

Addendum Drainage Technical Note

Introduction

- 1.1 An original Drainage Technical Note (TN) has been produced by White Young Green (WYG) to describe the proposed surface and foul water strategy for Phase 2 of the development. The TN_RevA, dated 07th September 2017, is contained in Appendix A of this report.
- 1.2 Mayer Brown Limited (MBL) have subsequently been appointed as the Consulting Engineers who will undertake the detailed design the proposed drainage for the scheme.
- 1.3 The surface water strategy drainage as described in the original TN has undergone some amendments since the September 2017 issue. The purpose of this addendum technical note (Addendum TN) is to summarise the changes that have occurred to the proposed scheme.

Proposed Layout

- 1.4 From a drainage perspective the proposed layout essentially remains the same as in the original TN_RevA.
- 1.5 The proposed dwelling numbers have not altered and the surface house surface water catchments have not altered. There are minor alterations to parking and landscape areas that have a negligible impact on the surface and foul water drainage.

Foul Drainage

- 1.6 The foul drainage strategy has **not altered**.
- 1.7 All foul effluent from the proposed dwellings will drain by gravity to the new foul pump station located within the application boundary. This is discussed in more detail in section 5 of TN_RevA.
- 1.8 The proposed detailed route of the foul drainage within the application boundary is contained within Appendix E of this Addendum TN

Persimmon Homes Thames Valley
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Drainage Strategy – West of Wetlands

- 1.9 The surface water drainage strategy as described in the original TN essentially remains the same
- ✧ The Outfall will be located in the same location at the northwest corner.
 - ✧ The attenuation tank will be located in the same location underneath the future parking square.
 - ✧ The proposed peak rate of surface water discharge will remain the same, which is a greenfield discharge rate of 15 litres / second per hectare.
- 1.10 Phase 2 is one of many development parcels within the overall Littlehampton Development, and the upstream and surrounding parcels extend to approximately 19.0 hectares. All the surface water run-off generated on these parcels will eventually drain into the Phase 2 surface water network.
- 1.11 The overall land use plan, showing the parcels, is contained in Appendix C of this Addendum TN. The land use plan shows the extent of the overall 19.0 hectare catchment and the location of the proposed outfall into the Black Ditch to the north of the site. Phase 2 is clearly identifiable on this land use plan.
- 1.12 Mayer Brown have undertaken a detailed design of the surface water to ensure it will be adequately sized to receive the surface water run-off from these future development parcels.
- 1.13 The proposed peak rate of surface water discharge from the 19.0 hectare catchment will be restricted to greenfield rates for the critical 1 in 100 year return period, plus a 30% allowance for climate change. The proposed / resulting attenuation will be located in a large attenuation tank (approximately 1,300m³) located in the parking square shown in the land use plan.
- 1.1 The proposed surface water drainage system will be constructed in accordance with Sewers for Adoption 7th edition (SFA7) and will be offered for adoption to Southern Water under a S104 agreement. The proposed attenuation tank will be an on-line concrete structure to facilitate its adoption by Southern Water
- 1.14 A discharge consent for the proposed outfall has been obtained from the Environment Agency and is contained in Appendix J of this addendum TN.

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1.15 The overall drainage network covering the entire 19 hectare catchment has been modelled in Micro Drainage. This modelling exercise has resulted in a significantly more complicated and accurate output and design than contained in the WYG TN_RevA. The results of this are contained in:

- ✧ Appendix F – Drainage Network Details
- ✧ Appendix G – 1 in 100 year Simulation Results
- ✧ Appendix H – 1 in 30 year Simulation Results
- ✧ Appendix I – 1 in 1 year Simulation Results

Conclusion

1.16 Having completed this Addendum TN it is considered that is sufficient to contribute to the discharge of outline planning Conditions 10, 11, 12 & 13

- ✧ **Condition 10:**
 - It is proposed that the surface water from the Phase 2 works covered by this Reserved Matters application will discharge at the restricted rate of 15l/s/ha as set out in the approved FRA into the black ditch at Outfall B, for which discharge consent has been granted by the EA. The system has been designed to include sufficient storage to allow for previously agreed flow rates from current and future developments connected to the Outfall B network.
 - As described in TN_RevA SUDS will continue to be in the form of an attenuation tank and some oversized sewers.
 - Infiltration is not proposed and the entire catchment will be restricted to greenfield discharge rates into the black ditch
 - The gullies, sewers and attenuation tank will be offered for adoption to WSCC and Southern Water and, as such, and will be subject their maintenance and management regime. The maintenance of the remainder of the private system being undertaken by an appointed Management Company.
- ✧ **Condition 11:** There are no existing watercourses or culverts affected by this RM planning application
- ✧ **Condition 12:** A discharge consent for the proposed outfall has been obtained from the Environment Agency and is contained in Appendix J of this addendum TN.
- ✧ **Condition 13:** Foul drainage will be conveyed via a new gravity sewer system to a new pumping station and pumped to the existing public foul sewer at an agreed connection

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point in Mill Lane. Downstream improvement works will be undertaken by Southern Water to provide capacity for the full site.

Author: Sean Foley

Date: 07th November 2017

APPENDIX A: WYG Technical Note



Land North of Toddington Lane, Littlehampton

Drainage Technical Note

Project	Land North of Toddington Lane, Littlehampton	Date	07th September 2017
Note	Surface and Foul Drainage Technical Note	Ref	A100789/RM
Author	Jack James	Rev	A

1.0 Introduction

WYG have been commissioned by Persimmon Homes Thames Valley (the Developer) to carry out a detailed foul and surface water drainage strategy to support a Reserved Matters application in relation to Arun District Council planning application reference LU/47/11 for a development on Land North of Toddington Lane, Littlehampton (the Development).

This technical note has been produced in support of the discharge of Conditions 10, 11, 12 and 13 of the Outline Consent dated 23 January 2013 in relation to a partial development of Parcels B2, B4 and C1.

2.0 Background & Existing Site

The Developer has received outline consent for the demolition of existing buildings and construction of up to 1,260 dwellings up to 13,000 sqm of B1 employment floorspace (including 3,000 sqm Enterprise Centre), up to 3,500 sqm of Class A local facilities, a 100 bed hotel, 60 bed care home, a new 2 Form Entry primary school, community centre, youth and leisure facilities, combined heat & power plant, extension to existing household recycling centre, landscaping, replacement and additional allotments, multi-functional green infrastructure including sports pitches (& associated changing facilities), informal open space, children's play areas, primary vehicular access from a new access from the A259 bridging over the railway line with additional access from Mill Lane & Toddington Lane.

The Development will be delivered in phases, the first phase comprising Parcels A1, B3 and B5 have received full consent and are currently under construction with B3 and B5 being constructed by a separate Developer, Bovis Homes.

This technical note relates to the requirements of Conditions 10 to 13 for Phase 2 of the Development encompassing 126 units from parts of Parcels B2, B4, C1 and C2. It also demonstrates how the detailed strategy for this Phase will tie into the overall site-wide drainage strategy submitted as part of the Outline Consent.



Land North of Toddington Lane, Littlehampton

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The technical note should be read in conjunction with the site wide Drainage Strategy and Flood Risk Assessment (FRA) that supported the Outline Consent together with the surface and foul drainage strategies produced by Glanville Consultants to support the Reserved Matters application for Phase 1 of the Development.

3.0 Proposed Site Development

The proposed Development covered by this application comprises the construction of the Phase 2 works of 126 residential units. 114 units have previously received Reserved Matters approval and are currently under construction. The extents of the application are shown on Persimmon Homes drawing 543_PL_Site Layout_100 attached as Appendix A.

4.0 Phase 2 Surface Water Drainage Strategy

As some of the site is being developed from permeable to impermeable area, the risk of flooding downstream will increase. In order to mitigate this issue a suitable Drainage Strategy is to be put in place as required by Condition 10.

A site-wide drainage strategy, issued with the Outline Planning Application, set out the agreed principles for discharging surface water. The preferred method of disposal for surface water is infiltration but the drainage strategy demonstrated that this was not feasible at this site. The second preference is for disposal into a watercourse and the site-wide strategy provided several points of discharge from the Development into existing watercourses that connect into the Black Ditch, an ordinary watercourse and tributary of the River Arun. The majority of the site area covered by the Phase 2 works was envisaged to discharge via Outfall B. Our drawing A100789/505 included in Appendix B shows the detailed drainage strategy for area covered by this application in context of the overall strategy for the Development.

Appendix C includes our drawing A100789/500 Rev. D which shows the detailed surface and foul drainage strategy for the Phase 2 application site. The design takes account of upstream flow of 120 l/s from the Bovis developments of Parcels B3 and B5 that are currently under construction together with 15.5 l/s of flow from future development of other parcels that are intended to discharge via Outfall B (Parcels A2, B1, B6, Retail / Resi Block A and Retail / Resi Block B). These parcels will be attenuated locally to discharge into the system as shown on drawing 500 Rev. D.



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All proposed surface water from the application site has been designed to connect into the piped system that will discharge at Outfall B. A Hydrobrake has been proposed in the final chamber to restrict the discharge rate to 163.6 l/s based on a catchment of 10.91 hectares and the discharge rate of 15l/s/ha as agreed in the FRA undertaken for the Outline Application. Storage will be provided in the form of a cellular crate tank system to be constructed beneath the area of the proposed public parking square (the construction of the parking square itself is not a part of this application). This storage tank has been designed to accommodate storage for a 1:100 year return period + 30% climate change for flows from the application site, the future development of the public parking square, the apartments within Parcel C1, upstream flow of 15.5 l/s from future development of Parcels A2, B1, B6 and Retail / Resi Block B, 5 l/s from the future development of Retail / Resi Block A as well as the 120 l/s flow from Parcels B3 and B5 that are currently under construction. The incoming flows from the parcels outside of the application site will be attenuated to the above rates via additional flow control devices and storage during the detailed design of the relevant phase(s). Our calculations in support of this drainage design are included as Appendix D.

It is intended that the remaining areas of Parcels B2, B4 and C1 that are not covered within this application will be attenuated and discharge into the central wetland area. Full details for that area will be included within the relevant planning application.

As required by Condition 12, Discharge Consent for Outfall B has been obtained from the Environment Agency (EA) under Consent Number SE_WS_2015_311_2 dated 30 July 2015 and included within Appendix E of this note.

It is intended that the main sewer run identified on drawing 500 Rev. D connecting the upstream development, proposed and under construction, to Outfall B will be offered for adoption by Southern Water under a Section 104 Agreement and future maintenance of this section of sewer will fall to Southern Water. Access to this network will be provided in the form of agreed easements for any sections of sewer that are outside adopted highway. The remaining surface water drainage for the Phase 2 works covered by this Reserved Matters application, including the proposed storage tank, will remain private and will be maintained by a Management Company to be appointed by the Developer. Details of a typical maintenance regime for the proposed system are attached as Appendix F.



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5.0 Foul Water Drainage Strategy

Southern Water have confirmed that Ford Treatment Works has sufficient capacity to accommodate the foul drainage from the whole development. They have also confirmed that both the foul sewer runs in Mill Lane and Toddington Lane fall to Littlehampton pumping station, located on Sea Road.

The site-wide drainage strategy report identified two potential discharge points for foul drainage; one to the west of site in Lyminster Road, and one to the south of the site in Toddington Lane. Three further potential discharge points have been identified to the west of the site within Mill Lane, Granary Way and Fullers Walk.

In order to utilise the potential discharge point in Fullers Walk a S98 sewer requisition would be required as the option would pass through adjacent third party land. If the potential discharge point in Granary Way is to be used, further confirmation of land ownership would be required.

Southern Water have previously been consulted in respect of the outline application for the whole site and the Phase 1 works. They have identified that significant existing sewer upgrade works will be necessary to accept foul water from the whole development. These upgrade works will require either upgrading existing foul sewers or laying additional parallel sewers to take the foul drainage from the site to a point where sufficient capacity is available.

Southern Water provided a Budget Estimate Offer in June 2012 of £3.04m for the construction of 4.75km of two rising mains in parallel directly to Ford Treatment Works that will serve the entire development of 1260 homes and associated uses.

A Section 98 application was submitted by the Developer to Southern Water in January 2015 and the design / cost estimate for these works is currently awaited.

It has previously been agreed as part of the Phase 1 works that foul drainage will discharge into the adopted manhole located west of the site in Mill Lane, opposite Granary Way, referenced as EXFWMH9914 via a proposed pumping station that is to be constructed in the south-western corner of the Phase 2 boundary.





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An allowance for connection into this system for up to 100 residential units prior to completion of the downstream upgrade works has been agreed with Southern Water. However, discussions are in place for this allowance to be increased subject to the signing of the S98 Agreement. The pumping station has been designed to provide 24 hour storage to enable discharge into the existing network to take place at off-peak times due to the restricted capacity. A flow monitor is fitted to the system downstream of the site and in the event that flows exceed capacity a warning will be provided at which point the pumping station would be switched off and emptied by tanker.

Foul flow from the 126 units included within this application has been calculated as 5.83l/s based on 4000 litres/dwelling/day as required by Sewers for Adoption 7th Edition. Our calculations are included in Appendix G.

It is proposed that the foul drainage for the works covered by this Reserved Matters application will connect by means of a gravity system to the proposed pumping station and from there conveyed by the rising main serving the Phase 1 works to the point of connection in Mill Lane. The detailed layout of the proposed foul sewer system is shown on drawing 500 Rev. D in Appendix C.

6.0 Summary and Conclusion

It is proposed that the surface water from the Phase 2 works covered by this Reserved Matters application will discharge at the restricted rate of 15l/s/ha as set out in the approved FRA into the watercourse at Outfall B for which discharge consent has been granted by the EA. The system has been designed to include sufficient storage to allow for previously agreed flow rates from current and future developments connected to the Outfall B network.

Maintenance of the main carrier sewer will be undertaken by Southern Water who are to adopt the system under a S104 Agreement with the maintenance of the remainder of the system being undertaken by an appointed Management Company.

Foul drainage will be conveyed via a new gravity sewer system to a new pumping station and pumped to the existing public foul sewer at an agreed connection point in Mill Lane. Downstream improvement works will be undertaken by Southern Water to provide capacity for the full site and in the event of permitted flows being exceeded before this work is completed the pumping station will be shut down and waste taken away in tankers until flow rates return to an acceptable level.



AND

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Land North of Toddington Lane, Littlehampton

Drainage Technical Note



APPENDIX C

PHASE 2 SURFACE AND FOUL WATER DRAINAGE STRATEGY



D	Amended following Amendments to layout	JJ	MM	10.08.17
C	Amended following Clients Comments	JJ	MP	10.08.17
B	Amended following Clients Comments	PG	MP	29.03.17
A	Amended to Mayer Brown Road Levels	PG	MP	24.03.17

REV	DETAILS	DRAWN BY	INCHARGE	DATE
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CLIENT

PERSIMMON HOMES

PROJECT

NORTH LITTLEHAMPTON

DRAWING TITLE

PROPOSED FOUL AND
SURFACE WATER DRAINAGE LAYOUT

SCALE

1:500

SHEET SIZE

A0

DRAWN PG

CHECKED MP

DATE 13.03.17

WYG Transport
part of WYG group

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wyg

REVISION

DRAWING NUMBER

A100789_500

REVISION

D

Land North of Toddington Lane, Littlehampton

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APPENDIX F

SURFACE WATER MAINTENANCE REGIME



Land North of Toddington Lane, Littlehampton

Drainage Technical Note

Surface Water Drainage Maintenance

Sustainable urban drainage systems (SUDS) have been incorporated into the design of the development including areas of geocellular attenuation tanks. The drainage on the site has been designed to cater for a 1 in 100 year storm event with a 30% allowance for climate change.

At present the Flood Water Management Act 2010 has yet to be fully implemented and water companies will not adopt SUDS features. Maintenance of shared SUDS features will be therefore be transferred to a Management Company to be set up by the Developer. Maintenance of any features serving a single property, and which are located within the curtilage of that property, such as domestic geocellular soakaways serving only the rear roof areas and pervious driveways, will be maintained by the property owner.

The Management Company will be funded through a service charge paid by property owners. This service charge will be made a legal requirement as part of the sale of any property on the site and funding is therefore guaranteed for the lifetime of the development.

This following table provides guidance on the anticipated level of maintenance of the drainage features by the Management Company. Maintenance of adopted drainage systems will be undertaken by Southern Water in accordance with their own policies.

Traditional Surface Water Drainage Features

The following provides details of the proposed levels of maintenance to be undertaken by the Management Company in relation to traditional drainage features including manholes, pipes and gullies:



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Drainage Technical Note

Maintenance Activity	Action	Frequency
Check gully pots/catch pits	Check, clean and empty gully pots as required to ensure that debris collected does not flow block the pipe network and obstruct Hydrobrakes.	Typically annually or as required.
Check manholes and inspection chambers	Inspect manholes and inspection chambers for any signs of blockages. Clean, jet and empty as required.	Typically annually or as required.
CCTV survey and jetting of drains	Check the integrity of drains, jet and clean as required. Remove collected debris as required.	Typically annually or as required.
Hydrobrake chambers	Hydrobrake chambers. Check and remove any silt build up or blockages in accordance with the Manufacturers recommendations.	Typically biannually or as required.



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Cellular Attenuation System

The proposed scheme incorporates a cellular crate storage tank. The following provides details of the recommended maintenance for this feature:

Maintenance Activity	Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Typically Monthly for 3 months, then six monthly
Remedial Actions	Inspect manholes and inspection chambers for any signs of blockages. Clean, jet and empty as required.	Typically annually or as required
Monitoring	Check the integrity of drains, jet and clean as required. Remove collected debris as required.	Typically annually or as required

APPENDIX B: Proposed Phase 2 Layout



creative minds safe hands



Parcel C1 and part Parcels B2, B4 and C2

Landscape Layout

- Site boundary
- Existing vegetation retained
- Vegetation to be removed

Soft landscape proposals

Refer drawing LA101 for details and tree and hedge plant schedule. Note: here trees are positioned in narrow planting areas, an underground cellular / structure will be necessary to achieve minimum 8 cubic metres of soil (per tree).

