
S15	507330.135	104455.588	507330.135	104455.588	Required	
S16	507329.947	104458.834	507329.947	104458.834	Required	
S17	507291.358	104452.579	507291.358	104452.579	Required	
S18	507293.953	104463.337	507293.953	104463.337	Required	
S19	507291.126	104456.585	507291.126	104456.585	Required	
S20	507282.875	104456.445	507282.875	104456.445	Required	
S21	507284.929	104459.179	507284.929	104459.179	Required	
S22	507274.156	104475.338	507274.156	104475.338	Required	
S23	507271.953	104468.929	507271.953	104468.929	Required	
S24	507265.987	104470.486	507265.987	104470.486	Required	
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Abley Letchford Partnership Ltd						Page 7																																																															
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering																																																																		
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Manhole Schedules for STORM WEST <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S25</td><td>507260.975</td><td>104464.438</td><td>507260.975</td><td>104464.438</td><td>Required</td><td></td></tr><tr><td>S26</td><td>507258.340</td><td>104468.254</td><td>507258.340</td><td>104468.254</td><td>Required</td><td></td></tr><tr><td>S27</td><td>507249.323</td><td>104462.026</td><td>507249.323</td><td>104462.026</td><td>Required</td><td></td></tr><tr><td>S28</td><td>507246.276</td><td>104453.713</td><td>507246.276</td><td>104453.713</td><td>Required</td><td></td></tr><tr><td>S29</td><td>507232.996</td><td>104463.994</td><td>507232.996</td><td>104463.994</td><td>Required</td><td></td></tr><tr><td>S30</td><td>507239.530</td><td>104453.046</td><td>507239.530</td><td>104453.046</td><td>Required</td><td></td></tr><tr><td>S31</td><td>507235.200</td><td>104447.736</td><td>507235.200</td><td>104447.736</td><td>Required</td><td></td></tr><tr><td>S</td><td>507232.272</td><td>104443.872</td><td></td><td></td><td>No Entry</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S25	507260.975	104464.438	507260.975	104464.438	Required		S26	507258.340	104468.254	507258.340	104468.254	Required		S27	507249.323	104462.026	507249.323	104462.026	Required		S28	507246.276	104453.713	507246.276	104453.713	Required		S29	507232.996	104463.994	507232.996	104463.994	Required		S30	507239.530	104453.046	507239.530	104453.046	Required		S31	507235.200	104447.736	507235.200	104447.736	Required		S	507232.272	104443.872			No Entry	
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Abley Letchford Partnership Ltd		Page 8
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions	Network 2020.1	
Online Controls for STORM WEST Pump Manhole: S31, DS/PN: S1.015, Volume (m³): 3.4 Invert Level (m) 13.186		
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Abley Letchford Partnership Ltd		Page 9
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020	Designed by SL	
File NETWORK 1 V1.MDX	Checked by SL	
XP Solutions		Network 2020.1

Storage Structures for STORM WEST

Cellular Storage Manhole: S31, DS/PN: S1.015

Invert Level (m) 13.373 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.22993 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.22993

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	288.0	288.0	1.100	0.0	370.0
1.000	288.0	370.0			

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Abley Letchford Partnership Ltd		Page 10
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions Network 2020.1		

Summary of Critical Results by Maximum Level (Rank 1) for STORM WEST

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%	100/15 Summer			
S1.001	S2	15 Winter	100	+40%	100/15 Summer			
S1.002	S3	15 Winter	100	+40%	100/15 Summer			
S2.000	S4	15 Winter	100	+40%	100/15 Summer			
S3.000	S5	15 Winter	100	+40%	100/15 Summer			
S1.003	S6	15 Winter	100	+40%	100/15 Summer			
S4.000	S7	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S5.000	S8	15 Winter	100	+40%	100/15 Summer			
S1.004	S9	15 Winter	100	+40%	100/15 Summer			
S6.000	S10	15 Winter	100	+40%	100/15 Summer			
S1.005	S11	15 Winter	100	+40%	100/15 Summer			
S7.000	S12	15 Winter	100	+40%	100/15 Summer			
S8.000	S13	15 Winter	100	+40%	100/15 Summer			
S1.006	S14	15 Winter	100	+40%	100/15 Summer			
S9.000	S15	15 Winter	100	+40%	100/15 Summer			
S1.007	S16	15 Winter	100	+40%	100/15 Summer			

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Abley Letchford Partnership Ltd								Page 11	
Search House Charnham Lane Hungerford RG17 0EY				Water Lane, Angmering					
Date 26/05/2020 File NETWORK 1 V1.MDX				Designed by SL Checked by SL					
XP Solutions				Network 2020.1					
<u>Summary of Critical Results by Maximum Level (Rank 1) for STORM WEST</u>									

Abley Letchford Partnership Ltd								Page 12	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering				
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL				
XP Solutions					Network 2020.1				
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Abley Letchford Partnership Ltd										Page 1																																																																																																																																																																																									
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<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for STORM NORTH</u> Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>5</td><td>PIMP (%)</td><td>100</td></tr><tr><td>M5-60 (mm)</td><td>19.000</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>Ratio R</td><td>0.350</td><td>Minimum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Maximum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Design Depth for Optimisation (m)</td><td>1.200</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Vel for Auto Design only (m/s)</td><td>1.00</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr></table> Designed with Level Soffits												Return Period (years)	5	PIMP (%)	100	M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0	Ratio R	0.350	Minimum Backdrop Height (m)	0.000	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																												
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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design																																																																																																																																																																																								
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S1.001	27.487	0.551	49.9	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit																																																																																																																																																																																									
S3.000	7.392	0.141	52.4	0.033	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																									
S4.000	5.589	0.056	100.0	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																									
S3.001	12.537	0.100	125.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit																																																																																																																																																																																									
S5.000	6.895	0.119	57.9	0.034	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																									
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)																																																																																																																																																																																									
S1.000	50.00	5.12	16.254	0.012	0.0	0.0	0.0	1.41	24.9	1.6																																																																																																																																																																																									
S2.000	50.00	5.08	16.107	0.023	0.0	0.0	0.0	1.00	17.8	3.1																																																																																																																																																																																									
S1.001	50.00	5.37	15.984	0.075	0.0	0.0	0.0	1.86	73.8	10.2																																																																																																																																																																																									
S3.000	50.00	5.09	16.297	0.033	0.0	0.0	0.0	1.39	24.6	4.5																																																																																																																																																																																									
S4.000	50.00	5.09	16.212	0.006	0.0	0.0	0.0	1.00	17.8	0.8																																																																																																																																																																																									
S3.001	50.00	5.27	16.081	0.039	0.0	0.0	0.0	1.17	46.4	5.3																																																																																																																																																																																									
S5.000	50.00	5.09	16.175	0.034	0.0	0.0	0.0	1.32	23.4	4.6																																																																																																																																																																																									

Abley Letchford Partnership Ltd										Page 2	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM NORTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S6.000	9.379	0.187	50.2	0.014	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.002	39.734	0.493	80.6	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.000	5.830	0.333	17.5	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.003	9.348	0.055	169.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.000	4.519	0.045	100.4	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	9.347	0.360	26.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.000	10.927	0.511	21.4	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S10.000	4.452	0.045	98.9	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	34.219	1.358	25.2	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	
S11.000	8.020	0.199	40.3	0.031	5.00	0.0	0.600	o	150	Pipe/Conduit	
S12.000	9.319	0.889	10.5	0.040	5.00	0.0	0.600	o	150	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S6.000	50.00	5.11	16.243	0.014	0.0	0.0	0.0	1.42	25.2	1.8	
S3.002	50.00	5.73	15.981	0.137	0.0	0.0	0.0	1.46	58.0	18.5	
S7.000	50.00	5.04	15.896	0.013	0.0	0.0	0.0	2.42	42.7	1.7	
S3.003	50.00	5.88	15.488	0.160	0.0	0.0	0.0	1.00	39.9	21.6	
S8.000	50.00	5.08	15.553	0.021	0.0	0.0	0.0	1.00	17.7	2.9	
S1.002	50.00	5.94	15.433	0.256	0.0	0.0	0.0	2.58	102.5	34.6	
S9.000	50.00	5.08	15.659	0.006	0.0	0.0	0.0	2.19	38.7	0.7	
S10.000	50.00	5.07	15.193	0.018	0.0	0.0	0.0	1.01	17.9	2.5	
S1.003	50.00	6.16	15.073	0.316	0.0	0.0	0.0	2.62	104.1	42.7	
S11.000	50.00	5.08	13.989	0.031	0.0	0.0	0.0	1.59	28.1	4.2	
S12.000	50.00	5.05	14.679	0.040	0.0	0.0	0.0	3.13	55.3	5.4	
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Abley Letchford Partnership Ltd										Page 3	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM NORTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.004	19.017	0.777	24.5	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
S13.000	10.893	0.265	41.0	0.029	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	25.663	0.589	43.6	0.023	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.000	11.366	0.407	27.9	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	6.158	0.269	22.9	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
S15.000	6.727	0.045	150.0	0.066	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.007	19.537	0.060	325.0	0.033	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.008	12.318	0.038	324.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S16.000	9.800	0.097	101.0	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.001	29.094	0.172	169.0	0.027	0.00	0.0	0.600	o	225	Pipe/Conduit	
S17.000	10.680	0.269	39.7	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.002	7.317	0.093	78.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S1.004	50.00	6.28	13.715	0.414		0.0	0.0	0.0	2.66	105.6	56.1
S13.000	50.00	5.12	13.279	0.029		0.0	0.0	0.0	1.58	27.8	4.0
S1.005	50.00	6.46	12.863	0.467		0.0	0.0	0.0	2.39	168.8	63.2
S14.000	50.00	5.10	12.831	0.008		0.0	0.0	0.0	1.91	33.8	1.0
S1.006	50.00	6.49	12.274	0.509		0.0	0.0	0.0	3.30	233.3	68.9
S15.000	50.00	5.14	12.200	0.066		0.0	0.0	0.0	0.82	14.5	9.0
S1.007	50.00	6.82	11.930	0.608		0.0	0.0	0.0	1.00	110.4	82.4
S1.008	50.00	7.02	11.870	0.608		0.0	0.0	0.0	1.00	110.5	82.4
S16.000	50.00	5.16	17.150	0.032		0.0	0.0	0.0	1.00	17.7	4.4
S16.001	50.00	5.65	16.978	0.060		0.0	0.0	0.0	1.00	39.9	8.1
S17.000	50.00	5.11	17.150	0.008		0.0	0.0	0.0	1.60	28.3	1.1
S16.002	50.00	5.73	16.806	0.068		0.0	0.0	0.0	1.48	58.7	9.2
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Abley Letchford Partnership Ltd										Page 4	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM NORTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S16.003	8.415	0.212	39.7	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S18.000	5.810	0.219	26.5	0.007	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.004	7.317	0.210	34.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.000	4.730	0.050	94.6	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S20.000	3.670	0.050	73.4	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
S19.001	12.356	0.073	169.0	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.000	9.017	0.120	75.3	0.058	5.00	0.0	0.600	o	150	Pipe/Conduit	
S22.000	4.683	0.262	17.9	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
S21.001	5.342	0.638	8.4	0.021	0.00	0.0	0.600	o	150	Pipe/Conduit	
S23.000	6.196	0.636	9.7	0.041	5.00	0.0	0.600	o	150	Pipe/Conduit	
S19.002	44.923	0.266	169.0	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S16.003	50.00	5.80	16.713	0.086	0.0	0.0	0.0	2.08	82.8	11.7	
S18.000	50.00	5.05	16.795	0.007	0.0	0.0	0.0	1.96	34.7	0.9	
S16.004	50.00	5.85	16.501	0.093	0.0	0.0	0.0	2.23	88.5	12.6	
S19.000	50.00	5.08	14.150	0.006	0.0	0.0	0.0	1.03	18.3	0.8	
S20.000	50.00	5.05	14.150	0.011	0.0	0.0	0.0	1.17	20.8	1.5	
S19.001	50.00	5.28	14.025	0.041	0.0	0.0	0.0	1.00	39.9	5.6	
S21.000	50.00	5.13	14.785	0.058	0.0	0.0	0.0	1.16	20.5	7.9	
S22.000	50.00	5.03	14.927	0.019	0.0	0.0	0.0	2.39	42.3	2.6	
S21.001	50.00	5.16	14.665	0.099	0.0	0.0	0.0	3.50	61.9	13.3	
S23.000	50.00	5.03	14.663	0.041	0.0	0.0	0.0	3.25	57.4	5.6	
S19.002	50.00	6.03	13.952	0.235	0.0	0.0	0.0	1.00	39.9	31.9	
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Abley Letchford Partnership Ltd											Page 5	
Search House Charnham Lane Hungerford RG17 0EY						Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX						Designed by SL Checked by SL						
XP Solutions						Network 2020.1						
Network Design Table for STORM NORTH												
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	
S24.000	6.317	0.090	70.2	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit		
S25.000	8.498	0.084	100.9	0.022	5.00	0.0	0.600	o	150	Pipe/Conduit		
S19.003	16.249	0.096	169.0	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit		
S16.005	10.284	0.043	241.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S26.000	4.372	0.141	31.0	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit		
S27.000	6.444	0.110	58.6	0.056	5.00	0.0	0.600	o	150	Pipe/Conduit		
S16.006	24.854	0.103	241.9	0.023	0.00	0.0	0.600	o	300	Pipe/Conduit		
S28.000	6.493	0.091	71.4	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit		
S29.000	4.485	0.080	56.1	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit		
S28.001	27.275	0.515	53.0	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit		
S30.000	3.906	0.139	28.1	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit		
Network Results Table												
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
S24.000	50.00	5.09	16.233	0.032	0.0	0.0	0.0	1.20	21.2	4.3		
S25.000	50.00	5.14	15.927	0.022	0.0	0.0	0.0	1.00	17.7	3.0		
S19.003	50.00	6.25	13.611	0.315	0.0	0.0	0.0	1.21	85.3	42.7		
S16.005	50.00	6.42	13.515	0.408	0.0	0.0	0.0	1.01	71.1	55.3		
S26.000	50.00	5.04	16.167	0.010	0.0	0.0	0.0	1.81	32.1	1.3		
S27.000	50.00	5.08	16.136	0.056	0.0	0.0	0.0	1.32	23.3	7.5		
S16.006	50.00	6.83	13.472	0.497	0.0	0.0	0.0	1.01	71.1	67.3		
S28.000	50.00	5.09	16.163	0.011	0.0	0.0	0.0	1.19	21.1	1.5		
S29.000	50.00	5.06	16.152	0.008	0.0	0.0	0.0	1.35	23.8	1.1		
S28.001	50.00	5.34	15.997	0.054	0.0	0.0	0.0	1.80	71.6	7.3		
S30.000	50.00	5.03	15.696	0.018	0.0	0.0	0.0	1.91	33.7	2.5		
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Abley Letchford Partnership Ltd										Page 6	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020 File NETWORK 1 V1.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM NORTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S31.000	5.827	0.057	102.2	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
S28.002	26.333	0.480	54.9	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
S32.000	4.370	0.384	11.4	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S33.000	7.430	0.297	25.0	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S28.003	6.650	1.557	4.3	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S16.007	15.613	0.065	241.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S34.000	6.224	0.648	9.6	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
S35.000	5.672	0.571	9.9	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.008	37.371	0.528	70.8	0.049	0.00	0.0	0.600	o	375	Pipe/Conduit	
S36.000	7.400	0.329	22.5	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit	
S16.009	17.390	0.300	58.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S16.010	23.361	0.570	41.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S31.000	50.00	5.10	15.614	0.019	0.0	0.0	0.0	0.99	17.6	2.6	
S28.002	50.00	5.59	15.482	0.093	0.0	0.0	0.0	1.77	70.4	12.6	
S32.000	50.00	5.02	15.461	0.006	0.0	0.0	0.0	3.00	53.1	0.7	
S33.000	50.00	5.06	15.374	0.006	0.0	0.0	0.0	2.02	35.7	0.7	
S28.003	50.00	5.61	15.002	0.124	0.0	0.0	0.0	6.38	253.5	16.7	
S16.007	50.00	7.06	13.295	0.620	0.0	0.0	0.0	1.16	128.2	84.0	
S34.000	50.00	5.03	15.070	0.011	0.0	0.0	0.0	3.27	57.8	1.5	
S35.000	50.00	5.03	14.993	0.018	0.0	0.0	0.0	3.22	56.8	2.5	
S16.008	50.00	7.35	13.230	0.699	0.0	0.0	0.0	2.16	238.1	94.6	
S36.000	50.00	5.06	13.256	0.027	0.0	0.0	0.0	2.13	37.7	3.7	
S16.009	50.00	7.47	12.702	0.726	0.0	0.0	0.0	2.38	263.3	98.3	
S16.010	50.00	7.61	12.402	0.726	0.0	0.0	0.0	2.84	313.4	98.3	
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Abley Letchford Partnership Ltd										Page 7	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 26/05/2020					Designed by SL						
File NETWORK 1 V1.MDX					Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM NORTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S37.000	5.782	0.224	25.9	0.055	5.00	0.0	0.600	o	150	Pipe/Conduit	
S38.000	3.307	0.139	23.8	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
S37.001	19.609	0.553	35.5	0.099	0.00	0.0	0.600	o	225	Pipe/Conduit	
S37.002	40.357	0.517	78.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.009	24.669	0.147	168.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S37.000	50.00	5.05	13.351	0.055	0.0	0.0	0.0	1.99	35.1	7.4	
S38.000	50.00	5.03	13.267	0.019	0.0	0.0	0.0	2.07	36.6	2.6	
S37.001	50.00	5.20	13.053	0.173	0.0	0.0	0.0	2.20	87.6	23.5	
S37.002	50.00	5.65	12.500	0.173	0.0	0.0	0.0	1.48	58.9	23.5	
S1.009	50.00	5.41	11.832	0.000	20.0	0.0	0.0	1.01	40.0	20.0	
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Abley Letchford Partnership Ltd		Page 8
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions Network 2020.1		

