

Land to the North and East of Great Wymondley, Hertfordshire (Priory Farm Solar Array)

Surface Water Drainage and Overland Flow Management Strategy

Technical Note

Project ref:	5208 – Land to the North and East of Great Wymondley, Hertfordshire
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Background

- 1. A planning application for the *"Proposed solar farm measuring 88 hectares with associated battery storage containers, transformers stations, storage buildings, fencing etc including means of access"* was submitted to North Hertfordshire District Council (local planning authority) on 14 December 2021. The application was validated with the planning reference 21/03380/FP.
- 2. The proposals are for the construction of a photovoltaic solar array and associated support frames; 22 no. colocated inverter/transformer stations and battery storage containers; a storage building, switchgear building and control building (also co-located); and maintenance access tracks.
- 3. The planning application was accompanied by a Flood Risk Assessment report prepared by Weetwood Services Ltd ("Weetwood") (Report ref: 5208/FRA/Final/v1.2/2022-02-15).
- 4. The lead local flood authority (LLFA) Hertfordshire County Council objected to the proposals by way of its consultation letter dated 14 February 2022. The letter concluded by stating that the LLFA was concerned that the development will increase flooding downstream, and that details of a sustainable surface water drainage scheme were required to manage flood risk from overland flows.
- 5. The basis for the LLFA objection principally relates to historic flooding in Little Wymondley. The source of flooding in Little Wymondley is Ash Brook, although an unnamed tributary, sometimes referred to as Priory Lane Stream, flows to the west of the application site and discharges into the Ash Brook in Little Wymondley.
- 6. The LLFA response states that Priory Lane Stream is fed by several tributaries (ordinary watercourses) and that the application site is located at the head of these watercourses. The LLFA is concerned that the solar farm would increase runoff rates and/or volumes to the aforementioned watercourses and in so doing would increase flood risk in Little Wymondley.
- 7. The response letter states:
 - The development must avoid the Priory Lane Stream/tributaries and their associated flood extents, as any changes to ground levels or impedance to flows may increase flood risk.
 - The LLFA will not remove its objection until it is demonstrated that the proposals will provide betterment to the existing flood risk from overland flows.
 - That a hydraulic assessment/site specific modelling will need to be undertaken to establish overland flow routes and flood extents (i.e. the LLFA will not accept reliance on the EA surface water modelling to identify the extent of watercourse/drains and as an indicator of the overland pathways
 - That ground truthing should be undertaken to confirm the location and condition of the ordinary watercourses.
 - A comprehensive scheme to manage surface water runoff from the development should be developed. (The response states that the LLFA regards solar panels as impermeable, and that managing runoff from the development by gravel tracks and grassland is not considered acceptable)



- Infiltration testing, ground investigations and groundwater monitoring would need to be undertaken, prior to determination, if infiltration is proposed as a means of managing runoff.
- 8. This document presents additional technical information relating to flood risk and runoff management and in so doing addresses the matters raised in the LLFA consultation letter. The information presented in this document supplements the information presented in the submitted Flood Risk Assessment report. Specifically:
 - 2D direct rainfall hydraulic modelling has been undertaken to accurately model overland flow routes (pathways) across the site
 - A site visit has been undertaken to validate existing on site drainage ditches and overland flow pathways
 - A scheme has been prepared to manage overland flows across the developed site. The scheme is based on the discharge of runoff to existing drainage ditches at controlled/restricted rates to reduce downstream flood risk.
 - The above analysis has informed a revision to the proposed site layout to mitigate the risk of obstructing overland flow pathways.

Direct Rainfall Runoff Modelling

- 9. Overland flow across the site has been simulated using a 2D (TUFLOW) direct rainfall-runoff model with ground levels derived from Environment Agency LiDAR data.
- The model has been run for a 6-hour duration rainfall event with the following annual exceedance probabilities (AEP): Present day 1:30 AEP event, Present day 1:100 AEP event, 1 in 30 AEP event plus 25% (Central allowance), 1 in 30 AEP event plus 35% (Upper end allowance), 1 in 100 AEP event plus 25% (Central allowance), and 1 in 100 AEP event plus 40% (Upper end allowance).
- 11. The climate change allowances are in accordance with the guidance released by the Environment Agency on 10 May 2022 and are for the Upper and Bedford Ouse management catchment to the year 2125 (103 years).
- 12. For the purposes of the modelling, the site is split into two land areas located to the north of Graveley Land ("the northern parcel"; 45.01 ha) and to the south of Graveley Land southern parcel ("the southern parcel"; 39.51 ha). The extent of each parcel is presented in **Figure 1**.
- 13. Outputs from the 2D rainfall-runoff modelling for the aforementioned events for the pre-panelled (baseline) scenario are presented in **Figure 2** (accumulated depth of runoff and flow velocity and direction respectively.
- 14. The model outputs, validated by a site visit indicate the following:

Northern Parcel (refer Figure 3):

- Land in the northern part of the parcel drains to the ditch that runs along the northern boundary (Figure 3; 4a). The ditch drains in a westerly direction to a brick chamber housing the inlet of a circa 300 mm diameter pipe (Figure 4b). The pipe conveys flow across the field to the south in a south-westerly direction, outfalling in the north-east corner of a wood located on the western boundary of the parcel. The pipe run is approximately 285 m. The drain is effectively the upper reach of the Old Priory Stream. (Refer also Figure 2).
- Overland flow in the western part of the parcel drains to a defined overland flow pathway that broadly follows the route of the pipe. The flow pathway also receives runoff generated from the north-west corner of the parcel and from land to the north-west of the site (i.e. off-site). The open channel of the Old Priory Stream to the south of the pipe outlet also receives runoff from the lower western part of the site via multiple overland flow routes. A site visit determined that these routes are not well defined and no channels are present, aside from Old Priory Stream and one small drainage ditch corresponding to an existing field boundary. Flood depths along the flow pathway are <100 mm during all modelled events up to an including the 1 in 100 AEP event plus 40% climate change. (Refer **Figure 5** and **Figure 2**).
- Land in the south-west part of the parcel drains to a defined overland flow pathway that runs adjacent to the southern boundary (Graveley Lane) as shown on Figure 6a (refer also Figure 2). The pathway flows into Old Priory Stream upstream of where the stream crosses under Graveley Lane in a culvert. A site visit determined that these routes are not defined and no channels are present (refer Figure 6b and Figure 6c). Flood depths



along the flow pathway are <100 mm during all modelled events up to an including the 1 in 100 AEP event plus 40% climate change. (Refer **Figure 2**).

Southern Parcel (refer Figure 7):

- Runoff from the northern part of the parcel drains to the western boundary and along an existing field boundary across the southern edge of the area. In the case of the former, an overland flow pathway drains in a south/south-westerly direction to a single "outlet" on the western boundary of the parcel, while the later flows in a west/north-westerly direction, converging on the same "outlet" (refer **Figure 2**; **Figure 8**). The flow pathway continues off-site in a west/south-westerly direction toward The Priory. A site visit determined that the overland flow routes are not defined and no defined channels are present. Flood depths along the flow pathway are generally <100 mm during all modelled events up to an including the 1 in 100 AEP event plus 40% climate change (Refer **Figure 5** and **Figure 2**).
- Overland flow from the southern area discharges to two "outlets" further south on the western boundary (Refer Figure 9 and Figure 2). The flow pathways continue off-site in a west/north-westerly direction toward The Priory, and both converge with the off-site flow pathway described above at a location between the site boundary and The Priory. A site visit determined that the overland flow routes are not defined and no defined channels are present. Flood depths along the flow pathway are <100 mm during all modelled events up to an including the 1 in 100 AEP event plus 40% climate change. (Refer Figure 5 and Figure 2).
- Overland flow in the south-east corner drains across the southern boundary of the parcel in a southerly direction. Flood depths along the flow pathway are <100 mm during all modelled events up to an including the 1 in 100 AEP event plus 40% climate change. (Refer **Figure 5** and **Figure 2**).

Management of Overland Flow

- 15. The revised strategy for managing overland flows from the developed site is based on the following design principles:
 - Runoff infiltrating into the internal site access tracks and ancillary equipment hardstanding areas will be positively managed by a surface water drainage scheme. The drainage scheme includes 3 No. surface water attenuation basins.
 - Surface water runoff generated from the panelled part of the site (the "greenfield" areas of the solar farm) will by attenuated through the provision of 2 No. overland flow attenuation basins.
- 16. Further details follow below.

Access tracks and other areas of hardstanding

- 17. Northern Parcel:
 - The internal site access tracks, and the hardstanding areas where the control room building, switchgear building, storage building, and circa 10 no battery storage container/inverter transformer stations is located, has an estimated surface area of (circa 0.43 ha).
 - The access tracks and hardstanding will be constructed of 0.4 m deep Type 3 granular material.
 - Rainfall infiltrating into the build-up of the access track and hardstanding areas would be conveyed by gravity within a perforated pipe located in the base of the build-up, to an outlet control manhole (reference S1) fitted with a 50 mm diameter orifice plate. The plate restricts the outflow rate and attenuates runoff whilst minimising the risk of blockage.
 - The outlet from the control manhole is a solid pipe to a new outfall to the Old Priory Stream.
 - An offline storage basin ("North Basin"; volume 298 cu m) is located adjacent to the access track. The basin has sufficient storage to attenuate runoff from the access track and hardstanding generated during the 1 in 100 AEP event plus 40% climate change event.
 - The Microdrainage outputs for this element of the drainage scheme are provided in Annex 1-1.



