ARDENT | CONSULTING ENGINEERS

CAREBASE LTD

PROPOSED REDEVELOPMENT OF LAND OFF DANSON ROAD, BEXLEYHEATH



FLOOD RISK/FOUL & SURFACE WATER MANAGEMENT STATEMENT (INCLUDING DRAINAGE STRATEGY)

REPORT REF. 190320-04

PROJECT NO. 190320

DECEMBER 2019

PROPOSED CAREHOME DEVELOPMENT:
LAND OFF DANSON ROAD, BEXLEYHEATH

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(INCLUDING DRAINAGE STRATEGY)

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DOCUMENT CONTROL SHEET

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
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1.0 INTRODUCTION

1.1 Ardent Consulting Engineers has been appointed by Carebase Ltd to advise on flood risk/foul and surface water management matters associated with the proposed redevelopment site situated off Danson Road, in Bexleyheath.

1.2 This Flood Risk/Foul & Surface Water Management Statement has been prepared to support a full planning application to redevelop the existing site and provide a 70-bed care home facility, associated car parking provision and landscaping strategy.

1.3 The site is situated within a Flood Zone 1 area and the developable area is less than one hectare. As such, a formal site-specific Flood Risk Assessment is not required, although the principles outlined within the National Planning Policy Framework and accompanying web-based Planning Practice Guidance, have continued to be adopted.

1.4 The NPPF was originally published in March 2012 (updated in February 2019) by the Ministry for Housing, Communities & Local Government, and is now the acknowledged standard for conducting FRAs/SuDS Statements.

1.5 This report aims to demonstrate to the Local Planning Authority and Statutory Consultees that the site can be suitably redeveloped whilst complying with the requirements of the NPPF.

1.6 On the basis of this report, supporting evidence is provided to enable the planning application to be determined in terms of flood risk and SuDS/surface water disposal. If additional and/or detailed information is required, it is anticipated that appropriate conditions will be recommended for future consideration.

2.0 BASELINE PARAMETERS

Existing Site

2.1 The application site is situated to west of Bexleyheath (as illustrated in **Figure 1**), which is a town in the London Borough of Bexley, Greater London:

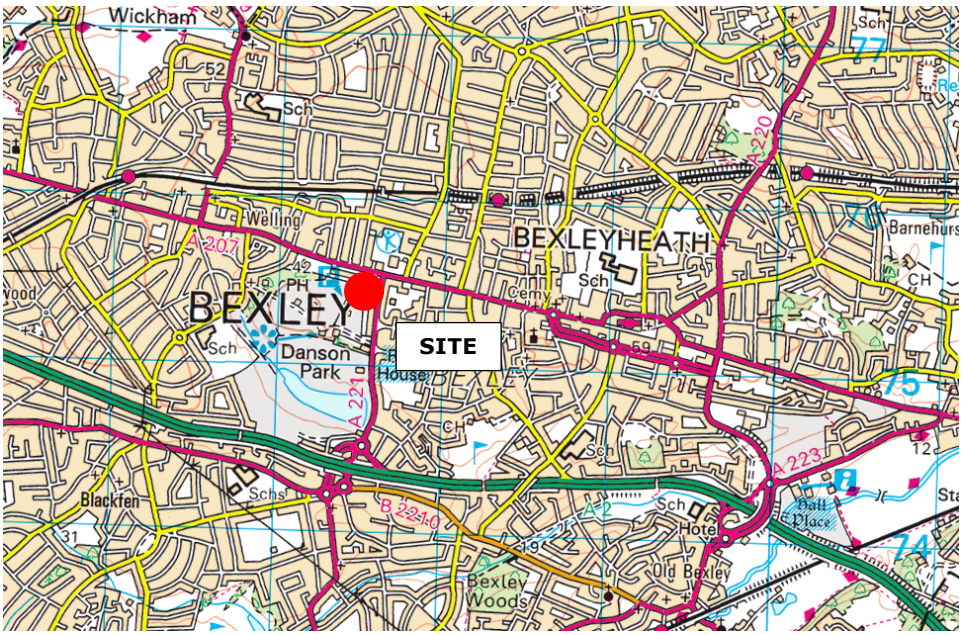


Figure 1: Site's Location

2.2 The site's boundaries are formed by: Danson Park to the north and west; the highway of Danson Road to the east; and residential properties to the south.

2.3 The application site is situated on an Ordnance Survey grid reference of 547590mE, 175490mN.

2.4 The application boundary comprises an area of circa 0.353 hectares, as illustrated in **Figure 2** on the following page.



Figure 2: Aerial Record

2.5 The topographical survey confirms that there is a significant area associated with the existing site comprising roof and parking courtyard as illustrated below. A detailed version of the survey has been included within **Appendix A** of this report for further reference:

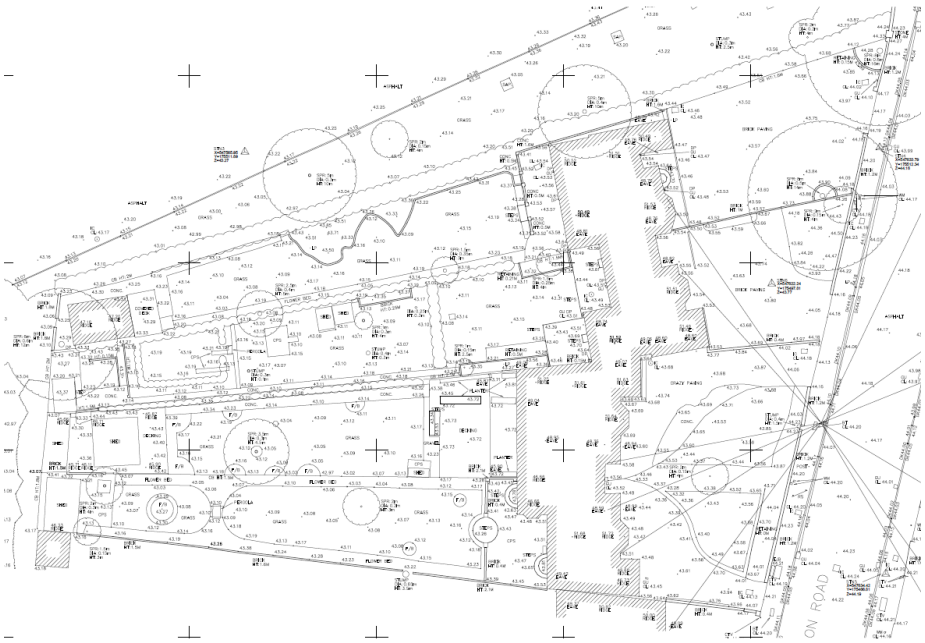


Figure 3: Extract of Topographical Survey

2.6 The existing impermeable area is calculated to be circa 1,435m^2.

2.7 The public sewer asset record plan for the local area has been obtained from the Sewerage Undertaker for the region, Thames Water Utilities Ltd, which illustrates that there are no strategic foul or surface water public sewers which traverse the site, as illustrated in **Figure 4** below:



Figure 4: Public Sewer Asset Record Plan

2.8 In this respect, no protection or diversion works to strategic sewerage infrastructure is anticipated to accommodate the redevelopment scheme. A copy of the public sewer asset record plans has been provided within **Appendix B** of this report for further reference.

Redevelopment Proposals

2.9 A planning application is submitted to the local planning authority at the London Borough of Bexley, which seeks permission to demolish the existing properties and provide a three-storey 70-bed care home with an internal access road, parking provision, landscaping and supporting infrastructure.

2.10 A layout of the proposed site has been prepared by the scheme's Architect and Landscape Architect (Ryder Architecture & Tyler Grange Group respectively), which outlines the proposals, as illustrated in **Figure 5** below:



Figure 5: Indicative Masterplan Layout

2.11 A detailed version of the layout plan has been provided in **Appendix C** of this report for further reference.

Urban Creep

2.12 The impermeable area associated with the proposed development scheme (roof area of 1,194m^2, roads, driveways, paving etc.) is calculated to be circa 2,618m^2 with the remainder being soft landscaping.

2.13 As the scheme comprises a single-block for the residential care home facility, no future extension will be constructed and therefore an allowance for any urban creep is not deemed necessary in this instance. Therefore, the hydraulic modelling has been based on an impermeable area of 0.262 hectares.

3.0 FLOOD RISK/SURFACE WATER MANAGEMENT

Flood Risk Assessment

3.1 According to the Environment Agency's indicative floodplain mapping, the redevelopment site is not deemed to be situated within the indicative undefended floodplain of any nearby designated main river/watercourse and/or tidal estuary, as illustrated in **Figure 6** below:

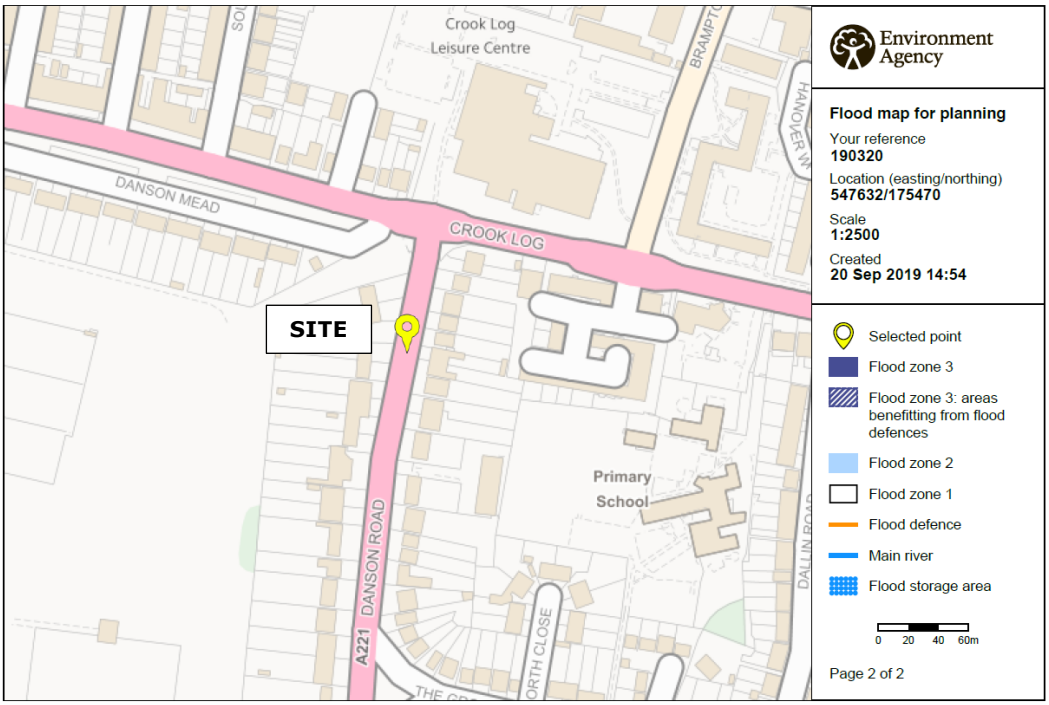


Figure 6: Indicative Fluvial/Tidal Floodplain Extent

3.2 The site is therefore classified as a Flood Zone 1 site, at a low probability of fluvial and/or tidal flooding. As the site is situated within a Flood Zone 1 area and the developable area is less than one hectare, a formal site-specific Flood Risk Assessment is not required, although the principles outlined within the National Planning Policy Framework and accompanying web-based Planning Practice Guidance have continued to be adopted.

3.3 'Planning Policy Statement 25: Development and Flood Risk' (PPS25) was first published in December 2006 by the Ministry for Housing, Communities & Local Government but has since been replaced by the National Planning Policy Framework (NPPF) which was originally published in March 2012 and subsequently revised in February 2019. This study is therefore based on the latest guidance stated within the NPPF and the accompanying web-based Planning Practice Guidance.

3.4 The guidance uses the concept of sequential testing and the risk-based approach to flood risk and development. Development priorities are based on the specific flood risk zones outlined within Table 1 of the Planning Practice Guidance. These flood risk zones have been briefly outlined below for reference:

Zone 1 - Low probability: Land assessed as having a less than 1 in 1,000-year annual probability of river and sea flooding (<0.1%) in any year;

Zone 2 – Medium probability: Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1%-0.1%) and between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5%-0.1%) in any year;

Zone 3a – High probability: Land assessed as having a 1 in 100-year or greater annual probability of river flooding (>1%) and a 1 in 200-year or greater annual probability of flooding from the sea (>0.5%) in any year;

Zone 3b – Functional floodplain: Land where water has to flow or be stored in times of flood.

3.5 Consulting Table 2 contained within the NPPF's Planning Practice Guidance classifies residential care home schemes to be a 'more vulnerable' land-class usage, in terms of flood risk:

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

3.6 Table 3 of the Planning Practice Guidance (*Flood Risk Vulnerability and Flood Zone 'Compatibility'*) determines that a residential care home scheme in a Flood Zone 1 area, is deemed to be appropriate:

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

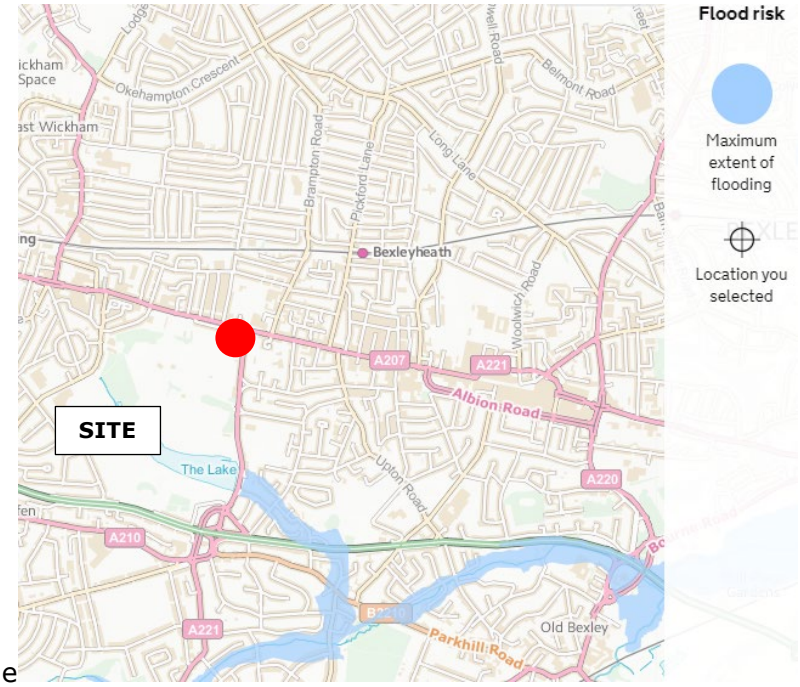
Key:

✓ Development is appropriate

✗ Development should not be permitted.

Other Potential Sources of Flooding

3.7 A further search of the Environment Agency's mapping also confirms that the site is not shown to be susceptible from flooding as a result of a breach of a nearby reservoir flooding, as illustrated in **Figure 7** on the following page.



2e

Figure 7: Extent of Reservoir Flooding

3.8 According to the Environment Agency's indicative mapping for the local area, these indicate that the site is partially susceptible to pluvial/surface water flooding for the medium-risk (1:100-year event), which appears to be emanating from the park area to the rear of the site, as illustrated in **Figure 8** below:



Figure 8: Localised Pluvial/Surface Water Flooding

3.9 To assess the extent of any impact, the flood extent has been analysed in comparison to the existing ground levels and the encroachment extends to a level of circa 43.2mAOD, as illustrated in **Figure 9** below:

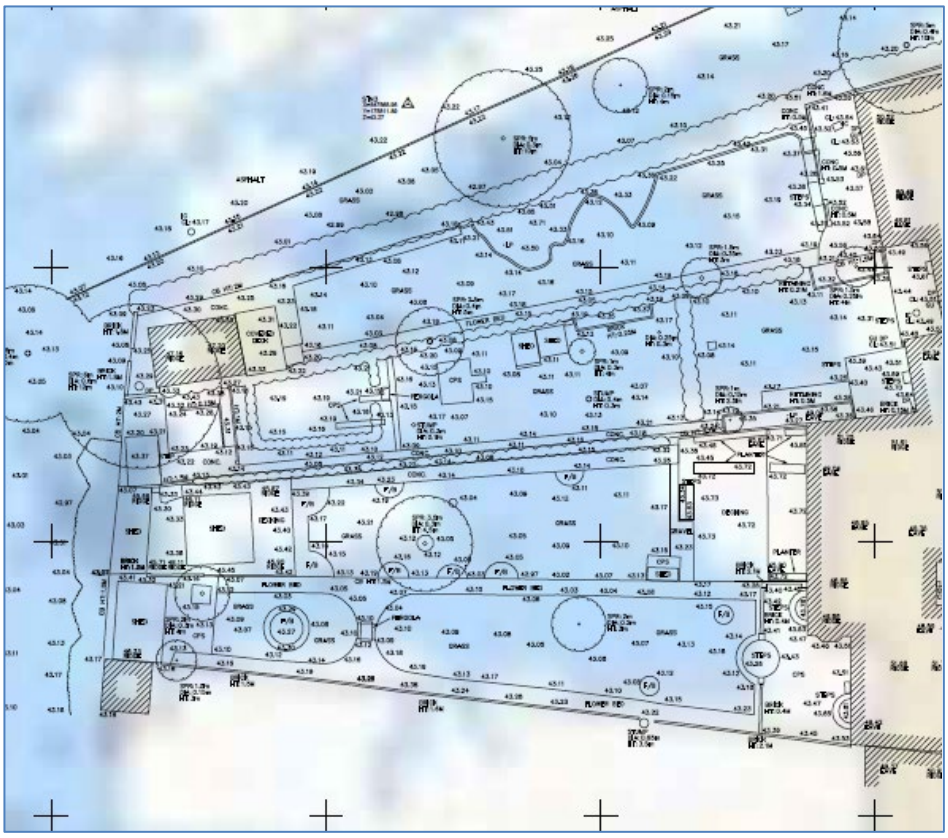


Figure 9: Existing Surface Water Encroachment

3.10 To mitigate the risk of any pluvial/surface water flooding impacting upon the layout the ground floor finished floor levels will be set at/above 42.5mAOD to provide a 300mm freeboard tolerance above the 1:100-year flood event.

3.11 According to the records held on the British Geological Survey website, a borehole (BGS Reference TQ47NE724) was drilled to a depth of 9.75m to the east of the application site. Groundwater was not encountered therefore it is concluded that the site is not at risk of any groundwater flooding, even allowing for seasonal variances. A

copy of the borehole record has been included within **Appendix D** of this report for further reference.

3.12 In view of this assessment, it is concluded that the scheme is not at risk of flooding from any source including fluvial, tidal, a breach of any nearby reservoir, groundwater or pluvial/surface water (due to the proposed mitigation measures offered).

Pre and Post-Development Run-off

3.13 According to the topographical survey, there is a significant area of existing hard standing associated with the existing properties and associated driveway/parking areas to the front of the site of 0.1435 hectares, which is calculated to generate a peak surface water run-off rate of 19.4 litres/sec when subjected to a 1:1-year rainfall event with a 50mm per hour rainfall intensity (based on the parameters specified within the '*Wallingford Procedure, Volume 4 – The Modified Rational Method'*):

$Q_{Discharge} = 3.61\ Cv\ i\ A$

$Q_{Discharge} = 3.61x\ 0.75\ x\ 50mm\ x\ 0.1435$ hectares (existing)

Where:

Cv = volumetric run-off coefficient

i = rainfall intensity

A = area

3.14 It is therefore concluded that the existing site can generate a total surface water run-off rate of 19.4 litres/sec. However, for the purposes of this assessment, the peak discharge rate will be restricted for all events (up to and including the 1:100-year plus climate change rainfall event) to no greater than **7.8 litres/sec,** thus offering a 60% betterment to the existing scenario should a positive outfall be utilised.

Infiltration Feasibility Appraisal

3.15 The above assessment would only be applicable if a positive outfall is utilised to dispose of the surface water run-off from the scheme. The volume of surface water attenuation could be reduced though, if infiltration drainage techniques can be successfully utilised on the site, providing suitable soil conditions exist.

3.16 The British Geological Survey record plans for the Bexley area indicate the site is underlain by the London Clay Formation which is described as Clay and Silt, as illustrated in **Figure 10** below:

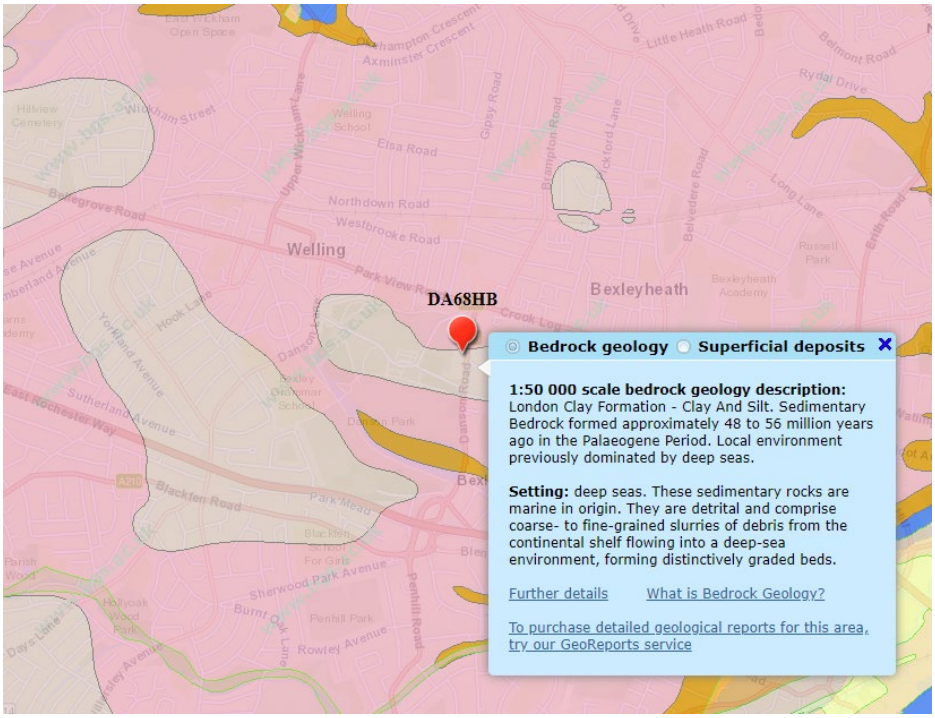


Figure 10: Extract of BGS's Geology Record Plan

3.17 In view of the underlying stratum formation, it is considered unlikely that the soil will be suitable for supporting the use of infiltration drainage techniques and therefore an alternative method of disposal is required.