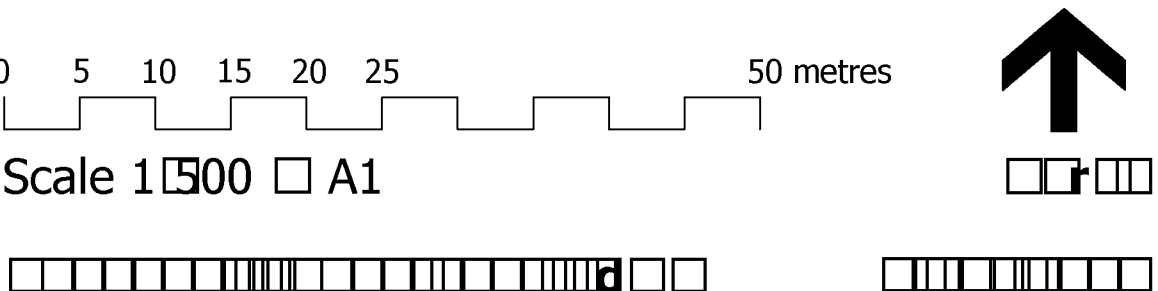
- Refer to drawing LA104 for plant schedule
- Refer to drawing LA101 for details and the plant schedule.
- Refer to LA104 for plant schedule
- Refer to LA101 for specification
- Refer to LA101 for specification

- Hard landscape proposals
- Tarmac or block paving (Bracken colour)
 - Marshall's slab paving (Buff colour)
 - Marshall's block paving (Bracken colour)
 - Marshall's block paving (Brindle colour)
 - Refer to drawing LA108
 - Refer to drawing LA106 for equipment and surface finish
 - Refer to drawing LA106

Ecology

Refer to Ecosa report

Boundaries - refer to sheets LA101-LA107



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Close board timber fence 1.8m high

Estate railings around LAP with black gate

Close board timber fence 1.8m high

Close board timber fence 1.8m high

Close board timber fence 1.8m high

Close board timber fence 1.8m high

Close board timber fence 1.8m high

Close board timber fence 1.8m high

Boat top style fence around LEAP with self-closing gates

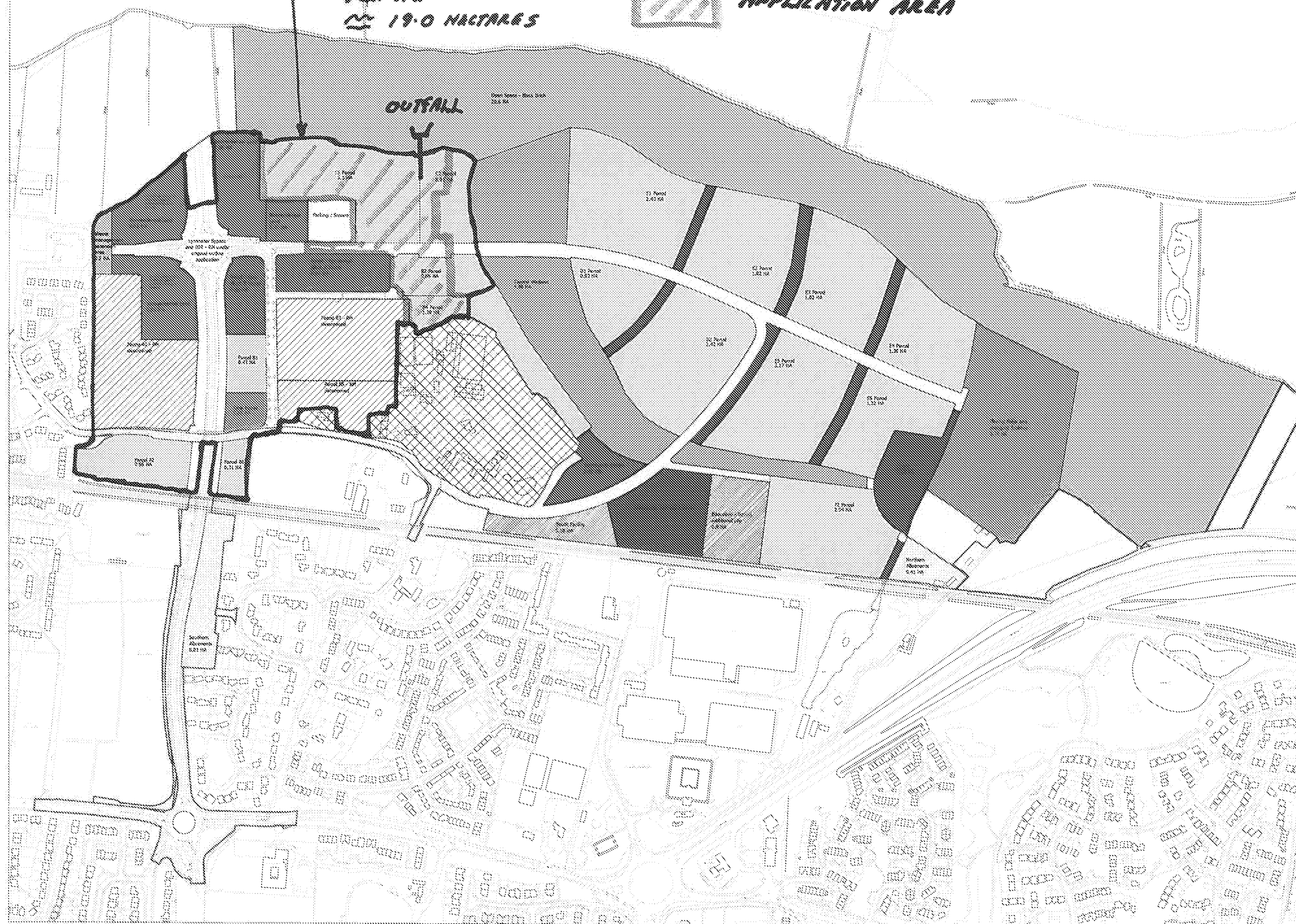
Hedge planting with post and wire fence through centre of hedge

APPENDIX C: Land Uses & Drainage Area Covered

RESERVED MATTERS
APPLICATION AREA



OUTFALL



- | Key | |
|-----|--|
| | Public Town Square - Street - Bench |
| | Public Town Square - General Weekend |
| | Playing Adults and Children Football (18106 - 1.79164) |
| | Afternoon (18106 - 2.41104 & 0.31164) |
| | Student |
| | Residential |
| | Education - School Week (18106 - 2.28181) |
| | Continuing Center and Youth Facility (18106 - 1.62181 & 0.30181) |
| | Nonresidential Land (18106 - 2.82181, Contours - 2.84181) |
| | Recreating Center (18106 - 0.31181) |
| | Hazel 2 (moderated map to 38951016 of Class 4) |
| | Infrastructure |
| | STL education - Periods (moderated under previous 80) |
| | Cura Home |

B	Veränderung des Umsatzes	13.04.17
A	Veränderung des Umsatzes	12.09.16



PERSIMMON
Together, we make a home

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Penniston House, Knoll Road,
Camden, Surrey GU10 3JQ
Tel 01276 800000

Toddington Lane
Littlehampton

27.06.16

1:2500 @ A1

519-GR-L 006

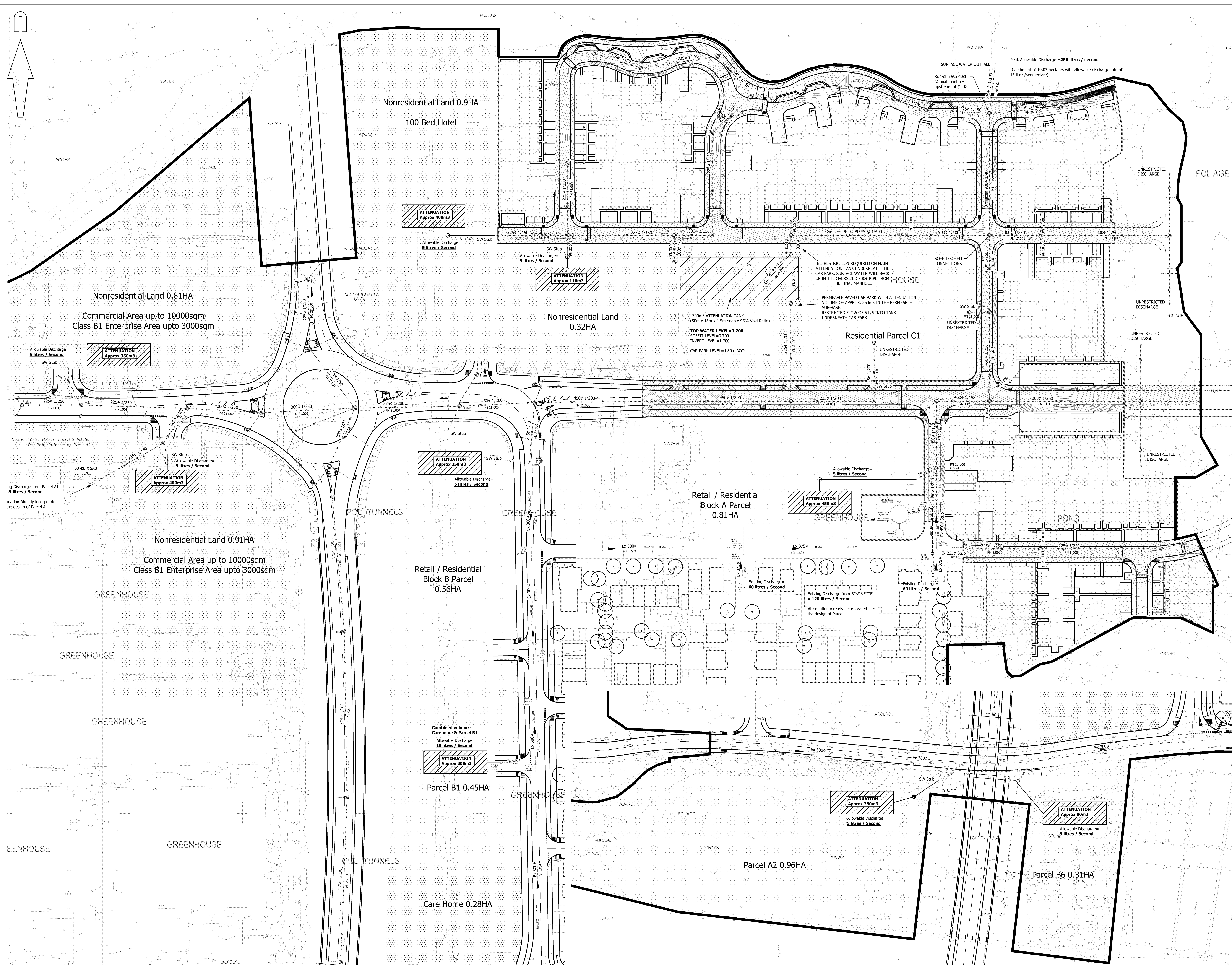
Parameter Plan - Land use

Submitted

1997

Figure 1

APPENDIX D: Site Wide Surface Water Strategy



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**FOR INFORMATION
NOT FOR CONSTRUCTION**

rev.	amendment	checked	date

mayer brown

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client: **PERSIMMON HOMES THAMES VALLEY**

project: **NORTH LITTLEHAMPTON PHASE 2
SITE WIDE DRAINAGE STRATEGY**

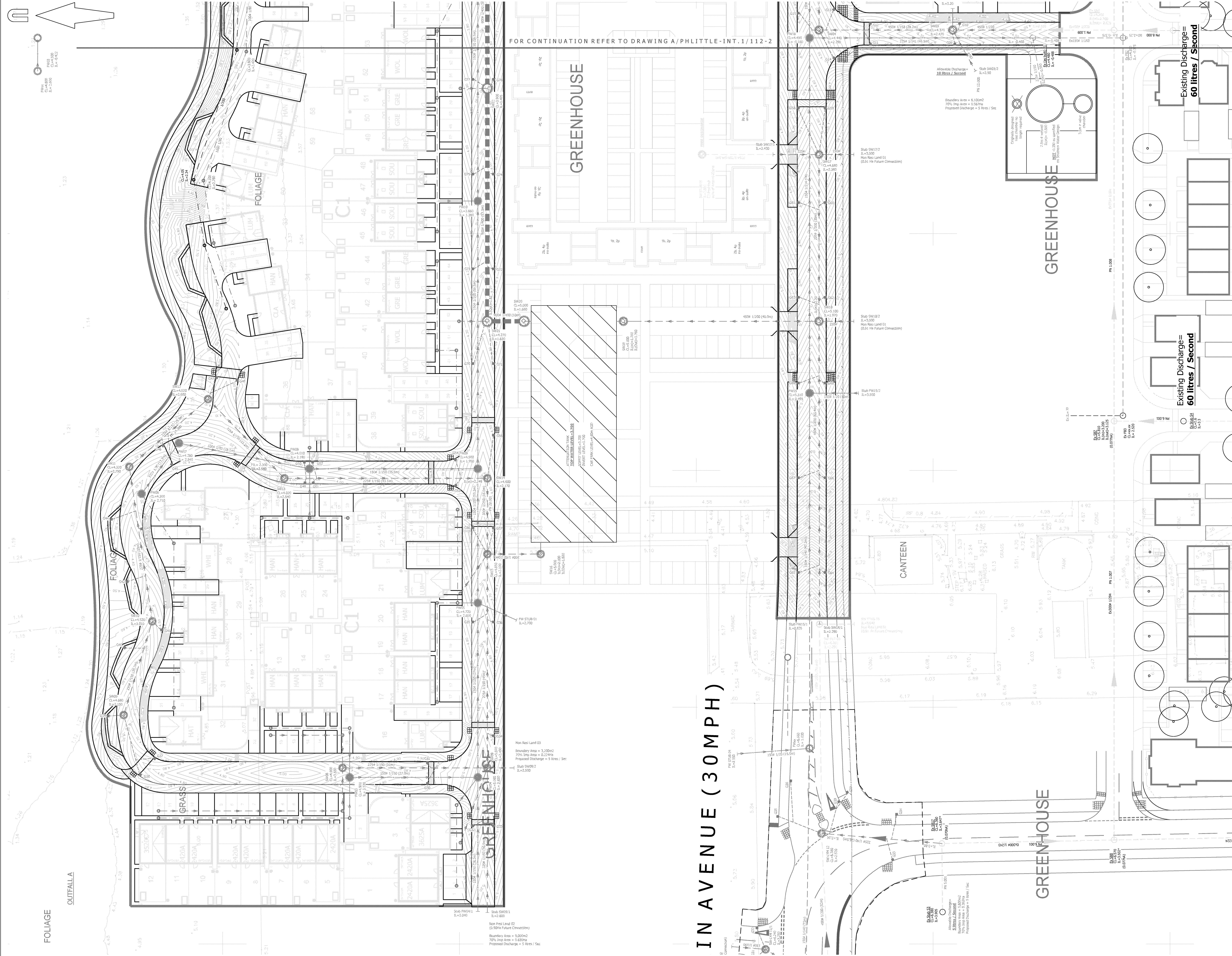
scale: **1:500** drawn by: **QJN** checked by: **GF**

date: **NOVEMBER 2017** cad file: **MASTER.DWG**

title: **SITE WIDE DRAINAGE STRATEGY DRAWING
WEST OF THE WETLANDS**

drawing number: **A/PHLITTLE.2/DS** rev: **P1**

APPENDIX E: Phase 2 Surface & Foul Water Drainage



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SURFACE WATER KEY

- PROPOSED SEWER AND MANHOLE
- PROPOSED OVERSIZED PIPE
- PROPOSED GULLY AND GULLY CONNECTION
- PROPOSED ATTENUATION TANK
- EXISTING SEWER AND MANHOLE
- PROPOSED SEWER AND MANHOLE FOR FUTURE PLOTS

FOUL WATER KEY

- PROPOSED SEWER AND MANHOLE
- PROPOSED BACKING MAIN
- EXISTING SEWER AND MANHOLE
- PROPOSED SEWER AND MANHOLE FOR FUTURE PLOTS
- SITE BOUNDARY

NOTES:

- The drawing is not to be scaled.
- This drawing is to be read in conjunction with the M3A Consulting 'Drainage Layout (Sheet 1)' drawing revision 5691.01, received on 30/11/2017.
- This drawing is to be read in conjunction with the latest revision of the Topographic Survey undertaken by WYG in July 2008, drawing numbered GGL/AD04029/LAY/01.
- Site layout taken from PHTV drawing numbered 543_PL_SITE LAYOUT, REV C.
- The proposed road and footpath levels have been set to ensure they are a minimum of 300mm above the nearest 1in100yr flood level (incl. C1) as described in the WYG Flood compensation report. The finished floor levels of the proposed dwellings will be above the adjacent road and footpath levels to ensure they are a minimum of 500mm above the flood level.
- All on-site civils and drainage works constructed in accordance with the Mayer Brown Limited Specification, details and schedules.
- Proprietary items are to be constructed in accordance with manufacturers recommendations / requirements.
- All drainage works shall be carried out in accordance with the requirements of the Local Authority, the Environment Agency and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and any addendums as appropriate.
- Invert levels and positions of existing drains / chambers / sewers where new connections are to be made must be checked and confirmed to the engineer prior to the commencement of any works.
- All new manholes and catchpits are to be set to invert unless noted otherwise. Invert level shown is outlet pipe.
- Any part of the existing drainage system to be retained as part of the new scheme shall be cleaned and inspected. Any structural defects shall be repaired using appropriate and approved means.
- All drainage shall comply with the typical details and the requirements of BS EN 752 and Part H of the Building Regulations.
- All runs connecting into the public drainage network to be vitrified clay, extra length to BS EN 295 or BS655 with plain sleeved or socketed flexible joints.
- All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.
- All surface water and foul water carrier drains shall be 100mm diameter unless noted otherwise. Gradients identified on layout.
- Manhole covers and frames shall be to BS EN 124 and shall be kitemarked. The strength classes of covers are shown in the manhole schedules.
- Cover levels are to be adjusted locally to suit finished ground levels.
- HEALTH AND SAFETY:** The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operators shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.