Manhole Schedules for STORM NORTH

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	17.604	1.350	Open Manhole	600	S1.000	16.254	150				
S2	17.457	1.350	Open Manhole	600	S2.000	16.107	150				
S3	17.432	1.448	Open Manhole	1200	S1.001	15.984	225	S1.000	16.059	150	
								S2.000	16.059	150	
S4	17.647	1.350	Open Manhole	600	S3.000	16.297	150				
S5	17.562	1.350	Open Manhole	600	S4.000	16.212	150				
S6	17.527	1.446	Open Manhole	1200	S3.001	16.081	225	S3.000	16.156	150	
								S4.000	16.156	150	
S7	17.525	1.350	Open Manhole	600	S5.000	16.175	150				
S8	17.593	1.350	Open Manhole	600	S6.000	16.243	150				
S9	17.406	1.425	Open Manhole	1200	S3.002	15.981	225	S3.001	15.981	225	
								S5.000	16.056	150	
								S6.000	16.056	150	
S10	17.246	1.350	Open Manhole	600	S7.000	15.896	150				
S11	16.913	1.425	Open Manhole	1200	S3.003	15.488	225	S3.002	15.488	225	
								S7.000	15.563	150	
S12	16.849	1.296	Open Manhole	600	S8.000	15.553	150				
S13	16.868	1.435	Open Manhole	1200	S1.002	15.433	225	S1.001	15.433	225	
								S3.003	15.433	225	
								S8.000	15.508	150	
S14	17.009	1.350	Open Manhole	600	S9.000	15.659	150				
S15	16.527	1.334	Open Manhole	600	S10.000	15.193	150				
S16	16.498	1.425	Open Manhole	1200	S1.003	15.073	225	S1.002	15.073	225	
								S9.000	15.148	150	
								S10.000	15.148	150	
S17	15.339	1.350	Open Manhole	600	S11.000	13.989	150				
S18	16.029	1.350	Open Manhole	600	S12.000	14.679	150				
S19	15.140	1.425	Open Manhole	1200	S1.004	13.715	225	S1.003	13.715	225	
								S11.000	13.790	150	
								S12.000	13.790	150	
S20	14.873	1.594	Open Manhole	600	S13.000	13.279	150				
S21	14.363	1.500	Open Manhole	1200	S1.005	12.863	300	S1.004	12.938	225	
								S13.000	13.013	150	
S22	14.181	1.350	Open Manhole	600	S14.000	12.831	150				
S23	13.774	1.500	Open Manhole	1200	S1.006	12.274	300	S1.005	12.274	300	
								S14.000	12.424	150	
S24	13.555	1.355	Open Manhole	1200	S15.000	12.200	150				
S25	13.610	1.680	Open Manhole	1350	S1.007	11.930	375	S1.006	12.005	300	

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Abley Letchford Partnership Ltd		Page 9
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions Network 2020.1		

Manhole Schedules for STORM NORTH

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S26	13.500	1.630	Open Manhole	1350	S1.008	11.870	375	S15.000	12.155	150	
S27	18.500	1.350	Open Manhole	600	S16.000	17.150	150	S1.007	11.870	375	
S28	18.698	1.720	Open Manhole	1200	S16.001	16.978	225	S16.000	17.053	150	
S29	18.500	1.350	Open Manhole	600	S17.000	17.150	150				
S30	18.295	1.489	Open Manhole	1200	S16.002	16.806	225	S16.001	16.806	225	
								S17.000	16.881	150	
S31	18.138	1.425	Open Manhole	1200	S16.003	16.713	225	S16.002	16.713	225	
S32	18.145	1.350	Open Manhole	600	S18.000	16.795	150				
S33	17.926	1.425	Open Manhole	1200	S16.004	16.501	225	S16.003	16.501	225	
								S18.000	16.576	150	
S34	15.320	1.170	Open Manhole	600	S19.000	14.150	150				
S35	15.520	1.370	Open Manhole	600	S20.000	14.150	150				
S36	15.450	1.425	Open Manhole	1200	S19.001	14.025	225	S19.000	14.100	150	
								S20.000	14.100	150	
S37	16.037	1.253	Open Manhole	600	S21.000	14.785	150				
S38	16.262	1.335	Open Manhole	600	S22.000	14.927	150				
S39	16.015	1.350	Open Manhole	1200	S21.001	14.665	150	S21.000	14.665	150	
								S22.000	14.665	150	
S40	15.781	1.118	Open Manhole	600	S23.000	14.663	150				
S41	15.944	1.993	Open Manhole	1200	S19.002	13.952	225	S19.001	13.952	225	
								S21.001	14.027	150	
								S23.000	14.027	150	
S42	17.583	1.350	Open Manhole	600	S24.000	16.233	150				
S43	17.167	1.240	Open Manhole	600	S25.000	15.927	150				
S44	17.493	3.882	Open Manhole	1200	S19.003	13.611	300	S19.002	13.686	225	
								S24.000	16.143	150	2382
								S25.000	15.843	150	2082
S45	17.716	4.201	Open Manhole	1200	S16.005	13.515	300	S16.004	16.290	225	2701
								S19.003	13.515	300	
S46	17.517	1.350	Open Manhole	600	S26.000	16.167	150				
S47	17.486	1.350	Open Manhole	600	S27.000	16.136	150				
S48	17.376	3.904	Open Manhole	1200	S16.006	13.472	300	S16.005	13.472	300	
								S26.000	16.026	150	2404
								S27.000	16.026	150	2404
S49	17.513	1.350	Open Manhole	600	S28.000	16.163	150				
S50	17.502	1.350	Open Manhole	600	S29.000	16.152	150				
S51	17.422	1.425	Open Manhole	1200	S28.001	15.997	225	S28.000	16.072	150	

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Abley Letchford Partnership Ltd		Page 10
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions Network 2020.1		

Manhole Schedules for STORM NORTH

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S52	17.046	1.350	Open Manhole	600	S30.000	15.696	150	S29.000	16.072	150	
S53	16.964	1.350	Open Manhole	600	S31.000	15.614	150				
S54	16.907	1.425	Open Manhole	1200	S28.002	15.482	225	S28.001	15.482	225	
								S30.000	15.557	150	
								S31.000	15.557	150	
S55	16.811	1.350	Open Manhole	600	S32.000	15.461	150				
S56	16.724	1.350	Open Manhole	600	S33.000	15.374	150				
S57	16.427	1.425	Open Manhole	1200	S28.003	15.002	225	S28.002	15.002	225	
								S32.000	15.077	150	
								S33.000	15.077	150	
S58	16.393	3.098	Open Manhole	1350	S16.007	13.295	375	S16.006	13.370	300	
								S28.003	13.445	225	
S59	16.420	1.350	Open Manhole	600	S34.000	15.070	150				
S60	16.343	1.350	Open Manhole	600	S35.000	14.993	150				
S61	15.772	2.542	Open Manhole	1350	S16.008	13.230	375	S16.007	13.230	375	
								S34.000	14.422	150	967
								S35.000	14.422	150	967
S62	14.606	1.350	Open Manhole	600	S36.000	13.256	150				
S63	14.277	1.575	Open Manhole	1350	S16.009	12.702	375	S16.008	12.702	375	
								S36.000	12.927	150	
S64	13.837	1.435	Open Manhole	1350	S16.010	12.402	375	S16.009	12.402	375	
S65	14.701	1.350	Open Manhole	1200	S37.000	13.351	150				
S66	14.617	1.350	Open Manhole	600	S38.000	13.267	150				
S67	14.552	1.500	Open Manhole	1200	S37.001	13.053	225	S37.000	13.128	150	
								S38.000	13.128	150	
S68	13.789	1.289	Open Manhole	1200	S37.002	12.500	225	S37.001	12.500	225	
S69	13.500	1.668	Open Manhole	1350	S1.009	11.832	225	S1.008	11.832	375	
								S16.010	11.832	375	
								S37.002	11.983	225	
S	12.000	0.315	Open Manhole	0		OUTFALL		S1.009	11.685	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
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S1 507512.929 104545.716 507512.929 104545.716 Required



Abley Letchford Partnership Ltd						Page 11																																																																																																																
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering																																																																																																																			
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Manhole Schedules for STORM NORTH <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S2</td><td>507498.329</td><td>104543.409</td><td>507498.329</td><td>104543.409</td><td>Required</td><td></td></tr><tr><td>S3</td><td>507503.025</td><td>104544.151</td><td>507503.025</td><td>104544.151</td><td>Required</td><td></td></tr><tr><td>S4</td><td>507566.048</td><td>104575.158</td><td>507566.048</td><td>104575.158</td><td>Required</td><td></td></tr><tr><td>S5</td><td>507561.056</td><td>104580.832</td><td>507561.056</td><td>104580.832</td><td>Required</td><td></td></tr><tr><td>S6</td><td>507558.682</td><td>104575.772</td><td>507558.682</td><td>104575.772</td><td>Required</td><td></td></tr><tr><td>S7</td><td>507548.275</td><td>104573.508</td><td>507548.275</td><td>104573.508</td><td>Required</td><td></td></tr><tr><td>S8</td><td>507545.194</td><td>104589.488</td><td>507545.194</td><td>104589.488</td><td>Required</td><td></td></tr><tr><td>S9</td><td>507546.984</td><td>104580.281</td><td>507546.984</td><td>104580.281</td><td>Required</td><td></td></tr><tr><td>S10</td><td>507509.072</td><td>104567.036</td><td>507509.072</td><td>104567.036</td><td>Required</td><td></td></tr><tr><td>S11</td><td>507507.969</td><td>104572.760</td><td>507507.969</td><td>104572.760</td><td>Required</td><td></td></tr><tr><td>S12</td><td>507494.272</td><td>104570.596</td><td>507494.272</td><td>104570.596</td><td>Required</td><td></td></tr><tr><td>S13</td><td>507498.735</td><td>104571.301</td><td>507498.735</td><td>104571.301</td><td>Required</td><td></td></tr><tr><td>S14</td><td>507508.203</td><td>104580.453</td><td>507508.203</td><td>104580.453</td><td>Required</td><td></td></tr><tr><td>S15</td><td>507492.830</td><td>104580.313</td><td>507492.830</td><td>104580.313</td><td>Required</td><td></td></tr><tr><td>S16</td><td>507497.276</td><td>104580.534</td><td>507497.276</td><td>104580.534</td><td>Required</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S2	507498.329	104543.409	507498.329	104543.409	Required		S3	507503.025	104544.151	507503.025	104544.151	Required		S4	507566.048	104575.158	507566.048	104575.158	Required		S5	507561.056	104580.832	507561.056	104580.832	Required		S6	507558.682	104575.772	507558.682	104575.772	Required		S7	507548.275	104573.508	507548.275	104573.508	Required		S8	507545.194	104589.488	507545.194	104589.488	Required		S9	507546.984	104580.281	507546.984	104580.281	Required		S10	507509.072	104567.036	507509.072	104567.036	Required		S11	507507.969	104572.760	507507.969	104572.760	Required		S12	507494.272	104570.596	507494.272	104570.596	Required		S13	507498.735	104571.301	507498.735	104571.301	Required		S14	507508.203	104580.453	507508.203	104580.453	Required		S15	507492.830	104580.313	507492.830	104580.313	Required		S16	507497.276	104580.534	507497.276	104580.534	Required	
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)																																																																																																																
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Abley Letchford Partnership Ltd						Page 12																																																																																																																
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Date 26/05/2020 File NETWORK 1 V1.MDX			Designed by SL Checked by SL																																																																																																																			
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S21	507487.704	104631.034	507487.704	104631.034	Required																																																																																																																	
S22	507495.783	104652.727	507495.783	104652.727	Required																																																																																																																	
S23	507485.084	104656.563	507485.084	104656.563	Required																																																																																																																	
S24	507476.020	104653.812	507476.020	104653.812	Required																																																																																																																	
S25	507479.657	104659.471	507479.657	104659.471	Required																																																																																																																	
S26	507487.121	104677.527	507487.121	104677.527	Required																																																																																																																	
S27	507603.479	104611.247	507603.479	104611.247	Required																																																																																																																	
S28	507613.192	104609.948	507613.192	104609.948	Required																																																																																																																	
S29	507607.776	104633.487	507607.776	104633.487	Required																																																																																																																	
S30	507617.048	104638.785	507617.048	104638.785	Required																																																																																																																	
S31	507615.079	104645.832	507615.079	104645.832	Required																																																																																																																	
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Abley Letchford Partnership Ltd						Page 13
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering			
Date 26/05/2020 File NETWORK 1 V1.MDX			Designed by SL Checked by SL			
XP Solutions			Network 2020.1			
<u>Manhole Schedules for STORM NORTH</u>						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S32	507615.843	104652.362	507615.843	104652.362	Required	
S33	507610.036	104652.569	507610.036	104652.569	Required	
S34	507610.099	104727.418	507610.099	104727.418	Required	
S35	507618.494	104727.118	507618.494	104727.118	Required	
S36	507614.826	104727.249	507614.826	104727.249	Required	
S37	507625.630	104721.524	507625.630	104721.524	Required	
S38	507619.557	104710.030	507619.557	104710.030	Required	
S39	507619.724	104714.710	507619.724	104714.710	Required	
S40	507608.193	104715.122	507608.193	104715.122	Required	
S41	507614.385	104714.901	507614.385	104714.901	Required	
S42	507618.730	104672.128	507618.730	104672.128	Required	
S43	507605.690	104674.690	507605.690	104674.690	Required	
S44	507612.781	104670.006	507612.781	104670.006	Required	
S45	507603.830	104656.445	507603.830	104656.445	Required	
S46	507593.808	104662.283	507593.808	104662.283	Required	
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Abley Letchford Partnership Ltd						Page 14
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering			
Date 26/05/2020 File NETWORK 1 V1.MDX			Designed by SL Checked by SL			
XP Solutions			Network 2020.1			
<u>Manhole Schedules for STORM NORTH</u>						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S47	507593.736	104651.470	507593.736	104651.470	Required	
S48	507593.652	104657.914	507593.652	104657.914	Required	
S49	507545.504	104602.308	507545.504	104602.308	Required	
S50	507555.744	104599.339	507555.744	104599.339	Required	
S51	507551.974	104601.769	507551.974	104601.769	Required	
S52	507570.643	104624.379	507570.643	104624.379	Required	
S53	507560.942	104625.168	507560.942	104625.168	Required	
S54	507566.750	104624.696	507566.750	104624.696	Required	
S55	507572.871	104649.147	507572.871	104649.147	Required	
S56	507561.457	104650.845	507561.457	104650.845	Required	
S57	507568.887	104650.942	507568.887	104650.942	Required	
S58	507568.800	104657.591	507568.800	104657.591	Required	
S59	507557.910	104662.053	507557.910	104662.053	Required	
S60	507551.560	104652.561	507551.560	104652.561	Required	
S61	507553.193	104657.992	507553.193	104657.992	Required	
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Abley Letchford Partnership Ltd						Page 15																																																																						
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering																																																																									
Date 26/05/2020 File NETWORK 1 V1.MDX			Designed by SL Checked by SL																																																																									
XP Solutions			Network 2020.1																																																																									
Manhole Schedules for STORM NORTH <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S62</td><td>507519.769</td><td>104661.739</td><td>507519.769</td><td>104661.739</td><td>Required</td><td></td></tr><tr><td>S63</td><td>507517.405</td><td>104668.752</td><td>507517.405</td><td>104668.752</td><td>Required</td><td></td></tr><tr><td>S64</td><td>507517.742</td><td>104686.139</td><td>507517.742</td><td>104686.139</td><td>Required</td><td></td></tr><tr><td>S65</td><td>507554.371</td><td>104696.003</td><td>507554.371</td><td>104696.003</td><td>Required</td><td></td></tr><tr><td>S66</td><td>507555.799</td><td>104702.509</td><td>507555.799</td><td>104702.509</td><td>Required</td><td></td></tr><tr><td>S67</td><td>507552.643</td><td>104701.521</td><td>507552.643</td><td>104701.521</td><td>Required</td><td></td></tr><tr><td>S68</td><td>507533.931</td><td>104695.660</td><td>507533.931</td><td>104695.660</td><td>Required</td><td></td></tr><tr><td>S69</td><td>507494.418</td><td>104687.450</td><td>507494.418</td><td>104687.450</td><td>Required</td><td></td></tr><tr><td>S</td><td>507478.465</td><td>104706.267</td><td></td><td></td><td>No Entry</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S62	507519.769	104661.739	507519.769	104661.739	Required		S63	507517.405	104668.752	507517.405	104668.752	Required		S64	507517.742	104686.139	507517.742	104686.139	Required		S65	507554.371	104696.003	507554.371	104696.003	Required		S66	507555.799	104702.509	507555.799	104702.509	Required		S67	507552.643	104701.521	507552.643	104701.521	Required		S68	507533.931	104695.660	507533.931	104695.660	Required		S69	507494.418	104687.450	507494.418	104687.450	Required		S	507478.465	104706.267			No Entry	
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)																																																																						
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S64	507517.742	104686.139	507517.742	104686.139	Required																																																																							
S65	507554.371	104696.003	507554.371	104696.003	Required																																																																							
S66	507555.799	104702.509	507555.799	104702.509	Required																																																																							
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Abley Letchford Partnership Ltd		Page 16
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020	Designed by SL	
File NETWORK 1 V1.MDX	Checked by SL	
XP Solutions	Network 2020.1	

Online Controls for STORM NORTH

Hydro-Brake® Optimum Manhole: S69, DS/PN: S1.009, Volume (m³): 7.6

Unit Reference	MD-SHE-0104-5400-1400-5400
Design Head (m)	1.400
Design Flow (l/s)	5.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	104
Invert Level (m)	11.832
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	5.4
Flush-Flo™	0.414	5.4
Kick-Flo®	0.856	4.3
Mean Flow over Head Range	-	4.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	1.200	5.0	3.000	7.7	7.000	11.5
0.200	4.9	1.400	5.4	3.500	8.3	7.500	11.9
0.300	5.3	1.600	5.7	4.000	8.8	8.000	12.3
0.400	5.4	1.800	6.1	4.500	9.3	8.500	12.6
0.500	5.4	2.000	6.4	5.000	9.8	9.000	13.0
0.600	5.2	2.200	6.7	5.500	10.3	9.500	13.3
0.800	4.6	2.400	6.9	6.000	10.7		
1.000	4.6	2.600	7.2	6.500	11.1		

Abley Letchford Partnership Ltd		Page 17
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 26/05/2020 File NETWORK 1 V1.MDX	Designed by SL Checked by SL	
XP Solutions Network 2020.1		

Storage Structures for STORM NORTH

Tank or Pond Manhole: S69, DS/PN: S1.009

Invert Level (m) 11.832

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	500.0	0.700	746.6	1.400	1042.4	2.100	0.0
0.100	532.2	0.800	785.8	1.500	1088.7	2.200	0.0
0.200	565.4	0.900	826.1	1.600	1136.0	2.300	0.0
0.300	599.6	1.000	867.3	1.700	1184.3	2.400	0.0
0.400	634.9	1.100	909.6	1.800	0.0	2.500	0.0
0.500	671.1	1.200	952.9	1.900	0.0		
0.600	708.3	1.300	997.1	2.000	0.0		