3.18 As there is no open channel watercourse/ditch present on-site, a connection to the public sewer present within Danson Road will be

required under S106 of the Water Industry Act 1991, in agreement with Thames Water. An application for a pre-development impact study has been submitted to Thames Water to confirm there is sufficient capacity to accept surface water run-off from the redevelopment scheme.

Attenuation Provision

3.19 To drain the site in a sustainable manner whilst complying with the requirements of the NPPF, the strategy will adopt an appropriate form of sustainable drainage systems (SuDS). These forms of SuDS could comprise utilisation of infiltration drainage devices to discharge surface water to the underlying soil stratum (if soil conditions permit), basins/ponds, filter strips and swales, permeable surfaces, geo-cellular units and/or over-sized pipes.

3.20 Adopting the design parameters outlined below, the following preliminary assessment has been conducted using Innovyze's 'Micro Drainage' computer hydraulic modelling suite. Within the simulations, we have also included an additional 40% storage provision as allowance for any potential climate change impact (based on the guidance published by the Environment Agency in February 2016 for the year 2070 to 2115 scenario which includes a residential care home scheme):

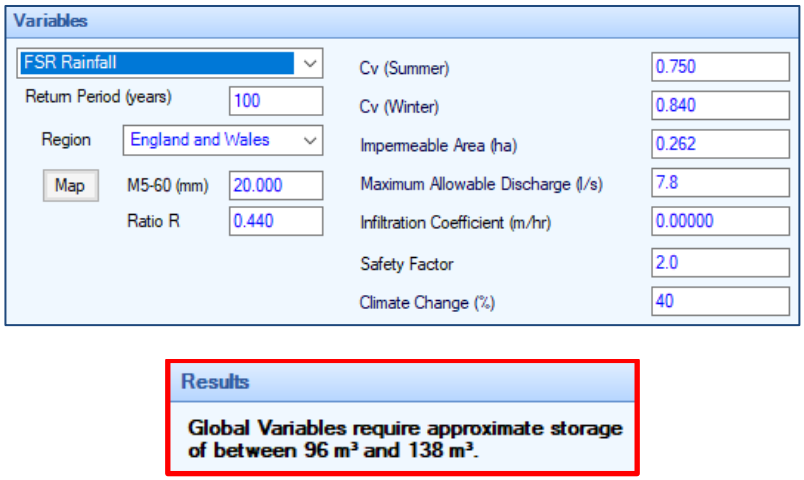


Figure 11: Preliminary Attenuation Simulation

3.21 Based on the above assessment, the preliminary attenuation simulations predict that in the region of 96m^3 to 138m^3 of storage will be required (including an additional 40% increase as an allowance for climate change impact) to facilitate the surface water run-off from the redevelopment site.

3.22 The above assessment merely provides an initial preliminary estimate of the volume required at this stage of the report. Detailed hydraulic modelling has been included within the SuDS/Surface Water Drainage Strategy section of this report that follows.

SuDS/Surface Water Drainage Strategy

3.23 For the purposes of this assessment, a SuDS/surface water drainage strategy has been prepared to demonstrate how the run-off will be disposed of, and that the system will be capable of withstanding a 1:100-year rainfall event (including an additional 40% as an allowance for climate change).

3.24 To dispose of the surface water run-off generated by the redevelopment scheme, it is anticipated that the run-off will be directed to the nearby public sewer located within Danson Road, at a controlled discharge rate not exceeding 7.8 litres/sec.

3.25 To facilitate the connection works, it is acknowledged that the formal consent will be secured from Thames Water under S106 of the Water Industry Act 1991, once planning permission is granted.

3.26 The principles of the strategy will comprise:

- Surface water run-off will be restricted to a reduced discharge rate no greater than 7.8 litres/sec for all events, up to and including the 1:100-year (plus 40%climate change) rainfall event;
- A suitable flow-control device will be utilised at the outfall to ensure the post-development discharge is not exceeded for events

up to and including the 1:100-year event (including 40% climate change);

- A hydraulic model has been designed which confirms that the SuDS proposals can withstand the impact of a 1:100-year rainfall event (including an additional 40% as an allowance for potential climate change impact). A copy of the hydraulic simulation output files has been included within **Appendix D** of this report for reference;
- The peak water level in the system at the outfall is deemed to be 43.268m AOD generated by a 240-minute winter profile for the 1:100-year rainfall event (including an additional 40% as an allowance for climate change impact):

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.462	0.512	0.0	0.0	0.0	19.5	O K
30 min Summer	42.714	0.764	0.0	0.0	0.0	29.0	O K
60 min Summer	42.937	0.987	0.0	0.8	0.8	31.8	O K
120 min Summer	42.986	1.036	0.0	3.9	3.9	31.8	O K
180 min Summer	43.014	1.064	0.0	5.9	5.9	31.8	O K
240 min Summer	43.043	1.093	0.0	7.5	7.5	31.9	O K
360 min Summer	43.010	1.060	0.0	5.6	5.6	31.8	O K
480 min Summer	43.043	1.093	0.0	7.5	7.5	31.9	O K
600 min Summer	43.014	1.064	0.0	5.9	5.9	31.8	O K
720 min Summer	43.032	1.082	0.0	6.9	6.9	31.8	O K
960 min Summer	43.023	1.073	0.0	6.4	6.4	31.8	O K
1440 min Summer	43.003	1.053	0.0	5.1	5.1	31.8	O K
2160 min Summer	43.002	1.052	0.0	5.0	5.0	31.8	O K
2880 min Summer	42.982	1.032	0.0	3.6	3.6	31.8	O K
4320 min Summer	42.959	1.009	0.0	2.0	2.0	31.8	O K
5760 min Summer	42.962	1.012	0.0	2.2	2.2	31.8	O K
7200 min Summer	42.944	0.994	0.0	1.2	1.2	31.8	O K
8640 min Summer	42.945	0.995	0.0	1.2	1.2	31.8	O K
10080 min Summer	42.938	0.988	0.0	0.9	0.9	31.8	O K
15 min Winter	42.561	0.611	0.0	0.0	0.0	23.2	O K
30 min Winter	42.915	0.965	0.0	0.2	0.2	31.7	O K
60 min Winter	42.973	1.023	0.0	3.0	3.0	31.8	O K
120 min Winter	43.064	1.114	0.0	7.7	7.7	31.9	Flood Risk
180 min Winter	43.034	1.084	0.0	7.0	7.0	31.9	O K
240 min Winter	43.268	1.318	0.0	7.8	7.8	32.1	Flood Risk
360 min Winter	43.154	1.204	0.0	7.8	7.8	32.0	Flood Risk
480 min Winter	43.074	1.124	0.0	7.7	7.7	31.9	Flood Risk
600 min Winter	43.098	1.148	0.0	7.8	7.8	31.9	Flood Risk
720 min Winter	43.062	1.112	0.0	7.7	7.7	31.9	Flood Risk
960 min Winter	43.016	1.066	0.0	6.0	6.0	31.8	O K
1440 min Winter	42.988	1.038	0.0	4.0	4.0	31.8	O K
2160 min Winter	42.969	1.019	0.0	2.7	2.7	31.8	O K
2880 min Winter	42.970	1.020	0.0	2.8	2.8	31.8	O K
4320 min Winter	42.948	0.998	0.0	1.4	1.4	31.8	O K
5760 min Winter	42.952	1.002	0.0	1.6	1.6	31.8	O K
7200 min Winter	42.938	0.988	0.0	0.9	0.9	31.8	O K

- To accommodate the attenuated volume generated by the 1:100-year rainfall event (including an additional 40% as an allowance for climate change), the run-off will be contained within a system of permeable paving with effective storage depth of 300mm within the granular drainage medium reservoir course;

- A geo-cellular attenuation system at the outfall will also provide further storage which will comprise 40m^2 x 1.2m in depth. The units will be required to withstand vehicular loading where located under the parking courtyard;
- To mitigate the risk of the run-off being polluted, the parking area shall be constructed as a lined permeable paving system to allow any contaminants to be filtered as the run-off passes through the granular drainage medium reservoir course. A 30% void ratio is modelled for the granular reservoir material;
- The drainage medium reservoir course will also include a specialist membrane which will provide a further level of treatment to remove any contaminants that are present in the surface water run-off prior to leaving the site;

3.27 The principles of the SuDS/surface water drainage strategy have been presented on **Drawing No. 190320-002** and appended to this report for further reference.

Water Quality Assessment

3.28 A 70-bed residential care home scheme with access to parking provision, would fall within the low-pollution indices, as outlined in Table 26.2 of Chapter 26 within the CIRIA SuDS Manual 753.

3.29 The following tables outline the water quality assessment in accordance with CIRIA SuDS Manual 753:

Land-use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	**Low**	**0.5**	**0.4**	**0.4**
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

Table 1: Pollution hazard indices for different land-use classifications (land-use shaded yellow applicable for the development)

3.30 To ensure the target-indices are met, the following performance can be expected from the SuDS/surface water drainage strategy:

Type of SuDS component	Mitigation indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bio retention system	0.8	0.8	0.8
Permeable pavement	**0.7**	**0.6**	**0.7**
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Downstream Defender (Proprietary Treatment System*)	0.5	0.4	0.8

*Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1-year return period event, for inflow concentrations relevant to the contributing drainage area.

Table 2: Indicative SuDS mitigation indices for discharges to surface waters (SuDS components shaded yellow applicable to this development)

Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day			
	Required mitigation indices		
Source	**TSS**	**Metals**	**Hydrocarbons**
Low	0.5	0.4	0.4
Mitigation Indices			
Permeable Pavement *(Mitigation index$_1$)*	0.7	0.6	0.7
Proprietary Product *(Mitigation index$_2$)*	N/A	N/A	N/A
Total Performance	0.7	0.6	0.7
Check	Criteria Exceeded	Criteria Exceeded	Criteria Exceeded

Total SuDS mitigation index = mitigation index$_1$ + (0.5 x mitigation index$_2$)

Table 3: Indicative SuDS mitigation indices for discharge to surface waters

3.31 As demonstrated in **Tables 1** to **3** above, the mitigation of pollution provided by the development is appropriate for the low-risk, it represents. The performance criteria can be met by implementing a permeable paving system.

Maintenance Regime

3.32 To ensure that the system is regularly maintained, it is anticipated that the external drainage systems will be placed under a formal agreement with an independent Maintenance Company to carry out periodic inspections and any necessary remediation/maintenance works, thus safeguarding the development for the on-going future.

4.0 FOUL WATER DRAINAGE

4.1 The Sewerage Undertaker for the area is Thames Water Utilities Ltd and a copy of the public sewer asset record plan has been obtained and provided within **Appendix B** of this report for further reference.

4.2 The asset record plan confirms that there is a 225mm diameter foul water public sewer present within Danson Road, running across the site's eastern frontage in the highway. There are no strategic public sewers which cross the site which would need diverting.

4.3 The peak post-development foul water flow for the proposed 70-bed residential care home scheme is predicted to be 2 litres/sec, based on 375 litres/bed per 24-hours (6DWF+10%). An application for a pre-development impact study has been submitted to Thames Water to confirm there is sufficient capacity to accept the foul water flow from the redevelopment scheme.

4.4 To facilitate the drainage connection, the necessary connection consent will be obtained from Thames Water under S106 of the Water Industry Act 1991 to facilitate these works. The application will be submitted once the scheme secures planning permission.

4.5 The principles of the proposed foul water drainage strategy have been presented on **Drawing No. 190320-002** and appended to this report for further reference.

5.0 SUMMARY & RECOMMENDATIONS

5.1 The proposal to redevelop the existing site is considered to follow the national planning legislation which prefers the redevelopment of previously developed brownfield sites.

5.2 A residential care home scheme located in a Flood Zone 1 area is deemed to be suitable for development, as defined by the NPPF.

5.3 The site is not at risk of flooding from a fluvial source and/or tidal estuary, groundwater or a breach of any nearby reservoir. The risks associated with any pluvial/surface water flooding emerging from the adjacent park will be suitably mitigated by setting the ground floor level above the floodwater to provide a provision of freeboard.

5.4 No strategic foul or surface water public sewer networks traverse the site and therefore no protection/diversion works are anticipated.

5.5 An allowance for any future urban creep has not been included in the assessment as the scheme comprises single block which will not be extended without securing a separate planning consent for any alterations.

5.6 Detailed hydraulic modelling has been carried out which demonstrates that the proposed SuDS/surface water drainage system can withstand the impact of a 1:100-year rainfall event (including an additional 40% as an allowance for climate change), thus complying with the requirements of the NPPF.

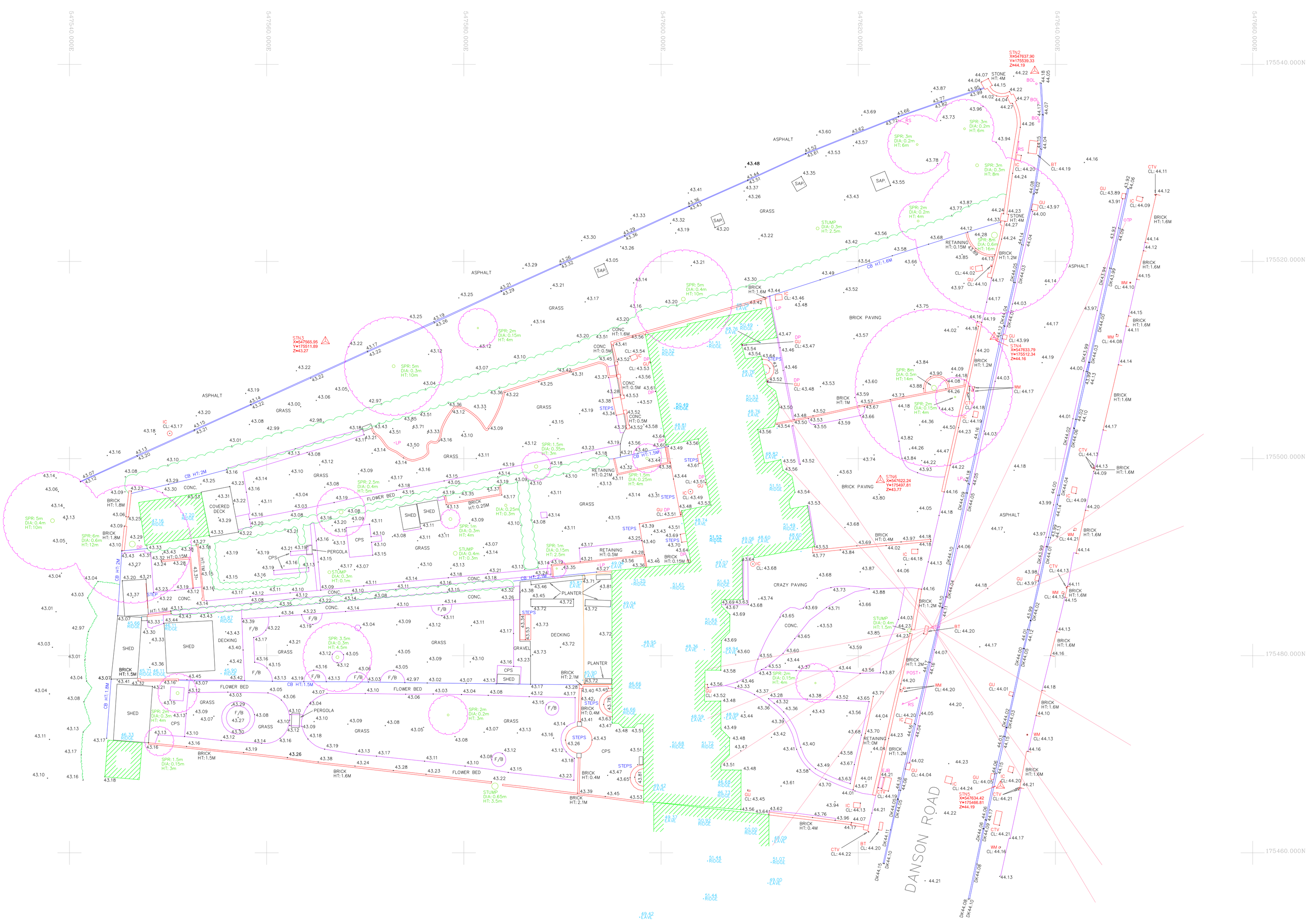
5.7 In view of this assessment, the report concludes that:

i. The redevelopment scheme and its occupants will not be at an increased risk of flooding;
ii. The redevelopment scheme will not increase the risk of flooding elsewhere;
iii. A sustainable drainage scheme can be implemented.

5.8 The findings of this report identify the opportunity to provide a scheme which fully adopts the principles outlined within the NPPF. In this respect, it is anticipated that planning permission can be granted for this application on flood risk and drainage matters. Where additional or further information is required, appropriate planning conditions should be recommended for future consideration.

Appendix A

Topographical Survey



OS North

Topographical Abbreviations

A/R	Assumed Route	MKR	Marker
BH	Borehole	MT	Mercury Telecom Cover
BOL	Bollard	OHC	Overhead Cable
BT	British Telecom Cover	OHP	Overhead Pipe
BW	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
BWK	Brickwork	PB	Post Box
CATV	Cable TV Cover	PGM	Permanent Ground Marker
CB	Close Boarded Fence	PR	Post & Rail Fence
CCTV	Closed Circuit TV	PW	Post & Wire Fence
CHLK	Chainlink Fence	PWM	Post & Wire Mesh Fence
CHPL	Chestnut Paling Fence	RE	Rodding Eye
CL	Cover Level	RG	Road Gully
CM	Cable Marker	RN	Road Name
CP	Catch Pit	RS	Road Sign
CPS	Concrete Paving Slab	RW	Retaining Wall
DIA	Diameter	RWP	Rain Water Pipe
DK	Drop Kerb	SAP	Sapling
DP	Down Pipe	SC	Stop Cock
EJB	Electricity Junction Box	SPR	Spread
EC	Electricity Cover	STA	Traverse Station
EP	Electricity Pole	SV	Stop Valve
ER	Earthing Rod	SVP	Soil Vent Pipe
F/B	Flower Bed	SW	Storm Water
FCL	Finished Ceiling Level	TB	Telephone Box
FH	Fire Hydrant	TBM	Temporary Bench Mark
FIG	Feed Into Ground	TFR	Taken From Records
FW	Foul Water	TJB	Telephone Junction Box
GU	Gully	TPT	Trial Pit
GV	Gas Valve	TL	Traffic Light
H	Height	TP	Telephone Pole
IC	Inspection Cover	UTL	Unable To Lift
IL	Invert Level	UTT	Unable To Trace
IR	Iron Railing Fence	VP	Vent Pipe
KO	Kerb Outlet	WKH	Water Key Hole
LB	Litter Bin	WM	Water Meter
LC	Lamp Column	WV	Water Valve
LP	Lamp Post		
MH	Manhole		

Notes

The survey has been oriented to Ordnance Survey (OS) National Grid (OSGB36) using Industry Standard Network RTK GPS equipment utilising the OS Active Network (OS Net).
A true OSGB36 coordinate has been established on site using the OSTN15 (transformation) & OSGB15 (geoid) models.
The survey detail has been correlated to this point and a further one (or more) OSGB36 points established to produce a true OS bearing for angle orientation.
Scale factor 1.0 has been applied therefore the survey coordinates are shown on a pseudo OS grid.
All dimensions are in metres unless otherwise specified

Rev	Svyr	QA Check	Description	Date
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-
0	/	AM	First Complete Issue	14/05/2019
Prelim	/	-	Preliminary - Not Complete	-

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G,3 Bedford House, 69-79 Fulham High St, LONDON, SW6 3JW, T +44 (0)203 651 7549
5th Floor 1 Temple Way, BRISTOL, BS2 0BY, T +44 (0)117 301 8137
Unit G9, The Arch, 48-52 Floodgate St, BIRMINGHAM, B5 5SL, T +44(0)121 752 1220
Queens Court, 9-17 Eastern Road, ROMFORD, RM1 3NH, T +44(0)121 752 1220

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Oil, Gas & Industrial Surveying & Dimensional Control