PRELIMINARY
NOT FOR CONSTRUCTION

P1	Initial issue, (IC)	SF	07/12/2017
rev	amendment	checked	date

m3
mayer brown

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Client
PERSIMMON HOMES THAMES VALLEY

Project
**NORTH LITTLEHAMPTON PHASE 2
PARCEL C1 AND PART PARCELS B2, B4 & C2**

Scale
1:250

Drawn by
IC

Checked by
AB

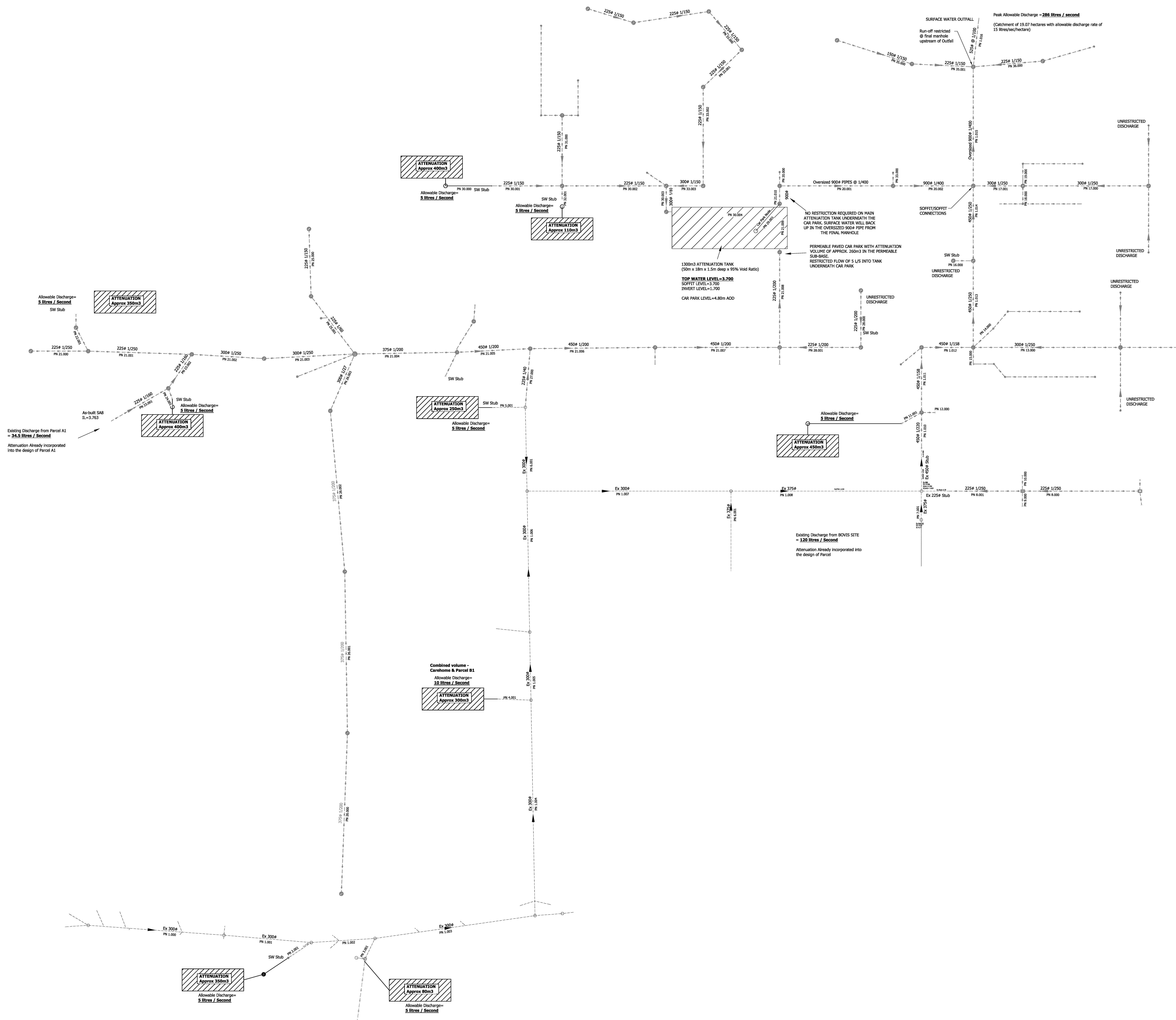
Date
NOVEMBER 2017

Cad file
MASTER.DWG

Title
DRAINAGE GENERAL ARRANGEMENT (1 OF 2)