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Abley Letchford Partnership Ltd					Page 18			
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering					
Date 26/05/2020			Designed by SL					
File NETWORK 1 V1.MDX			Checked by SL					
XP Solutions			Network 2020.1					
<u>Summary of Critical Results by Maximum Level (Rank 1) for STORM NORTH</u>								
<u>Simulation Criteria</u>								
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000		
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000		
Hot Start Level (mm)		0		Inlet Coefficient		0.800		
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000		
Foul Sewage per hectare (l/s)		0.000						
Number of Input Hydrographs		0		Number of Storage Structures		1		
Number of Online Controls		1		Number of Time/Area Diagrams		0		
Number of Offline Controls		0		Number of Real Time Controls		0		
<u>Synthetic Rainfall Details</u>								
Rainfall Model		FSR		Ratio R		0.350		
Region England and Wales Cv (Summer)		0.750						
M5-60 (mm)		19.000		Cv (Winter)		0.840		
Margin for Flood Risk Warning (mm)						300.0		
Analysis Timestep		2.5		Second Increment (Extended)				
DTS Status						ON		
DVD Status						OFF		
Inertia Status						OFF		
Profile(s)						Summer and Winter		
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440						
Return Period(s) (years)						100		
Climate Change (%)						40		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%	100/15 Summer			
S2.000	S2	15 Winter	100	+40%	100/15 Summer			
S1.001	S3	15 Winter	100	+40%	100/15 Summer			
S3.000	S4	15 Winter	100	+40%	100/15 Summer			
S4.000	S5	15 Winter	100	+40%	100/15 Summer			
S3.001	S6	15 Winter	100	+40%	100/15 Summer			
S5.000	S7	15 Winter	100	+40%	100/15 Summer			
S6.000	S8	15 Winter	100	+40%	100/15 Summer			
S3.002	S9	15 Winter	100	+40%	100/15 Summer			
S7.000	S10	15 Winter	100	+40%	100/15 Summer			
S3.003	S11	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
S8.000	S12	15 Winter	100	+40%	100/15 Summer			
S1.002	S13	15 Winter	100	+40%	100/15 Summer			
S9.000	S14	15 Winter	100	+40%	100/15 Summer			
S10.000	S15	15 Winter	100	+40%	100/15 Summer			
S1.003	S16	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
S11.000	S17	15 Winter	100	+40%	100/15 Summer			
S12.000	S18	15 Winter	100	+40%	100/15 Summer			
S1.004	S19	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
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Abley Letchford Partnership Ltd									Page 19
Search House Charnham Lane Hungerford RG17 0EY				Water Lane, Angmering					
Date 26/05/2020 File NETWORK 1 V1.MDX				Designed by SL Checked by SL					
XP Solutions				Network 2020.1					
Summary of Critical Results by Maximum Level (Rank 1) for STORM NORTH									
		Water	Surcharged	Flooded			Half Drain	Pipe	
PN	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	Status
	Name	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	
S1.000	S1	16.942	0.538	0.000	0.28			6.2	SURCHARGED
S2.000	S2	16.946	0.689	0.000	0.85			11.7	SURCHARGED
S1.001	S3	16.924	0.715	0.000	0.55			37.7	SURCHARGED
S3.000	S4	17.381	0.934	0.000	0.70			14.9	FLOOD RISK
S4.000	S5	17.327	0.965	0.000	0.15			2.3	FLOOD RISK
S3.001	S6	17.323	1.017	0.000	0.38			15.1	FLOOD RISK
S5.000	S7	17.359	1.034	0.000	0.71			14.1	FLOOD RISK
S6.000	S8	17.318	0.925	0.000	0.26			5.7	FLOOD RISK
S3.002	S9	17.300	1.094	0.000	0.87			48.1	FLOOD RISK
S7.000	S10	16.926	0.880	0.000	0.15			5.4	SURCHARGED
S3.003	S11	16.914	1.201	1.094	1.81			59.5	FLOOD
S8.000	S12	16.842	1.139	0.000	0.65			8.6	FLOOD RISK
S1.002	S13	16.823	1.165	0.000	0.97			81.5	FLOOD RISK
S9.000	S14	16.507	0.698	0.000	0.07			2.3	SURCHARGED
S10.000	S15	16.513	1.170	0.000	0.59			7.8	FLOOD RISK
S1.003	S16	16.498	1.201	0.214	1.00			97.9	FLOOD
S11.000	S17	15.236	1.097	0.000	0.61			14.9	FLOOD RISK
S12.000	S18	15.311	0.482	0.000	0.39			19.1	SURCHARGED
S1.004	S19	15.142	1.202	2.017	1.41			133.9	FLOOD
	US/MH	Level							
PN	Name	Exceeded							
S1.000	S1								
S2.000	S2								
S1.001	S3								
S3.000	S4								
S4.000	S5								
S3.001	S6								
S5.000	S7								
S6.000	S8								
S3.002	S9								
S7.000	S10								
S3.003	S11	1							
S8.000	S12								
S1.002	S13								
S9.000	S14								
S10.000	S15								
S1.003	S16	1							
S11.000	S17								
S12.000	S18								
S1.004	S19	2							
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Abley Letchford Partnership Ltd										Page 1																																																																																																																																																																																																																
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering																																																																																																																																																																																																																					
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<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for STORM SOUTH</u> Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>5</td><td>PIMP (%)</td><td>100</td></tr><tr><td>M5-60 (mm)</td><td>19.000</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>Ratio R</td><td>0.350</td><td>Minimum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Maximum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Design Depth for Optimisation (m)</td><td>1.200</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Vel for Auto Design only (m/s)</td><td>1.00</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr></table> Designed with Level Soffits												Return Period (years)	5	PIMP (%)	100	M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0	Ratio R	0.350	Minimum Backdrop Height (m)	0.000	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																																																			
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Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00																																																																																																																																																																																																																							
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																																																																																							
<u>Network Design Table for STORM SOUTH</u> <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>S1.000</td><td>8.350</td><td>0.083</td><td>100.9</td><td>0.028</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.001</td><td>45.674</td><td>0.270</td><td>169.0</td><td>0.026</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.000</td><td>4.766</td><td>0.130</td><td>36.7</td><td>0.043</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.002</td><td>25.430</td><td>0.209</td><td>121.7</td><td>0.027</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S3.000</td><td>3.700</td><td>0.037</td><td>100.0</td><td>0.016</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>100</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S3.001</td><td>24.713</td><td>0.190</td><td>130.0</td><td>0.025</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S3.002</td><td>6.115</td><td>0.051</td><td>119.9</td><td>0.013</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.003</td><td>38.916</td><td>0.391</td><td>99.5</td><td>0.020</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr></table> <u>Network Results Table</u> <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>S1.000</td><td>50.00</td><td>5.14</td><td>17.244</td><td>0.028</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.00</td><td>17.7</td><td>3.8</td></tr><tr><td>S1.001</td><td>50.00</td><td>5.90</td><td>17.087</td><td>0.054</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.00</td><td>39.9</td><td>7.3</td></tr><tr><td>S2.000</td><td>50.00</td><td>5.05</td><td>17.022</td><td>0.043</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.67</td><td>29.5</td><td>5.8</td></tr><tr><td>S1.002</td><td>50.00</td><td>6.26</td><td>16.816</td><td>0.124</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.18</td><td>47.1</td><td>16.7</td></tr><tr><td>S3.000</td><td>50.00</td><td>5.08</td><td>17.011</td><td>0.016</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.77</td><td>6.0</td><td>2.1</td></tr><tr><td>S3.001</td><td>50.00</td><td>5.55</td><td>16.924</td><td>0.041</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.88</td><td>15.5</td><td>5.6</td></tr><tr><td>S3.002</td><td>50.00</td><td>5.66</td><td>16.734</td><td>0.054</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.92</td><td>16.2</td><td>7.3</td></tr><tr><td>S1.003</td><td>50.00</td><td>6.67</td><td>16.532</td><td>0.198</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.58</td><td>111.4</td><td>26.8</td></tr></table>												PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	S1.000	8.350	0.083	100.9	0.028	5.00	0.0	0.600	o	150	Pipe/Conduit		S1.001	45.674	0.270	169.0	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit		S2.000	4.766	0.130	36.7	0.043	5.00	0.0	0.600	o	150	Pipe/Conduit		S1.002	25.430	0.209	121.7	0.027	0.00	0.0	0.600	o	225	Pipe/Conduit		S3.000	3.700	0.037	100.0	0.016	5.00	0.0	0.600	o	100	Pipe/Conduit		S3.001	24.713	0.190	130.0	0.025	0.00	0.0	0.600	o	150	Pipe/Conduit		S3.002	6.115	0.051	119.9	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit		S1.003	38.916	0.391	99.5	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit		PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	S1.000	50.00	5.14	17.244	0.028	0.0	0.0	0.0	1.00	17.7	3.8	S1.001	50.00	5.90	17.087	0.054	0.0	0.0	0.0	1.00	39.9	7.3	S2.000	50.00	5.05	17.022	0.043	0.0	0.0	0.0	1.67	29.5	5.8	S1.002	50.00	6.26	16.816	0.124	0.0	0.0	0.0	1.18	47.1	16.7	S3.000	50.00	5.08	17.011	0.016	0.0	0.0	0.0	0.77	6.0	2.1	S3.001	50.00	5.55	16.924	0.041	0.0	0.0	0.0	0.88	15.5	5.6	S3.002	50.00	5.66	16.734	0.054	0.0	0.0	0.0	0.92	16.2	7.3	S1.003	50.00	6.67	16.532	0.198	0.0	0.0	0.0	1.58	111.4	26.8
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design																																																																																																																																																																																																															
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S1.000	50.00	5.14	17.244	0.028	0.0	0.0	0.0	1.00	17.7	3.8																																																																																																																																																																																																																
S1.001	50.00	5.90	17.087	0.054	0.0	0.0	0.0	1.00	39.9	7.3																																																																																																																																																																																																																
S2.000	50.00	5.05	17.022	0.043	0.0	0.0	0.0	1.67	29.5	5.8																																																																																																																																																																																																																
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Abley Letchford Partnership Ltd										Page 2		
Search House Charnham Lane Hungerford RG17 0EY						Water Lane, Angmering						
Date 24/06/2020 File NETWORK 1 V2.MDX						Designed by SL Checked by SL						
XP Solutions						Network 2020.1						
Network Design Table for STORM SOUTH												
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
S4.000	4.738	0.163	29.1	0.086	5.00	0.0	0.600	o	150	Pipe/Conduit		
S1.004	26.259	0.259	101.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S5.000	4.699	0.146	32.2	0.014	5.00	0.0	0.600	o	150	Pipe/Conduit		
S1.005	21.319	0.088	241.0	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit		
S6.000	4.300	0.211	20.4	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit		
S1.006	18.914	0.078	241.0	0.003	0.00	0.0	0.600	o	300	Pipe/Conduit		
S1.007	5.536	0.023	241.0	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit		
S1.008	5.500	0.023	241.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S7.000	4.326	0.549	7.9	0.015	5.00	0.0	0.600	o	150	Pipe/Conduit		
S1.009	29.749	0.123	241.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S8.000	5.606	0.603	9.3	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit		
S9.000	13.450	0.090	150.0	0.074	5.00	0.0	0.600	o	150	Pipe/Conduit		
Network Results Table												
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
S4.000	50.00	5.04	16.455	0.086	0.0	0.0	0.0	1.87	33.1	11.6		
S1.004	50.00	6.95	16.141	0.284	0.0	0.0	0.0	1.56	110.4	38.4		
S5.000	50.00	5.04	16.179	0.014	0.0	0.0	0.0	1.78	31.5	1.9		
S1.005	50.00	7.30	15.882	0.341	0.0	0.0	0.0	1.01	71.3	46.2		
S6.000	50.00	5.03	16.155	0.018	0.0	0.0	0.0	2.24	39.6	2.5		
S1.006	50.00	7.61	15.794	0.363	0.0	0.0	0.0	1.01	71.3	49.2		
S1.007	50.00	7.70	15.715	0.394	0.0	0.0	0.0	1.01	71.3	53.3		
S1.008	50.00	7.80	15.693	0.394	0.0	0.0	0.0	1.01	71.3	53.3		
S7.000	50.00	5.02	16.369	0.015	0.0	0.0	0.0	3.61	63.8	2.0		
S1.009	50.00	8.29	15.670	0.409	0.0	0.0	0.0	1.01	71.3	55.4		
S8.000	50.00	5.03	16.300	0.027	0.0	0.0	0.0	3.32	58.7	3.7		
S9.000	50.00	5.27	16.014	0.074	0.0	0.0	0.0	0.82	14.5	10.0		
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Abley Letchford Partnership Ltd											Page 3	
Search House Charnham Lane Hungerford RG17 0EY						Water Lane, Angmering						
Date 24/06/2020 File NETWORK 1 V2.MDX						Designed by SL Checked by SL						
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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	
S10.000	8.703	0.066	131.9	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit		
S9.001	23.388	0.160	146.2	0.056	0.00	0.0	0.600	o	225	Pipe/Conduit		
S11.000	6.668	0.489	13.6	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit		
S9.002	7.320	0.067	109.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		
S1.010	28.649	0.119	241.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit		
S1.011	19.203	0.080	241.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit		
S1.012	7.680	0.268	28.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit		
S12.000	7.073	0.071	99.6	0.023	5.00	0.0	0.600	o	150	Pipe/Conduit		
S13.000	5.650	0.056	100.9	0.017	5.00	0.0	0.600	o	100	Pipe/Conduit		
S13.001	39.916	0.396	100.9	0.062	0.00	0.0	0.600	o	150	Pipe/Conduit		
S13.002	9.140	0.140	65.3	0.049	0.00	0.0	0.600	o	150	Pipe/Conduit		
S12.001	28.349	0.242	117.1	0.076	0.00	0.0	0.600	o	225	Pipe/Conduit		
S14.000	5.233	0.143	36.6	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit		
S14.001	14.990	0.149	100.9	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit		
Network Results Table												
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
S10.000	50.00	5.17	15.990	0.032	0.0	0.0	0.0	0.87	15.4	4.3		
S9.001	50.00	5.64	15.849	0.161	0.0	0.0	0.0	1.08	42.9	21.8		
S11.000	50.00	5.04	16.253	0.008	0.0	0.0	0.0	2.74	48.5	1.1		
S9.002	50.00	5.73	15.689	0.169	0.0	0.0	0.0	1.25	49.7	22.9		
S1.010	50.00	8.70	15.471	0.605	0.0	0.0	0.0	1.16	128.4	81.9		
S1.011	50.00	8.97	15.352	0.605	0.0	0.0	0.0	1.16	128.4	81.9		
S1.012	50.00	9.01	15.273	0.605	0.0	0.0	0.0	3.40	375.1	81.9		
S12.000	50.00	5.12	16.421	0.023	0.0	0.0	0.0	1.01	17.8	3.2		
S13.000	50.00	5.12	16.992	0.017	0.0	0.0	0.0	0.77	6.0	2.3		
S13.001	50.00	5.79	16.886	0.078	0.0	0.0	0.0	1.00	17.7	10.6		
S13.002	50.00	5.91	16.490	0.127	0.0	0.0	0.0	1.25	22.0	17.2		
S12.001	50.00	6.30	16.275	0.227	0.0	0.0	0.0	1.21	48.0	30.8		
S14.000	50.00	5.05	16.400	0.008	0.0	0.0	0.0	1.67	29.5	1.1		
S14.001	50.00	5.30	16.257	0.023	0.0	0.0	0.0	1.00	17.7	3.1		
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Abley Letchford Partnership Ltd										Page 4																																																																																																																																																																																																																																																																																					
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(mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>S12.002</td><td>10.370</td><td>0.043</td><td>241.9</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S15.000</td><td>7.746</td><td>0.573</td><td>13.5</td><td>0.081</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S16.000</td><td>5.957</td><td>0.427</td><td>14.0</td><td>0.021</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S12.003</td><td>26.418</td><td>0.109</td><td>241.9</td><td>0.029</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S17.000</td><td>6.074</td><td>0.061</td><td>99.6</td><td>0.004</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S18.000</td><td>6.074</td><td>0.065</td><td>93.4</td><td>0.008</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S12.004</td><td>17.263</td><td>0.071</td><td>241.9</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S19.000</td><td>6.164</td><td>0.061</td><td>101.0</td><td>0.021</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S12.005</td><td>11.191</td><td>0.046</td><td>242.0</td><td>0.025</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S20.000</td><td>6.510</td><td>0.124</td><td>52.5</td><td>0.018</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S12.006</td><td>11.080</td><td>0.091</td><td>121.8</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr></table> Network Results Table <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>S12.002</td><td>50.00</td><td>6.47</td><td>15.958</td><td>0.250</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.1</td><td>33.9</td></tr><tr><td>S15.000</td><td>50.00</td><td>5.05</td><td>16.638</td><td>0.081</td><td>0.0</td><td>0.0</td><td>0.0</td><td>2.75</td><td>48.7</td><td>11.0</td></tr><tr><td>S16.000</td><td>50.00</td><td>5.04</td><td>16.492</td><td>0.021</td><td>0.0</td><td>0.0</td><td>0.0</td><td>2.71</td><td>47.9</td><td>2.9</td></tr><tr><td>S12.003</td><td>50.00</td><td>6.91</td><td>15.915</td><td>0.382</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.1</td><td>51.7</td></tr><tr><td>S17.000</td><td>50.00</td><td>5.10</td><td>16.017</td><td>0.004</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>17.8</td><td>0.5</td></tr><tr><td>S18.000</td><td>50.00</td><td>5.10</td><td>16.021</td><td>0.008</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.04</td><td>18.4</td><td>1.1</td></tr><tr><td>S12.004</td><td>50.00</td><td>7.20</td><td>15.806</td><td>0.394</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.1</td><td>53.3</td></tr><tr><td>S19.000</td><td>50.00</td><td>5.10</td><td>15.946</td><td>0.021</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.00</td><td>17.7</td><td>2.8</td></tr><tr><td>S12.005</td><td>50.00</td><td>7.38</td><td>15.734</td><td>0.439</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.1</td><td>59.4</td></tr><tr><td>S20.000</td><td>50.00</td><td>5.08</td><td>15.951</td><td>0.018</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.39</td><td>24.6</td><td>2.4</td></tr><tr><td>S12.006</td><td>50.00</td><td>7.51</td><td>15.677</td><td>0.457</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.42</td><td>100.6</td><td>61.8</td></tr></table>												PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	S12.002	10.370	0.043	241.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		S15.000	7.746	0.573	13.5	0.081	5.00	0.0	0.600	o	150	Pipe/Conduit		S16.000	5.957	0.427	14.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit		S12.003	26.418	0.109	241.9	0.029	0.00	0.0	0.600	o	300	Pipe/Conduit		S17.000	6.074	0.061	99.6	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit		S18.000	6.074	0.065	93.4	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit		S12.004	17.263	0.071	241.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		S19.000	6.164	0.061	101.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit		S12.005	11.191	0.046	242.0	0.025	0.00	0.0	0.600	o	300	Pipe/Conduit		S20.000	6.510	0.124	52.5	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit		S12.006	11.080	0.091	121.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	S12.002	50.00	6.47	15.958	0.250	0.0	0.0	0.0	1.01	71.1	33.9	S15.000	50.00	5.05	16.638	0.081	0.0	0.0	0.0	2.75	48.7	11.0	S16.000	50.00	5.04	16.492	0.021	0.0	0.0	0.0	2.71	47.9	2.9	S12.003	50.00	6.91	15.915	0.382	0.0	0.0	0.0	1.01	71.1	51.7	S17.000	50.00	5.10	16.017	0.004	0.0	0.0	0.0	1.01	17.8	0.5	S18.000	50.00	5.10	16.021	0.008	0.0	0.0	0.0	1.04	18.4	1.1	S12.004	50.00	7.20	15.806	0.394	0.0	0.0	0.0	1.01	71.1	53.3	S19.000	50.00	5.10	15.946	0.021	0.0	0.0	0.0	1.00	17.7	2.8	S12.005	50.00	7.38	15.734	0.439	0.0	0.0	0.0	1.01	71.1	59.4	S20.000	50.00	5.08	15.951	0.018	0.0	0.0	0.0	1.39	24.6	2.4	S12.006	50.00	7.51	15.677	0.457	0.0	0.0	0.0	1.42	100.6	61.8
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design																																																																																																																																																																																																																																																																																				
S12.002	10.370	0.043	241.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S15.000	7.746	0.573	13.5	0.081	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S16.000	5.957	0.427	14.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S12.003	26.418	0.109	241.9	0.029	0.00	0.0	0.600	o	300	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S17.000	6.074	0.061	99.6	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S18.000	6.074	0.065	93.4	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S12.004	17.263	0.071	241.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S19.000	6.164	0.061	101.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S12.005	11.191	0.046	242.0	0.025	0.00	0.0	0.600	o	300	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S20.000	6.510	0.124	52.5	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit																																																																																																																																																																																																																																																																																					
S12.006	11.080	0.091	121.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit																																																																																																																																																																																																																																																																																					
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)																																																																																																																																																																																																																																																																																					
S12.002	50.00	6.47	15.958	0.250	0.0	0.0	0.0	1.01	71.1	33.9																																																																																																																																																																																																																																																																																					
S15.000	50.00	5.05	16.638	0.081	0.0	0.0	0.0	2.75	48.7	11.0																																																																																																																																																																																																																																																																																					
S16.000	50.00	5.04	16.492	0.021	0.0	0.0	0.0	2.71	47.9	2.9																																																																																																																																																																																																																																																																																					
S12.003	50.00	6.91	15.915	0.382	0.0	0.0	0.0	1.01	71.1	51.7																																																																																																																																																																																																																																																																																					
S17.000	50.00	5.10	16.017	0.004	0.0	0.0	0.0	1.01	17.8	0.5																																																																																																																																																																																																																																																																																					
S18.000	50.00	5.10	16.021	0.008	0.0	0.0	0.0	1.04	18.4	1.1																																																																																																																																																																																																																																																																																					
S12.004	50.00	7.20	15.806	0.394	0.0	0.0	0.0	1.01	71.1	53.3																																																																																																																																																																																																																																																																																					
S19.000	50.00	5.10	15.946	0.021	0.0	0.0	0.0	1.00	17.7	2.8																																																																																																																																																																																																																																																																																					
S12.005	50.00	7.38	15.734	0.439	0.0	0.0	0.0	1.01	71.1	59.4																																																																																																																																																																																																																																																																																					
S20.000	50.00	5.08	15.951	0.018	0.0	0.0	0.0	1.39	24.6	2.4																																																																																																																																																																																																																																																																																					
S12.006	50.00	7.51	15.677	0.457	0.0	0.0	0.0	1.42	100.6	61.8																																																																																																																																																																																																																																																																																					
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Abley Letchford Partnership Ltd										Page 5	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 24/06/2020 File NETWORK 1 V2.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM SOUTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.000	13.783	0.336	41.0	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S12.007	20.387	0.068	300.0	0.084	0.00	0.0	0.600	o	375	Pipe/Conduit	
S22.000	7.697	0.232	33.2	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
S23.000	4.590	0.282	16.3	0.029	5.00	0.0	0.600	o	150	Pipe/Conduit	
S12.008	19.583	0.065	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S24.000	4.516	0.197	22.9	0.030	5.00	0.0	0.600	o	150	Pipe/Conduit	
S25.000	5.645	0.297	19.0	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
S12.009	17.038	0.057	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S26.000	6.220	0.154	40.4	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
S12.010	5.768	0.036	160.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S27.000	4.003	0.090	44.5	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S21.000	50.00	5.15	16.072	0.006	0.0	0.0	0.0	1.58	27.8	0.7	
S12.007	50.00	7.84	15.511	0.546	0.0	0.0	0.0	1.04	115.0	74.0	
S22.000	50.00	5.07	15.900	0.008	0.0	0.0	0.0	1.75	31.0	1.0	
S23.000	50.00	5.03	15.950	0.029	0.0	0.0	0.0	2.51	44.3	3.9	
S12.008	50.00	8.15	15.443	0.583	0.0	0.0	0.0	1.04	115.0	78.9	
S24.000	50.00	5.04	15.800	0.030	0.0	0.0	0.0	2.11	37.3	4.1	
S25.000	50.00	5.04	15.900	0.018	0.0	0.0	0.0	2.32	41.0	2.5	
S12.009	50.00	8.42	15.378	0.631	0.0	0.0	0.0	1.04	115.0	85.4	
S26.000	50.00	5.07	15.700	0.012	0.0	0.0	0.0	1.59	28.1	1.6	
S12.010	50.00	8.49	15.321	0.643	0.0	0.0	0.0	1.43	157.8	87.0	
S27.000	50.00	5.04	15.600	0.008	0.0	0.0	0.0	1.51	26.7	1.1	
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Abley Letchford Partnership Ltd										Page 6	
Search House Charnham Lane Hungerford RG17 0EY					Water Lane, Angmering						
Date 24/06/2020 File NETWORK 1 V2.MDX					Designed by SL Checked by SL						
XP Solutions					Network 2020.1						
Network Design Table for STORM SOUTH											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S12.011	21.490	0.072	300.0	0.053	0.00	0.0	0.600	o	375	Pipe/Conduit	
S12.012	21.812	0.073	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S28.000	10.696	0.399	26.8	0.073	5.00	0.0	0.600	o	150	Pipe/Conduit	
S12.013	17.216	0.057	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S12.014	14.721	0.049	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S12.015	8.750	0.029	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.013	3.221	0.013	250.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
S12.011	50.00	8.84	15.285	0.703	0.0	0.0	0.0	1.04	115.0	95.3	
S12.012	50.00	9.19	15.213	0.703	0.0	0.0	0.0	1.04	115.0	95.3	
S28.000	50.00	5.09	15.765	0.073	0.0	0.0	0.0	1.95	34.5	9.9	
S12.013	50.00	9.46	15.141	0.777	0.0	0.0	0.0	1.04	115.0	105.2	
S12.014	50.00	9.70	15.083	0.777	0.0	0.0	0.0	1.04	115.0	105.2	
S12.015	50.00	9.84	15.034	0.777	0.0	0.0	0.0	1.04	115.0	105.2	
S1.013	50.00	9.88	14.930	1.382	0.0	0.0	0.0	1.28	203.8	187.1	
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Abley Letchford Partnership Ltd		Page 7
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
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Manhole Schedules for STORM SOUTH