SURVEYED	JW
DRAWN	SJ
SCALE	1:200

Ryder Architecture

2-8 Danson Road

TOPOGRAPHICAL SURVEY

JOB No	DRAWING NUMBER
LT319/0554	LT319/0554/P/0001

A1 Sheet - 841mm X 594mm

Appendix B

Public Sewer Asset Record Plan

Asset location search

Thames Water Property Searches

Ardent Consulting Engineers
Felaw Maltings
44Felaw Street
IPSWICH
IP2 8SJ

Search address supplied Danson Road
Bexleyheath
DA6 8HB

Your reference 190320 - Danson Road Bexleyheath

Our reference ALS/ALS Standard/2019_4063440

Search date 22 August 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

searchcode

Asset location search

Property Searches

Search address supplied: Danson Road, Bexleyheath, DA6 8HB

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

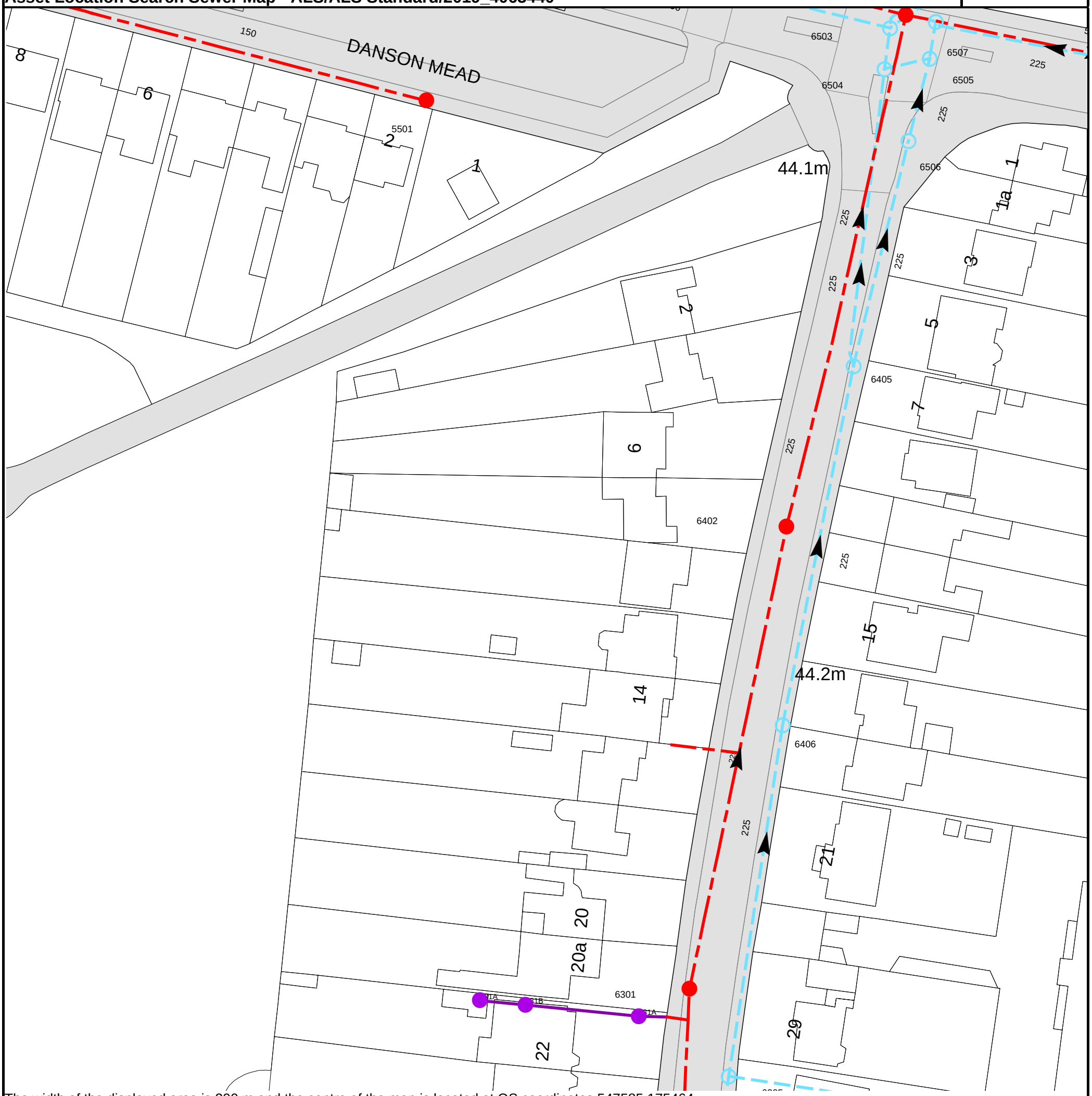
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2019_4063440



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 547585,175464

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5501	43.33	42.24
6406	44.2	43.36
6402	n/a	n/a
6405	44.07	43.21
6504	44.23	42.81
6503	44.12	41.12
6501	44.11	39
6506	44.27	43.36
6505	44.25	43.35
6507	44.12	43.06
6305	n/a	n/a
631A	n/a	n/a
531B	n/a	n/a
531A	n/a	n/a
6301	44.47	40.95

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

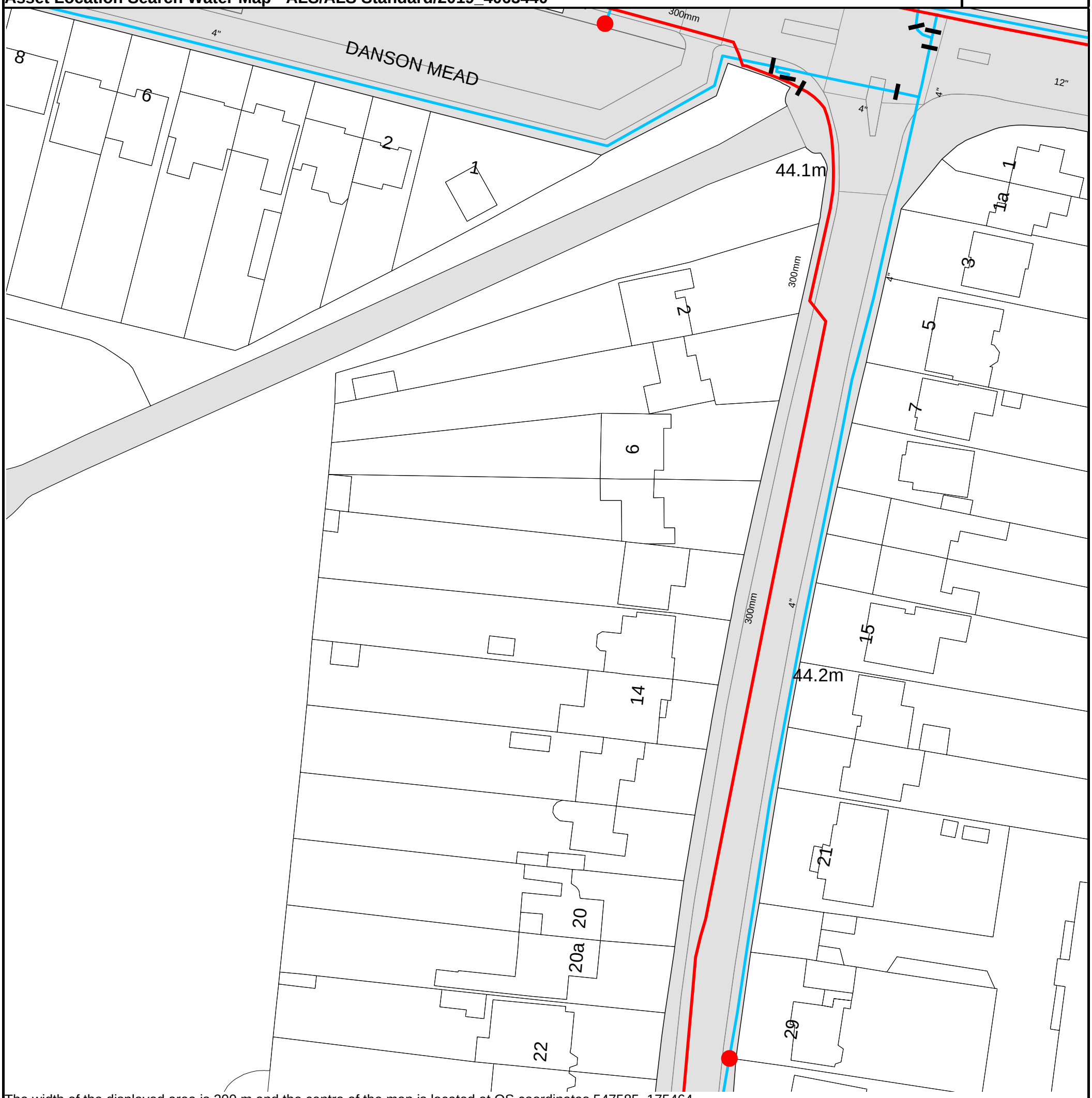
Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2019_4063440



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 547585, 175464.

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0845 070 9148** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Web site: www.tpos.co.uk
Email: admin@tpos.co.uk

You can get more information about the PCCB from https://pccb.org.uk/

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

Appendix C

Development Masterplan Layout



KEY

GENERAL ARRANGEMENT PLANS 1:200

APPLICATION SITE BOUNDARY

SURFACE MATERIALS

P01 CONCRETE PERMEABLE PAVING TO VEHICULAR AREAS AND PARKING BAYS : MARSHALLS TEGULA PRIORA OR SIMILAR APPROVED. SIZE: 240x160x80mm. COLOUR: TRADITIONAL. BOND: HERRINGBONE

P02 CONCRETE PERMEABLE PAVING TO PEDESTRIAN ENTRANCE : MARSHALLS TEGULA PRIORA OR SIMILAR APPROVED. SIZE: 240x160x60/80mm. COLOUR: PENNANT GREY. BOND: HERRINGBONE

P03 CONCRETE PERMEABLE PAVING TO GARDENS: MARSHALLS TEGULA PRIORA OR SIMILAR APPROVED. SIZE: 240/160x160x60mm. COLOUR: HARVEST. BOND: STRETCHER

P04 CONCRETE PERMEABLE PAVING TO PRIVATE PATIOS: MARSHALLS PRIORA FLAG OR SIMILAR APPROVED. SIZE: 400x400x65mm. COLOUR: NATURAL. BOND: STACK

FEATURE BANDING: CONCRETE PERMEABLE PAVING MARSHALLS TEGULA PRIORA OR SIMILAR APPROVED. SIZE: 160x160x60mm. COLOUR: PENNANT GREY. BOND: STRETCHER COURSE IN TWO OR FOUR ROWS

P05 PERMEABLE SURFACE TO SUNKEN GARDEN: BREEDON SELF BINDING GRAVEL OR SIMILAR APPROVED. COLOUR: GOLDEN AMBER

GRAVEL MAINTENANCE PATH. BUFF FLINT GRAVEL BY CED OR SIMILAR APPROVED. 20mm NOMINAL PARTICLE SIZE. LAID TO A DEPTH OF 150mm

DK RAISED KERB: CONSERVATION KERB BY MARSHALLS OR SIMILAR APPROVED. SIZE: 145x255x915mm. COLOUR: SILVER GREY. LAID WITH 125mm UPSTAND. DROP KERBS PROVIDED AT FLUSH ACCESS POINTS

FLUSH KERB: CONSERVATION KERB BY MARSHALLS OR SIMILAR APPROVED. SIZE: 145x255x915mm. COLOUR: SILVER GREY. LAID FLUSH

FLUSH KERB: FLAT TOP EDGING BY MARSHALLS OR SIMILAR APPROVED. SIZE: 50x150x914mm. COLOUR: STANDARD GREY. LAID FLUSH

EDGING: BORDERLINE LANDSCAPE EDGING BY KINLEY OR SIMILAR APPROVED. SIZE: 150x3mm. COLOUR: POWDERCOATED BROWN.

SOFT MATERIALS

ORNAMENTAL SHRUB PLANTING

CUT FLOWER PLANTING

EXISTING HEDGING TO BE RETAINED

PROPOSED HEDGING

LAWN

PROPOSED SPECIMEN SHRUBS

PROPOSED FEATURE TREES

EXISTING TREES TO BE RETAINED

MOUNDED SOIL WITHIN PLANTING AREAS

FURNITURE AND FEATURES

BENCHES AND SEATING: TIMBER BENCHES AND SEATS, LINEAR AND RADIAL. TO HAVE BACKRESTS AND ARMRESTS

RAISED HARDWOOD TIMBER PLANTERS, 750mm HIGH.

WATER FEATURES/PONDS: FOUR WATER FEATURES TO INCLUDE SOME WITH FOUNTAINS/CASCADE/FISH POND

LOCATION FOR BIRD BATH/SUNDIAL

PERGOLA TO MATCH ARCHITECT'S DETAIL

CIRCULAR TREE GRILLE: YARE TREE GRILLE BY GREENBLUE URBAN OR SIMILAR APPROVED. COLOUR: BLACK

RAILINGS TO UPPER GARDEN EDGE. STEEL VERTICAL BAR RAILINGS WITH FLAT TOP EDGE. HEIGHT 1100mm

NEW LOW BRICK WALL WITH RAILINGS TO PUBLIC REALM BOUNDARY. WALL HEIGHT 400mm. STEEL VERTICAL BAR RAILINGS TO SIT ATOP WALL 700mm HIGH. TOTAL HEIGHT 1100mm

TIMBER FENCE AND GATE: HARDWOOD TIMBER FENCE AND GATE, 1800mm HIGH, WITH FOB LOCK ACCESS.

0 10m

North

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Client

CAREBASE

Rev	Description	Date
-	ISSUED FOR PLANNING	XX.XX.20XX

Tyler Grange

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Project title

DANSON ROAD CARE HOME

Drawing title

LANDSCAPE GENERAL ARRANGEMENT PLAN

DRAFT

Issued By	London	T: 020 3934 9470	
Scale	1:200 @ A1	Drawn	HM
Status	PLANNING	Checked	JG
Date	04.09.2019	Approved	XXX

Drawing number

12395_TG_P_100

Revision

-

Appendix D

BGS’s Borehole Record Log

TQ 47 NE - 724
476 754.3

TERRESEARCH LIMITED

British Geological Survey

BOREHOLE NO. 2

Contract Name: Bexley (Crook Log)
Report No.: S. 634/14
Client: W. V. Zinn & Associates
Site Address: Near C.E.G.B. Transformer Station Crook Log, Bexley (On A 207 road from London)
Address: Collingham House, Eagle Street, Southampton Row, London, W.C.1.

Standing Water Level: 22'0"
Diameter: 8"
Water Struck: None
Method of Boring: Shell/Auger
Ground Level: 147.3
Start: 9.3.64 Finish: 10.3.64

Remarks: 4½ hours chiselling from 28'0" to 32'0"

Description of Strata	Thickness	Depth	Disturbed Samples	'U' Cores and 'N' P. Test
Top soil	2'0"	2'0"	J2237 1'6"	
Brown sandy clay	1'6"	3'6"	J2238 2'6"	
Gravel	3'6"	7'0"	B2239 5'0"	5'0" N = 49
Sand	16'0"	23'0"	J2240 7'6" B2241 10'0" J2242 12'6" B2243 15'0" J2244 17'6" B2245 20'0" J2246 22'6"	10'0" N = 129 15'0" N = 139 20'0" N = 152
Gravel and shells	5'0"	28'0"	B2247 25'0" J2248 27'6"	25'0" N = 42
Gravel and shells	4'0"	32'0"	B2249 30'0" J2250 32'0"	
			W2251	
TOTALS	32'0"	32'0"		

Notes: 1. Descriptions are given in accordance with the B.S. Civil Engineering Code of Practice C.P.2001 "Site Investigations"
2. J indicates Jar Samples.
B ,, Bulk Samples.
W ,, Water Samples.
U ,, Undisturbed Core Samples. These are nominal 4 in. diam. and 18 in. long. Depths shown are top of sample.
N ,, Number of blows per ft. penetration [illegible] penetration Tests.

Appendix E

Hydraulic Simulations

Cascade Summary of Results for 190320 - GEO CRATES - 1.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 4 - 1.SRCX	(None)	(None)
190320 - Perm Pave 3 - 1.SRCX		
190320 - Perm Pave 2 - 1.SRCX		
190320 - Perm Pave 1 - 1.SRCX		
190320 - Perm Pave 6 - 1.SRCX		
190320 - Perm Pave 5 - 1.SRCX		

Half Drain Time : 27 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	41.950	0.000	0.0	0.0	0.0	0.0	O K
30 min Summer	41.950	0.000	0.0	0.0	0.0	0.0	O K
60 min Summer	41.956	0.006	0.0	0.0	0.0	0.2	O K
120 min Summer	41.962	0.012	0.0	0.1	0.1	0.5	O K
180 min Summer	41.965	0.015	0.0	0.2	0.2	0.6	O K
240 min Summer	41.967	0.017	0.0	0.2	0.2	0.6	O K
360 min Summer	41.970	0.020	0.0	0.3	0.3	0.8	O K
480 min Summer	41.973	0.023	0.0	0.3	0.3	0.9	O K
600 min Summer	41.974	0.024	0.0	0.4	0.4	0.9	O K
720 min Summer	41.974	0.024	0.0	0.4	0.4	0.9	O K
960 min Summer	41.975	0.025	0.0	0.4	0.4	0.9	O K
1440 min Summer	41.976	0.026	0.0	0.4	0.4	1.0	O K
2160 min Summer	41.975	0.025	0.0	0.4	0.4	1.0	O K
2880 min Summer	41.975	0.025	0.0	0.4	0.4	0.9	O K
4320 min Summer	41.972	0.022	0.0	0.3	0.3	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.0	0
30 min Summer	20.325	0.0	0.0	0
60 min Summer	12.800	0.0	0.8	238
120 min Summer	7.895	0.0	2.4	186
180 min Summer	5.922	0.0	4.0	216
240 min Summer	4.823	0.0	5.3	256
360 min Summer	3.593	0.0	7.0	408
480 min Summer	2.905	0.0	8.3	496
600 min Summer	2.464	0.0	9.2	544
720 min Summer	2.153	0.0	10.0	608
960 min Summer	1.741	0.0	11.1	722
1440 min Summer	1.291	0.0	12.6	958
2160 min Summer	0.957	0.0	14.0	1368
2880 min Summer	0.774	0.0	14.4	1744
4320 min Summer	0.574	0.0	14.3	2488

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Cascade Summary of Results for 190320 - GEO CRATES - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
5760 min Summer	41.971	0.021	0.0	0.3	0.3	0.8	O K
7200 min Summer	41.969	0.019	0.0	0.2	0.2	0.7	O K
8640 min Summer	41.968	0.018	0.0	0.2	0.2	0.7	O K
10080 min Summer	41.967	0.017	0.0	0.2	0.2	0.6	O K
15 min Winter	41.950	0.000	0.0	0.0	0.0	0.0	O K
30 min Winter	41.953	0.003	0.0	0.0	0.0	0.1	O K
60 min Winter	41.959	0.009	0.0	0.1	0.1	0.3	O K
120 min Winter	41.966	0.016	0.0	0.2	0.2	0.6	O K
180 min Winter	41.968	0.018	0.0	0.2	0.2	0.7	O K
240 min Winter	41.972	0.022	0.0	0.3	0.3	0.8	O K
360 min Winter	41.976	0.026	0.0	0.4	0.4	1.0	O K
480 min Winter	41.978	0.028	0.0	0.5	0.5	1.1	O K
600 min Winter	41.979	0.029	0.0	0.5	0.5	1.1	O K
720 min Winter	41.979	0.029	0.0	0.5	0.5	1.1	O K
960 min Winter	41.980	0.030	0.0	0.6	0.6	1.1	O K
1440 min Winter	41.979	0.029	0.0	0.5	0.5	1.1	O K
2160 min Winter	41.977	0.027	0.0	0.5	0.5	1.0	O K
2880 min Winter	41.976	0.026	0.0	0.4	0.4	1.0	O K
4320 min Winter	41.972	0.022	0.0	0.3	0.3	0.8	O K
5760 min Winter	41.970	0.020	0.0	0.3	0.3	0.8	O K
7200 min Winter	41.968	0.018	0.0	0.2	0.2	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
5760 min Summer	0.464	0.0	13.8	3248
7200 min Summer	0.394	0.0	13.3	4024
8640 min Summer	0.344	0.0	12.9	4800
10080 min Summer	0.307	0.0	12.5	5576
15 min Winter	31.296	0.0	0.0	0
30 min Winter	20.325	0.0	0.2	420
60 min Winter	12.800	0.0	1.4	166
120 min Winter	7.895	0.0	4.1	174
180 min Winter	5.922	0.0	6.0	208
240 min Winter	4.823	0.0	7.5	316
360 min Winter	3.593	0.0	9.5	382
480 min Winter	2.905	0.0	10.9	460
600 min Winter	2.464	0.0	12.0	506
720 min Winter	2.153	0.0	12.9	568
960 min Winter	1.741	0.0	14.3	710
1440 min Winter	1.291	0.0	16.1	970
2160 min Winter	0.957	0.0	17.9	1364
2880 min Winter	0.774	0.0	18.8	1764
4320 min Winter	0.574	0.0	19.2	2432
5760 min Winter	0.464	0.0	19.0	3240
7200 min Winter	0.394	0.0	18.3	3960

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Cascade Summary of Results for 190320 - GEO CRATES - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Winter	41.967	0.017	0.0	0.2	0.2	0.6	O K
10080 min Winter	41.966	0.016	0.0	0.2	0.2	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Winter	0.344	0.0	17.4	4752
10080 min Winter	0.307	0.0	16.8	5560

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Cascade Summary of Results for 190320 - GEO CRATES - 30.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 4 - 30.SRCX	(None)	(None)
190320 - Perm Pave 3 - 30.SRCX		
190320 - Perm Pave 2 - 30.SRCX		
190320 - Perm Pave 1 - 30.SRCX		
190320 - Perm Pave 6 - 30.SRCX		
190320 - Perm Pave 5 - 30.SRCX		

Half Drain Time : 13 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	41.968	0.018	0.0	0.2	0.2	0.7	O K
30 min Summer	41.981	0.031	0.0	0.6	0.6	1.2	O K
60 min Summer	41.996	0.046	0.0	1.3	1.3	1.7	O K
120 min Summer	42.011	0.061	0.0	2.2	2.2	2.3	O K
180 min Summer	42.015	0.065	0.0	2.4	2.4	2.5	O K
240 min Summer	42.017	0.067	0.0	2.6	2.6	2.5	O K
360 min Summer	42.019	0.069	0.0	2.7	2.7	2.6	O K
480 min Summer	42.019	0.069	0.0	2.7	2.7	2.6	O K
600 min Summer	42.019	0.069	0.0	2.7	2.7	2.6	O K
720 min Summer	42.017	0.067	0.0	2.6	2.6	2.6	O K
960 min Summer	42.014	0.064	0.0	2.4	2.4	2.4	O K
1440 min Summer	42.008	0.058	0.0	2.0	2.0	2.2	O K
2160 min Summer	42.002	0.052	0.0	1.6	1.6	2.0	O K
2880 min Summer	41.997	0.047	0.0	1.3	1.3	1.8	O K
4320 min Summer	41.990	0.040	0.0	1.0	1.0	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	5.6	93
30 min Summer	49.754	0.0	10.8	114
60 min Summer	30.811	0.0	16.5	112
120 min Summer	18.522	0.0	22.1	134
180 min Summer	13.611	0.0	25.5	170
240 min Summer	10.893	0.0	27.9	196
360 min Summer	7.936	0.0	31.3	256
480 min Summer	6.337	0.0	33.8	318
600 min Summer	5.319	0.0	35.8	380
720 min Summer	4.609	0.0	37.4	444
960 min Summer	3.673	0.0	39.9	564
1440 min Summer	2.665	0.0	43.2	804
2160 min Summer	1.932	0.0	46.6	1164
2880 min Summer	1.536	0.0	48.4	1524
4320 min Summer	1.112	0.0	50.0	2260