drawing number	rev
A/PHLITTLE-INT.1/12-1	P1

APPENDIX F: Windes – Network Details



Mayer Brown Ltd		Page 1
Lion House Oriental Road Woking GU22 8AR	Littlehampton Overall Surface Network West of Wetlands	
Date November 2017	Designed by S Foley	
File Test_Simulation_Tank ...	Checked by	
XP Solutions	Network 2013.1	
Existing Network Details for Storm		
* - Indicates pipe has been modified outside of System 1		
	PN Length Fall Slope I.Area T.E. k HYD DIA (m) (m) (1:X) (ha) (mins) (mm) SECT (mm)	
* 1.000	59.000 0.251 235.1 0.066 2.00 0.600	o 300
* 1.001	38.000 0.163 233.1 0.040 0.00 0.600	o 300
* 2.000	12.808 0.200 64.0 0.533 5.00 0.600	o 300
* 2.001	12.001 0.080 150.0 0.000 2.00 0.600	o 150
* 1.002	27.675 0.121 228.7 0.045 0.00 0.600	o 300
* 3.000	19.930 0.200 99.6 0.200 5.00 0.600	o 300
* 3.001	10.000 0.067 149.3 0.000 2.00 0.600	o 150
* 1.003	70.062 0.300 233.5 0.047 0.00 0.600	o 300
* 1.004	94.210 0.425 221.7 0.153 0.00 0.600	o 300
* 4.000	20.000 0.065 307.7 0.438 5.00 0.600	o 300
* 4.001	14.532 0.097 149.8 0.000 2.00 0.600	o 150
* 1.005	30.500 0.140 217.9 0.046 0.00 0.600	o 300
* 1.006	59.368 0.270 219.9 0.088 0.00 0.600	o 300
* 5.000	19.999 0.595 33.6 0.480 5.00 0.600	o 300
* 5.001	14.532 0.105 138.4 0.000 2.00 0.600	o 150
* 5.002	36.500 0.150 243.3 0.070 0.00 0.600	o 300
* 1.007	88.421 0.300 294.7 0.077 0.00 0.600	o 300
* 6.000	20.006 0.100 200.1 0.700 5.00 0.600	o 375
* 6.001	14.650 0.875 16.7 0.000 5.00 0.600	o 375
* 1.008	77.584 0.400 194.0 0.077 0.00 0.600	o 375
PN	US/MH US/CL US/IL US DS/CL DS/IL DS Name (m) (m) C.Depth (m) (m) C.Depth (m) (m) (m)	Ctrl US/MH (mm)
* 1.000	TL_SW01 6.380 5.170 0.910 6.790 4.919 1.571	1050
* 1.001	TL_SW02 6.790 4.919 1.571 6.800 4.756 1.744	1200
* 2.000	Parcel A2_1 6.800 5.200 1.300 6.900 5.000 1.600	1200
* 2.001	Parcel A2_2 6.900 5.000 1.750 6.800 4.920 1.730	Hydro-Brake® 1200
* 1.002	TL_SW03 6.800 4.756 1.744 6.780 4.635 1.845	1200
* 3.000	Parcel B6_1 6.900 5.000 1.600 6.900 4.800 1.800	1200
* 3.001	Parcel B6_2 6.900 4.800 1.950 6.780 4.733 1.897	Hydro-Brake® 1200
* 1.003	TL_SW04 6.780 4.635 1.845 6.380 4.335 1.745	1200
* 1.004	TL_SW05 6.380 4.335 1.745 7.055 3.910 2.845	1200
* 4.000	Parcel B1&CH_1 7.220 4.200 2.720 7.220 4.135 2.785	1200
* 4.001	Parcel B1&CH 2 7.220 4.135 2.935 7.055 4.038 2.867	Hydro-Brake® 1200
* 1.005	Ex. SB10 7.055 3.910 2.845 6.900 3.770 2.830	1200
* 1.006	Ex. SB9 6.900 3.770 2.830 6.570 3.500 2.770	1200
* 5.000	Block B_1 6.380 4.500 1.580 6.380 3.905 2.175	1200
* 5.001	Block B_2 6.380 3.905 2.325 6.360 3.800 2.410	Hydro-Brake® 1200
* 5.002	Ex. SB17 6.360 3.650 2.410 6.570 3.500 2.770	1200
* 1.007	Ex. SB8 6.570 3.500 2.770 5.810 3.200 2.310	1350
* 6.000	BovisA_1 5.600 4.100 1.125 5.600 4.000 1.225	1200
* 6.001	BovisA_2 5.600 4.000 1.225 5.810 3.125 2.310	Hydro-Brake® 1200
* 1.008	Ex SB7 5.810 3.125 2.310 4.700 2.725 1.600	1350
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Lion House Oriental Road Woking GU22 8AR	Littlehampton Overall Surface Network West of Wetlands									
Date November 2017 File Test_Simulation_Tank ...	Designed by S Foley Checked by									
XP Solutions	Network 2013.1									
Existing Network Details for Storm										
	PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
	*	7.000	20.000	0.175	114.3	0.700	5.00	0.600	o	375
	*	7.001	13.401	0.425	31.5	0.000	5.00	0.600	o	375
	*	1.009	4.916	0.025	196.6	0.000	0.00	0.600	o	450
	*	8.000	43.097	0.210	205.2	0.114	2.00	0.600	o	300
	*	9.000	6.800	0.100	68.0	0.106	2.00	0.600	o	225
	*	10.000	6.800	0.100	68.0	0.146	2.00	0.600	o	225
	*	8.001	43.824	0.130	337.1	0.029	0.00	0.600	o	300
	*	1.010	34.073	0.155	219.8	0.000	0.00	0.600	o	450
	*	11.000	40.643	0.100	406.4	0.567	5.00	0.600	o	300
	*	11.001	9.903	0.130	76.2	0.000	2.00	0.600	o	150
	*	12.000	6.000	0.103	58.3	0.064	2.00	0.600	o	225
	*	1.011	28.223	0.180	156.8	0.042	0.00	0.600	o	450
	*	1.012	22.432	0.140	160.2	0.038	0.00	0.600	o	450
	*	13.000	63.816	0.260	245.4	0.275	2.00	0.600	o	300
	*	14.000	12.624	0.250	50.5	0.089	2.00	0.600	o	225
	*	15.000	7.200	0.250	28.8	0.102	2.00	0.600	o	225
	*	1.013	37.575	0.160	234.8	0.038	0.00	0.600	o	450
	PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
	*	7.000	BovisB_1	4.650	3.400	0.875	4.650	3.225	1.050	1200
	*	7.001	BovisB_2	4.650	3.225	1.050	4.700	2.800	1.525	Hydro-Brake® 1200
	*	1.009	Dummy Node	4.700	2.725	1.525	4.700	2.700	1.550	1200
	*	8.000	SW01	4.040	3.040	0.700	4.360	2.830	1.230	1200
	*	9.000	Plots 117-126	4.300	3.000	1.075	4.360	2.900	1.235	450
	*	10.000	Plots 101-116	4.300	3.000	1.075	4.360	2.900	1.235	450
	*	8.001	SW02	4.360	2.830	1.230	4.700	2.700	1.700	1200
	*	1.010	Ex SB6	4.700	2.625	1.625	4.600	2.470	1.680	1500
	*	11.000	Ret Block A	4.700	3.000	1.400	4.600	2.900	1.400	1200
	*	11.001	Ret Block A	4.600	2.900	1.550	4.600	2.770	1.680	Hydro-Brake® 1050
	*	12.000	Plots 95-100	4.600	3.000	1.375	4.600	2.897	1.478	450
	*	1.011	Outfall B-01	4.600	2.470	1.680	4.400	2.290	1.660	1500
	*	1.012	Outfall B-02	4.400	2.290	1.660	4.100	2.150	1.500	1500
	*	13.000	SW03	4.000	2.560	1.140	4.100	2.300	1.500	1200
	*	14.000	Plots 80-86	3.800	2.550	1.025	4.100	2.300	1.575	450
	*	15.000	Plots 87-94	3.800	2.550	1.025	4.100	2.300	1.575	450
	*	1.013	Outfall B-03	4.100	2.150	1.500	3.700	1.990	1.260	1500
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Lion House Oriental Road Woking GU22 8AR	Littlehampton Overall Surface Network West of Wetlands								
Date November 2017 File Test_Simulation_Tank ...	Designed by S Foley Checked by								
XP Solutions	Network 2013.1								
Existing Network Details for Storm									
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
16.000	8.659	0.221	39.2	0.147	2.00	0.600	o	225	
* 1.014	32.449	0.130	249.6	0.036	0.00	0.600	o	450	
* 17.000	54.502	0.220	247.7	0.186	2.00	0.600	o	300	
* 18.000	7.800	0.150	52.0	0.061	2.00	0.600	o	225	
* 19.000	9.600	0.150	64.0	0.071	2.00	0.600	o	225	
* 17.001	21.498	0.090	238.9	0.011	0.00	0.600	o	300	
20.000	6.005	0.785	7.6	0.080	5.00	0.600	o	225	
21.000	34.908	0.100	349.1	0.056	2.00	0.600	o	225	
* 22.000	39.317	0.280	140.4	0.567	5.00	0.600	o	450	
* 22.001	18.411	0.080	230.1	0.000	5.00	0.600	o	225	
21.001	34.883	0.215	162.2	0.045	0.00	0.600	o	225	
23.000	39.613	0.237	167.1	1.000	5.00	0.600	o	450	
23.001	28.513	0.193	147.7	0.000	5.00	0.600	o	225	
* 24.000	34.498	0.360	95.8	0.637	5.00	0.600	o	450	
24.001	5.111	0.070	73.0	0.000	5.00	0.600	o	225	
23.002	17.815	0.145	122.9	0.000	5.00	0.600	o	225	
21.002	26.317	0.125	210.5	0.045	0.00	0.600	o	225	
PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
16.000	C2 Resiblock A	3.700	2.275	1.200	3.700	2.054	1.421		450
* 1.014	Outfall B-04	3.700	1.990	1.260	3.710	1.860	1.400		1500
* 17.000	SW04	4.280	2.320	1.660	3.700	2.100	1.300		1200
* 18.000	Plots 60-73	3.700	2.600	0.875	3.700	2.450	1.025		450
* 19.000	Plots 74-78	3.700	2.600	0.875	3.700	2.450	1.025		450
* 17.001	SW05	3.700	2.100	1.300	3.710	2.010	1.400		1200
20.000	Plots 39-46	4.710	3.090	1.395	4.300	2.305	1.770		1200
21.000	SW-LYM 01	5.040	3.740	1.075	5.500	3.640	1.635		1200
* 22.000	Non resi	5.200	4.000	0.750	5.200	3.720	1.030		1200
* 22.001	Non resi	5.200	3.720	1.255	5.500	3.640	1.635	Hydro-Brake®	1200
21.001	SW-LYM 02	5.500	3.640	1.635	6.300	3.425	2.650		1200
23.000	Parcel A1	7.000	4.000	2.550	6.000	3.763	1.787		1200
23.001	As-built SA8	6.000	3.763	2.012	5.920	3.570	2.125	Hydro-Brake®	1200
* 24.000	Non Resi	6.000	4.000	1.550	6.000	3.640	1.910		1200
24.001	SW Stub 02	6.000	3.640	2.135	5.920	3.570	2.125	Hydro-Brake®	1200
23.002	SW-LYM 03/1	5.920	3.570	2.125	6.300	3.425	2.650		1200
21.002	SW-LYM 03	6.300	3.350	2.725	6.640	3.225	3.190		1200
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Lion House Oriental Road Woking GU22 8AR			Littlehampton Overall Surface Network West of Wetlands							
Date November 2017			Designed by S Foley							
File Test_Simulation_Tank ...			Checked by							
XP Solutions			Network 2013.1							
Existing Network Details for Storm										
	PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
	21.003	44.406	0.160	277.5	0.033	0.00	0.600	o	300	
	25.000	29.221	0.200	146.1	0.057	2.00	0.600	o	225	
	25.001	31.560	0.530	59.5	0.102	0.00	0.600	o	225	
	26.000	68.720	1.800	38.2	0.108	2.00	0.600	o	225	
	26.001	70.010	3.200	21.9	0.108	0.00	0.600	o	225	
	26.002	69.982	1.580	44.3	0.108	0.00	0.600	o	225	
	26.003	26.844	1.000	26.8	0.023	0.00	0.600	o	300	
	21.004	44.309	0.230	192.6	0.038	0.00	0.600	o	375	
	21.005	31.743	0.160	198.4	0.231	0.00	0.600	o	450	
	* 27.000	23.499	0.540	43.5	0.000	5.00	0.600	o	225	
	21.006	54.130	0.280	193.3	0.040	0.00	0.600	o	450	
	21.007	53.998	0.270	200.0	0.040	0.00	0.600	o	450	
	28.000	24.684	0.120	205.7	0.221	5.00	0.600	o	225	
	28.001	35.227	0.180	195.7	0.043	5.00	0.600	o	225	
	21.008	19.302	0.170	113.5	0.043	0.00	0.600	o	450	
	21.009	42.970	0.140	306.9	0.000	0.00	0.600	o	525	
	29.000	7.262	0.100	72.6	0.343	5.00	0.600	o	450	
	* 29.001	27.748	1.690	16.4	0.000	5.00	0.600	o	150	
	* 30.000	20.005	0.100	200.1	0.630	5.00	0.600	o	450	
	30.001	30.526	0.200	152.6	0.000	0.00	0.600	o	225	
	31.000	30.576	1.150	26.6	0.096	5.00	0.600	o	225	
	PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
	21.003	SW-LYM 04	6.640	3.225	3.115	6.640	3.065	3.275		1200
	25.000	SW-LYM 07	5.370	3.870	1.275	6.140	3.670	2.245		1200
	25.001	SW-LYM 08	6.140	3.670	2.245	6.640	3.140	3.275		1200
	26.000	PBA 01	13.700	12.200	1.275	11.900	10.400	1.275		1200
	26.001	PBA 02	11.900	10.400	1.275	8.700	7.200	1.275		1200
	26.002	PBA 03	8.700	7.200	1.275	7.200	5.620	1.355		1200
	26.003	SW-LYM 05	7.200	5.540	1.360	6.640	4.540	1.800		1200
	21.004	SW-LYM 10	6.640	2.990	3.275	5.900	2.760	2.765		1500
	21.005	SW-LYM11	5.900	2.680	2.770	6.380	2.520	3.410		1350
	* 27.000	ExSB17_Dum Node	6.360	3.700	2.435	6.380	3.160	2.995		1200
	21.006	SW-LYM 12	6.380	2.520	3.410	6.260	2.240	3.570		1350
	21.007	SW-LYM 13	6.260	2.240	3.570	5.100	1.970	2.680		1350
	28.000	C2 Resiblock B	4.300	2.500	1.575	4.680	2.380	2.075		1200
	28.001	SW-LYM 14/1	4.680	2.380	2.075	5.100	2.200	2.675		1200
	21.008	SW-LYM 14	5.100	1.970	2.680	5.000	1.800	2.750		1350
	21.009	SW-LYM 15	5.000	1.800	2.675	5.000	1.660	2.815		1800
	29.000	Car Park	5.000	3.500	1.050	5.000	3.400	1.150		1200
	* 29.001	Car Park	5.000	3.400	1.450	5.000	1.710	3.140	Hydro-Brake®	1200
	* 30.000	Non Resi	5.300	2.700	2.150	5.300	2.600	2.250		1200
	30.001	SW Stub	5.300	2.600	2.475	5.000	2.400	2.375	Hydro-Brake®	1200
	31.000	SW06	5.100	3.550	1.325	5.000	2.400	2.375		1200
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Lion House Oriental Road Woking GU22 8AR			Littlehampton Overall Surface Network West of Wetlands							
Date November 2017			Designed by S Foley							
File Test_Simulation_Tank ...			Checked by							
XP Solutions			Network 2013.1							
Existing Network Details for Storm										
	PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
	32.000	22.482	0.200	112.4	0.250	5.00	0.600	o	450	
	32.001	5.638	0.100	56.4	0.000	5.00	0.600	o	225	
	30.002	45.139	0.300	150.5	0.084	0.00	0.600	o	225	
	* 33.000	21.924	0.110	199.3	0.071	5.00	0.600	o	225	
	* 33.001	23.225	0.160	145.2	0.071	5.00	0.600	o	225	
	33.002	42.860	0.290	147.8	0.071	5.00	0.600	o	225	
	* 33.003	16.004	0.130	123.1	0.071	5.00	0.600	o	300	
	* 30.003	7.752	0.300	25.8	0.068	0.00	0.600	o	300	
	30.004	49.146	0.140	351.0	0.000	0.00	0.600	o	450	
	21.010	7.734	0.030	257.8	0.000	0.00	0.600	o	900	
	20.001	49.171	0.135	364.2	0.064	0.00	0.600	o	900	
	34.000	5.695	0.100	57.0	0.080	5.00	0.600	o	225	
	20.002	34.760	0.085	408.9	0.020	0.00	0.600	o	900	
	* 1.015	51.616	0.130	397.0	0.064	0.00	0.600	o	900	
	35.000	34.385	0.230	149.5	0.055	5.00	0.600	o	225	
	35.001	26.630	0.180	147.9	0.055	0.00	0.600	o	225	
	36.000	30.249	0.200	151.2	0.094	2.00	0.600	o	225	
	* 1.016	21.220	0.200	106.1	0.030	0.00	0.600	o	525	
	PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
	32.000	Non Resi	5.100	2.700	1.950	5.100	2.500	2.150		1200
	32.001	SW Stub 07	5.100	2.500	2.375	5.000	2.400	2.375	Hydro-Brake®	1200
	30.002	SW07	5.000	2.400	2.375	4.640	2.100	2.315		1200
	* 33.000	SW10	4.320	2.790	1.305	4.020	2.680	1.115		1200
	* 33.001	SW11	4.020	2.680	1.115	4.020	2.520	1.275		1200
	33.002	SW12	4.020	2.520	1.275	4.600	2.230	2.145		1200
	* 33.003	SW13	4.600	2.230	2.070	4.640	2.100	2.240		1200
	* 30.003	SW14	4.640	2.100	2.240	5.000	1.800	2.900		1200
	30.004	SW15	5.000	1.800	2.750	5.000	1.660	2.890		1200
	21.010	SW16	5.000	1.660	2.440	4.300	1.630	1.770		1800
	20.001	SW17	4.300	1.630	1.770	3.900	1.495	1.505		1800
	34.000	Plots 47-55	4.100	2.600	1.275	3.900	2.500	1.175		1200
	20.002	SW18	3.900	1.495	1.505	3.710	1.410	1.400		1800
	* 1.015	Outfall B-05	3.710	1.410	1.400	3.660	1.280	1.480		1800
	35.000	SW19	4.170	2.370	1.575	3.900	2.140	1.535		1200
	35.001	SW20	3.900	2.140	1.535	3.660	1.960	1.475		1200
	36.000	SW21	3.700	2.160	1.315	3.660	1.960	1.475		1200
	* 1.016	Outfall B-06	3.660	1.200	1.935	1.750	1.000	0.225	Hydro-Brake®	1800
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Lion House	Littlehampton								
Oriental Road	Overall Surface Network								
Woking GU22 8AR	West of Wetlands								
Date November 2017	Designed by S Foley								
File Test_Simulation_Tank ...	Checked by								
XP Solutions	Network 2013.1								
Online Controls for Storm									
Hydro-Brake® Manhole: Parcel A2_2, DS/PN: 2.001, Volume (m³): 3.0									
Design Head (m) 1.200 Hydro-Brake® Type Md4 Invert Level (m) 5.000									
Design Flow (l/s) 5.0 Diameter (mm) 76									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	0.800	4.0	2.000	6.4	4.000	9.0	7.000	11.9
0.200	3.0	1.000	4.5	2.200	6.7	4.500	9.5	7.500	12.3
0.300	2.6	1.200	4.9	2.400	7.0	5.000	10.1	8.000	12.7
0.400	2.9	1.400	5.3	2.600	7.3	5.500	10.6	8.500	13.1
0.500	3.2	1.600	5.7	3.000	7.8	6.000	11.0	9.000	13.5
0.600	3.5	1.800	6.0	3.500	8.4	6.500	11.5	9.500	13.9
Hydro-Brake® Manhole: Parcel B6_2, DS/PN: 3.001, Volume (m³): 3.7									
Design Head (m) 0.800 Hydro-Brake® Type Md4 Invert Level (m) 4.800									
Design Flow (l/s) 5.0 Diameter (mm) 84									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	0.800	4.9	2.000	7.8	4.000	11.0	7.000	14.5
0.200	4.0	1.000	5.5	2.200	8.2	4.500	11.7	7.500	15.1
0.300	3.4	1.200	6.0	2.400	8.5	5.000	12.3	8.000	15.6
0.400	3.5	1.400	6.5	2.600	8.9	5.500	12.9	8.500	16.0
0.500	3.9	1.600	7.0	3.000	9.5	6.000	13.5	9.000	16.5
0.600	4.3	1.800	7.4	3.500	10.3	6.500	14.0	9.500	16.9
Hydro-Brake® Manhole: Parcel B1&CH 2, DS/PN: 4.001, Volume (m³): 4.8									
Design Head (m) 1.000 Hydro-Brake® Type Md4 Invert Level (m) 4.135									
Design Flow (l/s) 10.0 Diameter (mm) 113									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.800	8.9	2.000	14.1	4.000	19.9	7.000	26.3
0.200	8.2	1.000	10.0	2.200	14.8	4.500	21.1	7.500	27.3
0.300	8.0	1.200	10.9	2.400	15.4	5.000	22.2	8.000	28.1
0.400	7.1	1.400	11.8	2.600	16.0	5.500	23.3	8.500	29.0
0.500	7.2	1.600	12.6	3.000	17.2	6.000	24.4	9.000	29.9
0.600	7.8	1.800	13.3	3.500	18.6	6.500	25.4	9.500	30.7
Hydro-Brake® Manhole: Block B_2, DS/PN: 5.001, Volume (m³): 4.1									
Design Head (m) 1.000 Hydro-Brake® Type Md4 Invert Level (m) 3.905									
Design Flow (l/s) 5.0 Diameter (mm) 80									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	0.800	4.5	2.000	7.1	4.000	10.0	7.000	13.2
0.200	3.5	1.000	5.0	2.200	7.4	4.500	10.6	7.500	13.7
0.300	3.0	1.200	5.5	2.400	7.7	5.000	11.2	8.000	14.1
0.400	3.2	1.400	5.9	2.600	8.0	5.500	11.7	8.500	14.5
0.500	3.5	1.600	6.3	3.000	8.6	6.000	12.2	9.000	15.0
0.600	3.9	1.800	6.7	3.500	9.3	6.500	12.7	9.500	15.4
Hydro-Brake® Manhole: BovisA_2, DS/PN: 6.001, Volume (m³): 3.9									
Design Head (m) 1.200 Hydro-Brake® Type Md5 SW Only Invert Level (m) 4.000									
Design Flow (l/s) 60.0 Diameter (mm) 293									
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XP Solutions		Network 2013.1							
<u>Hydro-Brake® Manhole: BovisA_2, DS/PN: 6.001, Volume (m³): 3.9</u>									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.6	0.800	57.7	2.000	73.3	4.000	103.3	7.000	136.7
0.200	27.7	1.000	57.8	2.200	76.7	4.500	109.6	7.500	141.5
0.300	43.3	1.200	59.7	2.400	80.1	5.000	115.5	8.000	146.1
0.400	52.6	1.400	62.7	2.600	83.3	5.500	121.2	8.500	150.6
0.500	56.9	1.600	66.1	3.000	89.5	6.000	126.6	9.000	155.0
0.600	58.3	1.800	69.7	3.500	96.7	6.500	131.7	9.500	159.3
<u>Hydro-Brake® Manhole: BovisB_2, DS/PN: 7.001, Volume (m³): 3.7</u>									
Design Head (m)		1.200	Hydro-Brake® Type		Md5 SW Only	Invert Level (m)		3.225	
Design Flow (l/s)		60.0	Diameter (mm)		293				
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.6	0.800	57.7	2.000	73.3	4.000	103.3	7.000	136.7
0.200	27.7	1.000	57.8	2.200	76.7	4.500	109.6	7.500	141.5
0.300	43.3	1.200	59.7	2.400	80.1	5.000	115.5	8.000	146.1
0.400	52.6	1.400	62.7	2.600	83.3	5.500	121.2	8.500	150.6
0.500	56.9	1.600	66.1	3.000	89.5	6.000	126.6	9.000	155.0
0.600	58.3	1.800	69.7	3.500	96.7	6.500	131.7	9.500	159.3
<u>Hydro-Brake® Manhole: Ret Block A, DS/PN: 11.001, Volume (m³): 4.3</u>									
Design Head (m)		1.000	Hydro-Brake® Type		Md4	Invert Level (m)		2.900	
Design Flow (l/s)		5.0	Diameter (mm)		80				
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	0.800	4.5	2.000	7.1	4.000	10.0	7.000	13.2
0.200	3.5	1.000	5.0	2.200	7.4	4.500	10.6	7.500	13.7
0.300	3.0	1.200	5.5	2.400	7.7	5.000	11.2	8.000	14.1
0.400	3.2	1.400	5.9	2.600	8.0	5.500	11.7	8.500	14.5
0.500	3.5	1.600	6.3	3.000	8.6	6.000	12.2	9.000	15.0
0.600	3.9	1.800	6.7	3.500	9.3	6.500	12.7	9.500	15.4
<u>Hydro-Brake® Manhole: Non resi, DS/PN: 22.001, Volume (m³): 7.7</u>									
Design Head (m)		1.000	Hydro-Brake® Type		Md4	Invert Level (m)		3.720	
Design Flow (l/s)		5.0	Diameter (mm)		80				
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	0.800	4.5	2.000	7.1	4.000	10.0	7.000	13.2
0.200	3.5	1.000	5.0	2.200	7.4	4.500	10.6	7.500	13.7
0.300	3.0	1.200	5.5	2.400	7.7	5.000	11.2	8.000	14.1
0.400	3.2	1.400	5.9	2.600	8.0	5.500	11.7	8.500	14.5
0.500	3.5	1.600	6.3	3.000	8.6	6.000	12.2	9.000	15.0
0.600	3.9	1.800	6.7	3.500	9.3	6.500	12.7	9.500	15.4
<u>Hydro-Brake® Manhole: As-built SA8, DS/PN: 23.001, Volume (m³): 8.6</u>									
Design Head (m)		2.000	Hydro-Brake® Type		Md4	Invert Level (m)		3.763	
Design Flow (l/s)		34.5	Diameter (mm)		176				
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.2	0.800	22.1	2.000	34.1	4.000	48.3	7.000	63.9
0.200	15.1	1.000	24.2	2.200	35.8	4.500	51.2	7.500	66.1
0.300	24.2	1.200	26.5	2.400	37.4	5.000	54.0	8.000	68.3
0.400	25.7	1.400	28.6	2.600	38.9	5.500	56.6	8.500	70.4
0.500	23.3	1.600	30.5	3.000	41.8	6.000	59.1	9.000	72.4
0.600	21.6	1.800	32.4	3.500	45.2	6.500	61.5	9.500	74.4
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<u>Hydro-Brake® Manhole: SW Stub 02, DS/PN: 24.001, Volume (m³): 8.0</u> Design Head (m) 1.000 Hydro-Brake® Type Md4 Invert Level (m) 3.640 Design Flow (l/s) 5.0 Diameter (mm) 80 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>2.4</td><td>0.800</td><td>4.5</td><td>2.000</td><td>7.1</td><td>4.000</td><td>10.0</td><td>7.000</td><td>13.2</td></tr><tr><td>0.200</td><td>3.5</td><td>1.000</td><td>5.0</td><td>2.200</td><td>7.4</td><td>4.500</td><td>10.6</td><td>7.500</td><td>13.7</td></tr><tr><td>0.300</td><td>3.0</td><td>1.200</td><td>5.5</td><td>2.400</td><td>7.7</td><td>5.000</td><td>11.2</td><td>8.000</td><td>14.1</td></tr><tr><td>0.400</td><td>3.2</td><td>1.400</td><td>5.9</td><td>2.600</td><td>8.0</td><td>5.500</td><td>11.7</td><td>8.500</td><td>14.5</td></tr><tr><td>0.500</td><td>3.5</td><td>1.600</td><td>6.3</td><td>3.000</td><td>8.6</td><td>6.000</td><td>12.2</td><td>9.000</td><td>15.0</td></tr><tr><td>0.600</td><td>3.9</td><td>1.800</td><td>6.7</td><td>3.500</td><td>9.3</td><td>6.500</td><td>12.7</td><td>9.500</td><td>15.4</td></tr></table> <u>Hydro-Brake® Manhole: Car Park, DS/PN: 29.001, Volume (m³): 2.8</u> Design Head (m) 1.500 Hydro-Brake® Type Md4 Invert Level (m) 3.400 Design Flow (l/s) 5.0 Diameter (mm) 72 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>2.1</td><td>0.800</td><td>3.6</td><td>2.000</td><td>5.7</td><td>4.000</td><td>8.1</td><td>7.000</td><td>10.7</td></tr><tr><td>0.200</td><td>2.5</td><td>1.000</td><td>4.0</td><td>2.200</td><td>6.0</td><td>4.500</td><td>8.6</td><td>7.500</td><td>11.1</td></tr><tr><td>0.300</td><td>2.3</td><td>1.200</td><td>4.4</td><td>2.400</td><td>6.3</td><td>5.000</td><td>9.0</td><td>8.000</td><td>11.4</td></tr><tr><td>0.400</td><td>2.6</td><td>1.400</td><td>4.8</td><td>2.600</td><td>6.5</td><td>5.500</td><td>9.5</td><td>8.500</td><td>11.8</td></tr><tr><td>0.500</td><td>2.9</td><td>1.600</td><td>5.1</td><td>3.000</td><td>7.0</td><td>6.000</td><td>9.9</td><td>9.000</td><td>12.1</td></tr><tr><td>0.600</td><td>3.1</td><td>1.800</td><td>5.4</td><td>3.500</td><td>7.6</td><td>6.500</td><td>10.3</td><td>9.500</td><td>12.5</td></tr></table> <u>Hydro-Brake® Manhole: SW Stub, DS/PN: 30.001, Volume (m³): 6.0</u> Design Head (m) 1.000 Hydro-Brake® Type Md4 Invert Level (m) 2.600 Design Flow (l/s) 5.0 Diameter (mm) 80 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>2.4</td><td>0.800</td><td>4.5</td><td>2.000</td><td>7.1</td><td>4.000</td><td>10.0</td><td>7.000</td><td>13.2</td></tr><tr><td>0.200</td><td>3.5</td><td>1.000</td><td>5.0</td><td>2.200</td><td>7.4</td><td>4.500</td><td>10.6</td><td>7.500</td><td>13.7</td></tr><tr><td>0.300</td><td>3.0</td><td>1.200</td><td>5.5</td><td>2.400</td><td>7.7</td><td>5.000</td><td>11.2</td><td>8.000</td><td>14.1</td></tr><tr><td>0.400</td><td>3.2</td><td>1.400</td><td>5.9</td><td>2.600</td><td>8.0</td><td>5.500</td><td>11.7</td><td>8.500</td><td>14.5</td></tr><tr><td>0.500</td><td>3.5</td><td>1.600</td><td>6.3</td><td>3.000</td><td>8.6</td><td>6.000</td><td>12.2</td><td>9.000</td><td>15.0</td></tr><tr><td>0.600</td><td>3.9</td><td>1.800</td><td>6.7</td><td>3.500</td><td>9.3</td><td>6.500</td><td>12.7</td><td>9.500</td><td>15.4</td></tr></table> <u>Hydro-Brake® Manhole: SW Stub 07, DS/PN: 32.001, Volume (m³): 6.3</u> Design Head (m) 1.000 Hydro-Brake® Type Md4 Invert Level (m) 2.500 Design Flow (l/s) 5.0 Diameter (mm) 80 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>2.4</td><td>0.800</td><td>4.5</td><td>2.000</td><td>7.1</td><td>4.000</td><td>10.0</td><td>7.000</td><td>13.2</td></tr><tr><td>0.200</td><td>3.5</td><td>1.000</td><td>5.0</td><td>2.200</td><td>7.4</td><td>4.500</td><td>10.6</td><td>7.500</td><td>13.7</td></tr><tr><td>0.300</td><td>3.0</td><td>1.200</td><td>5.5</td><td>2.400</td><td>7.7</td><td>5.000</td><td>11.2</td><td>8.000</td><td>14.1</td></tr><tr><td>0.400</td><td>3.2</td><td>1.400</td><td>5.9</td><td>2.600</td><td>8.0</td><td>5.500</td><td>11.7</td><td>8.500</td><td>14.5</td></tr><tr><td>0.500</td><td>3.5</td><td>1.600</td><td>6.3</td><td>3.000</td><td>8.6</td><td>6.000</td><td>12.2</td><td>9.000</td><td>15.0</td></tr><tr><td>0.600</td><td>3.9</td><td>1.800</td><td>6.7</td><td>3.500</td><td>9.3</td><td>6.500</td><td>12.7</td><td>9.500</td><td>15.4</td></tr></table> <u>Hydro-Brake® Manhole: Outfall B-06, DS/PN: 1.016, Volume (m³): 40.1</u> Design Head (m) 2.500 Hydro-Brake® Type Md10 Invert Level (m) 1.200 Design Flow (l/s) 286.0 Diameter (mm) 360 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>13.1</td><td>0.500</td><td>101.5</td><td>1.200</td><td>198.1</td><td>2.000</td><td>255.7</td><td>3.000</td><td>313.1</td></tr><tr><td>0.200</td><td>33.1</td><td>0.600</td><td>122.7</td><td>1.400</td><td>213.9</td><td>2.200</td><td>268.2</td><td>3.500</td><td>338.2</td></tr><tr><td>0.300</td><td>55.6</td><td>0.800</td><td>158.1</td><td>1.600</td><td>228.7</td><td>2.400</td><td>280.1</td><td>4.000</td><td>361.6</td></tr><tr><td>0.400</td><td>78.8</td><td>1.000</td><td>180.8</td><td>1.800</td><td>242.6</td><td>2.600</td><td>291.5</td><td>4.500</td><td>383.5</td></tr></table>						Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	2.4	0.800	4.5	2.000	7.1	4.000	10.0	7.000	13.2	0.200	3.5	1.000	5.0	2.200	7.4	4.500	10.6	7.500	13.7	0.300	3.0	1.200	5.5	2.400	7.7	5.000	11.2	8.000	14.1	0.400	3.2	1.400	5.9	2.600	8.0	5.500	11.7	8.500	14.5	0.500	3.5	1.600	6.3	3.000	8.6	6.000	12.2	9.000	15.0	0.600	3.9	1.800	6.7	3.500	9.3	6.500	12.7	9.500	15.4	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	2.1	0.800	3.6	2.000	5.7	4.000	8.1	7.000	10.7	0.200	2.5	1.000	4.0	2.200	6.0	4.500	8.6	7.500	11.1	0.300	2.3	1.200	4.4	2.400	6.3	5.000	9.0	8.000	11.4	0.400	2.6	1.400	4.8	2.600	6.5	5.500	9.5	8.500	11.8	0.500	2.9	1.600	5.1	3.000	7.0	6.000	9.9	9.000	12.1	0.600	3.1	1.800	5.4	3.500	7.6	6.500	10.3	9.500	12.5	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	2.4	0.800	4.5	2.000	7.1	4.000	10.0	7.000	13.2	0.200	3.5	1.000	5.0	2.200	7.4	4.500	10.6	7.500	13.7	0.300	3.0	1.200	5.5	2.400	7.7	5.000	11.2	8.000	14.1	0.400	3.2	1.400	5.9	2.600	8.0	5.500	11.7	8.500	14.5	0.500	3.5	1.600	6.3	3.000	8.6	6.000	12.2	9.000	15.0	0.600	3.9	1.800	6.7	3.500	9.3	6.500	12.7	9.500	15.4	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	2.4	0.800	4.5	2.000	7.1	4.000	10.0	7.000	13.2	0.200	3.5	1.000	5.0	2.200	7.4	4.500	10.6	7.500	13.7	0.300	3.0	1.200	5.5	2.400	7.7	5.000	11.2	8.000	14.1	0.400	3.2	1.400	5.9	2.600	8.0	5.500	11.7	8.500	14.5	0.500	3.5	1.600	6.3	3.000	8.6	6.000	12.2	9.000	15.0	0.600	3.9	1.800	6.7	3.500	9.3	6.500	12.7	9.500	15.4	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	13.1	0.500	101.5	1.200	198.1	2.000	255.7	3.000	313.1	0.200	33.1	0.600	122.7	1.400	213.9	2.200	268.2	3.500	338.2	0.300	55.6	0.800	158.1	1.600	228.7	2.400	280.1	4.000	361.6	0.400	78.8	1.000	180.8	1.800	242.6	2.600	291.5	4.500	383.5
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																																																																																																																																																																																																																																																																						
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Lion House	Littlehampton								
Oriental Road	Overall Surface Network								
Woking GU22 8AR	West of Wetlands								
Date November 2017	Designed by S Foley								
File Test_Simulation_Tank ...	Checked by								
XP Solutions	Network 2013.1								
<u>Hydro-Brake® Manhole: Outfall B-06, DS/PN: 1.016, Volume (m³): 40.1</u>									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
5.000	404.3	6.000	442.9	7.000	478.3	8.000	511.4	9.000	542.4
5.500	424.0	6.500	460.9	7.500	495.1	8.500	527.1	9.500	557.3