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	18.594	1.350	Open Manhole	600	S1.000	17.244	150				
S2	18.705	1.619	Open Manhole	1200	S1.001	17.087	225	S1.000	17.162	150	
S3	18.430	1.408	Open Manhole	600	S2.000	17.022	150				
S4	18.287	1.470	Open Manhole	1200	S1.002	16.816	225	S1.001	16.816	225	
								S2.000	16.892	150	1
S5	18.360	1.349	Open Manhole	600	S3.000	17.011	100				
S6	18.401	1.477	Open Manhole	1200	S3.001	16.924	150	S3.000	16.974	100	
S7	18.192	1.458	Open Manhole	1200	S3.002	16.734	150	S3.001	16.734	150	
S8	18.032	1.500	Open Manhole	1200	S1.003	16.532	300	S1.002	16.607	225	
								S3.002	16.683	150	
S9	17.805	1.350	Open Manhole	600	S4.000	16.455	150				
S10	17.642	1.500	Open Manhole	1200	S1.004	16.141	300	S1.003	16.141	300	
								S4.000	16.292	150	1
S11	17.529	1.350	Open Manhole	600	S5.000	16.179	150				
S12	17.383	1.500	Open Manhole	1200	S1.005	15.882	300	S1.004	15.882	300	
								S5.000	16.033	150	1
S13	17.505	1.350	Open Manhole	600	S6.000	16.155	150				
S14	17.305	1.511	Open Manhole	1200	S1.006	15.794	300	S1.005	15.794	300	
								S6.000	15.944	150	
S15	17.501	1.786	Open Manhole	1200	S1.007	15.715	300	S1.006	15.715	300	
S16	17.554	1.861	Open Manhole	1200	S1.008	15.693	300	S1.007	15.693	300	
S17	17.719	1.350	Open Manhole	600	S7.000	16.369	150				
S18	17.614	1.944	Open Manhole	1200	S1.009	15.670	300	S1.008	15.670	300	
								S7.000	15.820	150	
S19	17.711	1.411	Open Manhole	600	S8.000	16.300	150				
S20	17.364	1.350	Open Manhole	600	S9.000	16.014	150				
S21	17.340	1.350	Open Manhole	600	S10.000	15.990	150				
S22	17.316	1.467	Open Manhole	1200	S9.001	15.849	225	S9.000	15.924	150	
								S10.000	15.924	150	
S23	17.603	1.350	Open Manhole	600	S11.000	16.253	150				
S24	17.560	1.871	Open Manhole	1200	S9.002	15.689	225	S9.001	15.689	225	
								S11.000	15.764	150	
S25	17.636	2.164	Open Manhole	1350	S1.010	15.471	375	S1.009	15.546	300	
								S8.000	15.697	150	1
								S9.002	15.622	225	1
S26	17.090	1.737	Open Manhole	1350	S1.011	15.352	375	S1.010	15.352	375	
S27	17.001	1.729	Open Manhole	1350	S1.012	15.273	375	S1.011	15.273	375	
S28	17.787	1.366	Open Manhole	600	S12.000	16.421	150				

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Abley Letchford Partnership Ltd		Page 8
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
XP Solutions	Network 2020.1	

Manhole Schedules for STORM SOUTH

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S29	18.293	1.301	Open Manhole	600	S13.000	16.992	100				
S30	18.326	1.440	Open Manhole	1200	S13.001	16.886	150	S13.000	16.936	100	
S31	17.911	1.420	Open Manhole	1200	S13.002	16.490	150	S13.001	16.490	150	
S32	17.700	1.425	Open Manhole	1200	S12.001	16.275	225	S12.000	16.350	150	
								S13.002	16.350	150	
S33	17.750	1.350	Open Manhole	600	S14.000	16.400	150				
S34	17.607	1.350	Open Manhole	1200	S14.001	16.257	150	S14.000	16.257	150	
S35	17.843	1.885	Open Manhole	1200	S12.002	15.958	300	S12.001	16.033	225	
								S14.001	16.108	150	
S36	17.989	1.351	Open Manhole	1200	S15.000	16.638	150				
S37	17.890	1.398	Open Manhole	600	S16.000	16.492	150				
S38	17.761	1.846	Open Manhole	1200	S12.003	15.915	300	S12.002	15.915	300	
								S15.000	16.065	150	
								S16.000	16.065	150	
S39	17.701	1.684	Open Manhole	600	S17.000	16.017	150				
S40	17.525	1.504	Open Manhole	600	S18.000	16.021	150				
S41	17.505	1.699	Open Manhole	1200	S12.004	15.806	300	S12.003	15.806	300	
								S17.000	15.956	150	
								S18.000	15.956	150	
S42	17.386	1.440	Open Manhole	600	S19.000	15.946	150				
S43	17.323	1.588	Open Manhole	1200	S12.005	15.734	300	S12.004	15.734	300	
								S19.000	15.885	150	1
S44	17.301	1.350	Open Manhole	600	S20.000	15.951	150				
S45	17.211	1.534	Open Manhole	1200	S12.006	15.677	300	S12.005	15.688	300	11
								S20.000	15.827	150	
S46	17.422	1.350	Open Manhole	600	S21.000	16.072	150				
S47	17.086	1.575	Open Manhole	1350	S12.007	15.511	375	S12.006	15.586	300	
								S21.000	15.736	150	
S48	17.269	1.369	Open Manhole	600	S22.000	15.900	150				
S49	17.350	1.400	Open Manhole	600	S23.000	15.950	150				
S50	17.213	1.770	Open Manhole	1350	S12.008	15.443	375	S12.007	15.443	375	
								S22.000	15.668	150	
								S23.000	15.668	150	
S51	17.227	1.427	Open Manhole	600	S24.000	15.800	150				
S52	17.238	1.338	Open Manhole	600	S25.000	15.900	150				
S53	17.092	1.714	Open Manhole	1350	S12.009	15.378	375	S12.008	15.378	375	
								S24.000	15.603	150	
								S25.000	15.603	150	

Abley Letchford Partnership Ltd		Page 9
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
XP Solutions	Network 2020.1	

Manhole Schedules for STORM SOUTH

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S54	17.044	1.344	Open Manhole	600	S26.000	15.700	150				
S55	16.932	1.611	Open Manhole	1350	S12.010	15.321	375	S12.009	15.321	375	
								S26.000	15.546	150	
S56	16.981	1.381	Open Manhole	600	S27.000	15.600	150				
S57	16.860	1.575	Open Manhole	1350	S12.011	15.285	375	S12.010	15.285	375	
								S27.000	15.510	150	
S58	16.645	1.431	Open Manhole	1350	S12.012	15.213	375	S12.011	15.213	375	
S59	17.115	1.350	Open Manhole	1200	S28.000	15.765	150				
S60	16.871	1.731	Open Manhole	1350	S12.013	15.141	375	S12.012	15.141	375	
								S28.000	15.366	150	
S61	16.964	1.881	Open Manhole	1350	S12.014	15.083	375	S12.013	15.083	375	
S62	16.976	1.942	Open Manhole	1350	S12.015	15.034	375	S12.014	15.034	375	
S63	16.997	2.068	Open Manhole	1350	S1.013	14.930	450	S1.012	15.005	375	
								S12.015	15.005	375	
S	17.005	2.088	Open Manhole	0		OUTFALL		S1.013	14.917	450	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	507600.828	104591.424	507600.828	104591.424	Required	
S2	507609.104	104590.317	507609.104	104590.317	Required	
S3	507600.289	104547.015	507600.289	104547.015	Required	
S4	507604.546	104544.871	507604.546	104544.871	Required	
S5	507574.099	104525.258	507574.099	104525.258	Required	
S6	507573.844	104521.567	507573.844	104521.567	Required	
S7	507598.499	104519.863	507598.499	104519.863	Required	

Abley Letchford Partnership Ltd						Page 10																																																																																																																
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering																																																																																																																			
Date 24/06/2020 File NETWORK 1 V2.MDX			Designed by SL Checked by SL																																																																																																																			
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MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)																																																																																																																
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S11	507603.357	104453.503	507603.357	104453.503	Required																																																																																																																	
S12	507607.955	104454.471	507607.955	104454.471	Required																																																																																																																	
S13	507608.142	104432.723	507608.142	104432.723	Required																																																																																																																	
S14	507612.350	104433.610	507612.350	104433.610	Required																																																																																																																	
S15	507616.249	104415.101	507616.249	104415.101	Required																																																																																																																	
S16	507614.301	104409.919	507614.301	104409.919	Required																																																																																																																	
S17	507609.484	104410.300	507609.484	104410.300	Required																																																																																																																	
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Abley Letchford Partnership Ltd		Page 11
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
XP Solutions	Network 2020.1	

Manhole Schedules for STORM SOUTH

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S23	507569.874	104394.475	507569.874	104394.475	Required	
S24	507574.752	104399.021	507574.752	104399.021	Required	
S25	507581.902	104397.450	507581.902	104397.450	Required	
S26	507579.084	104368.940	507579.084	104368.940	Required	
S27	507593.568	104356.332	507593.568	104356.332	Required	
S28	507502.827	104517.647	507502.827	104517.647	Required	
S29	507558.206	104528.871	507558.206	104528.871	Required	
S30	507558.639	104523.238	507558.639	104523.238	Required	
S31	507518.841	104520.178	507518.841	104520.178	Required	
S32	507509.813	104518.751	507509.813	104518.751	Required	
S33	507498.786	104499.168	507498.786	104499.168	Required	
S34	507499.603	104493.999	507499.603	104493.999	Required	
S35	507514.237	104490.750	507514.237	104490.750	Required	
S36	507521.618	104479.484	507521.618	104479.484	Required	
S37	507508.046	104481.347	507508.046	104481.347	Required	

Abley Letchford Partnership Ltd						Page 12																																																																																																																
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S44	507506.067	104425.808	507506.067	104425.808	Required																																																																																																																	
S45	507512.571	104426.097	507512.571	104426.097	Required																																																																																																																	
S46	507524.500	104427.722	507524.500	104427.722	Required																																																																																																																	
S47	507517.200	104416.031	507517.200	104416.031	Required																																																																																																																	
S48	507520.776	104401.014	507520.776	104401.014	Required																																																																																																																	
S49	507510.606	104396.276	507510.606	104396.276	Required																																																																																																																	
S50	507515.165	104395.746	507515.165	104395.746	Required																																																																																																																	
S51	507508.389	104376.132	507508.389	104376.132	Required																																																																																																																	
S52	507518.454	104377.314	507518.454	104377.314	Required																																																																																																																	
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Abley Letchford Partnership Ltd						Page 13																																																																																											
Search House Charnham Lane Hungerford RG17 0EY			Water Lane, Angmering																																																																																														
Date 24/06/2020 File NETWORK 1 V2.MDX			Designed by SL Checked by SL																																																																																														
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Manhole Schedules for STORM SOUTH <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S53</td><td>507512.902</td><td>104376.294</td><td>507512.902</td><td>104376.294</td><td>Required</td><td></td></tr><tr><td>S54</td><td>507510.402</td><td>104362.091</td><td>507510.402</td><td>104362.091</td><td>Required</td><td></td></tr><tr><td>S55</td><td>507516.081</td><td>104359.555</td><td>507516.081</td><td>104359.555</td><td>Required</td><td></td></tr><tr><td>S56</td><td>507521.979</td><td>104358.487</td><td>507521.979</td><td>104358.487</td><td>Required</td><td></td></tr><tr><td>S57</td><td>507519.788</td><td>104355.136</td><td>507519.788</td><td>104355.136</td><td>Required</td><td></td></tr><tr><td>S58</td><td>507537.777</td><td>104343.378</td><td>507537.777</td><td>104343.378</td><td>Required</td><td></td></tr><tr><td>S59</td><td>507559.503</td><td>104354.247</td><td>507559.503</td><td>104354.247</td><td>Required</td><td></td></tr><tr><td>S60</td><td>507559.588</td><td>104343.552</td><td>507559.588</td><td>104343.552</td><td>Required</td><td></td></tr><tr><td>S61</td><td>507576.803</td><td>104343.689</td><td>507576.803</td><td>104343.689</td><td>Required</td><td></td></tr><tr><td>S62</td><td>507591.411</td><td>104345.507</td><td>507591.411</td><td>104345.507</td><td>Required</td><td></td></tr><tr><td>S63</td><td>507598.585</td><td>104350.517</td><td>507598.585</td><td>104350.517</td><td>Required</td><td></td></tr><tr><td>S</td><td>507600.120</td><td>104347.686</td><td></td><td></td><td>No Entry</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S53	507512.902	104376.294	507512.902	104376.294	Required		S54	507510.402	104362.091	507510.402	104362.091	Required		S55	507516.081	104359.555	507516.081	104359.555	Required		S56	507521.979	104358.487	507521.979	104358.487	Required		S57	507519.788	104355.136	507519.788	104355.136	Required		S58	507537.777	104343.378	507537.777	104343.378	Required		S59	507559.503	104354.247	507559.503	104354.247	Required		S60	507559.588	104343.552	507559.588	104343.552	Required		S61	507576.803	104343.689	507576.803	104343.689	Required		S62	507591.411	104345.507	507591.411	104345.507	Required		S63	507598.585	104350.517	507598.585	104350.517	Required		S	507600.120	104347.686			No Entry	
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Abley Letchford Partnership Ltd		Page 14
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
XP Solutions	Network 2020.1	
Online Controls for STORM SOUTH Pump Manhole: S63, DS/PN: S1.013, Volume (m³): 4.5 Invert Level (m) 14.930		
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Abley Letchford Partnership Ltd		Page 15
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
XP Solutions	Network 2020.1	