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Cascade Summary of Results for 190320 - GEO CRATES - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
5760 min Summer	41.985	0.035	0.0	0.8	0.8	1.3	O K
7200 min Summer	41.982	0.032	0.0	0.7	0.7	1.2	O K
8640 min Summer	41.980	0.030	0.0	0.6	0.6	1.1	O K
10080 min Summer	41.978	0.028	0.0	0.5	0.5	1.1	O K
15 min Winter	41.973	0.023	0.0	0.3	0.3	0.9	O K
30 min Winter	41.988	0.038	0.0	0.9	0.9	1.5	O K
60 min Winter	42.006	0.056	0.0	1.9	1.9	2.1	O K
120 min Winter	42.023	0.073	0.0	3.0	3.0	2.8	O K
180 min Winter	42.027	0.077	0.0	3.2	3.2	2.9	O K
240 min Winter	42.028	0.078	0.0	3.3	3.3	3.0	O K
360 min Winter	42.028	0.078	0.0	3.3	3.3	2.9	O K
480 min Winter	42.025	0.075	0.0	3.1	3.1	2.8	O K
600 min Winter	42.021	0.071	0.0	2.8	2.8	2.7	O K
720 min Winter	42.018	0.068	0.0	2.6	2.6	2.6	O K
960 min Winter	42.013	0.063	0.0	2.3	2.3	2.4	O K
1440 min Winter	42.004	0.054	0.0	1.7	1.7	2.1	O K
2160 min Winter	41.996	0.046	0.0	1.3	1.3	1.8	O K
2880 min Winter	41.991	0.041	0.0	1.0	1.0	1.6	O K
4320 min Winter	41.984	0.034	0.0	0.7	0.7	1.3	O K
5760 min Winter	41.981	0.031	0.0	0.6	0.6	1.2	O K
7200 min Winter	41.978	0.028	0.0	0.5	0.5	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
5760 min Summer	0.883	0.0	50.5	3000
7200 min Summer	0.738	0.0	50.0	3696
8640 min Summer	0.638	0.0	49.1	4440
10080 min Summer	0.564	0.0	47.9	5176
15 min Winter	76.797	0.0	7.7	166
30 min Winter	49.754	0.0	13.6	103
60 min Winter	30.811	0.0	19.9	96
120 min Winter	18.522	0.0	26.3	128
180 min Winter	13.611	0.0	30.0	162
240 min Winter	10.893	0.0	32.7	192
360 min Winter	7.936	0.0	36.6	256
480 min Winter	6.337	0.0	39.5	320
600 min Winter	5.319	0.0	41.7	384
720 min Winter	4.609	0.0	43.6	444
960 min Winter	3.673	0.0	46.5	576
1440 min Winter	2.665	0.0	50.4	808
2160 min Winter	1.932	0.0	54.4	1168
2880 min Winter	1.536	0.0	56.8	1556
4320 min Winter	1.112	0.0	59.2	2292
5760 min Winter	0.883	0.0	60.3	3000
7200 min Winter	0.738	0.0	60.4	3704

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Cascade Summary of Results for 190320 - GEO CRATES - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Winter	41.976	0.026	0.0	0.4	0.4	1.0	O K
10080 min Winter	41.974	0.024	0.0	0.4	0.4	0.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Winter	0.638	0.0	59.9	4456
10080 min Winter	0.564	0.0	59.0	5128

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Cascade Summary of Results for 190320 - GEO CRATES - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 4 - 100 + 40.SRCX	(None)	(None)
190320 - Perm Pave 3 - 100 + 40.SRCX		
190320 - Perm Pave 2 - 100 + 40.SRCX		
190320 - Perm Pave 1 - 100 + 40.SRCX		
190320 - Perm Pave 6 - 100 + 40.SRCX		
190320 - Perm Pave 5 - 100 + 40.SRCX		

Half Drain Time : 12 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.008	0.058	0.0	1.9	1.9	2.2	O K
30 min Summer	42.039	0.089	0.0	4.1	4.1	3.4	O K
60 min Summer	42.079	0.129	0.0	6.7	6.7	4.9	O K
120 min Summer	42.107	0.157	0.0	7.7	7.7	6.0	O K
180 min Summer	42.121	0.171	0.0	7.7	7.7	6.5	O K
240 min Summer	42.122	0.172	0.0	7.7	7.7	6.5	O K
360 min Summer	42.107	0.157	0.0	7.7	7.7	6.0	O K
480 min Summer	42.091	0.141	0.0	7.4	7.4	5.3	O K
600 min Summer	42.079	0.129	0.0	6.7	6.7	4.9	O K
720 min Summer	42.069	0.119	0.0	6.1	6.1	4.5	O K
960 min Summer	42.055	0.105	0.0	5.2	5.2	4.0	O K
1440 min Summer	42.039	0.089	0.0	4.1	4.1	3.4	O K
2160 min Summer	42.025	0.075	0.0	3.1	3.1	2.8	O K
2880 min Summer	42.016	0.066	0.0	2.5	2.5	2.5	O K
4320 min Summer	42.006	0.056	0.0	1.8	1.8	2.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	20.2	65
30 min Summer	91.185	0.0	30.1	59
60 min Summer	56.713	0.0	40.6	72
120 min Summer	34.079	0.0	51.1	110
180 min Summer	24.967	0.0	57.2	142
240 min Summer	19.906	0.0	61.4	174
360 min Summer	14.417	0.0	67.4	232
480 min Summer	11.468	0.0	72.0	288
600 min Summer	9.596	0.0	75.5	348
720 min Summer	8.292	0.0	78.5	410
960 min Summer	6.581	0.0	83.1	530
1440 min Summer	4.744	0.0	89.6	776
2160 min Summer	3.415	0.0	96.2	1148
2880 min Summer	2.702	0.0	100.4	1508
4320 min Summer	1.940	0.0	105.4	2232

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Cascade Summary of Results for 190320 - GEO CRATES - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
5760 min Summer	41.999	0.049	0.0	1.5	1.5	1.9	O K
7200 min Summer	41.995	0.045	0.0	1.2	1.2	1.7	O K
8640 min Summer	41.991	0.041	0.0	1.0	1.0	1.6	O K
10080 min Summer	41.988	0.038	0.0	0.9	0.9	1.5	O K
15 min Winter	42.019	0.069	0.0	2.7	2.7	2.6	O K
30 min Winter	42.058	0.108	0.0	5.5	5.5	4.1	O K
60 min Winter	42.118	0.168	0.0	7.7	7.7	6.4	O K
120 min Winter	42.189	0.239	0.0	7.8	7.8	9.1	O K
180 min Winter	42.194	0.244	0.0	7.8	7.8	9.3	O K
240 min Winter	42.174	0.224	0.0	7.8	7.8	8.5	O K
360 min Winter	42.114	0.164	0.0	7.7	7.7	6.2	O K
480 min Winter	42.084	0.134	0.0	7.0	7.0	5.1	O K
600 min Winter	42.068	0.118	0.0	6.1	6.1	4.5	O K
720 min Winter	42.057	0.107	0.0	5.4	5.4	4.1	O K
960 min Winter	42.044	0.094	0.0	4.4	4.4	3.6	O K
1440 min Winter	42.028	0.078	0.0	3.3	3.3	2.9	O K
2160 min Winter	42.015	0.065	0.0	2.4	2.4	2.5	O K
2880 min Winter	42.007	0.057	0.0	1.9	1.9	2.2	O K
4320 min Winter	41.997	0.047	0.0	1.4	1.4	1.8	O K
5760 min Winter	41.992	0.042	0.0	1.1	1.1	1.6	O K
7200 min Winter	41.988	0.038	0.0	0.9	0.9	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
5760 min Summer	1.532	0.0	108.4	2952
7200 min Summer	1.275	0.0	109.7	3680
8640 min Summer	1.097	0.0	110.2	4408
10080 min Summer	0.966	0.0	110.0	5128
15 min Winter	139.587	0.0	24.1	58
30 min Winter	91.185	0.0	35.1	55
60 min Winter	56.713	0.0	46.9	76
120 min Winter	34.079	0.0	58.7	122
180 min Winter	24.967	0.0	65.5	154
240 min Winter	19.906	0.0	70.3	186
360 min Winter	14.417	0.0	77.1	240
480 min Winter	11.468	0.0	82.2	292
600 min Winter	9.596	0.0	86.2	352
720 min Winter	8.292	0.0	89.6	418
960 min Winter	6.581	0.0	94.9	542
1440 min Winter	4.744	0.0	102.4	780
2160 min Winter	3.415	0.0	110.0	1148
2880 min Winter	2.702	0.0	115.0	1500
4320 min Winter	1.940	0.0	121.2	2252
5760 min Winter	1.532	0.0	125.0	2960
7200 min Winter	1.275	0.0	127.2	3688

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Cascade Summary of Results for 190320 - GEO CRATES - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Winter	41.985	0.035	0.0	0.8	0.8	1.3	O K
10080 min Winter	41.982	0.032	0.0	0.7	0.7	1.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Winter	1.097	0.0	128.3	4384
10080 min Winter	0.966	0.0	128.8	5104

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Cascade Summary of Results for 190320 - Perm Pave 1 - 1.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	190320 - Perm Pave 2 - 1.SRCX	(None)

Half Drain Time : 44 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.903	0.003	0.0	0.0	0.0	0.1	O K
30 min Summer	42.908	0.008	0.0	0.0	0.0	0.3	O K
60 min Summer	42.911	0.011	0.0	0.1	0.1	0.4	O K
120 min Summer	42.913	0.013	0.0	0.1	0.1	0.5	O K
180 min Summer	42.914	0.014	0.0	0.1	0.1	0.5	O K
240 min Summer	42.915	0.015	0.0	0.2	0.2	0.5	O K
360 min Summer	42.915	0.015	0.0	0.2	0.2	0.5	O K
480 min Summer	42.915	0.015	0.0	0.2	0.2	0.5	O K
600 min Summer	42.914	0.014	0.0	0.1	0.1	0.5	O K
720 min Summer	42.914	0.014	0.0	0.1	0.1	0.5	O K
960 min Summer	42.913	0.013	0.0	0.1	0.1	0.5	O K
1440 min Summer	42.912	0.012	0.0	0.1	0.1	0.4	O K
2160 min Summer	42.911	0.011	0.0	0.1	0.1	0.4	O K
2880 min Summer	42.910	0.010	0.0	0.1	0.1	0.4	O K
4320 min Summer	42.909	0.009	0.0	0.1	0.1	0.3	O K
5760 min Summer	42.908	0.008	0.0	0.0	0.0	0.3	O K
7200 min Summer	42.907	0.007	0.0	0.0	0.0	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.1	27
30 min Summer	20.325	0.0	0.3	39
60 min Summer	12.800	0.0	0.5	62
120 min Summer	7.895	0.0	0.8	90
180 min Summer	5.922	0.0	0.9	122
240 min Summer	4.823	0.0	1.0	154
360 min Summer	3.593	0.0	1.2	218
480 min Summer	2.905	0.0	1.3	280
600 min Summer	2.464	0.0	1.4	340
720 min Summer	2.153	0.0	1.5	402
960 min Summer	1.741	0.0	1.6	518
1440 min Summer	1.291	0.0	1.8	758
2160 min Summer	0.957	0.0	1.9	1124
2880 min Summer	0.774	0.0	2.0	1468
4320 min Summer	0.574	0.0	2.0	2232
5760 min Summer	0.464	0.0	1.9	2952
7200 min Summer	0.394	0.0	1.9	3672

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Cascade Summary of Results for 190320 - Perm Pave 1 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.907	0.007	0.0	0.0	0.0	0.2	O K
10080 min Summer	42.906	0.006	0.0	0.0	0.0	0.2	O K
15 min Winter	42.905	0.005	0.0	0.0	0.0	0.2	O K
30 min Winter	42.910	0.010	0.0	0.1	0.1	0.4	O K
60 min Winter	42.914	0.014	0.0	0.1	0.1	0.5	O K
120 min Winter	42.916	0.016	0.0	0.2	0.2	0.6	O K
180 min Winter	42.916	0.016	0.0	0.2	0.2	0.6	O K
240 min Winter	42.916	0.016	0.0	0.2	0.2	0.6	O K
360 min Winter	42.916	0.016	0.0	0.2	0.2	0.6	O K
480 min Winter	42.915	0.015	0.0	0.2	0.2	0.5	O K
600 min Winter	42.914	0.014	0.0	0.1	0.1	0.5	O K
720 min Winter	42.913	0.013	0.0	0.1	0.1	0.5	O K
960 min Winter	42.912	0.012	0.0	0.1	0.1	0.4	O K
1440 min Winter	42.911	0.011	0.0	0.1	0.1	0.4	O K
2160 min Winter	42.910	0.010	0.0	0.1	0.1	0.3	O K
2880 min Winter	42.909	0.009	0.0	0.1	0.1	0.3	O K
4320 min Winter	42.908	0.008	0.0	0.0	0.0	0.3	O K
5760 min Winter	42.907	0.007	0.0	0.0	0.0	0.2	O K
7200 min Winter	42.906	0.006	0.0	0.0	0.0	0.2	O K
8640 min Winter	42.906	0.006	0.0	0.0	0.0	0.2	O K
10080 min Winter	42.905	0.005	0.0	0.0	0.0	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.344	0.0	1.8	4392
10080 min Summer	0.307	0.0	1.8	5112
15 min Winter	31.296	0.0	0.2	26
30 min Winter	20.325	0.0	0.4	37
60 min Winter	12.800	0.0	0.6	60
120 min Winter	7.895	0.0	0.9	92
180 min Winter	5.922	0.0	1.1	128
240 min Winter	4.823	0.0	1.3	160
360 min Winter	3.593	0.0	1.5	226
480 min Winter	2.905	0.0	1.6	288
600 min Winter	2.464	0.0	1.7	352
720 min Winter	2.153	0.0	1.8	410
960 min Winter	1.741	0.0	1.9	530
1440 min Winter	1.291	0.0	2.1	774
2160 min Winter	0.957	0.0	2.3	1132
2880 min Winter	0.774	0.0	2.4	1464
4320 min Winter	0.574	0.0	2.5	2224
5760 min Winter	0.464	0.0	2.4	2888
7200 min Winter	0.394	0.0	2.4	3760
8640 min Winter	0.344	0.0	2.3	4424
10080 min Winter	0.307	0.0	2.2	5048

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Cascade Summary of Results for 190320 - Perm Pave 1 - 30.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	190320 - Perm Pave 2 - 30.SRCX	(None)

Half Drain Time : 23 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.926	0.026	0.0	0.4	0.4	0.9	O K
30 min Summer	42.932	0.032	0.0	0.6	0.6	1.2	O K
60 min Summer	42.936	0.036	0.0	0.8	0.8	1.3	O K
120 min Summer	42.936	0.036	0.0	0.8	0.8	1.3	O K
180 min Summer	42.935	0.035	0.0	0.7	0.7	1.3	O K
240 min Summer	42.934	0.034	0.0	0.7	0.7	1.2	O K
360 min Summer	42.931	0.031	0.0	0.6	0.6	1.1	O K
480 min Summer	42.928	0.028	0.0	0.5	0.5	1.0	O K
600 min Summer	42.927	0.027	0.0	0.4	0.4	1.0	O K
720 min Summer	42.925	0.025	0.0	0.4	0.4	0.9	O K
960 min Summer	42.923	0.023	0.0	0.3	0.3	0.8	O K
1440 min Summer	42.919	0.019	0.0	0.2	0.2	0.7	O K
2160 min Summer	42.916	0.016	0.0	0.2	0.2	0.6	O K
2880 min Summer	42.914	0.014	0.0	0.1	0.1	0.5	O K
4320 min Summer	42.912	0.012	0.0	0.1	0.1	0.4	O K
5760 min Summer	42.911	0.011	0.0	0.1	0.1	0.4	O K
7200 min Summer	42.910	0.010	0.0	0.1	0.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	1.1	22
30 min Summer	49.754	0.0	1.6	31
60 min Summer	30.811	0.0	2.1	46
120 min Summer	18.522	0.0	2.7	78
180 min Summer	13.611	0.0	3.0	110
240 min Summer	10.893	0.0	3.2	140
360 min Summer	7.936	0.0	3.6	202
480 min Summer	6.337	0.0	3.8	262
600 min Summer	5.319	0.0	4.0	322
720 min Summer	4.609	0.0	4.2	382
960 min Summer	3.673	0.0	4.4	506
1440 min Summer	2.665	0.0	4.8	752
2160 min Summer	1.932	0.0	5.1	1108
2880 min Summer	1.536	0.0	5.3	1468
4320 min Summer	1.112	0.0	5.5	2192
5760 min Summer	0.883	0.0	5.5	2936
7200 min Summer	0.738	0.0	5.5	3664

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Cascade Summary of Results for 190320 - Perm Pave 1 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.910	0.010	0.0	0.1	0.1	0.3	O K
10080 min Summer	42.909	0.009	0.0	0.1	0.1	0.3	O K
15 min Winter	42.930	0.030	0.0	0.5	0.5	1.1	O K
30 min Winter	42.937	0.037	0.0	0.8	0.8	1.3	O K
60 min Winter	42.939	0.039	0.0	0.9	0.9	1.4	O K
120 min Winter	42.937	0.037	0.0	0.8	0.8	1.4	O K
180 min Winter	42.935	0.035	0.0	0.7	0.7	1.3	O K
240 min Winter	42.933	0.033	0.0	0.6	0.6	1.2	O K
360 min Winter	42.929	0.029	0.0	0.5	0.5	1.0	O K
480 min Winter	42.926	0.026	0.0	0.4	0.4	0.9	O K
600 min Winter	42.924	0.024	0.0	0.4	0.4	0.9	O K
720 min Winter	42.923	0.023	0.0	0.3	0.3	0.8	O K
960 min Winter	42.920	0.020	0.0	0.2	0.2	0.7	O K
1440 min Winter	42.916	0.016	0.0	0.2	0.2	0.6	O K
2160 min Winter	42.914	0.014	0.0	0.1	0.1	0.5	O K
2880 min Winter	42.912	0.012	0.0	0.1	0.1	0.4	O K
4320 min Winter	42.911	0.011	0.0	0.1	0.1	0.4	O K
5760 min Winter	42.910	0.010	0.0	0.1	0.1	0.3	O K
7200 min Winter	42.909	0.009	0.0	0.1	0.1	0.3	O K
8640 min Winter	42.908	0.008	0.0	0.0	0.0	0.3	O K
10080 min Winter	42.908	0.008	0.0	0.0	0.0	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.638	0.0	5.4	4352
10080 min Summer	0.564	0.0	5.3	5072
15 min Winter	76.797	0.0	1.3	22
30 min Winter	49.754	0.0	1.9	31
60 min Winter	30.811	0.0	2.5	48
120 min Winter	18.522	0.0	3.1	80
180 min Winter	13.611	0.0	3.4	112
240 min Winter	10.893	0.0	3.7	144
360 min Winter	7.936	0.0	4.1	206
480 min Winter	6.337	0.0	4.4	264
600 min Winter	5.319	0.0	4.6	326
720 min Winter	4.609	0.0	4.8	392
960 min Winter	3.673	0.0	5.1	514
1440 min Winter	2.665	0.0	5.5	738
2160 min Winter	1.932	0.0	5.8	1140
2880 min Winter	1.536	0.0	6.1	1464
4320 min Winter	1.112	0.0	6.3	2200
5760 min Winter	0.883	0.0	6.5	2856
7200 min Winter	0.738	0.0	6.5	3632
8640 min Winter	0.638	0.0	6.5	4352
10080 min Winter	0.564	0.0	6.4	5080

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Cascade Summary of Results for 190320 - Perm Pave 1 - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	190320 - Perm Pave 2 - 100 + 40.SRCX	(None)

Half Drain Time : 15 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.951	0.051	0.0	1.5	1.5	1.9	O K
30 min Summer	42.959	0.059	0.0	2.0	2.0	2.2	O K
60 min Summer	42.962	0.062	0.0	2.2	2.2	2.3	O K
120 min Summer	42.959	0.059	0.0	2.0	2.0	2.2	O K
180 min Summer	42.954	0.054	0.0	1.7	1.7	2.0	O K
240 min Summer	42.951	0.051	0.0	1.5	1.5	1.9	O K
360 min Summer	42.945	0.045	0.0	1.1	1.1	1.6	O K
480 min Summer	42.941	0.041	0.0	1.0	1.0	1.5	O K
600 min Summer	42.938	0.038	0.0	0.8	0.8	1.4	O K
720 min Summer	42.935	0.035	0.0	0.7	0.7	1.3	O K
960 min Summer	42.932	0.032	0.0	0.6	0.6	1.2	O K
1440 min Summer	42.927	0.027	0.0	0.4	0.4	1.0	O K
2160 min Summer	42.923	0.023	0.0	0.3	0.3	0.8	O K
2880 min Summer	42.920	0.020	0.0	0.2	0.2	0.7	O K
4320 min Summer	42.916	0.016	0.0	0.2	0.2	0.6	O K
5760 min Summer	42.914	0.014	0.0	0.1	0.1	0.5	O K
7200 min Summer	42.913	0.013	0.0	0.1	0.1	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	2.5	20
30 min Summer	91.185	0.0	3.5	28
60 min Summer	56.713	0.0	4.5	44
120 min Summer	34.079	0.0	5.5	74
180 min Summer	24.967	0.0	6.1	104
240 min Summer	19.906	0.0	6.5	134
360 min Summer	14.417	0.0	7.1	196
480 min Summer	11.468	0.0	7.5	256
600 min Summer	9.596	0.0	7.9	316
720 min Summer	8.292	0.0	8.1	376
960 min Summer	6.581	0.0	8.6	500
1440 min Summer	4.744	0.0	9.3	738
2160 min Summer	3.415	0.0	9.9	1104
2880 min Summer	2.702	0.0	10.3	1476
4320 min Summer	1.940	0.0	10.8	2204
5760 min Summer	1.532	0.0	11.1	2872
7200 min Summer	1.275	0.0	11.3	3672