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Lion House Oriental Road Woking GU22 8AR		Littlehampton Overall Surface Network West of Wetlands						
Date November 2017		Designed by S Foley						
File Test_Simulation_Tank ...		Checked by						
XP Solutions		Network 2013.1						
Storage Structures for Storm								
Cellular Storage Manhole: Parcel A2_1, DS/PN: 2.000								
Invert Level (m)5.200Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000								
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	350.0	350.0	1.000	350.0	440.0	1.100	0.0	440.0
Cellular Storage Manhole: Parcel B6_1, DS/PN: 3.000								
Invert Level (m)5.000Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000								
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	80.0	1.000	80.0	128.0	1.100	0.0	128.0
Cellular Storage Manhole: Parcel B1&CH_1, DS/PN: 4.000								
Invert Level (m)4.200Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000								
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	300.0	300.0	1.000	300.0	380.0	1.100	0.0	380.0
Cellular Storage Manhole: Block B_1, DS/PN: 5.000								
Invert Level (m)4.500Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000								
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	270.0	270.0	1.000	270.0	344.0	1.100	0.0	344.0
Cellular Storage Manhole: BovisA_1, DS/PN: 6.000								
Invert Level (m)4.100Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000								
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	225.0	225.0	1.200	225.0	297.0	1.300	0.0	297.0
Cellular Storage Manhole: BovisB_1, DS/PN: 7.000								
Invert Level (m)3.400Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000								
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	225.0	225.0	1.200	225.0	297.0	1.300	0.0	297.0
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Lion House Oriental Road Woking GU22 8AR	Littlehampton Overall Surface Network West of Wetlands																																																																																											
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File Test_Simulation_Tank ...	Checked by																																																																																											
XP Solutions	Network 2013.1																																																																																											
<u>Cellular Storage Manhole: Ret Block A, DS/PN: 11.000</u> Invert Level (m) 3.000 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>450.0</td><td>450.0</td><td>1.000</td><td>450.0</td><td>560.0</td><td>1.100</td><td>0.0</td><td>560.0</td></tr></table> <u>Cellular Storage Manhole: Non resi, DS/PN: 22.000</u> Invert Level (m) 4.000 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>360.0</td><td>360.0</td><td>1.000</td><td>360.0</td><td>452.0</td><td>1.100</td><td>0.0</td><td>452.0</td></tr></table> <u>Cellular Storage Manhole: Parcel A1, DS/PN: 23.000</u> Invert Level (m) 4.000 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>500.0</td><td>500.0</td><td>1.000</td><td>500.0</td><td>590.0</td><td>1.100</td><td>0.0</td><td>590.0</td></tr></table> <u>Cellular Storage Manhole: Non Resi, DS/PN: 24.000</u> Invert Level (m) 4.000 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>400.0</td><td>400.0</td><td>1.000</td><td>400.0</td><td>500.0</td><td>1.100</td><td>0.0</td><td>500.0</td></tr></table> <u>Porous Car Park Manhole: Car Park, DS/PN: 29.000</u> Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 50.0 Membrane Percolation (mm/hr) 1000 Length (m) 50.0 Max Percolation (l/s) 694.4 Slope (1:X) 0.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 4.500 Cap Volume Depth (m) 0.000 <u>Cellular Storage Manhole: Non Resi, DS/PN: 30.000</u> Invert Level (m) 2.700 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>400.0</td><td>400.0</td><td>1.000</td><td>400.0</td><td>500.0</td><td>1.100</td><td>0.0</td><td>500.0</td></tr></table> <u>Cellular Storage Manhole: Non Resi, DS/PN: 32.000</u> Invert Level (m) 2.700 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	450.0	450.0	1.000	450.0	560.0	1.100	0.0	560.0	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	360.0	360.0	1.000	360.0	452.0	1.100	0.0	452.0	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	500.0	500.0	1.000	500.0	590.0	1.100	0.0	590.0	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	400.0	400.0	1.000	400.0	500.0	1.100	0.0	500.0	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	400.0	400.0	1.000	400.0	500.0	1.100	0.0	500.0
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																				
0.000	450.0	450.0	1.000	450.0	560.0	1.100	0.0	560.0																																																																																				
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																				
0.000	360.0	360.0	1.000	360.0	452.0	1.100	0.0	452.0																																																																																				
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																				
0.000	500.0	500.0	1.000	500.0	590.0	1.100	0.0	590.0																																																																																				
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																				
0.000	400.0	400.0	1.000	400.0	500.0	1.100	0.0	500.0																																																																																				
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																				
0.000	400.0	400.0	1.000	400.0	500.0	1.100	0.0	500.0																																																																																				
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Mayer Brown Ltd			Page 13																																						
Lion House		Littlehampton																																							
Oriental Road		Overall Surface Network																																							
Woking GU22 8AR		West of Wetlands																																							
Date November 2017		Designed by S Foley																																							
File Test_Simulation_Tank ...		Checked by																																							
XP Solutions		Network 2013.1																																							
Cellular Storage Manhole: Non Resi, DS/PN: 32.000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>110.0</td><td>110.0</td><td>1.000</td><td>110.0</td><td>152.0</td><td>1.100</td><td>0.0</td><td>152.0</td></tr></table> Cellular Storage Manhole: SW16, DS/PN: 21.010 Invert Level (m) 1.710 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>900.0</td><td>900.0</td><td>1.500</td><td>900.0</td><td>1104.0</td><td>1.600</td><td>0.0</td><td>1104.0</td></tr></table>						Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	110.0	110.0	1.000	110.0	152.0	1.100	0.0	152.0	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	900.0	900.0	1.500	900.0	1104.0	1.600	0.0	1104.0
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																	
0.000	110.0	110.0	1.000	110.0	152.0	1.100	0.0	152.0																																	
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																	
0.000	900.0	900.0	1.500	900.0	1104.0	1.600	0.0	1104.0																																	
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APPENDIX G: Windes – 1 in 100year (+CC) Simulation Results

Mayer Brown Ltd		Page 1						
Lion House	Littlehampton							
Oriental Road	Overall Surface Network							
Woking GU22 8AR	West of Wetlands							
Date November 2017	Designed by S Foley							
File Test_Simulation_Tank ...	Checked by							
XP Solutions	Network 2013.1							
Summary of Critical Results by Maximum Level (Rank 1) for Storm								
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 Offline Controls	1					
Number of Online Controls	14	Number of Storage Structures	14					
		Number of Time/Area Diagrams	0					
		Number of Real Time Controls	0					
Synthetic Rainfall Details								
Rainfall Model	FEH	D3 (1km)	0.407					
Site Location	GB 502850 104400 TQ 02850 04400	E (1km)	0.314					
C (1km)	-0.027	F (1km)	2.329					
D1 (1km)	0.393	Cv (Summer)	0.750					
D2 (1km)	0.274	Cv (Winter)	0.840					
Margin for Flood Risk Warning (mm)			300.0					
Analysis Timestep	2.5	Second Increment (Extended)						
DTS Status			ON					
DVD Status			ON					
Inertia Status			ON					
Profile(s)			Winter					
Duration(s) (mins)	60, 120, 240, 360, 480, 960, 1440							
Return Period(s) (years)			100					
Climate Change (%)			30					
PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter			1
1.001	60 Winter	100	+30%	100/60 Winter				
2.000	480 Winter	100	+30%	100/60 Winter				
2.001	480 Winter	100	+30%	100/60 Winter				
1.002	60 Winter	100	+30%	100/60 Winter				
3.000	60 Winter	100	+30%	100/60 Winter				
3.001	60 Winter	100	+30%	100/60 Winter				
1.003	60 Winter	100	+30%	100/60 Winter				
1.004	60 Winter	100	+30%	100/60 Winter				
4.000	120 Winter	100	+30%	100/60 Winter				
4.001	60 Winter	100	+30%	100/60 Winter				
1.005	60 Winter	100	+30%	100/60 Winter				
1.006	60 Winter	100	+30%	100/60 Winter				
5.000	360 Winter	100	+30%	100/60 Winter				
5.001	360 Winter	100	+30%	100/60 Winter				
5.002	60 Winter	100	+30%	100/60 Winter		100/60 Winter	6	
1.007	60 Winter	100	+30%	100/60 Winter				
6.000	60 Winter	100	+30%	100/60 Winter				
6.001	60 Winter	100	+30%	100/60 Winter	100/60 Winter			
1.008	60 Winter	100	+30%	100/60 Winter				
7.000	60 Winter	100	+30%	100/60 Winter				
7.001	60 Winter	100	+30%	100/60 Winter				
1.009	60 Winter	100	+30%	100/60 Winter				
8.000	240 Winter	100	+30%	100/60 Winter	100/60 Winter			5
9.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter			1
10.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter			2
3.001	60 Winter	100	+30%	100/60 Winter				
1.010	60 Winter	100	+30%	100/60 Winter				
11.000	480 Winter	100	+30%	100/60 Winter				
11.001	480 Winter	100	+30%	100/60 Winter				
12.000	60 Winter	100	+30%	100/60 Winter				
1.011	60 Winter	100	+30%	100/60 Winter				
1.012	60 Winter	100	+30%	100/60 Winter				
13.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter			1
14.000	240 Winter	100	+30%	100/60 Winter	100/60 Winter			4
15.000	240 Winter	100	+30%	100/60 Winter	100/60 Winter			4
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Mayer Brown Ltd				Page 2					
Lion House		Littlehampton							
Oriental Road		Overall Surface Network							
Woking GU22 8AR		West of Wetlands							
Date November 2017		Designed by S Foley							
File Test_Simulation_Tank ...		Checked by							
XP Solutions		Network 2013.1							
Summary of Critical Results by Maximum Level (Rank 1) for Storm									
PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.	
1.0013	60 Winter	100	+30%	100/60 Winter					
16.000	240 Winter	100	+30%	100/60 Winter	100/60 Winter				4
1.014	240 Winter	100	+30%	100/60 Winter	100/60 Winter				4
17.000	120 Winter	100	+30%	100/60 Winter					
18.000	240 Winter	100	+30%	100/60 Winter	100/120 Winter				3
19.000	240 Winter	100	+30%	100/60 Winter	100/60 Winter				3
17.001	240 Winter	100	+30%	100/60 Winter	100/120 Winter				3
20.000	240 Winter	100	+30%	100/60 Winter					
21.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter				1
22.000	480 Winter	100	+30%	100/60 Winter	100/480 Winter				1
22.001	480 Winter	100	+30%	100/60 Winter	100/60 Winter				5
21.001	60 Winter	100	+30%	100/60 Winter					
23.000	120 Winter	100	+30%	100/60 Winter					
23.001	60 Winter	100	+30%	100/60 Winter					
24.000	480 Winter	100	+30%	100/60 Winter	100/360 Winter				2
24.001	480 Winter	100	+30%	100/60 Winter	100/360 Winter				2
23.002	60 Winter	100	+30%	100/60 Winter					
21.002	60 Winter	100	+30%	100/60 Winter					
21.003	60 Winter	100	+30%	100/60 Winter					
25.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter				1
25.001	60 Winter	100	+30%	100/60 Winter					
26.000	60 Winter	100	+30%						
26.001	60 Winter	100	+30%						
26.002	60 Winter	100	+30%	100/60 Winter					
26.003	60 Winter	100	+30%						
21.004	60 Winter	100	+30%	100/60 Winter					
21.005	60 Winter	100	+30%	100/60 Winter					
27.000	60 Winter	100	+30%	100/60 Winter					
21.006	60 Winter	100	+30%	100/60 Winter					
21.007	480 Winter	100	+30%	100/60 Winter					
28.000	60 Winter	100	+30%	100/60 Winter	100/60 Winter				1
28.001	240 Winter	100	+30%	100/60 Winter					
21.008	480 Winter	100	+30%	100/60 Winter					
21.009	240 Winter	100	+30%	100/60 Winter					
29.000	360 Winter	100	+30%	100/60 Winter					
29.001	60 Winter	100	+30%	100/60 Winter					
30.000	480 Winter	100	+30%	100/60 Winter	100/360 Winter				2
30.001	480 Winter	100	+30%	100/60 Winter	100/360 Winter				2
31.000	240 Winter	100	+30%	100/120 Winter					
32.000	240 Winter	100	+30%	100/60 Winter	100/120 Winter				4
32.001	240 Winter	100	+30%	100/60 Winter	100/120 Winter				4
30.002	240 Winter	100	+30%	100/60 Winter					
33.000	240 Winter	100	+30%	100/60 Winter					
33.001	240 Winter	100	+30%	100/60 Winter					
33.002	240 Winter	100	+30%	100/60 Winter					
33.003	240 Winter	100	+30%	100/60 Winter					
30.003	240 Winter	100	+30%	100/60 Winter					
30.004	240 Winter	100	+30%	100/60 Winter					
21.010	240 Winter	100	+30%	100/60 Winter					
20.001	240 Winter	100	+30%	100/60 Winter					
34.000	240 Winter	100	+30%	100/60 Winter					
20.002	240 Winter	100	+30%	100/60 Winter					
1.015	240 Winter	100	+30%	100/60 Winter	100/60 Winter				
35.000	240 Winter	100	+30%	100/60 Winter					
35.001	240 Winter	100	+30%	100/60 Winter					
36.000	120 Winter	100	+30%	100/60 Winter	100/60 Winter				1
1.016	240 Winter	100	+30%	100/60 Winter	100/60 Winter				3