Storage Structures for STORM SOUTH

Infiltration Basin Manhole: S63, DS/PN: S1.013

Invert Level (m) 15.000 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.83988 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.83988

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	293.0	0.700	487.5	1.400	731.3	2.100	0.0
0.100	317.8	0.800	519.3	1.500	770.2	2.200	0.0
0.200	343.6	0.900	552.2	1.600	810.0	2.300	0.0
0.300	370.3	1.000	586.0	1.700	850.9	2.400	0.0
0.400	398.1	1.100	620.8	1.800	892.7	2.500	0.0
0.500	426.9	1.200	656.6	1.900	935.6		
0.600	456.7	1.300	693.5	2.000	979.5		

Abley Letchford Partnership Ltd						Page 16		
Search House Charnham Lane Hungerford RG17 0EY				Water Lane, Angmering				
Date 24/06/2020 File NETWORK 1 V2.MDX				Designed by SL Checked by SL				
XP Solutions				Network 2020.1				
<u>Summary of Critical Results by Maximum Level (Rank 1) for STORM SOUTH</u>								
Simulation Criteria								
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000		
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000		
Hot Start Level (mm)		0		Inlet Coefficient		0.800		
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000		
Foul Sewage per hectare (l/s)		0.000						
Number of Input Hydrographs		0		Number of Storage Structures		1		
Number of Online Controls		1		Number of Time/Area Diagrams		0		
Number of Offline Controls		0		Number of Real Time Controls		0		
Synthetic Rainfall Details								
Rainfall Model		FSR		Ratio R		0.350		
Region England and Wales Cv (Summer)		0.750						
M5-60 (mm)		19.000		Cv (Winter)		0.840		
Margin for Flood Risk Warning (mm)						300.0		
Analysis Timestep		2.5		Second Increment (Extended)				
DTS Status						ON		
DVD Status						OFF		
Inertia Status						OFF		
Profile(s)						Summer and Winter		
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440						
Return Period(s) (years)						100		
Climate Change (%)						40		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%	100/15 Summer			
S1.001	S2	15 Winter	100	+40%	100/15 Summer			
S2.000	S3	15 Winter	100	+40%	100/15 Summer			
S1.002	S4	15 Winter	100	+40%	100/15 Summer			
S3.000	S5	15 Winter	100	+40%	100/15 Summer			
S3.001	S6	15 Winter	100	+40%	100/15 Summer			
S3.002	S7	15 Winter	100	+40%	100/15 Summer			
S1.003	S8	15 Winter	100	+40%	100/15 Summer			
S4.000	S9	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S1.004	S10	15 Winter	100	+40%	100/15 Summer			
S5.000	S11	15 Winter	100	+40%	100/15 Summer			
S1.005	S12	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S6.000	S13	15 Winter	100	+40%	100/15 Summer			
S1.006	S14	15 Winter	100	+40%	100/15 Summer			
S1.007	S15	15 Winter	100	+40%	100/15 Summer			
S1.008	S16	15 Winter	100	+40%	100/15 Summer			
S7.000	S17	15 Winter	100	+40%	100/15 Summer			
S1.009	S18	15 Winter	100	+40%	100/15 Summer			
S8.000	S19	15 Winter	100	+40%				
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Abley Letchford Partnership Ltd		Page 17
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering	
Date 24/06/2020 File NETWORK 1 V2.MDX	Designed by SL Checked by SL	
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Summary of Critical Results by Maximum Level (Rank 1) for STORM SOUTH

PN	US/MH Name	Water Surcharged		Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
		Level (m)	Depth (m)	Volume (m³)	Flow					
S1.000	S1	18.128	0.733	0.000	0.93				14.4	SURCHARGED
S1.001	S2	18.081	0.769	0.000	0.65				24.6	SURCHARGED
S2.000	S3	18.091	0.919	0.000	0.89				20.2	SURCHARGED
S1.002	S4	18.008	0.967	0.000	1.02				44.5	FLOOD RISK
S3.000	S5	18.080	0.969	0.000	1.30				6.6	FLOOD RISK
S3.001	S6	18.024	0.950	0.000	1.13				16.7	SURCHARGED
S3.002	S7	17.861	0.977	0.000	1.41				19.1	SURCHARGED
S1.003	S8	17.782	0.949	0.000	0.64				66.2	FLOOD RISK
S4.000	S9	17.807	1.202	1.185	1.35				34.1	FLOOD
S1.004	S10	17.615	1.174	0.000	0.94				93.2	FLOOD RISK
S5.000	S11	17.398	1.069	0.000	0.27				6.4	FLOOD RISK
S1.005	S12	17.386	1.204	3.240	1.69				105.8	FLOOD
S6.000	S13	17.231	0.926	0.000	0.28				8.1	FLOOD RISK
S1.006	S14	17.217	1.123	0.000	1.77				108.9	FLOOD RISK
S1.007	S15	17.028	1.012	0.000	2.32				112.8	SURCHARGED
S1.008	S16	16.841	0.849	0.000	2.34				113.6	SURCHARGED
S7.000	S17	16.663	0.144	0.000	0.18				8.3	SURCHARGED
S1.009	S18	16.651	0.682	0.000	1.79				115.5	SURCHARGED
S8.000	S19	16.358	-0.092	0.000	0.31				15.2	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S2.000	S3	
S1.002	S4	
S3.000	S5	
S3.001	S6	
S3.002	S7	
S1.003	S8	
S4.000	S9	4
S1.004	S10	
S5.000	S11	
S1.005	S12	4
S6.000	S13	
S1.006	S14	
S1.007	S15	
S1.008	S16	
S7.000	S17	
S1.009	S18	
S8.000	S19	

Abley Letchford Partnership Ltd							Page 18	
Search House Charnham Lane Hungerford RG17 0EY				Water Lane, Angmering				
Date 24/06/2020 File NETWORK 1 V2.MDX				Designed by SL Checked by SL				
XP Solutions				Network 2020.1				
<u>Summary of Critical Results by Maximum Level (Rank 1) for STORM SOUTH</u>								
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S9.000	S20 15	Winter	100	+40%	100/15 Summer	100/15 Summer		
S10.000	S21 15	Winter	100	+40%	100/15 Summer			
S9.001	S22 15	Winter	100	+40%	100/15 Summer			
S11.000	S23 15	Winter	100	+40%	100/15 Summer			
S9.002	S24 15	Winter	100	+40%	100/15 Summer			
S1.010	S25 15	Winter	100	+40%	100/15 Summer			
S1.011	S26 60	Winter	100	+40%	100/15 Summer			
S1.012	S27 60	Winter	100	+40%	100/30 Summer			
S12.000	S28 15	Winter	100	+40%	100/15 Summer			
S13.000	S29 30	Winter	100	+40%	100/15 Summer	100/15 Summer		
S13.001	S30 15	Winter	100	+40%	100/15 Summer	100/15 Summer		
S13.002	S31 30	Winter	100	+40%	100/15 Summer	100/15 Summer		
S12.001	S32 30	Winter	100	+40%	100/15 Summer	100/15 Summer		
S14.000	S33 15	Winter	100	+40%	100/15 Summer			
S14.001	S34 15	Winter	100	+40%	100/15 Summer	100/15 Summer		
S12.002	S35 15	Winter	100	+40%	100/15 Summer			
S15.000	S36 15	Winter	100	+40%	100/15 Summer	100/15 Winter		
S16.000	S37 15	Winter	100	+40%	100/15 Summer			
S12.003	S38 15	Winter	100	+40%	100/15 Summer			
S17.000	S39 15	Winter	100	+40%	100/15 Summer			
S18.000	S40 15	Winter	100	+40%	100/15 Summer			
S12.004	S41 15	Winter	100	+40%	100/15 Summer			
S19.000	S42 15	Winter	100	+40%	100/15 Summer			
S12.005	S43 15	Winter	100	+40%	100/15 Summer	100/15 Winter		
S20.000	S44 15	Winter	100	+40%	100/15 Summer			
S12.006	S45 15	Winter	100	+40%	100/15 Summer	100/15 Winter		
S21.000	S46 15	Winter	100	+40%	100/15 Summer			
S12.007	S47 15	Winter	100	+40%	100/15 Summer	100/15 Winter		
S22.000	S48 15	Winter	100	+40%	100/15 Summer			
S23.000	S49 15	Winter	100	+40%	100/15 Summer			
S12.008	S50 15	Winter	100	+40%	100/15 Summer			
S24.000	S51 15	Winter	100	+40%	100/15 Summer			
S25.000	S52 15	Winter	100	+40%	100/15 Summer			
S12.009	S53 15	Winter	100	+40%	100/15 Summer			
S26.000	S54 30	Winter	100	+40%	100/15 Summer			
S12.010	S55 30	Winter	100	+40%	100/15 Summer			
S27.000	S56 30	Winter	100	+40%	100/15 Summer			
S12.011	S57 30	Winter	100	+40%	100/15 Summer			
S12.012	S58 30	Winter	100	+40%	100/15 Summer			
S28.000	S59 15	Winter	100	+40%	100/15 Summer			
S12.013	S60 30	Winter	100	+40%	100/15 Summer			
S12.014	S61 60	Winter	100	+40%	100/15 Summer			
S12.015	S62 60	Winter	100	+40%	100/15 Summer			
S1.013	S63 60	Winter	100	+40%	100/15 Summer			
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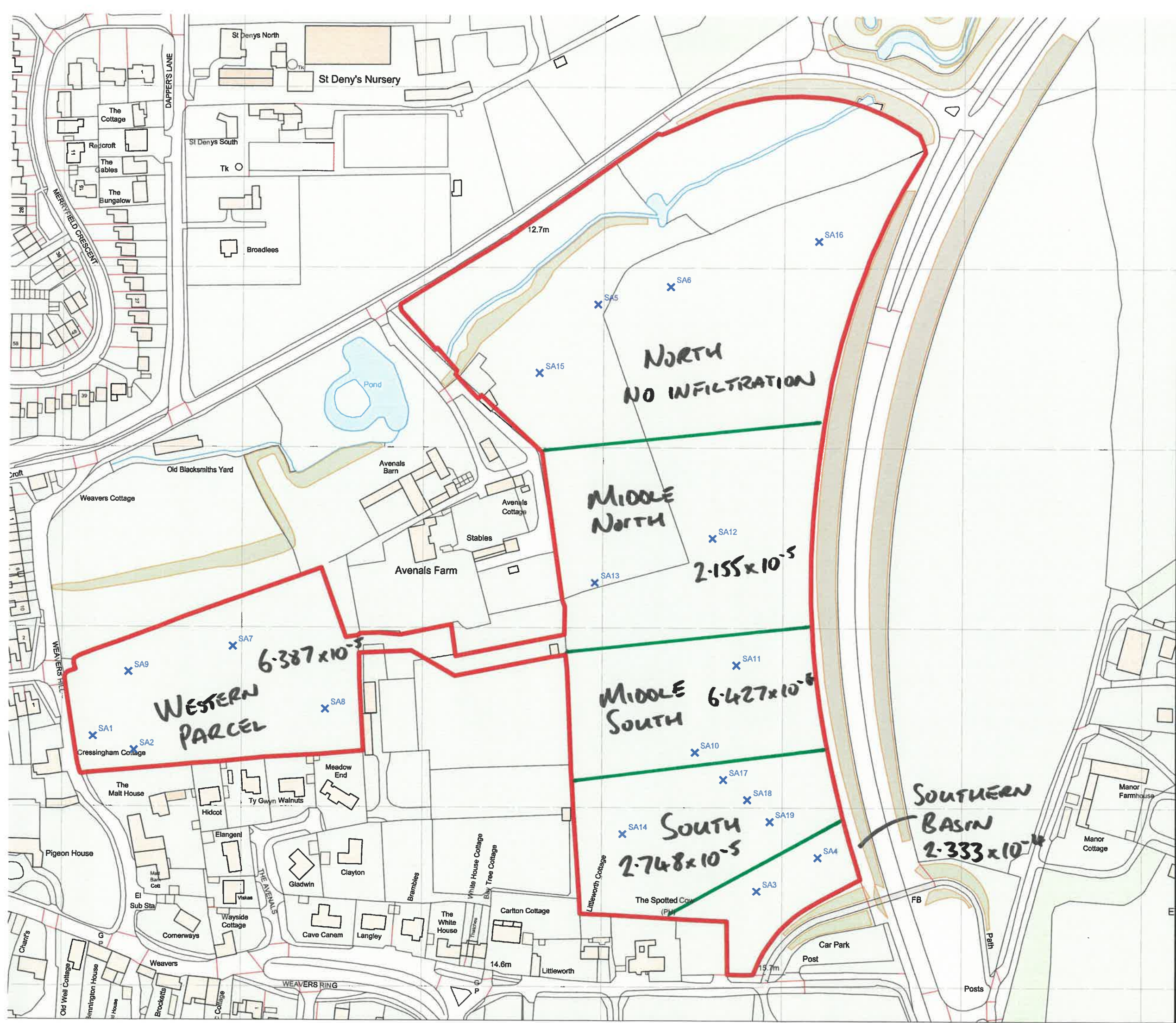
Abley Letchford Partnership Ltd							Page 19		
Search House Charnham Lane Hungerford RG17 0EY				Water Lane, Angmering					
Date 24/06/2020 File NETWORK 1 V2.MDX				Designed by SL Checked by SL					
XP Solutions				Network 2020.1					
Summary of Critical Results by Maximum Level (Rank 1) for STORM SOUTH									
		Water	Surcharged	Flooded			Half Drain	Pipe	
PN	US/MH Name	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status
S9.000	S20	17.365	1.201	0.972	2.51			33.3	FLOOD
S10.000	S21	17.064	0.924	0.000	1.12			15.2	FLOOD RISK
S9.001	S22	16.974	0.900	0.000	1.78			70.0	SURCHARGED
S11.000	S23	16.502	0.099	0.000	0.10			4.2	SURCHARGED
S9.002	S24	16.493	0.579	0.000	1.96			71.4	SURCHARGED
S1.010	S25	16.252	0.406	0.000	1.72			194.6	SURCHARGED
S1.011	S26	15.923	0.196	0.000	1.43			153.0	SURCHARGED
S1.012	S27	15.890	0.243	0.000	0.74			149.5	SURCHARGED
S12.000	S28	17.758	1.187	0.000	0.84			12.8	FLOOD RISK
S13.000	S29	18.297	1.205	3.265	1.81			9.7	FLOOD
S13.001	S30	18.328	1.292	2.016	1.15			19.7	FLOOD
S13.002	S31	17.915	1.274	3.843	1.90			37.0	FLOOD
S12.001	S32	17.709	1.209	9.144	1.46			65.2	FLOOD
S14.000	S33	17.616	1.066	0.000	0.16			3.7	FLOOD RISK
S14.001	S34	17.608	1.201	1.690	1.09			17.8	FLOOD
S12.002	S35	17.667	1.409	0.000	1.33			74.6	FLOOD RISK
S15.000	S36	17.989	1.201	0.196	0.81			34.0	FLOOD
S16.000	S37	17.683	1.041	0.000	0.25			10.0	FLOOD RISK
S12.003	S38	17.654	1.439	0.000	1.45			92.4	FLOOD RISK
S17.000	S39	17.481	1.314	0.000	0.11			1.6	FLOOD RISK
S18.000	S40	17.486	1.315	0.000	0.23			3.6	FLOOD RISK
S12.004	S41	17.477	1.372	0.000	1.45			88.1	FLOOD RISK
S19.000	S42	17.354	1.258	0.000	0.62			9.2	FLOOD RISK
S12.005	S43	17.324	1.290	1.832	1.83			103.8	FLOOD
S20.000	S44	17.231	1.130	0.000	0.35			7.3	FLOOD RISK
S12.006	S45	17.211	1.234	0.166	1.41			106.3	FLOOD
S21.000	S46	17.097	0.875	0.000	0.09			2.3	SURCHARGED
S12.007	S47	17.087	1.201	0.180	1.35			130.9	FLOOD
S22.000	S48	17.006	0.956	0.000	0.12			3.3	FLOOD RISK
S23.000	S49	17.033	0.933	0.000	0.37			12.2	SURCHARGED
S12.008	S50	16.997	1.179	0.000	1.46			140.8	FLOOD RISK
S24.000	S51	16.904	0.954	0.000	0.45			12.6	SURCHARGED
S25.000	S52	16.884	0.834	0.000	0.24			8.0	SURCHARGED
S12.009	S53	16.868	1.115	0.000	1.64			154.4	FLOOD RISK
S26.000	S54	16.728	0.878	0.000	0.16			3.9	SURCHARGED
S12.010	S55	16.719	1.023	0.000	1.54			154.7	FLOOD RISK
S27.000	S56	16.574	0.824	0.000	0.14			2.6	SURCHARGED
S12.011	S57	16.569	0.909	0.000	1.77			172.1	FLOOD RISK
S12.012	S58	16.353	0.765	0.000	1.74			170.3	FLOOD RISK
S28.000	S59	16.477	0.562	0.000	1.06			32.7	SURCHARGED
S12.013	S60	16.144	0.629	0.000	2.06			194.3	SURCHARGED
S12.014	S61	16.006	0.548	0.000	1.79			164.1	SURCHARGED
S12.015	S62	15.921	0.511	0.000	1.99			163.3	SURCHARGED
S1.013	S63	15.880	0.500	0.000	0.00		51	0.0	SURCHARGED
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Abley Letchford Partnership Ltd		Page 20																																																																																																																																										
Search House Charnham Lane Hungerford RG17 0EY	Water Lane, Angmering																																																																																																																																											
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Appendix 2 – Infiltration Report

Infiltration Report



LEGEND:

- Site boundary
- Soakaway locations

A	12.03.20	FIRST ISSUE	HD	KF	KF
REV	DATE	DESCRIPTION	BY	CHD	APF
Dimensions		Projection	Scale	Orig Size	
m			1:2,000	A3	

Unit 26
Basepoint Abbey Enterprise Centre
Premier Way
Abbey Park Industrial Estate
Romsey SO51 9AQ

Tel: +44 (0)1794 329276

CLIENT	BARRATT DAVID WILSON SOUTHERN COUNTIES				
PROJECT	WATER LANE, ANGMERING				
TITLE	SOAKAWAY LOCATION PLAN				
JOB No.:	305145		DRAWING FILE: 305145-R01(00)D002		
BY:	DATE:	CONTRACT NO.	REV:		
HD	12.03.20		FIGURE 2 A		

Scale 1 : 2,000

ARUN DISTRICT COUNCIL A1109/20/RES

Our Ref: 3050145 L01 (00)

19th March 2020

Barratt David Wilson Southern Counties

Walnut Tree Close

Guildford

GU1 4SW

For the attention of Sean Havis

Dear Sean,

RE: WATER LANE, ANGMERING, BN16 4EP, SOAKAWAY TESTING

1. INTRODUCTION

RSK Environment Limited (RSK) was commissioned by Barratt David Wilson (BDW) Southern Counties (the client) via email on 20th February 2020 to carry out soakaway testing at land off Water Lane, Angmering, West Sussex, BN16 4EP (the site). This letter report is subject to the service constraints laid out in **Appendix A**.