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Cascade Summary of Results for 190320 - Perm Pave 1 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.912	0.012	0.0	0.1	0.1	0.4	O K
10080 min Summer	42.911	0.011	0.0	0.1	0.1	0.4	O K
15 min Winter	42.956	0.056	0.0	1.8	1.8	2.1	O K
30 min Winter	42.964	0.064	0.0	2.3	2.3	2.4	O K
60 min Winter	42.964	0.064	0.0	2.3	2.3	2.4	O K
120 min Winter	42.957	0.057	0.0	1.9	1.9	2.1	O K
180 min Winter	42.951	0.051	0.0	1.5	1.5	1.9	O K
240 min Winter	42.947	0.047	0.0	1.3	1.3	1.7	O K
360 min Winter	42.940	0.040	0.0	1.0	1.0	1.5	O K
480 min Winter	42.936	0.036	0.0	0.8	0.8	1.3	O K
600 min Winter	42.933	0.033	0.0	0.7	0.7	1.2	O K
720 min Winter	42.931	0.031	0.0	0.6	0.6	1.1	O K
960 min Winter	42.928	0.028	0.0	0.5	0.5	1.0	O K
1440 min Winter	42.924	0.024	0.0	0.3	0.3	0.9	O K
2160 min Winter	42.919	0.019	0.0	0.2	0.2	0.7	O K
2880 min Winter	42.916	0.016	0.0	0.2	0.2	0.6	O K
4320 min Winter	42.914	0.014	0.0	0.1	0.1	0.5	O K
5760 min Winter	42.912	0.012	0.0	0.1	0.1	0.4	O K
7200 min Winter	42.911	0.011	0.0	0.1	0.1	0.4	O K
8640 min Winter	42.911	0.011	0.0	0.1	0.1	0.4	O K
10080 min Winter	42.910	0.010	0.0	0.1	0.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.097	0.0	11.4	4320
10080 min Summer	0.966	0.0	11.4	5136
15 min Winter	139.587	0.0	2.9	20
30 min Winter	91.185	0.0	4.0	29
60 min Winter	56.713	0.0	5.1	44
120 min Winter	34.079	0.0	6.2	76
180 min Winter	24.967	0.0	6.9	106
240 min Winter	19.906	0.0	7.3	138
360 min Winter	14.417	0.0	8.0	200
480 min Winter	11.468	0.0	8.5	258
600 min Winter	9.596	0.0	8.9	322
720 min Winter	8.292	0.0	9.2	378
960 min Winter	6.581	0.0	9.7	502
1440 min Winter	4.744	0.0	10.5	748
2160 min Winter	3.415	0.0	11.2	1104
2880 min Winter	2.702	0.0	11.7	1500
4320 min Winter	1.940	0.0	12.4	2188
5760 min Winter	1.532	0.0	12.7	2840
7200 min Winter	1.275	0.0	13.0	3568
8640 min Winter	1.097	0.0	13.1	4416
10080 min Winter	0.966	0.0	13.2	5008

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Cascade Summary of Results for 190320 - Perm Pave 2 - 1.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 1 - 1.SRCX	190320 - Perm Pave 3 - 1.SRCX	(None)

Half Drain Time : 11 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.952	0.002	0.0	0.0	0.0	0.0	O K
30 min Summer	42.956	0.006	0.0	0.0	0.0	0.0	O K
60 min Summer	42.960	0.010	0.0	0.1	0.1	0.1	O K
120 min Summer	42.963	0.013	0.0	0.1	0.1	0.1	O K
180 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
240 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
360 min Summer	42.965	0.015	0.0	0.2	0.2	0.1	O K
480 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
600 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
720 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
960 min Summer	42.963	0.013	0.0	0.1	0.1	0.1	O K
1440 min Summer	42.962	0.012	0.0	0.1	0.1	0.1	O K
2160 min Summer	42.961	0.011	0.0	0.1	0.1	0.1	O K
2880 min Summer	42.960	0.010	0.0	0.1	0.1	0.1	O K
4320 min Summer	42.959	0.009	0.0	0.0	0.0	0.1	O K
5760 min Summer	42.958	0.008	0.0	0.0	0.0	0.1	O K
7200 min Summer	42.957	0.007	0.0	0.0	0.0	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.1	86
30 min Summer	20.325	0.0	0.3	73
60 min Summer	12.800	0.0	0.5	74
120 min Summer	7.895	0.0	0.8	102
180 min Summer	5.922	0.0	0.9	132
240 min Summer	4.823	0.0	1.0	164
360 min Summer	3.593	0.0	1.2	228
480 min Summer	2.905	0.0	1.3	284
600 min Summer	2.464	0.0	1.4	344
720 min Summer	2.153	0.0	1.5	400
960 min Summer	1.741	0.0	1.6	520
1440 min Summer	1.291	0.0	1.8	762
2160 min Summer	0.957	0.0	1.9	1100
2880 min Summer	0.774	0.0	2.0	1476
4320 min Summer	0.574	0.0	2.0	2320
5760 min Summer	0.464	0.0	1.9	2896
7200 min Summer	0.394	0.0	1.9	3680

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Cascade Summary of Results for 190320 - Perm Pave 2 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.957	0.007	0.0	0.0	0.0	0.1	O K
10080 min Summer	42.956	0.006	0.0	0.0	0.0	0.0	O K
15 min Winter	42.953	0.003	0.0	0.0	0.0	0.0	O K
30 min Winter	42.958	0.008	0.0	0.0	0.0	0.1	O K
60 min Winter	42.963	0.013	0.0	0.1	0.1	0.1	O K
120 min Winter	42.965	0.015	0.0	0.2	0.2	0.1	O K
180 min Winter	42.966	0.016	0.0	0.2	0.2	0.1	O K
240 min Winter	42.966	0.016	0.0	0.2	0.2	0.1	O K
360 min Winter	42.965	0.015	0.0	0.2	0.2	0.1	O K
480 min Winter	42.965	0.015	0.0	0.2	0.2	0.1	O K
600 min Winter	42.964	0.014	0.0	0.1	0.1	0.1	O K
720 min Winter	42.963	0.013	0.0	0.1	0.1	0.1	O K
960 min Winter	42.962	0.012	0.0	0.1	0.1	0.1	O K
1440 min Winter	42.961	0.011	0.0	0.1	0.1	0.1	O K
2160 min Winter	42.960	0.010	0.0	0.1	0.1	0.1	O K
2880 min Winter	42.959	0.009	0.0	0.1	0.1	0.1	O K
4320 min Winter	42.958	0.008	0.0	0.0	0.0	0.1	O K
5760 min Winter	42.957	0.007	0.0	0.0	0.0	0.1	O K
7200 min Winter	42.956	0.006	0.0	0.0	0.0	0.0	O K
8640 min Winter	42.956	0.006	0.0	0.0	0.0	0.0	O K
10080 min Winter	42.955	0.005	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.344	0.0	1.8	4376
10080 min Summer	0.307	0.0	1.8	5056
15 min Winter	31.296	0.0	0.2	96
30 min Winter	20.325	0.0	0.4	63
60 min Winter	12.800	0.0	0.6	70
120 min Winter	7.895	0.0	0.9	108
180 min Winter	5.922	0.0	1.1	138
240 min Winter	4.823	0.0	1.3	166
360 min Winter	3.593	0.0	1.5	242
480 min Winter	2.905	0.0	1.6	296
600 min Winter	2.464	0.0	1.7	338
720 min Winter	2.153	0.0	1.8	396
960 min Winter	1.741	0.0	1.9	554
1440 min Winter	1.291	0.0	2.1	840
2160 min Winter	0.957	0.0	2.3	1068
2880 min Winter	0.774	0.0	2.4	1492
4320 min Winter	0.574	0.0	2.5	2256
5760 min Winter	0.464	0.0	2.4	2904
7200 min Winter	0.394	0.0	2.4	4056
8640 min Winter	0.344	0.0	2.3	4344
10080 min Winter	0.307	0.0	2.2	4832

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Cascade Summary of Results for 190320 - Perm Pave 2 - 30.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 1 - 30.SRCX	190320 - Perm Pave 3 - 30.SRCX	(None)

Half Drain Time : 5 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.971	0.021	0.0	0.3	0.3	0.2	O K
30 min Summer	42.980	0.030	0.0	0.5	0.5	0.2	O K
60 min Summer	42.984	0.034	0.0	0.7	0.7	0.3	O K
120 min Summer	42.985	0.035	0.0	0.7	0.7	0.3	O K
180 min Summer	42.985	0.035	0.0	0.7	0.7	0.3	O K
240 min Summer	42.983	0.033	0.0	0.7	0.7	0.3	O K
360 min Summer	42.981	0.031	0.0	0.6	0.6	0.3	O K
480 min Summer	42.978	0.028	0.0	0.5	0.5	0.2	O K
600 min Summer	42.976	0.026	0.0	0.4	0.4	0.2	O K
720 min Summer	42.975	0.025	0.0	0.4	0.4	0.2	O K
960 min Summer	42.973	0.023	0.0	0.3	0.3	0.2	O K
1440 min Summer	42.969	0.019	0.0	0.2	0.2	0.2	O K
2160 min Summer	42.966	0.016	0.0	0.2	0.2	0.1	O K
2880 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
4320 min Summer	42.962	0.012	0.0	0.1	0.1	0.1	O K
5760 min Summer	42.961	0.011	0.0	0.1	0.1	0.1	O K
7200 min Summer	42.960	0.010	0.0	0.1	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	1.1	32
30 min Summer	49.754	0.0	1.6	38
60 min Summer	30.811	0.0	2.1	52
120 min Summer	18.522	0.0	2.7	82
180 min Summer	13.611	0.0	3.0	112
240 min Summer	10.893	0.0	3.2	144
360 min Summer	7.936	0.0	3.6	204
480 min Summer	6.337	0.0	3.8	274
600 min Summer	5.319	0.0	4.0	324
720 min Summer	4.609	0.0	4.2	384
960 min Summer	3.673	0.0	4.4	508
1440 min Summer	2.665	0.0	4.8	782
2160 min Summer	1.932	0.0	5.1	1132
2880 min Summer	1.536	0.0	5.3	1472
4320 min Summer	1.112	0.0	5.5	2208
5760 min Summer	0.883	0.0	5.5	2856
7200 min Summer	0.738	0.0	5.5	3808

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Cascade Summary of Results for 190320 - Perm Pave 2 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.960	0.010	0.0	0.1	0.1	0.1	O K
10080 min Summer	42.959	0.009	0.0	0.1	0.1	0.1	O K
15 min Winter	42.975	0.025	0.0	0.4	0.4	0.2	O K
30 min Winter	42.984	0.034	0.0	0.7	0.7	0.3	O K
60 min Winter	42.988	0.038	0.0	0.8	0.8	0.3	O K
120 min Winter	42.987	0.037	0.0	0.8	0.8	0.3	O K
180 min Winter	42.985	0.035	0.0	0.7	0.7	0.3	O K
240 min Winter	42.982	0.032	0.0	0.6	0.6	0.3	O K
360 min Winter	42.979	0.029	0.0	0.5	0.5	0.2	O K
480 min Winter	42.976	0.026	0.0	0.4	0.4	0.2	O K
600 min Winter	42.974	0.024	0.0	0.4	0.4	0.2	O K
720 min Winter	42.972	0.022	0.0	0.3	0.3	0.2	O K
960 min Winter	42.970	0.020	0.0	0.2	0.2	0.2	O K
1440 min Winter	42.966	0.016	0.0	0.2	0.2	0.1	O K
2160 min Winter	42.964	0.014	0.0	0.1	0.1	0.1	O K
2880 min Winter	42.962	0.012	0.0	0.1	0.1	0.1	O K
4320 min Winter	42.961	0.011	0.0	0.1	0.1	0.1	O K
5760 min Winter	42.960	0.010	0.0	0.1	0.1	0.1	O K
7200 min Winter	42.959	0.009	0.0	0.1	0.1	0.1	O K
8640 min Winter	42.958	0.008	0.0	0.0	0.0	0.1	O K
10080 min Winter	42.958	0.008	0.0	0.0	0.0	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.638	0.0	5.4	4384
10080 min Summer	0.564	0.0	5.3	5328
15 min Winter	76.797	0.0	1.3	30
30 min Winter	49.754	0.0	1.9	36
60 min Winter	30.811	0.0	2.5	52
120 min Winter	18.522	0.0	3.1	84
180 min Winter	13.611	0.0	3.4	120
240 min Winter	10.893	0.0	3.7	146
360 min Winter	7.936	0.0	4.1	204
480 min Winter	6.337	0.0	4.4	268
600 min Winter	5.319	0.0	4.6	324
720 min Winter	4.609	0.0	4.8	396
960 min Winter	3.673	0.0	5.1	512
1440 min Winter	2.665	0.0	5.5	742
2160 min Winter	1.932	0.0	5.8	1124
2880 min Winter	1.536	0.0	6.1	1468
4320 min Winter	1.112	0.0	6.3	2192
5760 min Winter	0.883	0.0	6.5	2984
7200 min Winter	0.738	0.0	6.5	3992
8640 min Winter	0.638	0.0	6.5	4248
10080 min Winter	0.564	0.0	6.4	5336

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Cascade Summary of Results for 190320 - Perm Pave 2 - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 1 - 100 + 40.SRCX	190320 - Perm Pave 3 - 100 + 40.SRCX	(None)

Half Drain Time : 4 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.997	0.047	0.0	1.3	1.3	0.4	O K
30 min Summer	43.007	0.057	0.0	1.9	1.9	0.5	O K
60 min Summer	43.010	0.060	0.0	2.1	2.1	0.5	O K
120 min Summer	43.008	0.058	0.0	1.9	1.9	0.5	O K
180 min Summer	43.004	0.054	0.0	1.7	1.7	0.4	O K
240 min Summer	43.000	0.050	0.0	1.5	1.5	0.4	O K
360 min Summer	42.995	0.045	0.0	1.1	1.1	0.4	O K
480 min Summer	42.991	0.041	0.0	1.0	1.0	0.3	O K
600 min Summer	42.987	0.037	0.0	0.8	0.8	0.3	O K
720 min Summer	42.985	0.035	0.0	0.7	0.7	0.3	O K
960 min Summer	42.982	0.032	0.0	0.6	0.6	0.3	O K
1440 min Summer	42.977	0.027	0.0	0.4	0.4	0.2	O K
2160 min Summer	42.973	0.023	0.0	0.3	0.3	0.2	O K
2880 min Summer	42.970	0.020	0.0	0.2	0.2	0.2	O K
4320 min Summer	42.966	0.016	0.0	0.2	0.2	0.1	O K
5760 min Summer	42.964	0.014	0.0	0.1	0.1	0.1	O K
7200 min Summer	42.963	0.013	0.0	0.1	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	2.5	24
30 min Summer	91.185	0.0	3.5	31
60 min Summer	56.713	0.0	4.5	46
120 min Summer	34.079	0.0	5.5	76
180 min Summer	24.967	0.0	6.1	108
240 min Summer	19.906	0.0	6.5	138
360 min Summer	14.417	0.0	7.1	198
480 min Summer	11.468	0.0	7.5	258
600 min Summer	9.596	0.0	7.9	318
720 min Summer	8.292	0.0	8.1	376
960 min Summer	6.581	0.0	8.6	514
1440 min Summer	4.744	0.0	9.2	740
2160 min Summer	3.415	0.0	9.9	1108
2880 min Summer	2.702	0.0	10.3	1456
4320 min Summer	1.940	0.0	10.8	2256
5760 min Summer	1.532	0.0	11.1	2880
7200 min Summer	1.275	0.0	11.3	3712

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Cascade Summary of Results for 190320 - Perm Pave 2 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.962	0.012	0.0	0.1	0.1	0.1	O K
10080 min Summer	42.961	0.011	0.0	0.1	0.1	0.1	O K
15 min Winter	43.003	0.053	0.0	1.6	1.6	0.4	O K
30 min Winter	43.012	0.062	0.0	2.2	2.2	0.5	O K
60 min Winter	43.013	0.063	0.0	2.3	2.3	0.5	O K
120 min Winter	43.007	0.057	0.0	1.9	1.9	0.5	O K
180 min Winter	43.001	0.051	0.0	1.5	1.5	0.4	O K
240 min Winter	42.997	0.047	0.0	1.3	1.3	0.4	O K
360 min Winter	42.990	0.040	0.0	1.0	1.0	0.3	O K
480 min Winter	42.986	0.036	0.0	0.8	0.8	0.3	O K
600 min Winter	42.983	0.033	0.0	0.7	0.7	0.3	O K
720 min Winter	42.981	0.031	0.0	0.6	0.6	0.3	O K
960 min Winter	42.977	0.027	0.0	0.4	0.4	0.2	O K
1440 min Winter	42.973	0.023	0.0	0.3	0.3	0.2	O K
2160 min Winter	42.969	0.019	0.0	0.2	0.2	0.2	O K
2880 min Winter	42.966	0.016	0.0	0.2	0.2	0.1	O K
4320 min Winter	42.964	0.014	0.0	0.1	0.1	0.1	O K
5760 min Winter	42.962	0.012	0.0	0.1	0.1	0.1	O K
7200 min Winter	42.961	0.011	0.0	0.1	0.1	0.1	O K
8640 min Winter	42.961	0.011	0.0	0.1	0.1	0.1	O K
10080 min Winter	42.960	0.010	0.0	0.1	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.097	0.0	11.4	4408
10080 min Summer	0.966	0.0	11.4	5160
15 min Winter	139.587	0.0	2.9	24
30 min Winter	91.185	0.0	4.0	31
60 min Winter	56.713	0.0	5.1	48
120 min Winter	34.079	0.0	6.2	78
180 min Winter	24.967	0.0	6.9	110
240 min Winter	19.906	0.0	7.3	144
360 min Winter	14.417	0.0	8.0	206
480 min Winter	11.468	0.0	8.5	256
600 min Winter	9.596	0.0	8.9	310
720 min Winter	8.292	0.0	9.2	382
960 min Winter	6.581	0.0	9.7	506
1440 min Winter	4.744	0.0	10.5	792
2160 min Winter	3.415	0.0	11.2	1112
2880 min Winter	2.702	0.0	11.7	1616
4320 min Winter	1.940	0.0	12.3	2152
5760 min Winter	1.532	0.0	12.7	2848
7200 min Winter	1.275	0.0	13.0	3672
8640 min Winter	1.097	0.0	13.1	4360
10080 min Winter	0.966	0.0	13.2	5248

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Cascade Summary of Results for 190320 - Perm Pave 3 - 1.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 2 - 1.SRCX 190320 - Perm Pave 1 - 1.SRCX	190320 - Perm Pave 4 - 1.SRCX	(None)

Half Drain Time : 79 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.857	0.007	0.0	0.0	0.0	0.4	O K
30 min Summer	42.863	0.013	0.0	0.1	0.1	1.1	O K
60 min Summer	42.868	0.018	0.0	0.2	0.2	1.7	O K
120 min Summer	42.872	0.022	0.0	0.3	0.3	2.3	O K
180 min Summer	42.874	0.024	0.0	0.3	0.3	2.6	O K
240 min Summer	42.875	0.025	0.0	0.4	0.4	2.7	O K
360 min Summer	42.876	0.026	0.0	0.4	0.4	2.8	O K
480 min Summer	42.877	0.027	0.0	0.4	0.4	2.9	O K
600 min Summer	42.877	0.027	0.0	0.4	0.4	2.9	O K
720 min Summer	42.876	0.026	0.0	0.4	0.4	2.9	O K
960 min Summer	42.876	0.026	0.0	0.4	0.4	2.8	O K
1440 min Summer	42.874	0.024	0.0	0.4	0.4	2.6	O K
2160 min Summer	42.872	0.022	0.0	0.3	0.3	2.3	O K
2880 min Summer	42.870	0.020	0.0	0.3	0.3	2.0	O K
4320 min Summer	42.867	0.017	0.0	0.2	0.2	1.7	O K
5760 min Summer	42.866	0.016	0.0	0.2	0.2	1.4	O K
7200 min Summer	42.864	0.014	0.0	0.1	0.1	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.4	26
30 min Summer	20.325	0.0	1.4	40
60 min Summer	12.800	0.0	2.5	68
120 min Summer	7.895	0.0	3.7	122
180 min Summer	5.922	0.0	4.5	156
240 min Summer	4.823	0.0	5.1	180
360 min Summer	3.593	0.0	5.9	244
480 min Summer	2.905	0.0	6.5	310
600 min Summer	2.464	0.0	6.9	374
720 min Summer	2.153	0.0	7.3	440
960 min Summer	1.741	0.0	7.9	568
1440 min Summer	1.291	0.0	8.6	816
2160 min Summer	0.957	0.0	9.3	1192
2880 min Summer	0.774	0.0	9.6	1560
4320 min Summer	0.574	0.0	9.6	2292
5760 min Summer	0.464	0.0	9.4	3000
7200 min Summer	0.394	0.0	9.2	3744

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Cascade Summary of Results for 190320 - Perm Pave 3 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.863	0.013	0.0	0.1	0.1	1.1	O K
10080 min Summer	42.863	0.013	0.0	0.1	0.1	1.0	O K
15 min Winter	42.860	0.010	0.0	0.1	0.1	0.7	O K
30 min Winter	42.866	0.016	0.0	0.2	0.2	1.4	O K
60 min Winter	42.871	0.021	0.0	0.3	0.3	2.2	O K
120 min Winter	42.876	0.026	0.0	0.4	0.4	2.8	O K
180 min Winter	42.878	0.028	0.0	0.5	0.5	3.0	O K
240 min Winter	42.879	0.029	0.0	0.5	0.5	3.2	O K
360 min Winter	42.879	0.029	0.0	0.5	0.5	3.3	O K
480 min Winter	42.879	0.029	0.0	0.5	0.5	3.2	O K
600 min Winter	42.878	0.028	0.0	0.5	0.5	3.1	O K
720 min Winter	42.878	0.028	0.0	0.5	0.5	3.0	O K
960 min Winter	42.876	0.026	0.0	0.4	0.4	2.8	O K
1440 min Winter	42.874	0.024	0.0	0.3	0.3	2.5	O K
2160 min Winter	42.871	0.021	0.0	0.3	0.3	2.1	O K
2880 min Winter	42.868	0.018	0.0	0.2	0.2	1.8	O K
4320 min Winter	42.865	0.015	0.0	0.2	0.2	1.4	O K
5760 min Winter	42.864	0.014	0.0	0.1	0.1	1.1	O K
7200 min Winter	42.862	0.012	0.0	0.1	0.1	1.0	O K
8640 min Winter	42.862	0.012	0.0	0.1	0.1	0.9	O K
10080 min Winter	42.861	0.011	0.0	0.1	0.1	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.344	0.0	9.0	4424
10080 min Summer	0.307	0.0	8.8	5152
15 min Winter	31.296	0.0	0.8	26
30 min Winter	20.325	0.0	1.9	39
60 min Winter	12.800	0.0	3.2	66
120 min Winter	7.895	0.0	4.5	118
180 min Winter	5.922	0.0	5.4	148
240 min Winter	4.823	0.0	6.1	184
360 min Winter	3.593	0.0	7.0	256
480 min Winter	2.905	0.0	7.7	324
600 min Winter	2.464	0.0	8.2	392
720 min Winter	2.153	0.0	8.6	456
960 min Winter	1.741	0.0	9.3	584
1440 min Winter	1.291	0.0	10.3	842
2160 min Winter	0.957	0.0	11.1	1200
2880 min Winter	0.774	0.0	11.6	1564
4320 min Winter	0.574	0.0	11.9	2296
5760 min Winter	0.464	0.0	11.9	3000
7200 min Winter	0.394	0.0	11.6	3752
8640 min Winter	0.344	0.0	11.2	4416
10080 min Winter	0.307	0.0	10.9	5256