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Lion House Oriental Road Woking GU22 8AR			Littlehampton Overall Surface Network West of Wetlands					
Date November 2017			Designed by S Foley					
File Test_Simulation_Tank ...			Checked by					
XP Solutions			Network 2013.1					
Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.002	TL_SW03	6.382	1.326	0.000	0.62	0.0	40.9	SURCHARGED
3.000	Parcel B6_1	6.407	1.107	0.000	0.08	0.0	7.5	SURCHARGED
3.001	Parcel B6_2	6.400	1.450	0.000	0.54	0.0	6.9	SURCHARGED
1.003	TL_SW04	6.320	1.385	0.000	0.69	0.0	47.8	SURCHARGED
1.004	TL_SW05	6.225	1.533	0.000	1.04	0.0	74.5	FLOOD RISK
4.000	Parcel B1&CH_1	4.990	0.490	0.000	0.19	0.0	10.4	SURCHARGED
4.001	Parcel B1&CH 2	5.380	1.095	0.000	0.63	0.0	8.4	SURCHARGED
1.005	Ex. SB16	5.768	1.558	0.000	1.13	0.0	76.2	SURCHARGED
1.006	Ex. SB9	5.837	1.827	0.000	1.59	0.0	98.8	SURCHARGED
5.000	Block B_1	5.520	0.720	0.000	0.04	0.0	6.9	SURCHARGED
5.001	Block B_2	5.525	1.470	0.000	0.46	0.0	6.3	SURCHARGED
5.002	Ex. SB17	4.993	1.043	0.000	0.20	70.9	12.9	SURCHARGED
1.007	Ex. SB8	5.067	1.267	0.000	1.32	0.0	82.4	SURCHARGED
6.000	BovisA_1	5.118	0.643	0.000	0.50	0.0	58.7	SURCHARGED
6.001	BovisA_2	5.532	1.157	0.115	0.16	0.0	58.2	FLOOD
1.008	Ex SB7	4.607	1.107	0.000	0.94	0.0	127.9	SURCHARGED
7.000	BovisB_1	4.523	0.748	0.000	0.33	0.0	52.6	FLOOD RISK
7.001	BovisB_2	4.485	0.885	0.000	0.20	0.0	51.4	FLOOD RISK
1.009	Dummy Node	4.409	1.234	0.000	1.21	0.0	158.4	FLOOD RISK
8.000	SW01	4.150	0.810	109.692	0.75	0.0	53.8	FLOOD
9.000	Plots 117-126	4.300	1.075	0.377	0.81	0.0	36.0	FLOOD
10.000	Plots 101-116	4.301	1.076	1.669	1.08	0.0	48.3	FLOOD
8.001	SW02	4.318	1.168	0.000	1.27	0.0	71.6	FLOOD RISK
1.010	Ex SB6	4.371	1.296	0.000	0.96	0.0	181.7	SURCHARGED
11.000	Ret Block A	3.963	0.663	0.000	0.27	0.0	13.9	SURCHARGED
11.001	Ret Block A	4.224	1.174	0.000	0.28	0.0	5.1	SURCHARGED
12.000	Plots 95-100	4.298	1.073	0.000	0.50	0.0	22.5	SURCHARGED
1.011	Outfall B-01	4.204	1.284	0.000	0.87	0.0	192.3	SURCHARGED
1.012	Outfall B-02	4.049	1.309	0.000	0.98	0.0	205.2	SURCHARGED
13.000	SW03	4.807	1.147	6.346	1.06	0.0	71.6	FLOOD
14.000	Plots 80-86	3.831	1.056	31.368	0.49	0.0	30.7	FLOOD
15.000	Plots 87-94	3.835	1.060	35.087	0.46	0.0	32.7	FLOOD
1.013	Outfall B-03	3.915	1.315	0.000	1.32	0.0	333.5	FLOOD RISK
16.000	C2 Resiblock A	3.730	1.230	29.732	0.60	0.0	40.0	FLOOD
1.014	Outfall B-04	3.737	1.297	38.959	1.56	0.0	278.5	FLOOD
17.000	SW04	3.746	1.126	0.000	0.69	0.0	46.0	SURCHARGED
18.000	Plots 60-73	3.706	0.881	6.148	0.40	0.0	21.7	FLOOD
19.000	Plots 74-78	3.707	0.882	6.795	0.48	0.0	25.7	FLOOD
17.001	SW05	3.705	1.205	5.398	1.21	0.0	76.1	FLOOD
20.000	Plots 39-46	3.736	0.421	0.000	0.10	0.0	12.4	SURCHARGED
21.000	SW-LYM 01	5.047	1.032	7.064	1.50	0.0	54.5	FLOOD
22.000	Non resi	5.203	0.753	2.817	0.07	0.0	16.2	FLOOD
22.001	Non resi	5.200	1.255	0.158	0.18	0.0	5.6	FLOOD
21.001	SW-LYM 02	5.094	1.229	0.000	0.99	0.0	38.0	SURCHARGED
23.000	Parcel A1	4.969	0.519	0.000	0.15	0.0	34.1	SURCHARGED
23.001	As-built SA8	5.503	1.515	0.000	0.60	0.0	23.9	SURCHARGED
24.000	Non Resi	6.006	1.556	6.388	0.04	0.0	11.2	FLOOD
24.001	SW Stub 02	6.003	2.138	3.161	0.19	0.0	7.1	FLOOD
23.002	SW-LYM 03/1	5.010	1.215	0.000	0.64	0.0	27.0	SURCHARGED
21.002	SW-LYM 03	5.086	1.511	0.000	1.44	0.0	47.7	SURCHARGED
21.003	SW-LYM 04	5.103	1.578	0.000	0.82	0.0	50.8	SURCHARGED
25.000	SW-LYM 07	5.370	1.275	0.044	0.41	0.0	16.5	FLOOD
25.001	SW-LYM 08	5.336	1.441	0.000	0.68	0.0	42.9	SURCHARGED
26.000	PBA 01	12.304	-0.121	0.000	0.43	0.0	35.6	OK
26.001	PBA 02	10.533	-0.092	0.000	0.65	0.0	70.7	OK
26.002	PBA 03	8.577	1.153	0.000	1.33	0.0	93.2	FLOOD RISK
26.003	SW-LYM 05	5.699	-0.141	0.000	0.55	0.0	106.7	OK
21.004	SW-LYM 10	5.054	1.729	0.000	1.29	0.0	169.7	SURCHARGED
21.005	SW-LYM11	4.735	1.605	0.000	1.13	0.0	236.4	SURCHARGED
27.000	ExSB17_Dum Node	4.848	0.923	0.000	0.95	0.0	68.7	SURCHARGED
21.006	SW-LYM 12	4.521	1.551	0.000	1.42	0.0	300.9	SURCHARGED
21.007	SW-LYM 13	4.248	1.558	0.000	0.60	0.0	124.2	SURCHARGED
23.000	C2 Resiblock B	4.303	1.578	2.668	1.76	0.0	58.7	FLOOD
28.001	SW-LYM 14/1	4.057	1.452	0.000	0.84	0.0	29.3	SURCHARGED
21.008	SW-LYM 14	3.997	1.577	0.000	0.62	0.0	144.8	SURCHARGED
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Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
21.009	SW-LYM 15	3.846	1.521	0.000	0.90	0.0	217.2	SURCHARGED
29.000	Car Park	4.721	0.771	0.000	0.03	0.0	5.7	FLOOD RISK
29.001	Car Park	4.826	1.276	0.000	0.11	0.0	4.5	FLOOD RISK
30.000	Non Resi	5.309	2.159	8.628	0.05	0.0	9.5	FLOOD
30.001	SW Stub	5.306	2.481	5.785	0.20	0.0	7.7	FLOOD
31.000	SW06	3.964	0.189	0.000	0.12	0.0	11.6	SURCHARGED
32.000	Non Resi	5.104	1.954	3.878	0.03	0.0	7.5	FLOOD
32.001	SW Stub 07	5.101	2.376	1.358	0.15	0.0	6.6	FLOOD
30.002	SW07	3.947	1.322	0.000	0.64	0.0	25.8	SURCHARGED
33.000	SW10	4.028	1.013	0.000	0.23	0.0	7.7	FLOOD RISK
33.001	SW11	4.016	1.111	0.000	0.39	0.0	15.4	FLOOD RISK
33.002	SW12	3.992	1.247	0.000	0.56	0.0	22.7	FLOOD RISK
33.003	SW13	3.941	1.411	0.000	0.36	0.0	30.3	SURCHARGED
30.003	SW14	3.920	1.520	0.000	0.45	0.0	61.6	SURCHARGED
30.004	SW15	3.833	1.583	0.000	0.39	0.0	60.8	SURCHARGED
21.010	SW16	3.739	1.179	0.000	0.59	0.0	355.8	SURCHARGED
20.001	SW17	3.731	1.201	0.000	0.23	0.0	198.1	SURCHARGED
34.000	Plots 47-55	3.717	0.892	0.000	0.66	0.0	29.5	SURCHARGED
20.002	SW18	3.713	1.318	0.000	0.27	0.0	205.7	FLOOD RISK
1.015	Outfall B-05	3.696	1.386	0.000	0.37	0.0	304.1	FLOOD RISK
35.000	SW19	3.696	1.101	0.000	0.51	0.0	20.3	SURCHARGED
35.001	SW20	3.686	1.321	0.000	0.89	0.0	35.0	FLOOD RISK
35.000	SW21	3.700	1.318	0.000	1.23	0.0	48.5	FLOOD
1.016	Outfall B-06	3.670	1.945	9.606	0.83	0.0	284.1	FLOOD
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APPENDIX H: Windes – 1 in 30yr Simulation Results