The site comprises approximately 9 hectares and is divided into two sections – a large field to the south of Water Lane and a small field to the west of the main field. A stream is located within the northern portion of the larger field. A site location plan is given in **Figure 1**.

2. SUMMARY OF SITE SETTING

The published BGS geological records of the area indicate that the site is underlain by Superficial Deposits comprising Alluvium, at the northernmost tip of the site only, Head Deposits across the north of the site and River Terrace Deposits within the south of the site. These are underlain by the bedrock London Clay Formation within the north of the site and the Lambeth Group within the south. These are underlain in turn by the bedrock White Chalk.

The site does not lie within an EA designated Source Protection Zone and there are no groundwater abstraction boreholes within 500m of the site.

The superficial geology at the site is classified as a Superficial Aquifer Undifferentiated with respect to the Head and Alluvium and a Secondary A Aquifer with respect to the River Terrace Deposits noted within the south of the site. The bedrock geology is noted as Unproductive Strata with respect to the London Clay Formation, Secondary A Aquifer with respect to the Lambeth Group and Principal Aquifer with respect to the bedrock White Chalk.

3. SITE INVESTIGATION METHODOLOGY

RSK carried out intrusive investigation work on 3rd – 6th March 2020. The initial instructions comprised the excavation of 6 soakaway locations. Following assessment of how these were performing during the works, BDW added an additional 10 locations totalling 16 locations. Due to the recorded infiltration rates and site works logistics 3 fills were not achieved in all locations. During the works exceptionally heavy rainfall was experienced causing the fields to become soft and boggy, notably the northern half of the main field which prevented access to this area with the water filled bowser. A number of additional locations determined by RSK were undertaken within the southern portion of the site which was accessible during the wet weather. The tests were carried out in accordance with the method described in BRE Digest 365 (BRE, 2016), albeit for some locations it was not logistically possible to complete the 3 tests. A summary of the locations is presented in Error! Reference source not found. below:

Table 1: Exploratory location rationale

Location	Proposed depth (m bgl)	Actual Depth (m bgl)	Test attempted	Comments
SA1	2.0 – 3.0	2.0	Yes	Initial scope
SA2	2.0 – 3.0	2.2	Yes	Initial scope
SA3	2.0 – 3.0	2.4	Yes	Initial scope
SA4	2.0 – 3.0	2.3	Yes	Initial scope
SA5	2.0 – 3.0	2.3	Yes	Initial scope
SA6	2.0 – 3.0	2.3	Yes	Initial scope
SA7	1.0	2.0	Yes	Excavated before additional plan showing depths was received
SA8	1.0	2.3	Yes	Excavated before additional plan showing depths was received
SA9	0.5	-	No	Not undertaken due to logistical constraints
SA10	1.0	1.10	Yes	
SA11	1.0	1.0	Yes	
SA12	1.0	1.0	Yes	
SA13	1.0	1.0	Yes	
SA14	0.5	0.6	Yes	
SA15	0.5	-	No	No access to northern part of site due to wet conditions
SA16	0.5	-	No	No access to northern part of site due to wet conditions
SA17	2.0	2.0	Yes	RSK additional location
SA18	1.5	1.5	Yes	RSK additional location
SA19	0.5	0.5	Yes	RSK additional location

4. GROUND CONDITIONS

Ground conditions encountered during the investigation comprised Topsoil in all locations to a maximum depth of 0.2 m bgl overlying Superficial Deposits to a maximum depth of 2.3 m bgl. The Superficial Deposits varied in composition but generally comprised a variable combination of sand, gravel and silt. No groundwater was encountered during the investigation. Logs of the encountered ground conditions are presented within **Appendix B**.

5. SOAKAWAY TESTS

In-situ trial pit soakaway tests were undertaken in locations as detailed in Table 1 above. A summary of the calculated infiltration rate is given in **Table 2** below.

Table 2: Summary of calculated infiltration rate

Trial Pit	Test Number	Infiltration Rate (m/s)	Comment
SA1	1	4.67×10^{-5}	
	2	4.52×10^{-5}	
	3	4.93×10^{-5}	
SA2	1	8.51×10^{-5}	1 test completed due to time constraints
SA3	1	2.27×10^{-4}	
	2	1.93×10^{-4}	
	3	2.79×10^{-4}	
SA4	1	2.00×10^{-3}	
	2	1.17×10^{-3}	
	3	1.03×10^{-3}	
SA5	1	-	Test fail after >24 hours
SA6	1	-	Test fail after >24 hours
SA7	1	7.21×10^{-5}	
	2	5.78×10^{-5}	
	3	4.86×10^{-5}	
SA8	1	4.75×10^{-4}	1 test completed due to time constraints
SA10	1	1.02×10^{-5}	
	2	4.24×10^{-6}	Extrapolated result - pit left overnight
	3	Fail	Pit left for 6 hours 75-25% head of water not reached over this duration

SA11	1	5.59×10^{-6}	1 test completed due to time constraints
SA12	1	2.59×10^{-5}	
	2	2.09×10^{-5}	
	3	1.69×10^{-5}	
SA13	1	6.75×10^{-4}	
	2	6.24×10^{-4}	
	3	6.65×10^{-4}	
SA14	1	3.57×10^{-5}	
	2	4.20×10^{-5}	
	3	-	Insufficient time to complete test
SA17	1	2.18×10^{-5}	
	2	2.27×10^{-5}	
	3	2.46×10^{-5}	
SA18	1	-	Insufficient time to complete test
SA19	1	2.05×10^{-5}	1 test completed due to time constraints
Notes: m bgl – metres below ground level, m/s – metres per second.			

6. DISCUSSION AND CONCLUSION

As outlined in the table above infiltration rates varied across the site, with the greater infiltration occurring with the more granular soils and broadly in line with the underlying geology. Within pits where an infiltration rate has been calculated the infiltration rates recorded range between 2.0×10^{-3} m/s and 4.24×10^{-6} m/s.

It is noted that within the northern portion of the site SA5 and SA6 were left to run for over 24 hours and a negligible infiltration rate was recorded. In addition, ground conditions within the northern portion of the site precluded access to this area following prolonged rainfall. Given the proximity of the stream and the lack of infiltration recorded this area is unlikely to be suitable for soakaway drainage.

The data provided should allow the drainage engineer to select the appropriate infiltration rate for the areas of proposed soakaway drainage, where soakage has been shown to be feasible. It is considered that the conditions in which these tests were conducted (i.e. during heavy rain, and after the wettest February on record, and one of the wettest winters) provides a worst case scenario for the site in terms of likely infiltration rates.

We trust that the information provided above meets your requirements. Should you have any queries or require additional information, please do not hesitate to contact the undersigned.

Yours sincerely,

For RSK Environment Limited



Kirsten Fairall

Principal Geo-environmental Consultant

Enc.

Figures:

Figure 1	Site Location Plan
Figure 2	Exploratory Hole Location Plan

Appendices:

Appendix A	Service Constraints
Appendix B	Exploratory Hole Logs
Appendix C	Trial Pit Soakaway Test Data



Nigel Austin

Director – Geosciences

FIGURES



Contains Ordnance Survey data © Crown copyright and database right 2013



Unit 26
Basepoint Abbey Enterprise Centre
Premier Way
Abbey Park Industrial Estate
Romsey S051 9AQ

Tel: +44 1794 329276

Client	BARRATT DAVID WILSON SOUTHERN COUNTIES		
Project Title	WATER LANE, ANGMERING		
Drawing Title	SITE LOCATION PLAN		
Drawn	Date	Checked	Date
HD	12.03.20	KF	12.03.20
Approved	Date	Project No.	Drawing File
KF	12.03.20	305145	305145-R01(00)D001A
Scale	Orig Size	Dimensions	Drawing No.
NTS	A4	—	FIGURE 1
ARON DISTRICT COUNCIL A/109/20/RES			Rev.
			A

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Barratt David Wilson Southern Counties (the "client") in accordance with the terms of a contract between RSK and the "client". The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services that were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walkover survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.
8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B

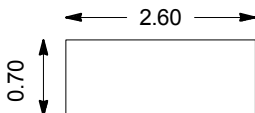
EXPLORATORY HOLE LOGS



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA1	
Contract Ref: 305145	Start: 04.03.20 End: 04.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.15	
						Dark brown gravelly fine SAND / SILT. Gravel is fine to medium subrounded to subangular flint. (Superficial Deposits)	(1.85)	
							2.00	
						Trial pit terminated at 2.0		

Plan (Not to Scale)		General Remarks	
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. Initial depth 2.00m. Trial pit collapsed to 1.70m during test. 4. No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF 



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA2	
Contract Ref: 305145	Start: 04.03.20 End: 04.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL	0.10	
						Dark brown sandy gravelly SILT. Sand is fine. Gravel is fine to medium subrounded to subangular flint.		
						(Superficial Deposits)	(2.10)	
							2.20	
						Trial pit terminated at 2.20m.		

Plan (Not to Scale)		General Remarks	
		- Services cleared by GPR. - Trial pit backfilled with arisings. - Initial depth 2.20m. Trial pit collapsed to 1.80m during test. - No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA3
Contract Ref: 305145	Start: 03.03.20 End: 03.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.20	
						Brown gravelly SAND / SILT. Sand is fine. Gravel is fine to coarse subrounded to subangular flint. Rare chalk fragments present. (Superficial Deposits)	(2.20)	
						Trial pit terminated at 2.40m.	2.40	

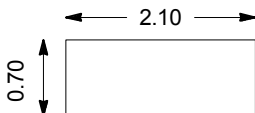
Plan (Not to Scale) 		General Remarks 1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. Initial depth 2.40m. Trial pit collapsed to 2.05m during test. 4. No groundwater encountered	
Method Used: Inspection pit + Machine dug		Plant Used: JCB 8080	
Logged By: GTsoutsis		Checked By: KF	
Scale: 1:25			



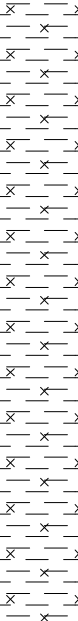
TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA4	
Contract Ref: 305145	Start: 03.03.20 End: 03.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Brown gravelly SAND / SILT. Sand is fine. Gravel is fine to medium subrounded to subangular flint with rare chalk fragments		
						(Superficial Deposits)	(2.20)	
							2.30	
						Trial pit terminated at 2.3m.		

Plan (Not to Scale)		General Remarks	
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. Initial depth 2.30m. Trial pit collapsed to 2.10m during test. 4. No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF 



Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.15	
						Brown slightly silty CLAY. (Superficial Deposits)	(2.15)	
						Trial pit terminated at 2.30m.	2.30	

ARUN DISTRICT LIBRARY V8_07.GLB LibVersion: v8_07_PijVersion: v8_07 | Log TRIAL PIT LOG - A4P | 305145 ANGMERING WATER LANE.GPJ - v8_07.
19/03/20 - 07:29 | KF2 |

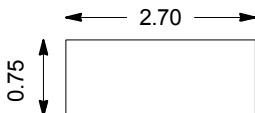
Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA6
Contract Ref: 305145	Start: 03.03.20 End: 04.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.20	
						Brown slightly silty CLAY. (Superficial Deposits)	(2.10)	
						Trial pit terminated at 2.30m.	2.30	

Plan (Not to Scale) 		General Remarks 1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered	
Method Used: Inspection pit + Machine dug		Plant Used: JCB 8080	
Logged By: GTsoutsis		Checked By: KF	
Scale: 1:25			

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA7
Contract Ref: 305145	Start: 04.03.02 End: 04.03.02	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.20	
						Brown gravelly sandy SILT. Sand is fine. Gravel is fine to coarse subrounded to subangular flint. (Superficial Deposits)	(1.80)	
						Trial pit terminated at 2.0m.	2.00	

Plan (Not to Scale) 		General Remarks 1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. Initial depth 2.00m. Trial pit collapsed to 1.85m during test. 4. No groundwater encountered	
Method Used: Inspection pit + Machine dug		Plant Used: JCB 8080	
Logged By: GTsoutsis		Checked By: KF	
Scale: 1:25			



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA8	
Contract Ref: 305145		Start: 04.03.20 End: 04.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Brown gravelly sandy SILT. Sand is fine. Gravel is fine to coarse subrounded to subangular flint.		
						(Superficial Deposits)	(2.20)	
							2.30	
						Trial pit terminated at 2.30m.		

Plan (Not to Scale)		General Remarks	
		- Services cleared by GPR. - Trial pit backfilled with arisings. - Initial depth 2.30m. Trial pit collapsed to 2.10m during test. - No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA10	
Contract Ref: 305145	Start: 05.03.20 End: 05.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.20	
						Brown sandy gravelly SILT. Sand is fine, gravel comprises angular to sub angular flint. (Superficial Deposits)	(0.90)	
						Trial pit terminated at 1.10m	1.10	

Plan (Not to Scale)		General Remarks	
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA11	
Contract Ref: 305145	Start: 05.03.20 End: 05.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Brown slightly sandy CLAY.		
						(Superficial Deposits)	(0.90)	
							1.00	
						Trial pit terminated at 1.00m.		

Plan (Not to Scale)		General Remarks	
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA12
Contract Ref: 305145	Start: 05.03.20 End: 05.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Dark brown sandy gravelly SILT. Sand is fine. Gravel is fine to medium subrounded to subangular flint.		
						(Superficial Deposits)	(0.90)	
							1.00	
						Trial pit terminated at 1.00m.		

Plan (Not to Scale)		General Remarks		
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered		
All dimensions in metres		Scale: 1:25		
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF	



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA13
Contract Ref: 305145	Start: 05.03.20 End: 05.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Dark brown sandy gravelly SILT Sand is fine. Gravel is fine to medium subrounded to subangular flint.	(0.90)	
						(Superficial Deposits)	1.00	
						Trial pit terminated at 1.00m.		

Plan (Not to Scale)		General Remarks		
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered		
		All dimensions in metres	Scale:	1:25
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF	



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA14
Contract Ref: 305145	Start: 05.03.20 End: 05.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.15	
						Brown sandy gravelly SILT. Gravel is fine subrounded to subangular flint.	(0.45)	
						(Superficial Deposits)	0.60	
						Trial pit terminated at 0.60m.		

Plan (Not to Scale)		General Remarks		
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered		
		All dimensions in metres	Scale:	1:25
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF	



TRIAL PIT LOG

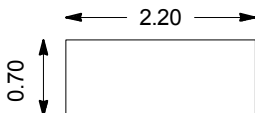
Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA17	
Contract Ref: 305145	Start: 06.03.20 End: 06.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Brown sandy gravelly SILT. Gravel comprises medium to fine angular to sub rounded flint		
						(Superficial Deposits)	(1.90)	
							2.00	
						Trial pit terminated at 2.00m.		

Plan (Not to Scale)		General Remarks	
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA18
Contract Ref: 305145	Start: 06.03.20 End: 06.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.20	
						Brown sandy SILT. Sand is fine. (Superficial Deposits)	(1.30)	
						Trial pit terminated at 1.50m	1.50	

Plan (Not to Scale) 		General Remarks 1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered	
Method Used: Inspection pit + Machine dug		Plant Used: JCB 8080	
Logged By: GTsoutsis		Checked By: KF	
Scale: 1:25			



TRIAL PIT LOG

Contract: Angmering Water Lane		Client: BDW Southern Counties		Trial Pit: SA19	
Contract Ref: 305145	Start: 06.03.20 End: 06.03.20	Ground Level: ---	National Grid Co-ordinate: ---	Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL.	0.10	
						Brown sandy slightly gravelly SILT. Sand is fine. Gravel comprises subrounded to subangular flint	(0.40)	
						(Superficial Deposits)	0.50	
						Trial pit terminated at 0.50m.		

Plan (Not to Scale)		General Remarks	
		1. Services cleared by GPR. 2. Trial pit backfilled with arisings. 3. No groundwater encountered	
All dimensions in metres		Scale: 1:25	
Method Used: Inspection pit + Machine dug	Plant Used: JCB 8080	Logged By: GTsoutsis	Checked By: KF

APPENDIX C

TRIAL PIT SOAKAWAY TEST DATA

ARUN DISTRICT COUNCIL A/109/20/RES

Soakaway Calculations



Soakaway Test No.	SA1 test 3
Contract:	Water Lane Angmering
Contract No.	305145

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

Depth of Pit	1.70 m
Width of Pit	0.70 m
Length of Pit	2.60 m
Depth of Pit Soaked	1.23 m
ap50	5.879 m2
Vp75-25	1.1193 m3
t75-25	64.3 min
water used	2.2386 m3
f	4.934E-05 m/sec.