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Cascade Summary of Results for 190320 - Perm Pave 3 - 30.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 2 - 30.SRCX 190320 - Perm Pave 1 - 30.SRCX	190320 - Perm Pave 4 - 30.SRCX	(None)

Half Drain Time : 45 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.884	0.034	0.0	0.7	0.7	3.9	O K
30 min Summer	42.895	0.045	0.0	1.1	1.1	5.4	O K
60 min Summer	42.903	0.053	0.0	1.6	1.6	6.5	O K
120 min Summer	42.907	0.057	0.0	1.9	1.9	7.0	O K
180 min Summer	42.908	0.058	0.0	1.9	1.9	7.1	O K
240 min Summer	42.908	0.058	0.0	1.9	1.9	7.1	O K
360 min Summer	42.906	0.056	0.0	1.8	1.8	6.9	O K
480 min Summer	42.904	0.054	0.0	1.7	1.7	6.6	O K
600 min Summer	42.902	0.052	0.0	1.6	1.6	6.3	O K
720 min Summer	42.900	0.050	0.0	1.4	1.4	6.0	O K
960 min Summer	42.896	0.046	0.0	1.2	1.2	5.6	O K
1440 min Summer	42.891	0.041	0.0	1.0	1.0	4.9	O K
2160 min Summer	42.886	0.036	0.0	0.8	0.8	4.2	O K
2880 min Summer	42.883	0.033	0.0	0.6	0.6	3.7	O K
4320 min Summer	42.878	0.028	0.0	0.5	0.5	3.1	O K
5760 min Summer	42.875	0.025	0.0	0.4	0.4	2.7	O K
7200 min Summer	42.873	0.023	0.0	0.3	0.3	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	5.3	25
30 min Summer	49.754	0.0	7.7	37
60 min Summer	30.811	0.0	10.2	60
120 min Summer	18.522	0.0	12.8	90
180 min Summer	13.611	0.0	14.4	122
240 min Summer	10.893	0.0	15.5	154
360 min Summer	7.936	0.0	17.0	220
480 min Summer	6.337	0.0	18.2	282
600 min Summer	5.319	0.0	19.1	342
720 min Summer	4.609	0.0	19.9	404
960 min Summer	3.673	0.0	21.1	530
1440 min Summer	2.665	0.0	22.7	770
2160 min Summer	1.932	0.0	24.3	1136
2880 min Summer	1.536	0.0	25.2	1500
4320 min Summer	1.112	0.0	26.2	2212
5760 min Summer	0.883	0.0	26.5	2944
7200 min Summer	0.738	0.0	26.4	3680

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Cascade Summary of Results for 190320 - Perm Pave 3 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.871	0.021	0.0	0.3	0.3	2.1	O K
10080 min Summer	42.869	0.019	0.0	0.2	0.2	1.9	O K
15 min Winter	42.889	0.039	0.0	0.9	0.9	4.6	O K
30 min Winter	42.901	0.051	0.0	1.5	1.5	6.2	O K
60 min Winter	42.910	0.060	0.0	2.0	2.0	7.4	O K
120 min Winter	42.913	0.063	0.0	2.3	2.3	7.8	O K
180 min Winter	42.913	0.063	0.0	2.2	2.2	7.8	O K
240 min Winter	42.911	0.061	0.0	2.1	2.1	7.5	O K
360 min Winter	42.907	0.057	0.0	1.9	1.9	7.0	O K
480 min Winter	42.903	0.053	0.0	1.6	1.6	6.5	O K
600 min Winter	42.900	0.050	0.0	1.5	1.5	6.1	O K
720 min Winter	42.898	0.048	0.0	1.3	1.3	5.7	O K
960 min Winter	42.893	0.043	0.0	1.1	1.1	5.1	O K
1440 min Winter	42.887	0.037	0.0	0.8	0.8	4.3	O K
2160 min Winter	42.882	0.032	0.0	0.6	0.6	3.6	O K
2880 min Winter	42.878	0.028	0.0	0.5	0.5	3.1	O K
4320 min Winter	42.874	0.024	0.0	0.4	0.4	2.6	O K
5760 min Winter	42.871	0.021	0.0	0.3	0.3	2.2	O K
7200 min Winter	42.869	0.019	0.0	0.2	0.2	1.8	O K
8640 min Winter	42.867	0.017	0.0	0.2	0.2	1.6	O K
10080 min Winter	42.865	0.015	0.0	0.2	0.2	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.638	0.0	26.1	4408
10080 min Summer	0.564	0.0	25.6	5152
15 min Winter	76.797	0.0	6.3	24
30 min Winter	49.754	0.0	9.0	37
60 min Winter	30.811	0.0	11.8	60
120 min Winter	18.522	0.0	14.7	92
180 min Winter	13.611	0.0	16.5	128
240 min Winter	10.893	0.0	17.7	162
360 min Winter	7.936	0.0	19.5	226
480 min Winter	6.337	0.0	20.8	290
600 min Winter	5.319	0.0	21.9	352
720 min Winter	4.609	0.0	22.7	414
960 min Winter	3.673	0.0	24.1	540
1440 min Winter	2.665	0.0	26.0	780
2160 min Winter	1.932	0.0	27.9	1148
2880 min Winter	1.536	0.0	29.0	1532
4320 min Winter	1.112	0.0	30.4	2236
5760 min Winter	0.883	0.0	31.0	3016
7200 min Winter	0.738	0.0	31.2	3744
8640 min Winter	0.638	0.0	31.1	4424
10080 min Winter	0.564	0.0	30.8	5256

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Cascade Summary of Results for 190320 - Perm Pave 3 - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 2 - 100 + 40.SRCX 190320 - Perm Pave 1 - 100 + 40.SRCX	190320 - Perm Pave 4 - 100 + 40.SRCX	(None)

Half Drain Time : 31 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.918	0.068	0.0	2.6	2.6	8.5	O K
30 min Summer	42.936	0.086	0.0	4.3	4.3	10.9	O K
60 min Summer	42.946	0.096	0.0	5.2	5.2	12.2	O K
120 min Summer	42.950	0.100	0.0	5.5	5.5	12.7	O K
180 min Summer	42.947	0.097	0.0	5.3	5.3	12.4	O K
240 min Summer	42.944	0.094	0.0	5.0	5.0	11.9	O K
360 min Summer	42.937	0.087	0.0	4.4	4.4	11.0	O K
480 min Summer	42.931	0.081	0.0	3.9	3.9	10.3	O K
600 min Summer	42.927	0.077	0.0	3.4	3.4	9.7	O K
720 min Summer	42.923	0.073	0.0	3.0	3.0	9.2	O K
960 min Summer	42.917	0.067	0.0	2.5	2.5	8.4	O K
1440 min Summer	42.908	0.058	0.0	1.9	1.9	7.1	O K
2160 min Summer	42.900	0.050	0.0	1.4	1.4	6.0	O K
2880 min Summer	42.895	0.045	0.0	1.1	1.1	5.3	O K
4320 min Summer	42.888	0.038	0.0	0.8	0.8	4.4	O K
5760 min Summer	42.884	0.034	0.0	0.7	0.7	3.9	O K
7200 min Summer	42.881	0.031	0.0	0.6	0.6	3.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	12.0	24
30 min Summer	91.185	0.0	16.6	33
60 min Summer	56.713	0.0	21.3	50
120 min Summer	34.079	0.0	26.1	82
180 min Summer	24.967	0.0	28.9	114
240 min Summer	19.906	0.0	30.9	146
360 min Summer	14.417	0.0	33.7	206
480 min Summer	11.468	0.0	35.8	268
600 min Summer	9.596	0.0	37.4	330
720 min Summer	8.292	0.0	38.8	392
960 min Summer	6.581	0.0	41.0	514
1440 min Summer	4.744	0.0	44.1	756
2160 min Summer	3.415	0.0	47.1	1124
2880 min Summer	2.702	0.0	49.1	1480
4320 min Summer	1.940	0.0	51.7	2212
5760 min Summer	1.532	0.0	53.1	2944
7200 min Summer	1.275	0.0	53.9	3680

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Cascade Summary of Results for 190320 - Perm Pave 3 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.878	0.028	0.0	0.5	0.5	3.2	O K
10080 min Summer	42.877	0.027	0.0	0.4	0.4	2.9	O K
15 min Winter	42.927	0.077	0.0	3.4	3.4	9.7	O K
30 min Winter	42.946	0.096	0.0	5.2	5.2	12.3	O K
60 min Winter	42.956	0.106	0.0	6.0	6.0	13.7	O K
120 min Winter	42.956	0.106	0.0	6.0	6.0	13.6	O K
180 min Winter	42.950	0.100	0.0	5.5	5.5	12.7	O K
240 min Winter	42.943	0.093	0.0	4.9	4.9	11.9	O K
360 min Winter	42.933	0.083	0.0	4.1	4.1	10.6	O K
480 min Winter	42.927	0.077	0.0	3.4	3.4	9.7	O K
600 min Winter	42.922	0.072	0.0	2.9	2.9	9.0	O K
720 min Winter	42.918	0.068	0.0	2.5	2.5	8.4	O K
960 min Winter	42.910	0.060	0.0	2.1	2.1	7.4	O K
1440 min Winter	42.901	0.051	0.0	1.5	1.5	6.2	O K
2160 min Winter	42.894	0.044	0.0	1.1	1.1	5.2	O K
2880 min Winter	42.888	0.038	0.0	0.9	0.9	4.5	O K
4320 min Winter	42.883	0.033	0.0	0.6	0.6	3.7	O K
5760 min Winter	42.879	0.029	0.0	0.5	0.5	3.2	O K
7200 min Winter	42.876	0.026	0.0	0.4	0.4	2.8	O K
8640 min Winter	42.874	0.024	0.0	0.4	0.4	2.6	O K
10080 min Winter	42.873	0.023	0.0	0.3	0.3	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.097	0.0	54.3	4408
10080 min Summer	0.966	0.0	54.4	5120
15 min Winter	139.587	0.0	13.8	23
30 min Winter	91.185	0.0	18.9	33
60 min Winter	56.713	0.0	24.2	52
120 min Winter	34.079	0.0	29.6	86
180 min Winter	24.967	0.0	32.8	118
240 min Winter	19.906	0.0	35.0	150
360 min Winter	14.417	0.0	38.1	212
480 min Winter	11.468	0.0	40.5	274
600 min Winter	9.596	0.0	42.4	334
720 min Winter	8.292	0.0	43.9	402
960 min Winter	6.581	0.0	46.4	522
1440 min Winter	4.744	0.0	49.9	764
2160 min Winter	3.415	0.0	53.4	1128
2880 min Winter	2.702	0.0	55.8	1504
4320 min Winter	1.940	0.0	58.9	2208
5760 min Winter	1.532	0.0	60.8	2944
7200 min Winter	1.275	0.0	61.9	3672
8640 min Winter	1.097	0.0	62.6	4400
10080 min Winter	0.966	0.0	63.0	5096

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Cascade Summary of Results for 190320 - Perm Pave 4 - 1.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 3 - 1.SRCX 190320 - Perm Pave 2 - 1.SRCX 190320 - Perm Pave 1 - 1.SRCX	190320 - GEO CRATES - 1.SRCX	(None)

Half Drain Time : 283 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.811	0.011	0.0	0.0	0.0	0.4	O K
30 min Summer	42.823	0.023	0.0	0.0	0.0	1.4	O K
60 min Summer	42.838	0.038	0.0	0.0	0.0	2.6	O K
120 min Summer	42.854	0.054	0.0	0.0	0.0	3.9	O K
180 min Summer	42.858	0.058	0.0	0.0	0.0	4.2	O K
240 min Summer	42.861	0.061	0.0	0.1	0.1	4.4	O K
360 min Summer	42.864	0.064	0.0	0.1	0.1	4.7	O K
480 min Summer	42.867	0.067	0.0	0.2	0.2	4.9	O K
600 min Summer	42.867	0.067	0.0	0.2	0.2	4.9	O K
720 min Summer	42.868	0.068	0.0	0.2	0.2	5.0	O K
960 min Summer	42.868	0.068	0.0	0.2	0.2	5.0	O K
1440 min Summer	42.869	0.069	0.0	0.2	0.2	5.1	O K
2160 min Summer	42.869	0.069	0.0	0.2	0.2	5.1	O K
2880 min Summer	42.868	0.068	0.0	0.2	0.2	5.0	O K
4320 min Summer	42.866	0.066	0.0	0.2	0.2	4.9	O K
5760 min Summer	42.865	0.065	0.0	0.2	0.2	4.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.0	1440
30 min Summer	20.325	0.0	0.0	1440
60 min Summer	12.800	0.0	0.0	2880
120 min Summer	7.895	0.0	0.5	744
180 min Summer	5.922	0.0	1.5	498
240 min Summer	4.823	0.0	2.2	420
360 min Summer	3.593	0.0	3.2	446
480 min Summer	2.905	0.0	3.9	494
600 min Summer	2.464	0.0	4.5	568
720 min Summer	2.153	0.0	4.9	620
960 min Summer	1.741	0.0	5.6	738
1440 min Summer	1.291	0.0	6.4	984
2160 min Summer	0.957	0.0	7.1	1356
2880 min Summer	0.774	0.0	7.3	1740
4320 min Summer	0.574	0.0	7.2	2504
5760 min Summer	0.464	0.0	6.9	3272

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Cascade Summary of Results for 190320 - Perm Pave 4 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Summer	42.864	0.064	0.0	0.1	0.1	4.6	O K
8640 min Summer	42.863	0.063	0.0	0.1	0.1	4.6	O K
10080 min Summer	42.862	0.062	0.0	0.1	0.1	4.5	O K
15 min Winter	42.816	0.016	0.0	0.0	0.0	0.8	O K
30 min Winter	42.830	0.030	0.0	0.0	0.0	1.9	O K
60 min Winter	42.848	0.048	0.0	0.0	0.0	3.4	O K
120 min Winter	42.859	0.059	0.0	0.0	0.0	4.2	O K
180 min Winter	42.863	0.063	0.0	0.1	0.1	4.6	O K
240 min Winter	42.865	0.065	0.0	0.2	0.2	4.8	O K
360 min Winter	42.869	0.069	0.0	0.2	0.2	5.1	O K
480 min Winter	42.871	0.071	0.0	0.3	0.3	5.2	O K
600 min Winter	42.872	0.072	0.0	0.3	0.3	5.3	O K
720 min Winter	42.872	0.072	0.0	0.3	0.3	5.3	O K
960 min Winter	42.873	0.073	0.0	0.3	0.3	5.4	O K
1440 min Winter	42.873	0.073	0.0	0.3	0.3	5.4	O K
2160 min Winter	42.871	0.071	0.0	0.3	0.3	5.2	O K
2880 min Winter	42.869	0.069	0.0	0.2	0.2	5.1	O K
4320 min Winter	42.866	0.066	0.0	0.2	0.2	4.9	O K
5760 min Winter	42.865	0.065	0.0	0.2	0.2	4.7	O K
7200 min Winter	42.863	0.063	0.0	0.1	0.1	4.6	O K
8640 min Winter	42.862	0.062	0.0	0.1	0.1	4.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	0.394	0.0	6.6	4032
8640 min Summer	0.344	0.0	6.3	4760
10080 min Summer	0.307	0.0	6.1	5592
15 min Winter	31.296	0.0	0.0	1440
30 min Winter	20.325	0.0	0.0	1440
60 min Winter	12.800	0.0	0.0	2880
120 min Winter	7.895	0.0	1.5	434
180 min Winter	5.922	0.0	2.6	348
240 min Winter	4.823	0.0	3.5	352
360 min Winter	3.593	0.0	4.6	392
480 min Winter	2.905	0.0	5.4	468
600 min Winter	2.464	0.0	6.1	534
720 min Winter	2.153	0.0	6.6	586
960 min Winter	1.741	0.0	7.4	704
1440 min Winter	1.291	0.0	8.4	982
2160 min Winter	0.957	0.0	9.4	1352
2880 min Winter	0.774	0.0	9.8	1744
4320 min Winter	0.574	0.0	10.0	2516
5760 min Winter	0.464	0.0	9.9	3232
7200 min Winter	0.394	0.0	9.4	3944
8640 min Winter	0.344	0.0	8.9	4824

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Cascade Summary of Results for 190320 - Perm Pave 4 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Winter	42.862	0.062	0.0	0.1	0.1	4.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	0.307	0.0	8.5	5536

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Cascade Summary of Results for 190320 - Perm Pave 4 - 30.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 3 - 30.SRCX 190320 - Perm Pave 2 - 30.SRCX 190320 - Perm Pave 1 - 30.SRCX	190320 - GEO CRATES - 30.SRCX	(None)

Half Drain Time : 70 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.862	0.062	0.0	0.1	0.1	4.5	O K
30 min Summer	42.873	0.073	0.0	0.3	0.3	5.4	O K
60 min Summer	42.885	0.085	0.0	0.7	0.7	6.3	O K
120 min Summer	42.896	0.096	0.0	1.2	1.2	7.2	O K
180 min Summer	42.899	0.099	0.0	1.4	1.4	7.5	O K
240 min Summer	42.900	0.100	0.0	1.5	1.5	7.6	O K
360 min Summer	42.902	0.102	0.0	1.6	1.6	7.7	O K
480 min Summer	42.902	0.102	0.0	1.6	1.6	7.7	O K
600 min Summer	42.902	0.102	0.0	1.6	1.6	7.6	O K
720 min Summer	42.901	0.101	0.0	1.5	1.5	7.6	O K
960 min Summer	42.899	0.099	0.0	1.4	1.4	7.4	O K
1440 min Summer	42.895	0.095	0.0	1.1	1.1	7.1	O K
2160 min Summer	42.890	0.090	0.0	0.9	0.9	6.7	O K
2880 min Summer	42.886	0.086	0.0	0.8	0.8	6.4	O K
4320 min Summer	42.881	0.081	0.0	0.6	0.6	6.0	O K
5760 min Summer	42.878	0.078	0.0	0.5	0.5	5.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	2.4	249
30 min Summer	49.754	0.0	5.5	141
60 min Summer	30.811	0.0	8.7	116
120 min Summer	18.522	0.0	12.0	132
180 min Summer	13.611	0.0	13.9	168
240 min Summer	10.893	0.0	15.3	196
360 min Summer	7.936	0.0	17.3	254
480 min Summer	6.337	0.0	18.7	316
600 min Summer	5.319	0.0	19.9	376
720 min Summer	4.609	0.0	20.8	436
960 min Summer	3.673	0.0	22.3	560
1440 min Summer	2.665	0.0	24.2	804
2160 min Summer	1.932	0.0	26.0	1156
2880 min Summer	1.536	0.0	27.0	1512
4320 min Summer	1.112	0.0	27.9	2252
5760 min Summer	0.883	0.0	28.0	2984

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Cascade Summary of Results for 190320 - Perm Pave 4 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Summer	42.875	0.075	0.0	0.4	0.4	5.5	O K
8640 min Summer	42.873	0.073	0.0	0.3	0.3	5.4	O K
10080 min Summer	42.872	0.072	0.0	0.3	0.3	5.3	O K
15 min Winter	42.866	0.066	0.0	0.2	0.2	4.9	O K
30 min Winter	42.879	0.079	0.0	0.5	0.5	5.9	O K
60 min Winter	42.892	0.092	0.0	1.0	1.0	6.9	O K
120 min Winter	42.904	0.104	0.0	1.7	1.7	7.8	O K
180 min Winter	42.907	0.107	0.0	1.9	1.9	8.1	O K
240 min Winter	42.908	0.108	0.0	1.9	1.9	8.1	O K
360 min Winter	42.908	0.108	0.0	1.9	1.9	8.1	O K
480 min Winter	42.906	0.106	0.0	1.8	1.8	8.0	O K
600 min Winter	42.904	0.104	0.0	1.7	1.7	7.8	O K
720 min Winter	42.901	0.101	0.0	1.5	1.5	7.6	O K
960 min Winter	42.898	0.098	0.0	1.3	1.3	7.3	O K
1440 min Winter	42.892	0.092	0.0	1.0	1.0	6.9	O K
2160 min Winter	42.886	0.086	0.0	0.8	0.8	6.4	O K
2880 min Winter	42.882	0.082	0.0	0.6	0.6	6.1	O K
4320 min Winter	42.877	0.077	0.0	0.4	0.4	5.7	O K
5760 min Winter	42.874	0.074	0.0	0.3	0.3	5.4	O K
7200 min Winter	42.871	0.071	0.0	0.3	0.3	5.2	O K
8640 min Winter	42.869	0.069	0.0	0.2	0.2	5.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	0.738	0.0	27.6	3704
8640 min Summer	0.638	0.0	27.1	4432
10080 min Summer	0.564	0.0	26.4	5152
15 min Winter	76.797	0.0	3.7	191
30 min Winter	49.754	0.0	7.1	113
60 min Winter	30.811	0.0	10.7	102
120 min Winter	18.522	0.0	14.4	126
180 min Winter	13.611	0.0	16.6	162
240 min Winter	10.893	0.0	18.1	190
360 min Winter	7.936	0.0	20.4	254
480 min Winter	6.337	0.0	22.0	318
600 min Winter	5.319	0.0	23.3	380
720 min Winter	4.609	0.0	24.4	444
960 min Winter	3.673	0.0	26.1	562
1440 min Winter	2.665	0.0	28.4	802
2160 min Winter	1.932	0.0	30.6	1164
2880 min Winter	1.536	0.0	31.9	1504
4320 min Winter	1.112	0.0	33.2	2260
5760 min Winter	0.883	0.0	33.7	2936
7200 min Winter	0.738	0.0	33.7	3760
8640 min Winter	0.638	0.0	33.3	4520

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Cascade Summary of Results for 190320 - Perm Pave 4 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Winter	42.868	0.068	0.0	0.2	0.2	5.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	0.564	0.0	32.7	5344

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Cascade Summary of Results for 190320 - Perm Pave 4 - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 3 - 100 + 40.SRCX 190320 - Perm Pave 2 - 100 + 40.SRCX 190320 - Perm Pave 1 - 100 + 40.SRCX	190320 - GEO CRATES - 100 + 40.SRCX	(None)