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</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 Offline Controls		1			
Number of Online Controls		14	Number of Storage Structures		14			
Number of Time/Area Diagrams				0				
Number of Real Time Controls				0				
<u>Synthetic Rainfall Details</u>								
Rainfall Model		FEH		D3 (1km)	0.407			
Site Location		GB 502850 104400 TQ 02850 04400		E (1km)	0.314			
C (1km)		-0.027		F (1km)	2.329			
D1 (1km)		0.393		Cv (Summer)	0.750			
D2 (1km)		0.274		Cv (Winter)	0.840			
Margin for Flood Risk Warning (mm)				300.0				
Analysis Timestep		2.5 Second Increment (Extended)						
DTS Status				ON				
DVD Status				ON				
Inertia Status				ON				
Profile(s)				Winter				
Duration(s) (mins)		15, 30, 60, 120, 240, 360, 480, 960, 1440						
Return Period(s) (years)				30				
Climate Change (%)				0				
PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%					
1.001	15 Winter	30	0%	30/15 Winter				
2.000	480 Winter	30	0%	30/60 Winter				
2.001	480 Winter	30	0%	30/15 Winter				
1.002	15 Winter	30	0%	30/15 Winter				
3.000	120 Winter	30	0%	30/15 Winter				
3.001	120 Winter	30	0%	30/15 Winter				
1.003	15 Winter	30	0%	30/15 Winter				
1.004	15 Winter	30	0%	30/15 Winter				
4.000	120 Winter	30	0%	30/60 Winter				
4.001	120 Winter	30	0%	30/15 Winter				
1.005	15 Winter	30	0%	30/15 Winter				
1.006	15 Winter	30	0%	30/15 Winter				
5.000	240 Winter	30	0%	30/30 Winter				
5.001	240 Winter	30	0%	30/15 Winter				
5.002	15 Winter	30	0%	30/15 Winter		30/15 Winter	4	
1.007	15 Winter	30	0%	30/15 Winter				
6.000	30 Winter	30	0%	30/15 Winter				
6.001	30 Winter	30	0%	30/15 Winter				
1.008	30 Winter	30	0%	30/15 Winter				
7.000	30 Winter	30	0%	30/15 Winter				
7.001	30 Winter	30	0%	30/15 Winter				
1.009	30 Winter	30	0%	30/15 Winter				
8.000	15 Winter	30	0%	30/15 Winter				
9.000	15 Winter	30	0%	30/15 Winter				
10.000	15 Winter	30	0%	30/15 Winter				
8.001	15 Winter	30	0%	30/15 Winter				
1.010	30 Winter	30	0%	30/15 Winter				
11.000	480 Winter	30	0%	30/60 Winter				
11.001	480 Winter	30	0%	30/15 Winter				
12.000	30 Winter	30	0%	30/15 Winter				
1.011	30 Winter	30	0%	30/15 Winter				
1.012	30 Winter	30	0%	30/15 Winter				
13.000	15 Winter	30	0%	30/15 Winter				
14.000	30 Winter	30	0%	30/15 Winter				
15.000	30 Winter	30	0%	30/15 Winter				
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Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.013	30 Winter	30	0%	30/15 Winter				
16.000	30 Winter	30	0%	30/15 Winter				
1.014	15 Wintex	30	0%	30/15 Wintex				
17.000	15 Winter	30	0%	30/15 Winter				
18.000	15 Winter	30	0%					
19.000	15 Winter	30	0%					
17.001	15 Winter	30	0%	30/15 Winter				
20.000	15 Winter	30	0%					
21.000	15 Winter	30	0%	30/15 Winter				
22.000	480 Winter	30	0%	30/240 Winter				
22.001	360 Winter	30	0%	30/15 Winter				
21.001	15 Winter	30	0%	30/15 Winter				
23.000	120 Winter	30	0%					
23.001	120 Winter	30	0%	30/15 Winter				
24.000	480 Winter	30	0%	30/240 Winter				
24.001	480 Winter	30	0%	30/15 Winter				
23.002	15 Winter	30	0%	30/15 Winter				
21.002	15 Winter	30	0%	30/15 Winter				
21.003	15 Winter	30	0%	30/15 Winter				
25.000	15 Winter	30	0%	30/15 Winter				
25.001	15 Winter	30	0%	30/15 Winter				
26.000	15 Winter	30	0%					
26.001	15 Winter	30	0%					
26.002	15 Winter	30	0%	30/15 Winter	30/15 Wintex			1
26.003	15 Winter	30	0%					
31.004	15 Winter	30	0%	30/15 Winter				
31.005	15 Winter	30	0%	30/15 Winter				
27.000	15 Winter	30	0%	30/15 Winter				
21.006	15 Wintex	30	0%	30/15 Wintex				
21.007	15 Winter	30	0%	30/15 Winter				
28.000	15 Winter	30	0%	30/15 Winter				
28.001	15 Winter	30	0%	30/15 Winter				
21.008	240 Winter	30	0%	30/15 Winter				
21.009	240 Winter	30	0%	30/15 Winter				
29.000	240 Winter	30	0%	30/15 Winter				
29.001	15 Winter	30	0%	30/15 Winter				
30.000	480 Winter	30	0%	30/240 Winter				
30.001	480 Winter	30	0%	30/15 Winter				
31.000	15 Winter	30	0%					
32.000	120 Winter	30	0%	30/120 Winter				
32.001	120 Winter	30	0%	30/15 Winter				
30.002	15 Winter	30	0%	30/15 Winter				
33.000	15 Winter	30	0%	30/15 Winter				
33.001	15 Winter	30	0%	30/15 Winter				
33.002	15 Wintex	30	0%	30/15 Wintex				
33.003	240 Winter	30	0%	30/15 Winter				
30.003	240 Winter	30	0%	30/15 Winter				
30.004	240 Winter	30	0%	30/15 Winter				
21.010	240 Winter	30	0%	30/120 Winter				
20.001	240 Winter	30	0%	30/15 Winter				
34.000	15 Winter	30	0%					
20.002	240 Winter	30	0%	30/15 Winter				
1.015	240 Winter	30	0%	30/15 Winter				
35.000	15 Winter	30	0%	30/15 Winter				
35.001	15 Winter	30	0%	30/15 Winter				
36.000	240 Winter	30	0%	30/15 Winter				
1.016	240 Winter	30	0%	30/15 Winter				
PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	TL_SW01	5.339	-0.131	0.000	0.37	0.0	25.5	OK
1.001	TL_SW02	5.324	0.105	0.000	0.58	0.0	38.7	SURCHARGED
2.000	Parcel A2_1	5.690	0.190	0.000	0.04	0.0	4.0	SURCHARGED
2.001	Parcel A2_2	5.698	0.548	0.000	0.28	0.0	3.7	SURCHARGED
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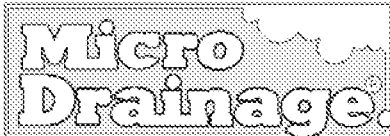
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Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.002	TL_SW03	5.311	0.255	0.000	0.72	0.0	47.8	SURCHARGED
3.000	Parcel B6_1	5.458	0.158	0.000	0.05	0.0	5.2	SURCHARGED
3.001	Parcel B6_2	5.461	0.511	0.000	0.34	0.0	4.4	SURCHARGED
1.003	TL_SW04	5.273	0.338	0.000	0.73	0.0	50.4	SURCHARGED
1.004	TL_SW05	5.214	0.579	0.000	1.01	0.0	73.4	SURCHARGED
4.000	Parcel B1&CH_1	4.536	0.036	0.000	0.19	0.0	10.3	SURCHARGED
4.001	Parcel B1&CH_2	4.607	0.322	0.000	0.61	0.0	8.1	SURCHARGED
1.005	Ex. SB10	4.847	0.637	0.000	1.05	0.0	71.7	SURCHARGED
1.006	Ex. SB9	4.933	0.613	0.000	1.16	0.0	82.5	SURCHARGED
5.000	Block B_1	4.966	0.166	0.000	0.03	0.0	5.8	SURCHARGED
5.001	Block B_2	4.961	0.906	0.000	0.37	0.0	5.1	SURCHARGED
5.002	Ex. SB17	4.177	0.227	0.000	0.32	65.6	21.2	SURCHARGED
1.007	Ex. SB8	4.275	0.475	0.000	1.12	0.0	69.6	SURCHARGED
6.000	BovisA_1	4.496	0.021	0.000	0.50	0.0	58.8	SURCHARGED
6.001	BovisA_2	4.425	0.050	0.000	0.14	0.0	52.6	SURCHARGED
1.008	Ex SB7	4.069	0.569	0.000	0.86	0.0	116.9	SURCHARGED
7.000	BovisB_1	3.856	0.081	0.000	0.32	0.0	50.7	SURCHARGED
7.001	BovisB_2	3.825	0.225	0.000	0.19	0.0	49.5	SURCHARGED
1.009	Dummy Node	1.769	0.594	0.000	1.31	0.0	169.1	SURCHARGED
8.000	SW01	4.009	0.669	0.000	0.43	0.0	31.2	FLOOD RISK
9.000	Plots 117-126	4.044	0.819	0.000	0.83	0.0	37.2	FLOOD RISK
10.000	Plots 101-116	4.037	0.812	0.000	1.14	0.0	51.0	FLOOD RISK
8.001	SW02	3.954	0.804	0.000	2.02	0.0	113.5	SURCHARGED
1.010	Ex SB6	3.749	0.674	0.000	1.05	0.0	159.7	SURCHARGED
11.000	Ret Block A	3.430	0.130	0.000	0.22	0.0	11.3	SURCHARGED
11.001	Ret Block A	3.633	0.583	0.000	0.20	0.0	3.7	SURCHARGED
12.000	Plots 95-100	3.621	0.396	0.000	0.38	0.0	17.2	SURCHARGED
1.011	Outfall B-01	3.611	0.691	0.000	0.94	0.0	206.2	SURCHARGED
1.012	Outfall B-02	3.470	0.730	0.000	1.00	0.0	211.0	SURCHARGED
13.000	SW03	3.481	0.831	0.000	1.31	0.0	98.4	SURCHARGED
14.000	Plots 80-86	3.363	0.588	0.000	0.33	0.0	20.7	SURCHARGED
15.000	Plots 87-94	3.357	0.582	0.000	0.34	0.0	23.7	SURCHARGED
1.013	Outfall B-03	3.341	0.741	0.000	1.52	0.0	292.1	SURCHARGED
16.000	C2 Resiblock A	3.028	0.528	0.000	0.57	0.0	37.5	SURCHARGED
1.014	Outfall B-04	2.985	0.845	0.000	1.74	0.0	308.7	SURCHARGED
17.000	SW04	2.915	0.295	0.000	1.03	0.0	68.3	SURCHARGED
18.000	Plots 60-73	2.742	-0.083	0.000	0.47	0.0	25.7	OK
19.000	Plots 74-78	2.743	-0.082	0.000	0.56	0.0	29.9	OK
17.001	SW05	2.746	0.246	0.000	1.34	0.0	122.0	SURCHARGED
20.000	Plots 39-46	3.162	-0.153	0.000	0.23	0.0	28.2	OK
21.000	SW-LYM 01	4.399	0.434	0.000	0.85	0.0	22.2	SURCHARGED
22.000	Non resi	4.474	0.024	0.000	0.06	0.0	14.5	SURCHARGED
22.001	Non resi	4.648	0.703	0.000	0.14	0.0	4.2	SURCHARGED
21.001	SW-LYM 02	4.383	0.518	0.000	0.79	0.0	30.2	SURCHARGED
23.000	Parcel A1	4.394	-0.056	0.000	0.13	0.0	28.8	OK
23.001	As-built SA8	4.349	0.361	0.000	0.62	0.0	24.8	SURCHARGED
24.000	Non Resi	4.504	0.054	0.000	0.04	0.0	12.1	SURCHARGED
24.001	SW Stub 02	4.721	0.856	0.000	0.12	0.0	4.4	SURCHARGED
23.002	SW-LYM 03/1	4.333	0.538	0.000	0.80	0.0	33.6	SURCHARGED
21.002	SW-LYM 03	4.363	0.788	0.000	1.55	0.0	51.2	SURCHARGED
21.003	SW-LYM 04	4.333	0.808	0.000	0.85	0.0	53.0	SURCHARGED
25.000	SW-LYM 07	4.357	0.262	0.000	0.59	0.0	23.7	SURCHARGED
25.001	SW-LYM 08	4.343	0.448	0.000	0.84	0.0	53.2	SURCHARGED
26.000	PBA 01	12.320	-0.105	0.000	0.55	0.0	44.7	OK
26.001	PBA 02	10.552	-0.073	0.000	0.77	0.0	83.8	OK
26.002	PBA 03	9.700	1.275	0.183	1.34	0.0	101.5	FLOOD
26.003	SW-LYM 05	5.701	-0.139	0.000	0.55	0.0	107.3	OK
21.004	SW-LYM 10	4.273	0.903	0.000	1.39	0.0	183.7	SURCHARGED
21.005	SW-LYM11	3.222	0.792	0.000	1.13	0.0	235.3	SURCHARGED
27.000	ExSB17_Dum Node	4.043	0.118	0.000	0.86	0.0	62.3	SURCHARGED
21.006	SW-LYM 12	3.759	0.789	0.000	1.36	0.0	289.6	SURCHARGED
21.007	SW-LYM 13	3.317	0.827	0.000	1.32	0.0	276.3	SURCHARGED
28.000	C2 Resiblock B	3.754	1.023	0.000	1.80	0.0	63.1	SURCHARGED
28.001	SW-LYM 14/1	3.427	0.822	0.000	2.09	0.0	72.9	SURCHARGED
21.008	SW-LYM 14	2.922	0.502	0.000	0.48	0.0	110.8	SURCHARGED
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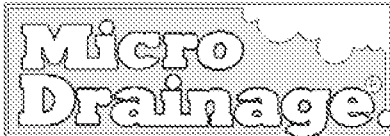
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PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
21.009	SW-LYM 15	2.783	0.458	0.000	0.45	0.0	109.4	SURCHARGED
29.000	Car Park	4.588	0.638	0.000	0.03	0.0	5.5	SURCHARGED
29.001	Car Park	4.709	1.159	0.000	0.10	0.0	4.3	FLOOD RISK
30.000	Non Resi	3.243	0.093	0.000	0.03	0.0	5.1	SURCHARGED
30.001	SW Stub	3.296	0.471	0.000	0.10	0.0	3.7	SURCHARGED
31.000	SW06	3.643	-0.132	0.000	0.36	0.0	33.8	OK
32.000	Non Resi	3.179	0.029	0.000	0.02	0.0	5.1	SURCHARGED
32.001	SW Stub 07	3.192	0.467	0.000	0.08	0.0	3.7	SURCHARGED
33.000	SW07	3.624	0.333	0.000	1.37	0.0	55.3	SURCHARGED
33.000	SW10	3.374	0.359	0.000	0.57	0.0	19.2	SURCHARGED
33.001	SW11	3.323	0.418	0.000	0.96	0.0	38.1	SURCHARGED
33.002	SW12	3.372	0.427	0.000	1.40	0.0	55.7	SURCHARGED
33.003	SW13	2.718	0.188	0.000	0.21	0.0	18.1	SURCHARGED
30.003	SW14	2.707	0.307	0.000	0.28	0.0	39.0	SURCHARGED
30.004	SW15	2.693	0.443	0.000	0.24	0.0	38.0	SURCHARGED
21.010	SW16	2.675	0.115	0.000	0.22	0.0	129.6	SURCHARGED
20.001	SW17	2.674	0.144	0.000	0.14	0.0	122.6	SURCHARGED
34.000	Plots 47-55	2.731	-0.094	0.000	0.63	0.0	28.0	OK
20.002	SW18	2.687	0.292	0.000	0.16	0.0	122.3	SURCHARGED
1.015	Outfall B-05	2.695	0.385	0.000	0.28	0.0	225.2	SURCHARGED
35.000	SW19	2.695	0.100	0.000	0.47	0.0	18.6	SURCHARGED
35.001	SW20	2.703	0.338	0.000	0.94	0.0	37.2	SURCHARGED
36.000	SW21	2.695	0.310	0.000	0.16	0.0	6.3	SURCHARGED
1.016	Outfall B-06	2.678	0.953	0.000	0.63	0.0	216.9	SURCHARGED
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APPENDIX I: Windes – 1 in 1yr Simulation Results