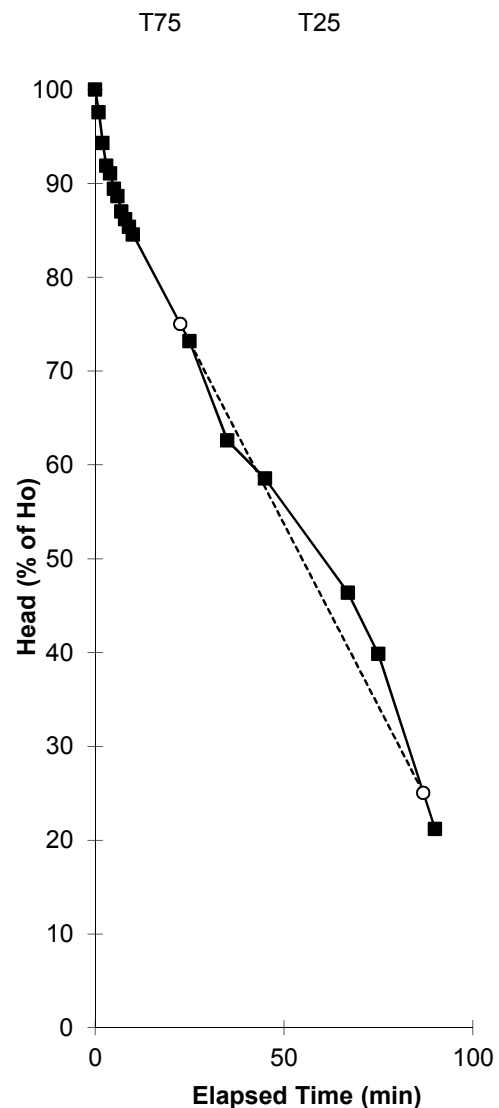
Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.47	0	100	1.23
0.5	1	98	1.20
0.54	2	94	1.16
0.57	3	92	1.13
0.58	4	91	1.12
0.6	5	89	1.10
0.61	6	89	1.09
0.63	7	87	1.07
0.64	8	86	1.06
0.65	9.00	85	1.05
0.66	10.00	85	1.04
0.8	25.00	73	0.90
0.93	35.00	63	0.77
0.98	45.00	59	0.72
1.13	67.00	46	0.57
1.21	75.00	40	0.49
1.44	90.00	21	0.26

T75	22.589	75
T25	86.902	25
T75-25	64.313	Derived from Best Fit

Comments

Trail pit collapse to 1.7m bgl



RSKARUN DISTRICT COUNCIL A/109/20/RES

Soakaway Calculations



Soakaway Test No.	SA3 test 1
Contract:	Water Lane Angmering
Contract No.	305145

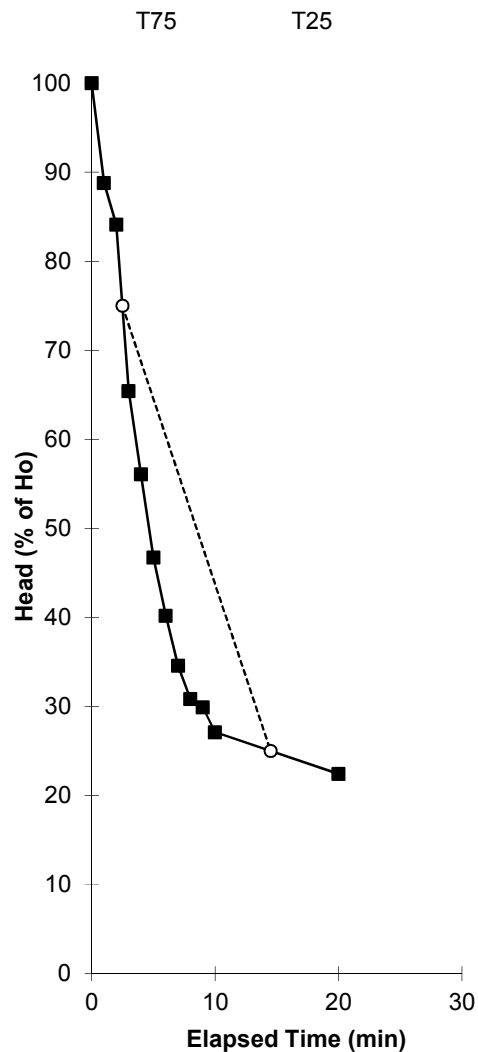
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

Depth of Pit	2.10 m
Width of Pit	0.60 m
Length of Pit	2.20 m
Depth of Pit Soaked	1.07 m
ap50	4.316 m ²
Vp75-25	0.7062 m ³
t75-25	12.0 min
water used	1.4124 m ³
f	2.270E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.03	0	100	1.07
1.15	1	89	0.95
1.2	2	84	0.90
1.4	3	65	0.70
1.5	4	56	0.60
1.6	5	47	0.50
1.67	6	40	0.43
1.73	7	35	0.37
1.77	8.00	31	0.33
1.78	9.00	30	0.32
1.81	10.00	27	0.29
1.86	20.00	22	0.24



T75	2.488	75
T25	14.500	25
T75-25	12.013	Derived from Best Fit

Comments

Initial depth 2.40m, collapse to 2.10m during test.

ARUN DISTRICT COUNCIL A/109/20/RES

Soakaway Calculations



Soakaway Test No.	SA4 test 1
Contract:	Water Lane Angmering
Contract No.	305145

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

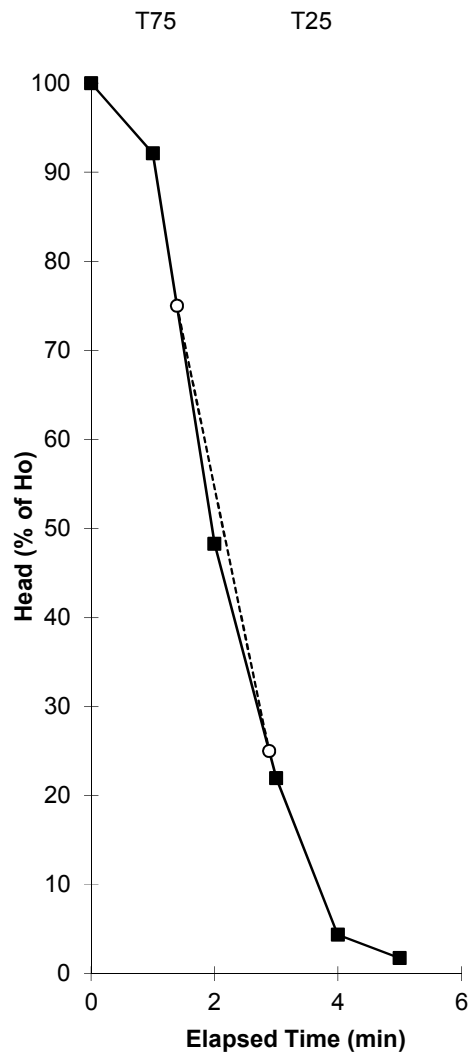
Depth of Pit	2.20 m
Width of Pit	0.70 m
Length of Pit	2.10 m
Depth of Pit Soaked	1.14 m
ap50	4.662 m2
Vp75-25	0.8379 m3
t75-25	1.5 min
water used	1.6758 m3
f	2.006E-03 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.06	0	100	1.14
1.15	1	92	1.05
1.65	2	48	0.55
1.95	3	22	0.25
2.15	4	4	0.05
2.18	5	2	0.02

T75	1.390	75
T25	2.883	25
T75-25	1.493	Derived from Best Fit

Comments



Trial Pit Log (include details of groundwater):
See trial Pit record.

Field Data

Elapsed Time (min)	Head (% of Ho) at T75	Head (% of Ho) at T25
0	100	100
1	85	-
1.5	-	75
2	67	-
3	33	-
4	26	25
5	20	-

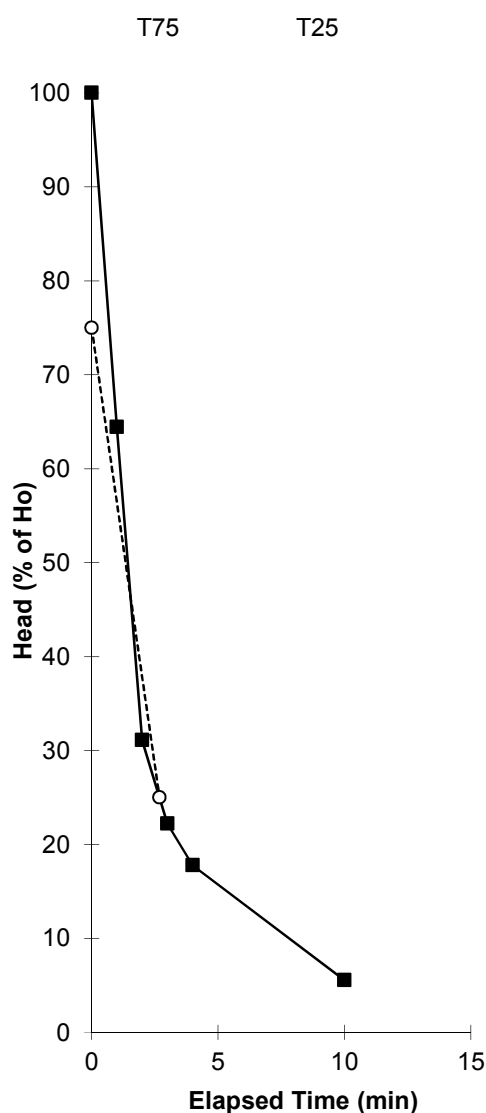
ARUN DISTRICT COUNCIL A/109/20/RES

Field Test

See trial Pit record.

Field Data

T75	0.000	75
T25	2.688	25
T75-25	2.688	Derived from Best Fit



Comments

RSK

RSKARUN DISTRICT COUNCIL A/109/20/RES

Soakaway Calculations



Soakaway Test No.	SA7 test 3
Contract:	Water Lane Angmering
Contract No.	305145

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

Depth of Pit	1.85 m
Width of Pit	0.75 m
Length of Pit	2.70 m
Depth of Pit Soaked	1.42 m
ap50	6.924 m ²
Vp75-25	1.43775 m ³
t75-25	71.3 min
water used	2.8755 m ³
f	4.857E-05 m/sec.

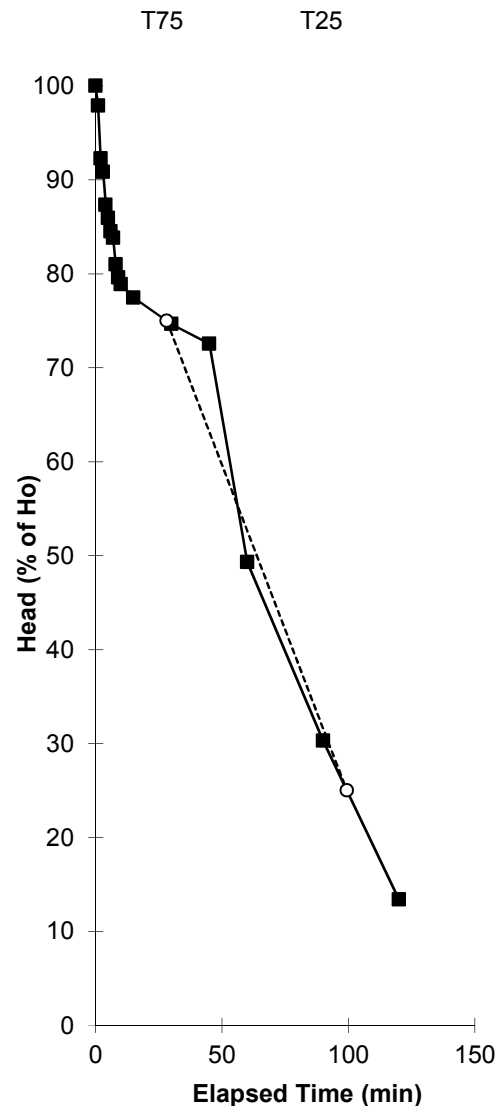
Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.43	0	100	1.42
0.46	1	98	1.39
0.54	2	92	1.31
0.56	3	91	1.29
0.61	4	87	1.24
0.63	5	86	1.22
0.65	6	85	1.20
0.66	7	84	1.19
0.7	8	81	1.15
0.72	9.00	80	1.13
0.73	10.00	79	1.12
0.75	15.00	77	1.10
0.79	30.00	75	1.06
0.82	45.00	73	1.03
1.15	60.00	49	0.70
1.42	90.00	30	0.43
1.66	120.00	13	0.19

T75	28.125	75
T25	99.375	25
T75-25	71.250	Derived from Best Fit

Comments

Trial pit collapse to 1.85m



Soakaway Calculations



Soakaway Test No.	SA8 test 1
Contract:	Water Lane Angmering
Contract No.	305145

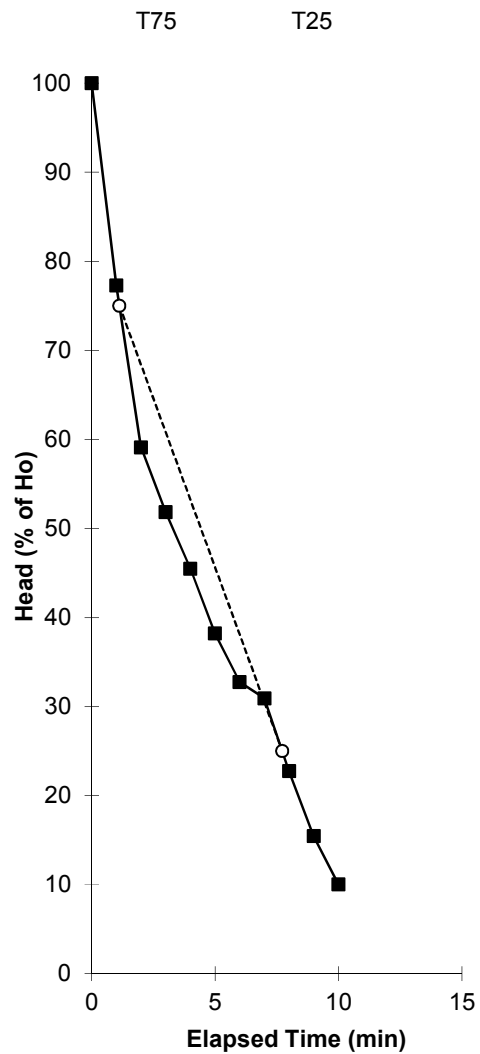
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

Depth of Pit	2.10 m
Width of Pit	0.75 m
Length of Pit	2.40 m
Depth of Pit Soaked	1.10 m
ap50	5.265 m ²
Vp75-25	0.99 m ³
t75-25	6.6 min
water used	1.9800 m ³
f	4.750E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1	0	100	1.10
1.25	1	77	0.85
1.45	2	59	0.65
1.53	3	52	0.57
1.6	4	45	0.50
1.68	5	38	0.42
1.74	6	33	0.36
1.76	7	31	0.34
1.85	8.00	23	0.25
1.93	9.00	15	0.17
1.99	10.00	10	0.11



T75	1.125	75
T25	7.722	25
T75-25	6.597	Derived from Best Fit

Comments

Initial depth 2.3m pit collapse to 2.1m

Soakaway Calculations



Soakaway Test No.	SA10 test 1
Contract:	Water Lane Angmering
Contract No.	305145

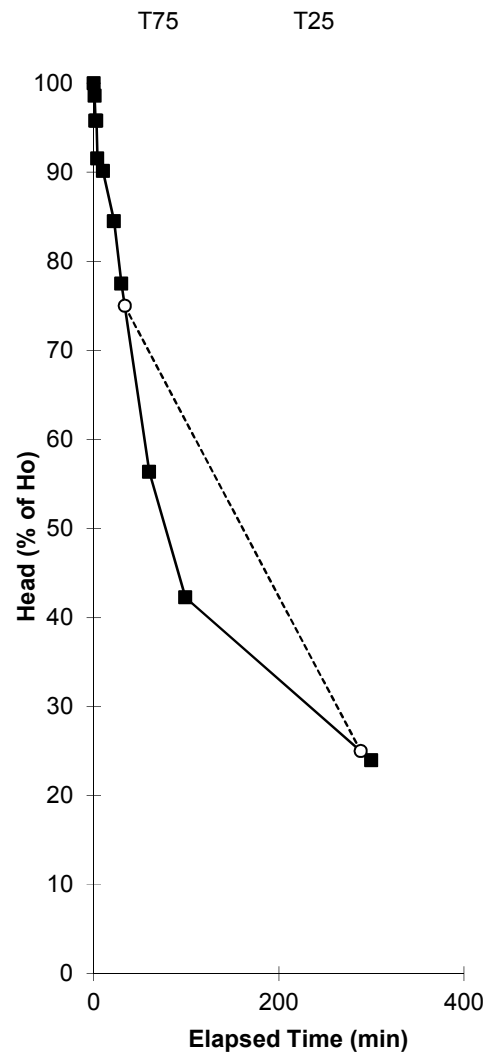
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

Depth of Pit	1.00 m
Width of Pit	0.70 m
Length of Pit	2.70 m
Depth of Pit Soaked	0.71 m
ap50	4.304 m2
Vp75-25	0.67095 m3
t75-25	254.9 min
water used	1.3419 m3
f	1.019E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.29	0	100	0.71
0.3	1	99	0.70
0.32	2	96	0.68
0.32	3	96	0.68
0.35	4	92	0.65
0.36	10	90	0.64
0.4	22	85	0.60
0.45	30	77	0.55
0.6	60.00	56	0.40
0.7	99.00	42	0.30
0.83	300.00	24	0.17



T75	33.500	75
T25	288.404	25
T75-25	254.904	Derived from Best Fit

Comments

Soakaway Calculations

Soakaway Test No.	SA10 test 2
Contract:	Water Lane Angmering
Contract No.	305145

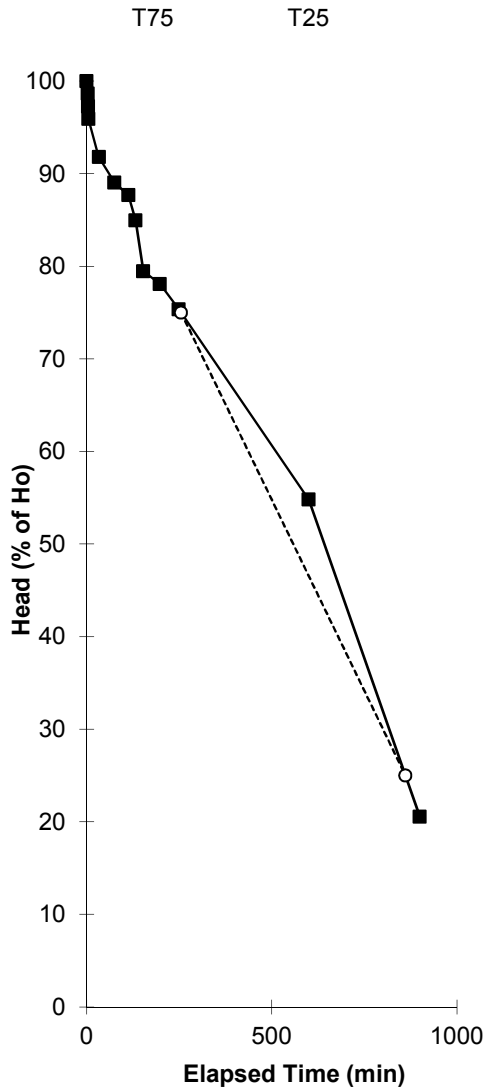
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record.