Half Drain Time : 33 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.893	0.093	0.0	1.1	1.1	6.9	O K
30 min Summer	42.913	0.113	0.0	2.3	2.3	8.6	O K
60 min Summer	42.934	0.134	0.0	4.1	4.1	10.2	O K
120 min Summer	42.942	0.142	0.0	4.9	4.9	10.9	O K
180 min Summer	42.945	0.145	0.0	5.1	5.1	11.1	O K
240 min Summer	42.945	0.145	0.0	5.1	5.1	11.1	O K
360 min Summer	42.942	0.142	0.0	4.9	4.9	10.8	O K
480 min Summer	42.937	0.137	0.0	4.5	4.5	10.5	O K
600 min Summer	42.933	0.133	0.0	4.0	4.0	10.1	O K
720 min Summer	42.929	0.129	0.0	3.7	3.7	9.8	O K
960 min Summer	42.924	0.124	0.0	3.1	3.1	9.4	O K
1440 min Summer	42.915	0.115	0.0	2.3	2.3	8.7	O K
2160 min Summer	42.905	0.105	0.0	1.8	1.8	8.0	O K
2880 min Summer	42.900	0.100	0.0	1.4	1.4	7.5	O K
4320 min Summer	42.893	0.093	0.0	1.1	1.1	6.9	O K
5760 min Summer	42.888	0.088	0.0	0.8	0.8	6.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	10.9	72
30 min Summer	91.185	0.0	16.7	60
60 min Summer	56.713	0.0	22.7	68
120 min Summer	34.079	0.0	28.8	102
180 min Summer	24.967	0.0	32.3	130
240 min Summer	19.906	0.0	34.8	160
360 min Summer	14.417	0.0	38.3	220
480 min Summer	11.468	0.0	40.9	280
600 min Summer	9.596	0.0	43.0	340
720 min Summer	8.292	0.0	44.7	402
960 min Summer	6.581	0.0	47.4	524
1440 min Summer	4.744	0.0	51.1	770
2160 min Summer	3.415	0.0	54.8	1132
2880 min Summer	2.702	0.0	57.2	1500
4320 min Summer	1.940	0.0	60.0	2236
5760 min Summer	1.532	0.0	61.6	2944

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Cascade Summary of Results for 190320 - Perm Pave 4 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
7200 min Summer	42.884	0.084	0.0	0.7	0.7	6.3	O K
8640 min Summer	42.882	0.082	0.0	0.6	0.6	6.1	O K
10080 min Summer	42.880	0.080	0.0	0.5	0.5	5.9	O K
15 min Winter	42.901	0.101	0.0	1.5	1.5	7.6	O K
30 min Winter	42.925	0.125	0.0	3.2	3.2	9.5	O K
60 min Winter	42.945	0.145	0.0	5.1	5.1	11.1	O K
120 min Winter	42.954	0.154	0.0	5.8	5.8	11.8	O K
180 min Winter	42.954	0.154	0.0	5.8	5.8	11.8	O K
240 min Winter	42.951	0.151	0.0	5.6	5.6	11.5	O K
360 min Winter	42.941	0.141	0.0	4.8	4.8	10.8	O K
480 min Winter	42.934	0.134	0.0	4.2	4.2	10.2	O K
600 min Winter	42.929	0.129	0.0	3.6	3.6	9.8	O K
720 min Winter	42.924	0.124	0.0	3.1	3.1	9.5	O K
960 min Winter	42.918	0.118	0.0	2.6	2.6	9.0	O K
1440 min Winter	42.908	0.108	0.0	1.9	1.9	8.1	O K
2160 min Winter	42.899	0.099	0.0	1.4	1.4	7.4	O K
2880 min Winter	42.894	0.094	0.0	1.1	1.1	7.0	O K
4320 min Winter	42.887	0.087	0.0	0.8	0.8	6.5	O K
5760 min Winter	42.883	0.083	0.0	0.6	0.6	6.1	O K
7200 min Winter	42.879	0.079	0.0	0.5	0.5	5.9	O K
8640 min Winter	42.877	0.077	0.0	0.4	0.4	5.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	1.275	0.0	62.3	3680
8640 min Summer	1.097	0.0	62.4	4384
10080 min Summer	0.966	0.0	62.2	5152
15 min Winter	139.587	0.0	13.2	61
30 min Winter	91.185	0.0	19.6	53
60 min Winter	56.713	0.0	26.4	68
120 min Winter	34.079	0.0	33.2	100
180 min Winter	24.967	0.0	37.2	132
240 min Winter	19.906	0.0	39.9	164
360 min Winter	14.417	0.0	43.9	224
480 min Winter	11.468	0.0	46.8	284
600 min Winter	9.596	0.0	49.2	342
720 min Winter	8.292	0.0	51.1	410
960 min Winter	6.581	0.0	54.2	534
1440 min Winter	4.744	0.0	58.5	776
2160 min Winter	3.415	0.0	62.8	1148
2880 min Winter	2.702	0.0	65.7	1512
4320 min Winter	1.940	0.0	69.2	2248
5760 min Winter	1.532	0.0	71.3	2992
7200 min Winter	1.275	0.0	72.4	3688
8640 min Winter	1.097	0.0	73.0	4448

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Cascade Summary of Results for 190320 - Perm Pave 4 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
10080 min Winter	42.875	0.075	0.0	0.4	0.4	5.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	0.966	0.0	73.2	5120

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Cascade Summary of Results for 190320 - Perm Pave 5 - 1.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	190320 - Perm Pave 6 - 1.SRCX	(None)

Half Drain Time : 12 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.907	0.007	0.0	0.0	0.0	0.0	O K
30 min Summer	42.911	0.011	0.0	0.1	0.1	0.1	O K
60 min Summer	42.912	0.012	0.0	0.1	0.1	0.1	O K
120 min Summer	42.913	0.013	0.0	0.1	0.1	0.1	O K
180 min Summer	42.913	0.013	0.0	0.1	0.1	0.1	O K
240 min Summer	42.912	0.012	0.0	0.1	0.1	0.1	O K
360 min Summer	42.912	0.012	0.0	0.1	0.1	0.1	O K
480 min Summer	42.911	0.011	0.0	0.1	0.1	0.1	O K
600 min Summer	42.910	0.010	0.0	0.1	0.1	0.1	O K
720 min Summer	42.910	0.010	0.0	0.1	0.1	0.1	O K
960 min Summer	42.909	0.009	0.0	0.1	0.1	0.0	O K
1440 min Summer	42.908	0.008	0.0	0.0	0.0	0.0	O K
2160 min Summer	42.907	0.007	0.0	0.0	0.0	0.0	O K
2880 min Summer	42.906	0.006	0.0	0.0	0.0	0.0	O K
4320 min Summer	42.905	0.005	0.0	0.0	0.0	0.0	O K
5760 min Summer	42.905	0.005	0.0	0.0	0.0	0.0	O K
7200 min Summer	42.904	0.004	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.0	24
30 min Summer	20.325	0.0	0.1	31
60 min Summer	12.800	0.0	0.2	46
120 min Summer	7.895	0.0	0.3	78
180 min Summer	5.922	0.0	0.3	108
240 min Summer	4.823	0.0	0.4	138
360 min Summer	3.593	0.0	0.4	200
480 min Summer	2.905	0.0	0.5	258
600 min Summer	2.464	0.0	0.5	316
720 min Summer	2.153	0.0	0.5	380
960 min Summer	1.741	0.0	0.6	498
1440 min Summer	1.291	0.0	0.6	744
2160 min Summer	0.957	0.0	0.7	1100
2880 min Summer	0.774	0.0	0.7	1456
4320 min Summer	0.574	0.0	0.7	2132
5760 min Summer	0.464	0.0	0.7	2912
7200 min Summer	0.394	0.0	0.7	3648

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Cascade Summary of Results for 190320 - Perm Pave 5 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.904	0.004	0.0	0.0	0.0	0.0	O K
10080 min Summer	42.903	0.003	0.0	0.0	0.0	0.0	O K
15 min Winter	42.910	0.010	0.0	0.1	0.1	0.1	O K
30 min Winter	42.912	0.012	0.0	0.1	0.1	0.1	O K
60 min Winter	42.914	0.014	0.0	0.1	0.1	0.1	O K
120 min Winter	42.913	0.013	0.0	0.1	0.1	0.1	O K
180 min Winter	42.913	0.013	0.0	0.1	0.1	0.1	O K
240 min Winter	42.912	0.012	0.0	0.1	0.1	0.1	O K
360 min Winter	42.911	0.011	0.0	0.1	0.1	0.1	O K
480 min Winter	42.910	0.010	0.0	0.1	0.1	0.1	O K
600 min Winter	42.910	0.010	0.0	0.1	0.1	0.1	O K
720 min Winter	42.909	0.009	0.0	0.1	0.1	0.0	O K
960 min Winter	42.908	0.008	0.0	0.0	0.0	0.0	O K
1440 min Winter	42.907	0.007	0.0	0.0	0.0	0.0	O K
2160 min Winter	42.906	0.006	0.0	0.0	0.0	0.0	O K
2880 min Winter	42.905	0.005	0.0	0.0	0.0	0.0	O K
4320 min Winter	42.904	0.004	0.0	0.0	0.0	0.0	O K
5760 min Winter	42.904	0.004	0.0	0.0	0.0	0.0	O K
7200 min Winter	42.903	0.003	0.0	0.0	0.0	0.0	O K
8640 min Winter	42.903	0.003	0.0	0.0	0.0	0.0	O K
10080 min Winter	42.903	0.003	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.344	0.0	0.7	4312
10080 min Summer	0.307	0.0	0.7	5096
15 min Winter	31.296	0.0	0.1	23
30 min Winter	20.325	0.0	0.1	32
60 min Winter	12.800	0.0	0.2	48
120 min Winter	7.895	0.0	0.3	80
180 min Winter	5.922	0.0	0.4	110
240 min Winter	4.823	0.0	0.4	140
360 min Winter	3.593	0.0	0.5	196
480 min Winter	2.905	0.0	0.6	256
600 min Winter	2.464	0.0	0.6	316
720 min Winter	2.153	0.0	0.6	398
960 min Winter	1.741	0.0	0.7	516
1440 min Winter	1.291	0.0	0.7	722
2160 min Winter	0.957	0.0	0.8	1088
2880 min Winter	0.774	0.0	0.8	1464
4320 min Winter	0.574	0.0	0.9	2252
5760 min Winter	0.464	0.0	0.9	3024
7200 min Winter	0.394	0.0	0.9	3704
8640 min Winter	0.344	0.0	0.8	4400
10080 min Winter	0.307	0.0	0.8	5368

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Cascade Summary of Results for 190320 - Perm Pave 5 - 30.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	190320 - Perm Pave 6 - 30.SRCX	(None)

Half Drain Time : 6 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.926	0.026	0.0	0.4	0.4	0.2	O K
30 min Summer	42.929	0.029	0.0	0.5	0.5	0.3	O K
60 min Summer	42.929	0.029	0.0	0.5	0.5	0.3	O K
120 min Summer	42.926	0.026	0.0	0.4	0.4	0.2	O K
180 min Summer	42.924	0.024	0.0	0.3	0.3	0.2	O K
240 min Summer	42.922	0.022	0.0	0.3	0.3	0.2	O K
360 min Summer	42.919	0.019	0.0	0.2	0.2	0.2	O K
480 min Summer	42.916	0.016	0.0	0.2	0.2	0.1	O K
600 min Summer	42.915	0.015	0.0	0.2	0.2	0.1	O K
720 min Summer	42.914	0.014	0.0	0.1	0.1	0.1	O K
960 min Summer	42.913	0.013	0.0	0.1	0.1	0.1	O K
1440 min Summer	42.911	0.011	0.0	0.1	0.1	0.1	O K
2160 min Summer	42.910	0.010	0.0	0.1	0.1	0.1	O K
2880 min Summer	42.909	0.009	0.0	0.1	0.1	0.0	O K
4320 min Summer	42.907	0.007	0.0	0.0	0.0	0.0	O K
5760 min Summer	42.907	0.007	0.0	0.0	0.0	0.0	O K
7200 min Summer	42.906	0.006	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	0.4	20
30 min Summer	49.754	0.0	0.6	28
60 min Summer	30.811	0.0	0.7	42
120 min Summer	18.522	0.0	0.9	72
180 min Summer	13.611	0.0	1.0	104
240 min Summer	10.893	0.0	1.1	134
360 min Summer	7.936	0.0	1.2	194
480 min Summer	6.337	0.0	1.3	256
600 min Summer	5.319	0.0	1.4	314
720 min Summer	4.609	0.0	1.4	374
960 min Summer	3.673	0.0	1.5	490
1440 min Summer	2.665	0.0	1.6	744
2160 min Summer	1.932	0.0	1.7	1068
2880 min Summer	1.536	0.0	1.8	1448
4320 min Summer	1.112	0.0	1.9	2208
5760 min Summer	0.883	0.0	1.9	2872
7200 min Summer	0.738	0.0	1.9	3672

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Cascade Summary of Results for 190320 - Perm Pave 5 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.906	0.006	0.0	0.0	0.0	0.0	O K
10080 min Summer	42.905	0.005	0.0	0.0	0.0	0.0	O K
15 min Winter	42.928	0.028	0.0	0.5	0.5	0.3	O K
30 min Winter	42.931	0.031	0.0	0.6	0.6	0.3	O K
60 min Winter	42.929	0.029	0.0	0.5	0.5	0.3	O K
120 min Winter	42.925	0.025	0.0	0.4	0.4	0.2	O K
180 min Winter	42.922	0.022	0.0	0.3	0.3	0.2	O K
240 min Winter	42.919	0.019	0.0	0.2	0.2	0.2	O K
360 min Winter	42.916	0.016	0.0	0.2	0.2	0.1	O K
480 min Winter	42.914	0.014	0.0	0.1	0.1	0.1	O K
600 min Winter	42.913	0.013	0.0	0.1	0.1	0.1	O K
720 min Winter	42.912	0.012	0.0	0.1	0.1	0.1	O K
960 min Winter	42.911	0.011	0.0	0.1	0.1	0.1	O K
1440 min Winter	42.910	0.010	0.0	0.1	0.1	0.1	O K
2160 min Winter	42.909	0.009	0.0	0.0	0.0	0.0	O K
2880 min Winter	42.907	0.007	0.0	0.0	0.0	0.0	O K
4320 min Winter	42.906	0.006	0.0	0.0	0.0	0.0	O K
5760 min Winter	42.906	0.006	0.0	0.0	0.0	0.0	O K
7200 min Winter	42.905	0.005	0.0	0.0	0.0	0.0	O K
8640 min Winter	42.905	0.005	0.0	0.0	0.0	0.0	O K
10080 min Winter	42.904	0.004	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.638	0.0	1.9	4352
10080 min Summer	0.564	0.0	1.9	5000
15 min Winter	76.797	0.0	0.5	20
30 min Winter	49.754	0.0	0.6	28
60 min Winter	30.811	0.0	0.8	44
120 min Winter	18.522	0.0	1.0	74
180 min Winter	13.611	0.0	1.2	106
240 min Winter	10.893	0.0	1.3	136
360 min Winter	7.936	0.0	1.4	192
480 min Winter	6.337	0.0	1.5	254
600 min Winter	5.319	0.0	1.5	316
720 min Winter	4.609	0.0	1.6	372
960 min Winter	3.673	0.0	1.7	488
1440 min Winter	2.665	0.0	1.8	718
2160 min Winter	1.932	0.0	2.0	1108
2880 min Winter	1.536	0.0	2.1	1504
4320 min Winter	1.112	0.0	2.2	2156
5760 min Winter	0.883	0.0	2.2	2968
7200 min Winter	0.738	0.0	2.2	3424
8640 min Winter	0.638	0.0	2.2	4360
10080 min Winter	0.564	0.0	2.2	5144

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Cascade Summary of Results for 190320 - Perm Pave 5 - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	190320 - Perm Pave 6 - 100 + 40.SRCX	(None)

Half Drain Time : 6 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.943	0.043	0.0	1.1	1.1	0.4	O K
30 min Summer	42.946	0.046	0.0	1.2	1.2	0.5	O K
60 min Summer	42.944	0.044	0.0	1.1	1.1	0.4	O K
120 min Summer	42.938	0.038	0.0	0.8	0.8	0.4	O K
180 min Summer	42.934	0.034	0.0	0.7	0.7	0.3	O K
240 min Summer	42.931	0.031	0.0	0.6	0.6	0.3	O K
360 min Summer	42.927	0.027	0.0	0.4	0.4	0.2	O K
480 min Summer	42.924	0.024	0.0	0.4	0.4	0.2	O K
600 min Summer	42.922	0.022	0.0	0.3	0.3	0.2	O K
720 min Summer	42.920	0.020	0.0	0.3	0.3	0.2	O K
960 min Summer	42.918	0.018	0.0	0.2	0.2	0.1	O K
1440 min Summer	42.915	0.015	0.0	0.2	0.2	0.1	O K
2160 min Summer	42.912	0.012	0.0	0.1	0.1	0.1	O K
2880 min Summer	42.911	0.011	0.0	0.1	0.1	0.1	O K
4320 min Summer	42.910	0.010	0.0	0.1	0.1	0.1	O K
5760 min Summer	42.909	0.009	0.0	0.1	0.1	0.0	O K
7200 min Summer	42.908	0.008	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	0.9	19
30 min Summer	91.185	0.0	1.2	27
60 min Summer	56.713	0.0	1.5	42
120 min Summer	34.079	0.0	1.8	72
180 min Summer	24.967	0.0	2.0	102
240 min Summer	19.906	0.0	2.2	132
360 min Summer	14.417	0.0	2.4	192
480 min Summer	11.468	0.0	2.5	252
600 min Summer	9.596	0.0	2.6	314
720 min Summer	8.292	0.0	2.7	374
960 min Summer	6.581	0.0	2.9	496
1440 min Summer	4.744	0.0	3.1	730
2160 min Summer	3.415	0.0	3.3	1104
2880 min Summer	2.702	0.0	3.5	1468
4320 min Summer	1.940	0.0	3.7	2204
5760 min Summer	1.532	0.0	3.8	2920
7200 min Summer	1.275	0.0	3.8	3608

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Cascade Summary of Results for 190320 - Perm Pave 5 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.907	0.007	0.0	0.0	0.0	0.0	O K
10080 min Summer	42.907	0.007	0.0	0.0	0.0	0.0	O K
15 min Winter	42.946	0.046	0.0	1.2	1.2	0.5	O K
30 min Winter	42.947	0.047	0.0	1.3	1.3	0.5	O K
60 min Winter	42.943	0.043	0.0	1.1	1.1	0.4	O K
120 min Winter	42.935	0.035	0.0	0.7	0.7	0.3	O K
180 min Winter	42.931	0.031	0.0	0.6	0.6	0.3	O K
240 min Winter	42.927	0.027	0.0	0.4	0.4	0.3	O K
360 min Winter	42.924	0.024	0.0	0.3	0.3	0.2	O K
480 min Winter	42.921	0.021	0.0	0.3	0.3	0.2	O K
600 min Winter	42.918	0.018	0.0	0.2	0.2	0.2	O K
720 min Winter	42.917	0.017	0.0	0.2	0.2	0.1	O K
960 min Winter	42.915	0.015	0.0	0.2	0.2	0.1	O K
1440 min Winter	42.912	0.012	0.0	0.1	0.1	0.1	O K
2160 min Winter	42.911	0.011	0.0	0.1	0.1	0.1	O K
2880 min Winter	42.910	0.010	0.0	0.1	0.1	0.1	O K
4320 min Winter	42.909	0.009	0.0	0.0	0.0	0.0	O K
5760 min Winter	42.908	0.008	0.0	0.0	0.0	0.0	O K
7200 min Winter	42.907	0.007	0.0	0.0	0.0	0.0	O K
8640 min Winter	42.906	0.006	0.0	0.0	0.0	0.0	O K
10080 min Winter	42.906	0.006	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.097	0.0	3.9	4408
10080 min Summer	0.966	0.0	3.9	5136
15 min Winter	139.587	0.0	1.0	19
30 min Winter	91.185	0.0	1.3	27
60 min Winter	56.713	0.0	1.7	42
120 min Winter	34.079	0.0	2.1	72
180 min Winter	24.967	0.0	2.3	102
240 min Winter	19.906	0.0	2.5	134
360 min Winter	14.417	0.0	2.7	190
480 min Winter	11.468	0.0	2.9	252
600 min Winter	9.596	0.0	3.0	318
720 min Winter	8.292	0.0	3.1	374
960 min Winter	6.581	0.0	3.3	488
1440 min Winter	4.744	0.0	3.5	752
2160 min Winter	3.415	0.0	3.8	1108
2880 min Winter	2.702	0.0	3.9	1480
4320 min Winter	1.940	0.0	4.2	2132
5760 min Winter	1.532	0.0	4.3	2944
7200 min Winter	1.275	0.0	4.4	3672
8640 min Winter	1.097	0.0	4.4	4384
10080 min Winter	0.966	0.0	4.5	5128

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Cascade Summary of Results for 190320 - Perm Pave 6 - 1.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 5 - 1.SRCX	190320 - GEO CRATES - 1.SRCX	(None)

Half Drain Time : 202 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.835	0.015	0.0	0.0	0.0	0.3	O K
30 min Summer	42.849	0.029	0.0	0.0	0.0	1.2	O K
60 min Summer	42.858	0.038	0.0	0.0	0.0	2.2	O K
120 min Summer	42.865	0.045	0.0	0.2	0.2	3.0	O K
180 min Summer	42.867	0.047	0.0	0.2	0.2	3.3	O K
240 min Summer	42.868	0.048	0.0	0.2	0.2	3.4	O K
360 min Summer	42.869	0.049	0.0	0.2	0.2	3.6	O K
480 min Summer	42.870	0.050	0.0	0.3	0.3	3.8	O K
600 min Summer	42.871	0.051	0.0	0.3	0.3	3.8	O K
720 min Summer	42.871	0.051	0.0	0.3	0.3	3.9	O K
960 min Summer	42.871	0.051	0.0	0.3	0.3	3.9	O K
1440 min Summer	42.870	0.050	0.0	0.3	0.3	3.8	O K
2160 min Summer	42.869	0.049	0.0	0.2	0.2	3.6	O K
2880 min Summer	42.868	0.048	0.0	0.2	0.2	3.4	O K
4320 min Summer	42.865	0.045	0.0	0.2	0.2	3.1	O K
5760 min Summer	42.864	0.044	0.0	0.1	0.1	2.9	O K
7200 min Summer	42.863	0.043	0.0	0.1	0.1	2.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	31.296	0.0	0.0	1420
30 min Summer	20.325	0.0	0.0	1440
60 min Summer	12.800	0.0	0.8	72
120 min Summer	7.895	0.0	1.9	126
180 min Summer	5.922	0.0	2.6	180
240 min Summer	4.823	0.0	3.1	204
360 min Summer	3.593	0.0	3.9	260
480 min Summer	2.905	0.0	4.4	324
600 min Summer	2.464	0.0	4.8	392
720 min Summer	2.153	0.0	5.1	458
960 min Summer	1.741	0.0	5.6	588
1440 min Summer	1.291	0.0	6.3	842
2160 min Summer	0.957	0.0	6.9	1216
2880 min Summer	0.774	0.0	7.2	1588
4320 min Summer	0.574	0.0	7.1	2336
5760 min Summer	0.464	0.0	6.9	3048
7200 min Summer	0.394	0.0	6.7	3792