Mayer Brown Ltd		Page 1																																																																																																																																																																																																																																																																																																																																													
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Lvl Exc.	1.000	15 Winter	2	0%						1.001	15 Winter	2	0%						2.000	480 Winter	2	0%						2.001	480 Winter	2	0%	2/15 Winter					1.002	15 Winter	2	0%						3.000	60 Winter	2	0%						3.001	60 Winter	2	0%	2/15 Winter					1.003	15 Winter	2	0%						1.004	15 Winter	2	0%						4.000	120 Winter	2	0%						4.001	120 Winter	2	0%	2/30 Winter					1.005	15 Winter	2	0%						1.006	15 Winter	2	0%						5.000	240 Winter	2	0%						5.001	240 Winter	2	0%	2/15 Winter					5.002	30 Winter	2	0%				0		1.007	30 Winter	2	0%						6.000	30 Winter	2	0%						6.001	30 Winter	2	0%						1.008	30 Winter	2	0%						7.000	30 Winter	2	0%						7.001	30 Winter	2	0%						1.009	30 Winter	2	0%						8.000	15 Winter	2	0%						9.000	15 Winter	2	0%						10.000	15 Winter	2	0%						8.001	15 Winter	2	0%						1.010	30 Winter	2	0%						11.000	480 Winter	2	0%						11.001	480 Winter	2	0%	2/15 Winter					12.000	15 Winter	2	0%						1.011	30 Winter	2	0%						1.012	60 Winter	2	0%						13.000	15 Winter	2	0%						14.000	15 Winter	2	0%						15.000	15 Winter	2	0%					
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Mayer Brown Ltd				Page 2				
Lion House		Littlehampton						
Oriental Road		Overall Surface Network						
Woking GU22 8AR		West of Wetlands						
Date November 2017		Designed by S Foley						
File Test_Simulation_Tank ...		Checked by						
XP Solutions		Network 2013.1						
Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	Storm	Return Climate Period Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.	
1.013	60 Winter	2 0%						
16.000	60 Winter	2 0%						
1.014	60 Winter	2 0%						
17.000	15 Winter	2 0%						
18.000	15 Winter	2 0%						
19.000	15 Winter	2 0%						
17.001	15 Winter	2 0%						
20.000	15 Winter	2 0%						
21.000	15 Winter	2 0%						
22.000	360 Winter	2 0%						
22.001	360 Winter	2 0%	2/15 Winter					
21.001	15 Winter	2 0%						
23.000	60 Winter	2 0%						
23.001	60 Winter	2 0%	2/15 Winter					
24.000	360 Winter	2 0%						
24.001	360 Winter	2 0%	2/15 Winter					
23.002	60 Winter	2 0%						
21.002	60 Winter	2 0%	2/15 Winter					
21.003	60 Winter	2 0%						
25.000	15 Winter	2 0%						
25.001	15 Winter	2 0%						
26.000	15 Winter	2 0%						
26.001	15 Winter	2 0%						
26.002	15 Winter	2 0%						
26.003	15 Winter	2 0%						
21.004	15 Winter	2 0%						
21.005	15 Winter	2 0%						
27.000	480 Winter	2 0%						
21.006	15 Winter	2 0%						
21.007	15 Winter	2 0%						
28.000	15 Winter	2 0%						
28.001	15 Winter	2 0%						
21.008	15 Winter	2 0%						
21.009	240 Winter	2 0%						
29.000	240 Winter	2 0%	2/15 Winter					
29.001	240 Winter	2 0%	2/15 Winter					
30.000	480 Winter	2 0%						
30.001	480 Winter	2 0%	2/60 Winter					
31.000	15 Winter	2 0%						
32.000	120 Winter	2 0%						
32.001	120 Winter	2 0%	2/15 Winter					
30.002	15 Winter	2 0%						
33.000	15 Winter	2 0%						
33.001	15 Winter	2 0%						
33.002	15 Winter	2 0%						
33.003	15 Winter	2 0%						
30.003	15 Winter	2 0%						
30.004	240 Winter	2 0%						
21.010	240 Winter	2 0%						
20.001	240 Winter	2 0%						
34.000	15 Winter	2 0%						
20.002	240 Winter	2 0%						
1.015	60 Winter	2 0%						
35.000	15 Winter	2 0%						
35.001	15 Winter	2 0%						
36.000	15 Winter	2 0%						
1.016	60 Winter	2 0%	2/15 Winter					
PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	TL_SW01	5.249	-0.221	0.000	0.14	0.0	9.9	OK
1.001	TL_SW02	5.013	-0.206	0.000	0.21	0.0	14.0	OK
2.000	Parcel A2_1	5.397	-0.103	0.000	0.03	0.0	3.7	OK
2.001	Parcel A2_2	5.394	0.244	0.000	0.22	0.0	2.9	SURCHARGED
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Mayer Brown Ltd						Page 3		
Lion House Oriental Road Woking GU22 8AR			Littlehampton Overall Surface Network West of Wetlands					
Date November 2017			Designed by S Foley					
File Test_Simulation_Tank ...			Checked by					
XP Solutions			Network 2013.1					
Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.002	TL_SW03	4.875	-0.181	0.000	0.33	0.0	21.5	OK
3.000	Parcel B6_1	5.148	-0.152	0.000	0.07	0.0	6.5	OK
3.001	Parcel B6_2	5.144	0.194	0.000	0.30	0.0	3.8	SURCHARGED
1.003	TL_SW04	4.774	-0.161	0.000	0.41	0.0	28.6	OK
1.004	TL_SW05	4.504	-0.131	0.000	0.57	0.0	41.0	OK
4.000	Parcel B1&CH_1	4.327	-0.173	0.000	0.14	0.0	7.8	OK
4.001	Parcel B1&CH 2	4.319	0.034	0.000	0.58	0.0	7.7	SURCHARGED
1.005	Ex. SB10	4.099	-0.111	0.000	0.71	0.0	48.6	OK
1.006	Ex. SB9	3.969	-0.101	0.000	0.75	0.0	53.3	OK
5.000	Block B_1	4.667	-0.133	0.000	0.04	0.0	6.7	OK
5.001	Block B_2	4.663	0.608	0.000	0.31	0.0	4.3	SURCHARGED
5.002	Ex. SB17	3.775	-0.175	0.000	0.16	0.0	10.6	OK
1.007	Ex. SB8	3.765	-0.035	0.000	0.99	0.0	61.8	OK
6.000	BovisA_1	4.254	-0.221	0.000	0.26	0.0	31.0	OK
6.001	BovisA_2	4.218	-0.157	0.000	0.08	0.0	30.9	OK
1.008	Ex SB7	3.358	-0.142	0.000	0.70	0.0	95.2	OK
7.000	BovisB_1	3.538	-0.237	0.000	0.25	0.0	38.5	OK
7.001	BovisB_2	3.490	-0.110	0.000	0.15	0.0	38.3	OK
1.009	Dummy Node	3.108	-0.067	0.000	1.00	0.0	129.1	OK
8.000	SW01	3.146	-0.194	0.000	0.25	0.0	17.7	OK
9.000	Plots 117-126	3.103	-0.122	0.000	0.39	0.0	17.2	OK
10.000	Plots 101-116	3.117	-0.108	0.000	0.54	0.0	23.9	OK
8.001	SW02	3.086	-0.044	0.000	0.98	0.0	54.8	OK
1.010	Ex SB6	2.921	-0.154	0.000	0.76	0.0	145.2	OK
11.000	Ret Block A	3.171	-0.129	0.000	0.07	0.0	3.7	OK
11.001	Ret Block A	3.167	0.117	0.000	0.18	0.0	3.2	SURCHARGED
12.000	Plots 95-100	3.073	-0.152	0.000	0.23	0.0	10.5	OK
1.011	Outfall B-01	2.746	-0.174	0.000	0.69	0.0	152.0	OK
1.012	Outfall B-02	2.590	-0.150	0.000	0.73	0.0	152.4	OK
13.000	SW03	2.740	-0.120	0.000	0.61	0.0	41.1	OK
14.000	Plots 80-86	2.623	-0.152	0.000	0.23	0.0	14.6	OK
15.000	Plots 87-94	2.624	-0.151	0.000	0.24	0.0	16.7	OK
1.013	Outfall B-03	2.516	-0.084	0.000	0.92	0.0	171.2	OK
16.000	C2 Resiblock A	2.387	-0.113	0.000	0.17	0.0	11.0	OK
1.014	Outfall B-04	2.381	-0.059	0.000	1.00	0.0	177.1	OK
17.000	SW04	2.462	-0.158	0.000	0.42	0.0	27.9	OK
18.000	Plots 60-73	2.665	-0.160	0.000	0.18	0.0	10.0	OK
19.000	Plots 74-78	2.670	-0.155	0.000	0.22	0.0	11.6	OK
17.001	SW05	2.304	-0.096	0.000	0.79	0.0	49.9	OK
20.000	Plots 39-46	3.135	-0.180	0.000	0.09	0.0	10.9	OK
21.000	SW-LYM 01	3.832	-0.133	0.000	0.33	0.0	8.6	OK
22.000	Non resi	4.178	-0.272	0.000	0.02	0.0	4.8	OK
22.001	Non resi	4.176	0.231	0.000	0.11	0.0	3.4	SURCHARGED
21.001	SW-LYM 02	3.740	-0.125	0.000	0.40	0.0	15.4	OK
23.000	Parcel A1	4.135	-0.315	0.000	0.12	0.0	27.0	OK
23.001	As-built SA8	4.104	0.116	0.000	0.62	0.0	24.7	SURCHARGED
24.000	Non Resi	4.188	-0.262	0.000	0.02	0.0	5.1	OK
24.001	SW Stub 02	4.191	0.326	0.000	0.10	0.0	3.7	SURCHARGED
23.002	SW-LYM 03/1	3.705	-0.090	0.000	0.67	0.0	28.1	OK
21.002	SW-LYM 03	3.605	0.030	0.000	1.15	0.0	38.0	SURCHARGED
21.003	SW-LYM 04	3.399	-0.126	0.000	0.64	0.0	39.6	OK
25.000	SW-LYM 07	3.943	-0.152	0.000	0.23	0.0	9.2	OK
25.001	SW-LYM 08	3.758	-0.137	0.000	0.33	0.0	20.6	OK
26.000	PBA 01	12.271	-0.154	0.000	0.21	0.0	17.3	OK
26.001	PBA 02	10.480	-0.145	0.000	0.27	0.0	29.1	OK
26.002	PBA 03	7.318	-0.107	0.000	0.54	0.0	41.2	OK
26.003	SW-LYM 05	5.638	-0.202	0.000	0.23	0.0	44.2	OK
21.004	SW-LYM 10	3.223	-0.142	0.000	0.69	0.0	91.4	OK
21.005	SW-LYM11	2.926	-0.204	0.000	0.57	0.0	113.9	OK
27.000	ExSB17_Dum Node	3.700	-0.225	0.000	0.00	0.0	0.0	OK
21.006	SW-LYM 12	2.760	-0.210	0.000	0.55	0.0	116.4	OK
21.007	SW-LYM 13	2.485	-0.205	0.000	0.56	0.0	117.8	OK
28.000	C2 Resiblock B	2.669	-0.056	0.000	0.89	0.0	29.7	OK
28.001	SW-LYM 14/1	2.564	-0.041	0.000	1.00	0.0	34.8	OK
21.008	SW-LYM 14	2.231	-0.189	0.000	0.63	0.0	147.6	OK
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Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
21.009	SW-LYM 15	2.130	-0.195	0.000	0.29	0.0	69.0	OK
29.000	Car Park	4.517	0.567	0.000	0.03	0.0	5.4	SURCHARGED
29.001	Car Park	4.557	1.007	0.000	0.10	0.0	4.2	SURCHARGED
30.000	Non Resi	2.915	-0.235	0.000	0.02	0.0	4.4	OK
30.001	SW Stub	2.918	0.093	0.000	0.08	0.0	3.3	SURCHARGED
31.000	SW06	3.606	-0.169	0.000	0.14	0.0	13.1	OK
32.000	Non Resi	2.855	-0.295	0.000	0.02	0.0	5.1	OK
32.001	SW Stub 07	2.854	0.129	0.000	0.08	0.0	3.4	SURCHARGED
30.002	SW07	2.539	-0.086	0.000	0.68	0.0	27.5	OK
33.000	SW10	2.873	-0.142	0.000	0.28	0.0	9.5	OK
33.001	SW11	2.791	-0.114	0.000	0.48	0.0	19.0	OK
33.002	SW12	2.658	-0.087	0.000	0.68	0.0	27.5	OK
33.003	SW13	2.368	-0.162	0.000	0.42	0.0	35.9	OK
30.003	SW14	2.254	-0.146	0.000	0.52	0.0	71.0	OK
30.004	SW15	2.093	-0.157	0.000	0.15	0.0	22.8	OK
21.010	SW16	2.080	-0.480	0.000	0.25	0.0	148.6	OK
20.001	SW17	2.078	-0.452	0.000	0.17	0.0	144.4	OK
34.000	Plots 47-55	2.676	-0.149	0.000	0.24	0.0	10.9	OK
20.002	SW18	2.061	-0.334	0.000	0.17	0.0	124.2	OK
1.015	Outfall B-05	2.043	-0.267	0.000	0.20	0.0	160.8	OK
35.000	SW19	2.436	-0.159	0.000	0.18	0.0	7.4	OK
35.001	SW20	2.232	-0.133	0.000	0.35	0.0	13.7	OK
36.000	SW21	2.257	-0.128	0.000	0.39	0.0	15.4	OK
1.016	Outfall B-06	1.979	0.254	0.000	0.45	0.0	154.9	SURCHARGED
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APPENDIX J: EA Flood Defence Consent



Flood Defence Consent

Section 23 of the Land Drainage Act 1991

Persimmons Homes Ltd
(Thames Valley)
Persimmon House
Knoll road
Camberley
Surrey
GU15 3TQ

**Consent applying to the
construction of 1 no.
surface water outfall to
take discharge from new
development into
Ordinary Watercourse
(within the River Arun
Internal Drainage
District)**

Land south of Black Ditch,
North Littlehampton, West
Sussex

NGR: 503413, 104302

Consent number
SE_WS_2015_311_2

Effective from
30th July 2015

Disclaimer

The Environment Agency does not accept any responsibility for the design and construction of the works referred hereto and any liability for any loss or damage which may arise out of their design, construction, maintenance or use.

Our approval is given solely on river morphology, flow, ecology, and other land drainage criteria. It should not be regarded by the applicant as in any way approving the design and soundness of the proposed structure, other than in relation to its impact on flows in the watercourse and its flood plain

This Consent does not free you from the need to obtain other licences, consents, approvals (including bye-law consents) or permissions (including planning permission) which may be required in law or in order to comply with any duties or responsibilities for conservation or protection of the environment. You should ensure that the works are carried out in a proper manner so as not to adversely affect the watercourse. A copy of the Special Requirements issued by the Environment Agency is available upon request. Work should be completed as quickly as possible once started.

The works shall be carried out at your own risk and responsibility. We accept no responsibility for any loss or damage howsoever caused arising from the carrying out or construction of the works. We may occasionally make observations on health and safety aspects of the work, however this should not be taken in any way whatsoever to imply that we have a role in ensuring site safety, nor that we have approved any contractors plans.

Land ownership is not a material consideration in determining this consent. Where you are not the owner of the land (including riverbeds and other water bodies) referred to in this consent, you must obtain suitable permission from the landowner prior to the commencement of works. This Consent does not confer any rights of entry or rights over property.

If you undertake works in contravention of Section 109 of the Water Resources Act, 1991 (Restriction on erection of structures in, over or under main river), or of the terms of this consent, we may remove, alter or pull down the works and recover from you the expenses incurred in doing so.

The responsibility to ascertain the location of any services, which may be affected by the proposed works, lies solely with the Applicant/Agent.

The contents of this consent must be brought to the attention of your contractor.

If you believe that conditions have been unreasonably imposed then you have a right of appeal.

Environment Agency Consent

Consent

Section 23 of the Land Drainage Act 1991



Flood Defence Consent

Control of works affecting watercourses and/or flood defences

Consent number **SE_WS_2015_311_2**

To Persimmon Homes Ltd (Thames Valley)
of Persimmon House, Knoll Road, Camberley, Surrey GU15 3TQ

The Environment Agency, in exercise of its powers under Section 23 of the Land Drainage Act 1991 and subject to the conditions overleaf, hereby grants its consent in relation to the works or operations described in this Consent.

Watercourse: Ordinary Watercourse within the River Arun Internal Drainage District

Location: Land south of Black Ditch, North Littlehampton, West Sussex

NGR: 503413, 104302

Description of works: Construction of 1 no. precast concrete surface water outfall (with railings and flapvalve) to take discharge from new development through 525mm diameter pipe.

For the following activities:

Construction of 1 no. surface water outfall

(1) Construction of 1 no. permanent precast concrete surface water outfall (with railings and flapvalve) to take discharge from new development through 525mm diameter pipe

As detailed on Drawings: 8140927/SK12, CV8140927/SK09 and SFA 10C Headwall Plan

The Agency does not accept any responsibility for the design and construction of the works referred hereto and any liability for any loss or damage which may arise out of their design, construction, maintenance or use.

This Consent shall come into effect on **30th July 2015**

Signed on behalf of the Environment Agency

A large black rectangular box redacting the signature of the official representing the Environment Agency.

Partnerships and Strategic Overview Team Leader

Date of signing

30th July 2015

Environment Agency Consent SE_WS_2015_311_2
Effective date 30th July 2015

Conditions

This consent is granted subject to the following conditions:

- 1. That the headwalls are adequately keyed into the banks and bed of the watercourse to prevent erosion.**
- 2. No excavated material or debris arising from the construction of the works shall be disposed of on the site or in the floodplain without our prior agreement. Any materials, debris etc that fall into the river channel, or onto the banks of the watercourse shall be removed immediately.**
- 3. There should be no storage of materials (or chemicals/fuels) within (EIGHT) metres of the watercourse.**
- 4. No refuelling of any machinery shall take place within (EIGHT) metres of any watercourse**
- 5. No dredging of the riverbed shall take place during the construction period.**
- 6. The banks and/or bed of the watercourse where disturbed shall be restored to our reasonable satisfaction.**
- 7. We shall be afforded access to the works at all reasonable times for the purpose of inspection during construction of the works and after completion of the works.**
- 8. The construction of the works described in this consent must be completed within three years from the date of issue of this consent. Works not completed within this time, additional works and/or amendments will require a new consent.**

Informatives

- Although the ditches involved were dry when the water vole survey/report was carried out, there are water vole populations in close proximity to this site.
- It is recommended that an ecologist looks over the works footprint prior to starting the work, to ensure no burrows are disturbed.
- Water vole burrows can normally extend up to 5 metres into the river banks.
- It is a legal offence to disturb water vole and their burrows so you should be aware of the legal implications when undertaking your work.

Other information

This Note does not form part of the Certificate of Authorisation.

Pollution Prevention

You are reminded that it is an offence under Regulation 38 of The Environmental Permitting (England and Wales) Regulations 2010 to cause or knowingly permit a water discharge activity or ground water activity. Care must be taken to ensure that neither the watercourse nor groundwater becomes polluted, particularly by, for example diesel fuel, petrol and oil from machinery. All fuels, oils and chemicals must be stored securely and any large containers left on site must be bunded. Care should also be taken when filling machinery to ensure that diesel/petrol/oil is not spilt on the ground. Spillages must not be washed away, but absorbed by some medium and then removed from site to a suitable licensed waste facility. Any such incidents must be reported to the Environment Agency immediately (Emergency Tel No 0800 807060). Copies of the Environment Agency's Pollution Prevention Guidelines (PPG5) and (PPG6) are either attached for your information or if not available upon request.

Disturbance of bed and bank material in watercourses should be minimised, including when carrying out excavations. An appropriate silt control system should also be considered if material is likely to be disturbed. In-river vehicle tracking should be kept to an absolute minimum.

Any waste generated in the course of the works must be disposed of in accordance with the provision of the Environmental Protection Act 1990. Persons carrying waste are required by law to register with the Environment Agency as a Waste Carrier (subject to certain exceptions). The deposit, keeping, treating or disposal of waste should only take place at premises licensed by the Environment Agency to receive the waste (subject to certain exceptions and exemptions). When you give waste to someone else, details of the transfer of waste should be described on a document called a Duty of Care Transfer Note.

If the waste contains any properties that are hazardous to health or the environment, the waste will be classed as 'Hazardous Waste' as defined in the Hazardous Waste Regulations 2005. These Regulations place specific requirements on the producer and carrier of such waste. Further information can be found on the Agency's website (www.environment-agency.gov.uk) or by contacting the National Customer Contact Centre on 03708 506506.

The activity of importing waste into the site for use as part of the construction process, for example hardcore, must be registered by Environment Agency as an exempt activity under the Waste Management Licensing Regulations 1994.

Flood Risk Management

The structure(s) must be removed immediately, for any reason, at the request of the Area Flood Risk Manager.

Environment Agency Consent SE_WS_2015_311_2
Effective date 30th July 2015

You must ensure that any structure is clear and free of rubbish, silt and debris at all times. Regular inspections of the structure should also be carried out and the appropriate maintenance work undertaken.

Fisheries

You are strongly advised to inform the appropriate Angling Association/Interests of your proposals (where applicable), before commencing work, since the issue of a Flood Defence Consent by this Agency will not protect you from any claim for nuisance or damage which may be attributed to your works.

The free passage of fish must be maintained at all times, unless otherwise agreed in advance with the Agency.

Under the terms of the Salmon and Freshwater Fisheries Act 1975, it is an offence to cause or knowingly permit to flow, or put, into any waters containing fish, any liquid or solid matter to such an extent as to cause the water to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish.

Biodiversity

Natural environments such as watercourses are important as habitats in their own right and for the plants and animals they support. There are several Acts and Regulations that ensure these special features are protected and you should be aware of and comply with this legislation. A list of relevant legislation can be found in our working method guidance.

The list of species and actions below are not exhaustive and the applicant should consult the relevant legislation regarding other concerns.

A licence for works affecting protected species may be required from Natural England. You should consult their standing advice for more information on this.

Otters and their places of rest are protected. Otters are widespread and significant tree works or works to the banks have the risk of disturbing otters and damaging their Holts. You should make an assessment of the risk to otters and where required a survey should be undertaken by a suitably qualified ecologist. Note otters sometimes lie up in drains/small watercourses so wherever possible drain entrances should be kept clear.

Bats and their habitats are protected. Bats are often found in structures and trees on or adjacent to watercourses. If your works are likely to affect structures such as bridges, walls, culverts or buildings you must consider impacts on bats. An appropriate assessment of risk and, where required a survey should be undertaken by a suitably qualified ecologist.

Water voles and their habitat are protected. If water voles are present on your site you need to consider the impacts of your work on them and an appropriate assessment of risk and where required survey should be undertaken by a suitably qualified ecologist.

Native Crayfish are protected. When undertaking works where native crayfish are present you need to consider the impacts of your works and an appropriate assessment of risk and where required survey should be undertaken by a suitably qualified ecologist.

Vegetation

No bankside vegetation within 7m of the watercourse is to be removed unless strictly necessary. In such cases, trees/shrubs should be limbed or coppiced, and the root base to be left intact. Scrub vegetation as possible should be retained, as this provides valuable wildlife habitat.

Trees should be protected from the works in accordance with British Standard 5837, "Trees in relation to construction", and contractors' working areas shall be clearly marked out and boundaries adhered to.

Any bankside trees or vegetation damaged or removed during the works should be replaced with native species of local provenance appropriate to the local habitat.

Birds

Breeding birds and their nests are protected under the Wildlife and Countryside Act 1981. If your work is taking place within or close to the main bird breeding season (1st March to 31st July) you should consider the impacts of your works and an appropriate assessment of risk should be undertaken.

Invasive Non-native species

The Wildlife and Countryside Act makes it an offence to cause certain species to spread in the wild. If these species are present on your site you need to have a plan for how you will manage them and any waste containing them during your work.

Bio security

When travelling or working between watercourses there is a high risk of transferring problem species or diseases between watercourses.

This can be avoided by following the advice of the 'check, clean, dry' campaign. Simple measures such as checking for and cleaning mud and bits of vegetation from boots, equipment and machines and allowing them to dry (ideally in sunlight) can prevent the spread of problem species.