Depth of Pit	1.00 m
Width of Pit	0.70 m
Length of Pit	2.70 m
Depth of Pit Soaked	0.73 m
ap50	4.372 m2
Vp75-25	0.68985 m3
t75-25	606.2 min
water used	1.3797 m3
f	4.339E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.27	0	100	0.73
0.28	3	99	0.72
0.29	4	97	0.71
0.3	5	96	0.70
0.33	33	92	0.67
0.35	75	89	0.65
0.36	113	88	0.64
0.38	132	85	0.62
0.42	153.00	79	0.58
0.43	198.00	78	0.57
0.45	249.00	75	0.55
0.6	600.00	55	0.40
0.85	900.00	21	0.15
T75	254.850	75	
T25	861.000	25	
T75-25	606.150	Derived from Best Fit	



Comments

Extrapolated below 0.45m- pit was left overnight

Soakaway Calculations



Soakaway Test No.	SA10 test 3
Contract:	Water Lane Angmering
Contract No.	305145

Field Test

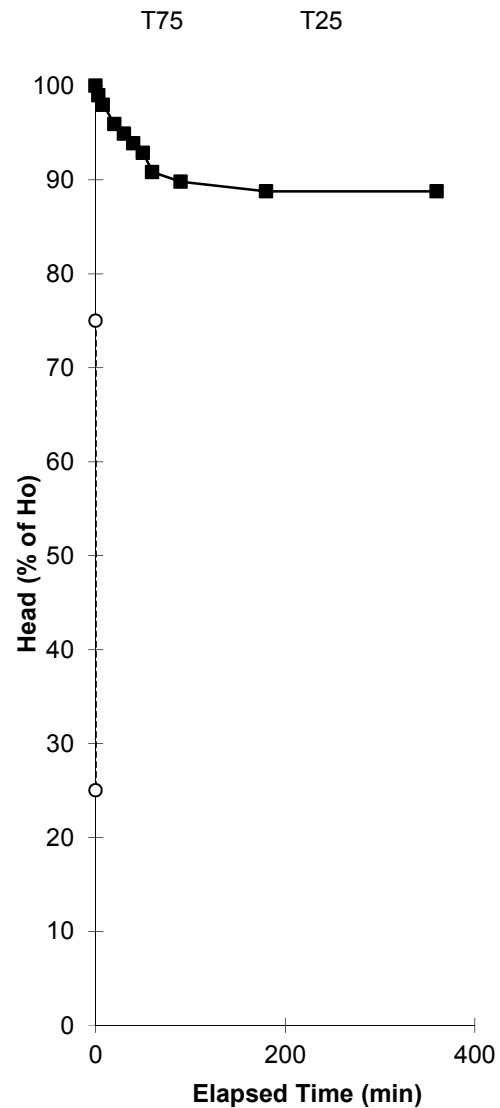
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.10 m
Width of Pit	0.70 m
Length of Pit	2.70 m
Depth of Pit Soaked	0.98 m
ap50	5.222 m2
Vp75-25	0.9261 m3
t75-25	0.0 min
water used	1.8522 m3
f	#DIV/0! m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.12	0	100	0.98
0.13	3	99	0.97
0.14	8	98	0.96
0.16	20	96	0.94
0.17	30	95	0.93
0.18	40	94	0.92
0.19	50	93	0.91
0.21	60	91	0.89
0.22	90	90	0.88
0.23	180.00	89	0.87
0.23	360.00	89	0.87



T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit

Comments

Test failed

RSKARUN DISTRICT COUNCIL A/109/20/RES

Soakaway Calculations

Soakaway Test No.	SA12 test 1
Contract:	Water Lane Angmering
Contract No.	305145

Field Test

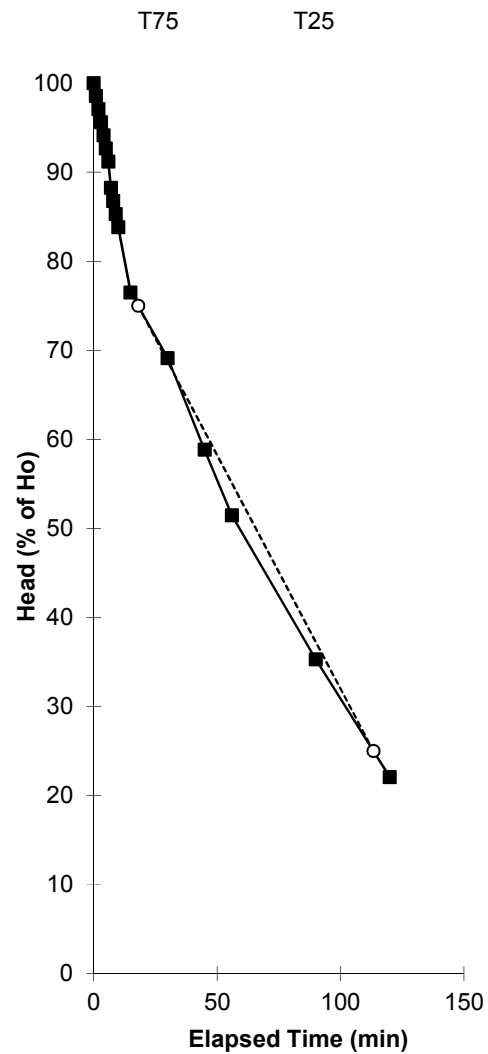
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.00 m
Width of Pit	0.70 m
Length of Pit	2.10 m
Depth of Pit Soaked	0.68 m
ap50	3.374 m2
Vp75-25	0.4998 m3
t75-25	95.3 min
water used	0.9996 m3
f	2.590E-05 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.32	0	100	0.68
0.33	1	99	0.67
0.34	2	97	0.66
0.35	3	96	0.65
0.36	4	94	0.64
0.37	5	93	0.63
0.38	6	91	0.62
0.4	7	88	0.60
0.41	8.00	87	0.59
0.42	9.00	85	0.58
0.43	10.00	84	0.57
0.48	15.00	76	0.52
0.53	30.00	69	0.47
0.6	45.00	59	0.40
0.65	56.00	51	0.35
0.76	90.00	35	0.24
0.85	120.00	22	0.15
T75	18.000	75	
T25	113.333	25	
T75-25	95.333	Derived from Best Fit	

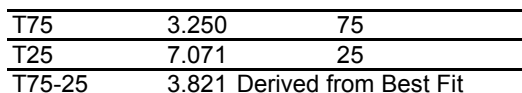


Comments

Field Test

ap50	3.8 m2
Vp75-25	0.58765 m3
t75-25	3.8 min
water used	1.1753 m3
f	6.745E-04 m/sec.

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.3	0	100	0.70
0.33	1	96	0.67
0.39	2	87	0.61
0.45	3	79	0.55
0.55	4	64	0.45
0.68	5	46	0.32
0.75	6	36	0.25
0.82	7	26	0.18
0.89	8.00	16	0.11



ARUN DISTRICT COUNCIL A/109/20/RES

Soakaway Calculations



Soakaway Test No.	SA13 test 3
Contract:	Water Lane Angmering
Contract No.	305145

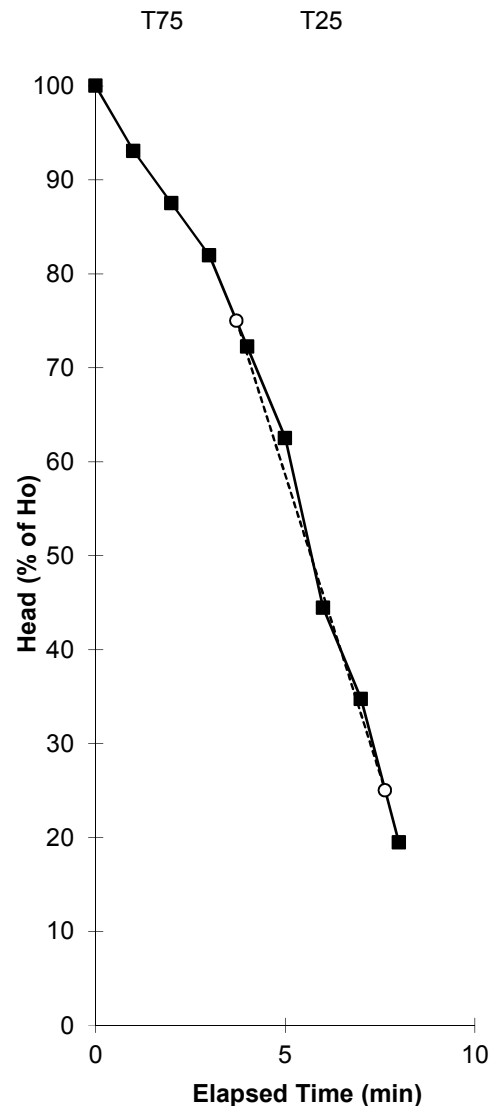
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.00 m
Width of Pit	0.73 m
Length of Pit	2.30 m
Depth of Pit Soaked	0.72 m
ap50	3.8606 m2
Vp75-25	0.60444 m3
t75-25	3.9 min
water used	1.2089 m3
f	6.653E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.28	0	100	0.72
0.33	1	93	0.67
0.37	2	88	0.63
0.41	3	82	0.59
0.48	4	72	0.52
0.55	5	63	0.45
0.68	6	44	0.32
0.75	7	35	0.25
0.86	8	19	0.14



Comments

Partial pit collapse during test

RSK

Field Test

ap50	2.823 m2
Vp75-25	0.3105 m3
t75-25	51.3 min
water used	0.6210 m3
f	3.571E-05 m/sec.

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.14	0	100	0.36
0.15	1	97	0.35
0.16	2	94	0.34
0.17	3	92	0.33
0.18	5	89	0.32
0.19	6	86	0.31
0.2	7	83	0.30
0.21	9	81	0.29
0.22	10.00	78	0.28
0.25	21.00	69	0.25
0.28	30.00	61	0.22
0.3	41.00	56	0.20
0.38	60.00	33	0.12
0.44	70.00	17	0.06

Figure 1 is a line graph showing the decay of head pressure over time for two temperatures, T75 and T25. The y-axis is labeled 'Head (% of Ho)' and ranges from 0 to 100. The x-axis is labeled 'Elapsed Time (min)' and ranges from 0 to 100. The T75 data is represented by a solid line with solid square markers, and the T25 data is represented by a dashed line with open circle markers. Both curves show a linear decay on this semi-log scale, with T75 decaying faster than T25.

Elapsed Time (min)	Head (% of Ho) at T75	Head (% of Ho) at T25
0	100	100
2	97	-
4	94	-
6	91	-
8	89	-
10	86	-
12	83	-
14	80	-
16	77	-
18	-	75
20	74	-
25	69	-
30	61	-
40	55	-
60	33	-
65	-	25
70	17	-

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Soakaway Calculations



Soakaway Test No.	SA17 test 2
Contract:	Water Lane Angmering
Contract No.	305145

Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

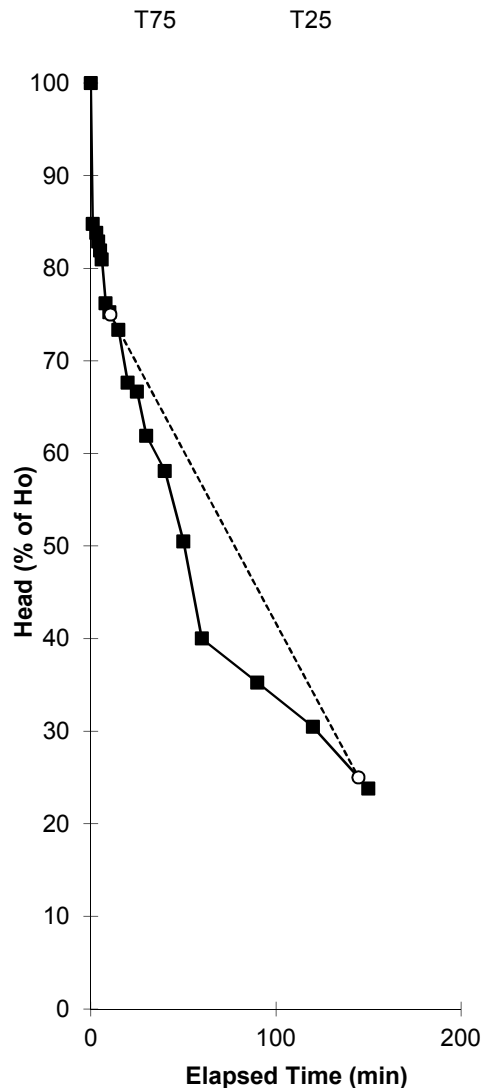
Depth of Pit	2.00 m
Width of Pit	0.73 m
Length of Pit	2.40 m
Depth of Pit Soaked	1.05 m
ap50	5.0385 m ²
Vp75-25	0.9198 m ³
t75-25	134.0 min
water used	1.8396 m ³
f	2.270E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.95	0	100	1.05
1.11	1	85	0.89
1.12	3	84	0.88
1.13	4	83	0.87
1.14	5	82	0.86
1.15	6	81	0.85
1.2	8	76	0.80
1.21	10	75	0.79
1.23	15.00	73	0.77
1.29	20.00	68	0.71
1.3	25.00	67	0.70
1.35	30.00	62	0.65
1.39	40.00	58	0.61
1.47	50.00	50	0.53
1.58	60.00	40	0.42
1.63	90.00	35	0.37
1.68	120.00	30	0.32
1.75	150.00	24	0.25

T75	10.625	75
T25	144.643	25
T75-25	134.018	Derived from Best Fit

Comments



Soakaway Calculations



Soakaway Test No.	SA17 test 3
Contract:	Water Lane Angmering
Contract No.	305145

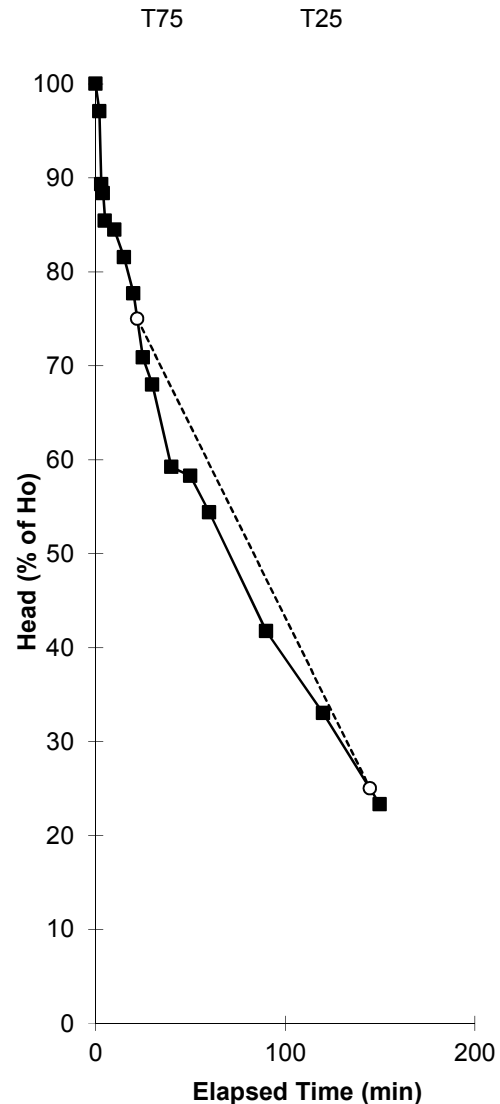
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	2.00 m
Width of Pit	0.73 m
Length of Pit	2.40 m
Depth of Pit Soaked	1.03 m
ap50	4.9759 m2
Vp75-25	0.90228 m3
t75-25	122.8 min
water used	1.8046 m3
f	2.461E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.97	0	100	1.03
1	2	97	1.00
1.08	3	89	0.92
1.09	4	88	0.91
1.12	5	85	0.88
1.13	10	84	0.87
1.16	15	82	0.84
1.2	20	78	0.80
1.27	25	71	0.73
1.3	30.00	68	0.70
1.39	40.00	59	0.61
1.4	50.00	58	0.60
1.44	60.00	54	0.56
1.57	90.00	42	0.43
1.66	120.00	33	0.34
1.76	150.00	23	0.24



T75	21.964	75
T25	144.750	25
T75-25	122.786	Derived from Best Fit

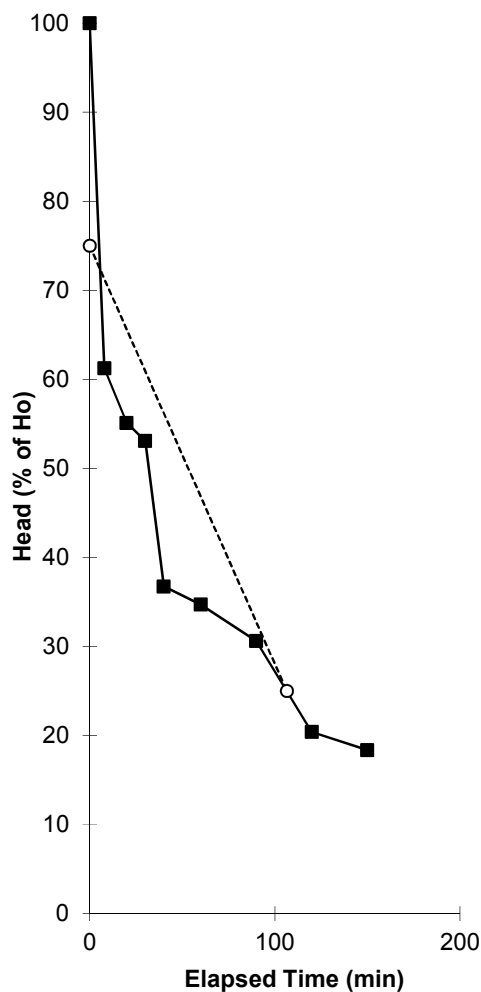
Comments

Field Test

ap50	3.2195 m2
Vp75-25	0.422625 m3
t75-25	106.5 min
water used	0.8453 m3
f	2.054E-05 m/sec.

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.01	0	100	0.49
0.2	8	61	0.30
0.23	20	55	0.27
0.24	30	53	0.26
0.32	40	37	0.18
0.33	60	35	0.17
0.35	90	31	0.15
0.4	120	20	0.10
0.41	150.00	18	0.09

T25



T75	0.000	75
T25	106.500	25
T75-25	106.500	Derived from Best Fit

Comments