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Cascade Summary of Results for 190320 - Perm Pave 6 - 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.862	0.042	0.0	0.1	0.1	2.7	O K
10080 min Summer	42.862	0.042	0.0	0.1	0.1	2.6	O K
15 min Winter	42.842	0.022	0.0	0.0	0.0	0.7	O K
30 min Winter	42.853	0.033	0.0	0.0	0.0	1.7	O K
60 min Winter	42.862	0.042	0.0	0.1	0.1	2.7	O K
120 min Winter	42.869	0.049	0.0	0.2	0.2	3.5	O K
180 min Winter	42.871	0.051	0.0	0.3	0.3	3.9	O K
240 min Winter	42.872	0.052	0.0	0.3	0.3	4.0	O K
360 min Winter	42.873	0.053	0.0	0.3	0.3	4.2	O K
480 min Winter	42.874	0.054	0.0	0.3	0.3	4.3	O K
600 min Winter	42.873	0.053	0.0	0.3	0.3	4.3	O K
720 min Winter	42.873	0.053	0.0	0.3	0.3	4.2	O K
960 min Winter	42.872	0.052	0.0	0.3	0.3	4.1	O K
1440 min Winter	42.871	0.051	0.0	0.3	0.3	3.8	O K
2160 min Winter	42.868	0.048	0.0	0.2	0.2	3.5	O K
2880 min Winter	42.867	0.047	0.0	0.2	0.2	3.3	O K
4320 min Winter	42.864	0.044	0.0	0.1	0.1	2.9	O K
5760 min Winter	42.863	0.043	0.0	0.1	0.1	2.7	O K
7200 min Winter	42.862	0.042	0.0	0.1	0.1	2.6	O K
8640 min Winter	42.861	0.041	0.0	0.1	0.1	2.5	O K
10080 min Winter	42.861	0.041	0.0	0.1	0.1	2.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.344	0.0	6.6	4504
10080 min Summer	0.307	0.0	6.4	5240
15 min Winter	31.296	0.0	0.0	1414
30 min Winter	20.325	0.0	0.3	72
60 min Winter	12.800	0.0	1.4	68
120 min Winter	7.895	0.0	2.6	122
180 min Winter	5.922	0.0	3.4	174
240 min Winter	4.823	0.0	4.0	196
360 min Winter	3.593	0.0	4.9	268
480 min Winter	2.905	0.0	5.5	338
600 min Winter	2.464	0.0	6.0	410
720 min Winter	2.153	0.0	6.4	478
960 min Winter	1.741	0.0	7.0	616
1440 min Winter	1.291	0.0	7.8	872
2160 min Winter	0.957	0.0	8.6	1256
2880 min Winter	0.774	0.0	9.0	1592
4320 min Winter	0.574	0.0	9.2	2336
5760 min Winter	0.464	0.0	9.2	3056
7200 min Winter	0.394	0.0	8.9	3752
8640 min Winter	0.344	0.0	8.5	4560
10080 min Winter	0.307	0.0	8.3	5312

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Cascade Summary of Results for 190320 - Perm Pave 6 - 30.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 5 - 30.SRCX	190320 - GEO CRATES - 30.SRCX	(None)

Half Drain Time : 73 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.875	0.055	0.0	0.4	0.4	4.4	O K
30 min Summer	42.886	0.066	0.0	0.8	0.8	6.2	O K
60 min Summer	42.895	0.075	0.0	1.1	1.1	7.5	O K
120 min Summer	42.899	0.079	0.0	1.4	1.4	8.1	O K
180 min Summer	42.900	0.080	0.0	1.5	1.5	8.3	O K
240 min Summer	42.901	0.081	0.0	1.5	1.5	8.3	O K
360 min Summer	42.900	0.080	0.0	1.4	1.4	8.2	O K
480 min Summer	42.898	0.078	0.0	1.3	1.3	8.0	O K
600 min Summer	42.897	0.077	0.0	1.3	1.3	7.8	O K
720 min Summer	42.895	0.075	0.0	1.2	1.2	7.6	O K
960 min Summer	42.893	0.073	0.0	1.1	1.1	7.1	O K
1440 min Summer	42.888	0.068	0.0	0.9	0.9	6.5	O K
2160 min Summer	42.884	0.064	0.0	0.7	0.7	5.8	O K
2880 min Summer	42.881	0.061	0.0	0.6	0.6	5.3	O K
4320 min Summer	42.876	0.056	0.0	0.4	0.4	4.7	O K
5760 min Summer	42.874	0.054	0.0	0.3	0.3	4.3	O K
7200 min Summer	42.871	0.051	0.0	0.3	0.3	3.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	76.797	0.0	3.3	26
30 min Summer	49.754	0.0	5.5	38
60 min Summer	30.811	0.0	7.8	62
120 min Summer	18.522	0.0	10.2	92
180 min Summer	13.611	0.0	11.6	124
240 min Summer	10.893	0.0	12.6	156
360 min Summer	7.936	0.0	14.0	222
480 min Summer	6.337	0.0	15.1	286
600 min Summer	5.319	0.0	15.9	348
720 min Summer	4.609	0.0	16.6	410
960 min Summer	3.673	0.0	17.7	530
1440 min Summer	2.665	0.0	19.2	772
2160 min Summer	1.932	0.0	20.6	1136
2880 min Summer	1.536	0.0	21.4	1504
4320 min Summer	1.112	0.0	22.2	2216
5760 min Summer	0.883	0.0	22.5	2952
7200 min Summer	0.738	0.0	22.4	3680

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Cascade Summary of Results for 190320 - Perm Pave 6 - 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.869	0.049	0.0	0.2	0.2	3.6	O K
10080 min Summer	42.868	0.048	0.0	0.2	0.2	3.4	O K
15 min Winter	42.880	0.060	0.0	0.5	0.5	5.2	O K
30 min Winter	42.893	0.073	0.0	1.1	1.1	7.1	O K
60 min Winter	42.901	0.081	0.0	1.5	1.5	8.5	O K
120 min Winter	42.905	0.085	0.0	1.8	1.8	9.0	O K
180 min Winter	42.905	0.085	0.0	1.8	1.8	9.0	O K
240 min Winter	42.904	0.084	0.0	1.7	1.7	8.9	O K
360 min Winter	42.901	0.081	0.0	1.5	1.5	8.5	O K
480 min Winter	42.899	0.079	0.0	1.4	1.4	8.1	O K
600 min Winter	42.896	0.076	0.0	1.2	1.2	7.7	O K
720 min Winter	42.894	0.074	0.0	1.1	1.1	7.4	O K
960 min Winter	42.890	0.070	0.0	1.0	1.0	6.8	O K
1440 min Winter	42.885	0.065	0.0	0.7	0.7	6.0	O K
2160 min Winter	42.880	0.060	0.0	0.5	0.5	5.3	O K
2880 min Winter	42.877	0.057	0.0	0.4	0.4	4.8	O K
4320 min Winter	42.873	0.053	0.0	0.3	0.3	4.2	O K
5760 min Winter	42.870	0.050	0.0	0.2	0.2	3.7	O K
7200 min Winter	42.867	0.047	0.0	0.2	0.2	3.4	O K
8640 min Winter	42.866	0.046	0.0	0.2	0.2	3.1	O K
10080 min Winter	42.865	0.045	0.0	0.2	0.2	3.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.638	0.0	22.1	4416
10080 min Summer	0.564	0.0	21.5	5144
15 min Winter	76.797	0.0	4.2	26
30 min Winter	49.754	0.0	6.6	37
60 min Winter	30.811	0.0	9.3	60
120 min Winter	18.522	0.0	11.9	94
180 min Winter	13.611	0.0	13.5	130
240 min Winter	10.893	0.0	14.6	164
360 min Winter	7.936	0.0	16.3	232
480 min Winter	6.337	0.0	17.5	296
600 min Winter	5.319	0.0	18.4	360
720 min Winter	4.609	0.0	19.2	422
960 min Winter	3.673	0.0	20.5	548
1440 min Winter	2.665	0.0	22.2	786
2160 min Winter	1.932	0.0	23.9	1168
2880 min Winter	1.536	0.0	24.9	1536
4320 min Winter	1.112	0.0	26.1	2284
5760 min Winter	0.883	0.0	26.6	2944
7200 min Winter	0.738	0.0	26.8	3752
8640 min Winter	0.638	0.0	26.6	4464
10080 min Winter	0.564	0.0	26.3	5088

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Cascade Summary of Results for 190320 - Perm Pave 6 - 100 + 40.SRCX

Upstream Structures	Outflow To	Overflow To
190320 - Perm Pave 5 - 100 + 40.SRCX	190320 - GEO CRATES - 100 + 40.SRCX	(None)

Half Drain Time : 44 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.909	0.089	0.0	2.0	2.0	9.6	O K
30 min Summer	42.926	0.106	0.0	3.3	3.3	12.2	O K
60 min Summer	42.936	0.116	0.0	4.3	4.3	13.6	O K
120 min Summer	42.939	0.119	0.0	4.7	4.7	14.2	O K
180 min Summer	42.938	0.118	0.0	4.6	4.6	14.0	O K
240 min Summer	42.936	0.116	0.0	4.3	4.3	13.6	O K
360 min Summer	42.931	0.111	0.0	3.8	3.8	12.8	O K
480 min Summer	42.926	0.106	0.0	3.3	3.3	12.2	O K
600 min Summer	42.922	0.102	0.0	2.9	2.9	11.6	O K
720 min Summer	42.919	0.099	0.0	2.6	2.6	11.1	O K
960 min Summer	42.913	0.093	0.0	2.2	2.2	10.2	O K
1440 min Summer	42.905	0.085	0.0	1.7	1.7	9.0	O K
2160 min Summer	42.897	0.077	0.0	1.3	1.3	7.9	O K
2880 min Summer	42.892	0.072	0.0	1.0	1.0	7.1	O K
4320 min Summer	42.886	0.066	0.0	0.8	0.8	6.2	O K
5760 min Summer	42.882	0.062	0.0	0.6	0.6	5.6	O K
7200 min Summer	42.879	0.059	0.0	0.5	0.5	5.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.587	0.0	9.4	24
30 min Summer	91.185	0.0	13.5	33
60 min Summer	56.713	0.0	17.9	50
120 min Summer	34.079	0.0	22.3	82
180 min Summer	24.967	0.0	24.9	114
240 min Summer	19.906	0.0	26.7	146
360 min Summer	14.417	0.0	29.2	208
480 min Summer	11.468	0.0	31.1	270
600 min Summer	9.596	0.0	32.6	332
720 min Summer	8.292	0.0	33.9	394
960 min Summer	6.581	0.0	35.8	516
1440 min Summer	4.744	0.0	38.6	756
2160 min Summer	3.415	0.0	41.4	1124
2880 min Summer	2.702	0.0	43.2	1480
4320 min Summer	1.940	0.0	45.5	2208
5760 min Summer	1.532	0.0	46.8	2944
7200 min Summer	1.275	0.0	47.5	3672

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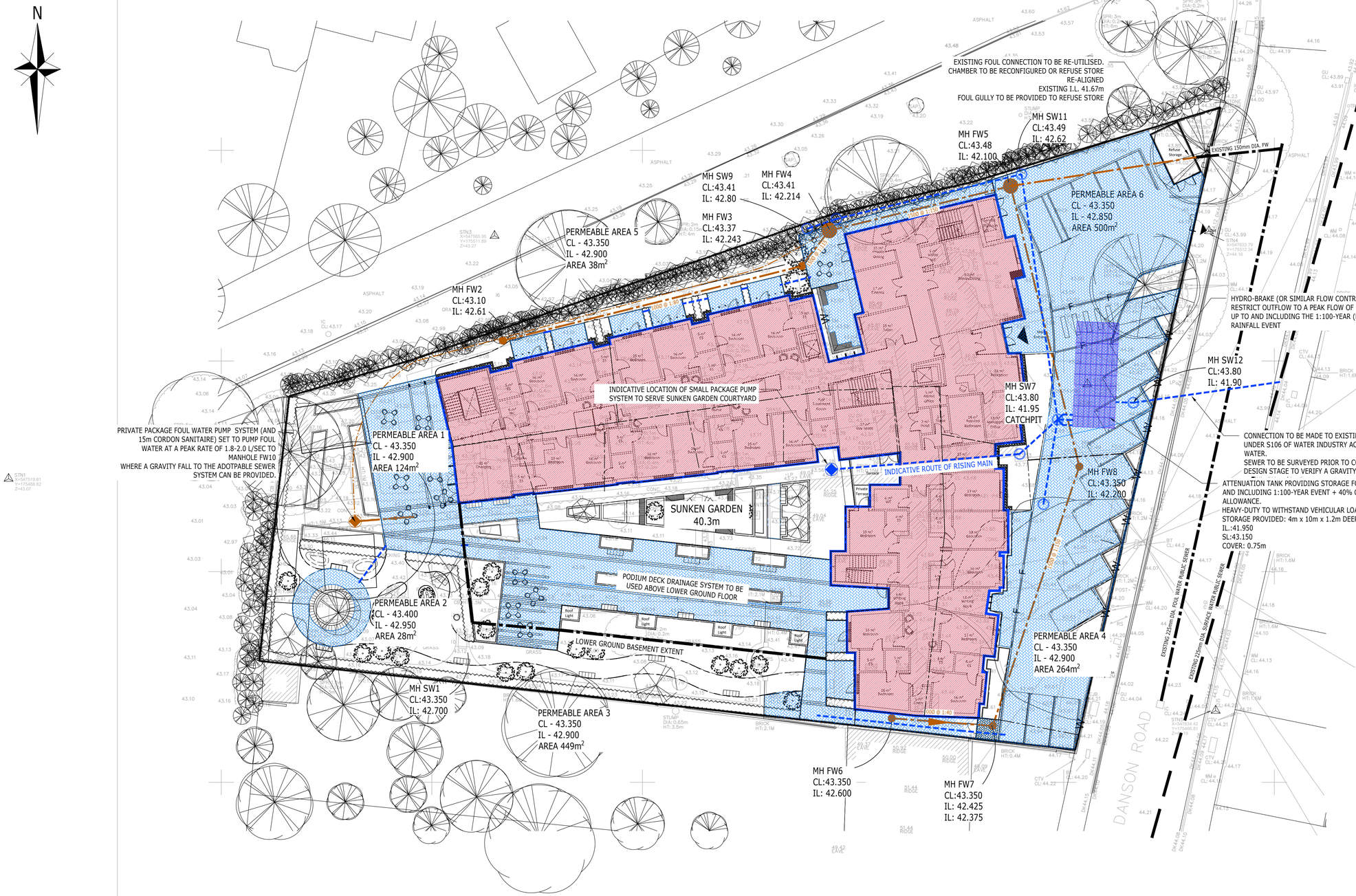
Cascade Summary of Results for 190320 - Perm Pave 6 - 100 + 40.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	42.877	0.057	0.0	0.4	0.4	4.8	O K
10080 min Summer	42.875	0.055	0.0	0.4	0.4	4.5	O K
15 min Winter	42.918	0.098	0.0	2.5	2.5	10.9	O K
30 min Winter	42.936	0.116	0.0	4.4	4.4	13.7	O K
60 min Winter	42.945	0.125	0.0	5.1	5.1	15.0	O K
120 min Winter	42.946	0.126	0.0	5.2	5.2	15.1	O K
180 min Winter	42.941	0.121	0.0	4.8	4.8	14.4	O K
240 min Winter	42.936	0.116	0.0	4.4	4.4	13.7	O K
360 min Winter	42.928	0.108	0.0	3.5	3.5	12.5	O K
480 min Winter	42.923	0.103	0.0	3.0	3.0	11.7	O K
600 min Winter	42.918	0.098	0.0	2.6	2.6	11.0	O K
720 min Winter	42.914	0.094	0.0	2.3	2.3	10.3	O K
960 min Winter	42.907	0.087	0.0	1.9	1.9	9.3	O K
1440 min Winter	42.899	0.079	0.0	1.4	1.4	8.1	O K
2160 min Winter	42.891	0.071	0.0	1.0	1.0	6.9	O K
2880 min Winter	42.887	0.067	0.0	0.8	0.8	6.2	O K
4320 min Winter	42.881	0.061	0.0	0.6	0.6	5.4	O K
5760 min Winter	42.877	0.057	0.0	0.4	0.4	4.8	O K
7200 min Winter	42.875	0.055	0.0	0.4	0.4	4.5	O K
8640 min Winter	42.873	0.053	0.0	0.3	0.3	4.2	O K
10080 min Winter	42.871	0.051	0.0	0.3	0.3	3.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.097	0.0	47.8	4400
10080 min Summer	0.966	0.0	47.8	5144
15 min Winter	139.587	0.0	11.0	24
30 min Winter	91.185	0.0	15.7	33
60 min Winter	56.713	0.0	20.6	52
120 min Winter	34.079	0.0	25.5	86
180 min Winter	24.967	0.0	28.4	118
240 min Winter	19.906	0.0	30.4	150
360 min Winter	14.417	0.0	33.2	214
480 min Winter	11.468	0.0	35.4	278
600 min Winter	9.596	0.0	37.1	342
720 min Winter	8.292	0.0	38.5	402
960 min Winter	6.581	0.0	40.8	526
1440 min Winter	4.744	0.0	44.0	770
2160 min Winter	3.415	0.0	47.2	1132
2880 min Winter	2.702	0.0	49.3	1476
4320 min Winter	1.940	0.0	52.1	2212
5760 min Winter	1.532	0.0	53.8	2960
7200 min Winter	1.275	0.0	54.8	3680
8640 min Winter	1.097	0.0	55.4	4376
10080 min Winter	0.966	0.0	55.7	5144

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Drawings



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
2. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES UNLESS OTHERWISE STATED.
4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
5. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
6. BACKFILL SHOULD BE PLACED IN LAYERS NOT EXCEEDING 300mm (UNCOMPACTED THICKNESS), EACH LAYER BEING WELL COMPACTED. MECHANICAL COMPACTION EQUIPMENT SHOULD NOT BE USED UNTIL THERE IS A MINIMUM OF 450mm OF COMPACTED MATERIAL ABOVE THE CROWN OF THE PIPE.
7. THE DRAINAGE PROPOSALS HAVE BEEN BASED ON THE DEVELOPMENT MASTERPLAN LAYOUT PRODUCED BY RYDER AND ILLUSTRATED ON THEIR DRAWING NO. HAYES-RYD-00-GF-DR-A-3002.
8. THIS DRAWING HAS BEEN BASED UPON A TOPOGRAPHICAL SURVEY PRODUCED BY MALCOM HUGHES CHARTERED SURVEYORS, DRAWING NUMBER 5049-1, DATED DECEMBER 2018.

DRAINAGE STRATEGY NOTES:

9. PRELIMINARY SURFACE WATER ATTENUATION SIMULATIONS HAVE IDENTIFIED A POTENTIAL STORAGE REQUIREMENT OF 96 TO 138m³ TO ACCOMMODATE A 1:100 YEAR RAINFALL EVENT (INCLUDING AN ADDITIONAL 40% FOR ANY POTENTIAL CLIMATE CHANGE IMPACT) - BASED ON THE FOLLOWING DESIGN PARAMETERS:

   M5-60mm = 20.00mm
   RATIO, R = 0.415
   IMPERMEABLE AREA = 0.262 HECTARES
   DISCHARGE RATE 7.8 LITRES/SEC (50% REDUCTION)

10. THE SURFACE WATER DETAILS ILLUSTRATED ON THIS PLAN ARE SUBJECT TO HYDRAULIC MODELING DURING THE DETAILED DESIGN STAGE TO ESTABLISH THE PEAK WATER LEVEL ASSOCIATED WITH A 1:100 YEAR RAINFALL EVENT (INCLUDING CLIMATE CHANGE).

NOTE:
DETAILS STATED ARE INDICATIVE AT THIS STAGE AND SUBJECT TO DETAILED DESIGN ONCE THE DEVELOPMENT PROPOSALS HAVE BEEN FINALISED

NOTE:
ALL PIPE SIZES AND GRADIENTS ARE INDICATIVE AND ARE SUBJECT TO DETAILED MODELING INCLUDING ACCURATE PIPE SIZING. ALL LEVELS SHOWN ARE INDICATIVE AND SUBJECT TO A DETAILED LEVEL REVIEW.

FOR INFORMATION ONLY

NOT FOR CONSTRUCTION

DRAINAGE KEY

- SITE BOUNDARY
- EXISTING FOUL WATER PUBLIC SEWER & MANHOLE
- EXISTING SURFACE WATER PUBLIC SEWER & MANHOLE
- PROPOSED PRIVATE SURFACE WATER DRAINAGE & MANHOLE
- PROPOSED PRIVATE FOUL WATER DRAINAGE & MANHOLE
- PROPOSED PRIVATE FOUL WATER PUMPING STATION & RISING MAIN
- PROPOSED POROUS PAVING ATTENUATION CONSTRUCTION (MINIMUM 300mm CONSTRUCTION REQUIRED FOR SURFACE WATER STORAGE PURPOSES) 30% VOID RATIO
- PROPOSED SURFACE WATER STORAGE TANK (MANUFACTURER AND SPECIFICATION TO BE CONFIRMED)
- PROPOSED 15m CORDON SANITARE

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Rev	Description	Drn	Chk	App	Date

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Client
CAREBASE LTD

Project Title:
DANSON ROAD, BEXLEYHEATH

Drawing Title:
PRELIMINARY FOUL & SuDS/SURFACE WATER DRAINAGE STRATEGY

A1 Scale	Date	Designed by
1:200	13/12/19	MAC
Drawn by	Checked by	Approved by
MAC	MAC	SJB

Drawing Number: 190320-002 Rev –