18. Southern Parcel:

- The internal site access tracks, and the hardstanding areas where the control room building, switchgear building, storage building, and 11 no. battery storage container/inverter transformer stations is located, has an estimated surface area of (circa 0.50 ha).
- The access tracks and hardstanding will be constructed of 0.4 m deep Type 3 granular material.
- Rainfall infiltrating into the build-up of the access track along the northern boundary of the parcel and 2 no. battery storage container/inverter transformer stations would be conveyed by gravity within perforated pipe located in the base of the build-up, to an online detention basin ("South Basin 1"; volume 61 cu m). An outlet control manhole (reference S2) fitted with a 50 mm diameter orifice plate restricts the outflow rate from the basin and attenuates runoff whilst minimising the risk of blockage. The outlet from the control manhole is a solid pipe to a new swale that runs adjacent to the western boundary of the parcel. The Microdrainage outputs for this element of the drainage scheme are provided in **Annex 1-2**.
- Rainfall infiltrating into the build-up of the access track along the centre of the parcel and 9 no. battery storage container/inverter transformer stations would be conveyed by gravity within a perforated pipe located in the base of the build-up, and then to a solid pipe to an online detention basin ("South Basin 2"; volume 246 cu m). An outlet control manhole (reference S3) fitted with a 50 mm diameter orifice plate restricts the outflow rate from the basin and attenuates runoff whilst minimising the risk of blockage. The outlet from the control manhole is a solid pipe to a new swale that runs adjacent to the boundary of the parcel and discharges to an existing field drainage ditch. The Microdrainage outputs for this element of the drainage scheme are provided in **Annex 1-3**.
- The proposed discharge rates and attenuation volumes for the 1 in 100 AEP event plus a 40% climate change allowance for the areas described above are presented in **Table 1** below. A preliminary drainage layout is presented in **Annex 2**.

Parcel	Outfall reference	Impermeable Area (sq m)	Peak Discharge (I/s)	Attenuation Volume (cu m)
Northern	\$1	4,320	5.0	298
Southern	S2	1,250	5.0	61
Southern	\$3	3,710	5.0	246

Table 1: Summary of Proposed Surface Water Drainage Scheme

"Greenfield' Areas of the Solar Farm

- 19. According to published research into the impact of solar-farm panels on runoff rates and volumes (ref: 'Hydrologic Response of Solar Farms' (Cook LM and McCuen RH, American Society of Civil Engineers, 2013) solar panels do not have a significant impact on the hydrologic response of a site when the ground comprises of well managed vegetation such as good grass cover. In such an instance, the research cites a potential increase of up to 0.35% in runoff volume. This research is also referenced by Essex County Council (lead local flood authority) in its Sustainable Drainage System Design Guide for Solar Array Development.
- 20. The research recognises that not all solar farms have well managed vegetation beneath the solar panels and concludes that runoff volumes may increase by up to 7% compared to pre-panelled (greenfield) rates when the surface beneath the solar panels is bare earth.
- 21. The land at the solar farm would be managed as permanent grassland, and not bare earth. As such, the solar farm would not be expected to have a negative impact on the hydrologic response of the developed site and would almost certainly provide a reduction in the rate of runoff (and soil erosion) compared to the existing land use (arable cropping), particularly during the winter months when bare soils are currently exposed.
- 22. Notwithstanding the above, given the historic flooding issue downstream in Little Wymondley, modelling has been undertaken to identify how surface based features could be provided to reduce peak runoff rates following completion of the solar farm (proposed scenario). The basis of the modelling has been to increase the design rainfall referenced in the Direct Rainfall Runoff Modelling section of this document by 7% to simulate the effect of increased runoff volumes due to bare earth. This modelling is hypothetical and conservative for the reasons presented above.



- 23. Based on the modelling, 2 no. on-line surface-based storage basins are proposed to attenuate overland flow, one located in the northern parcel (526 cu m storage volume) and one located in the southern parcel (552 cu m). The location of the attenuation basins, and illustrative sizing are presented on **Figure 10**.
- 24. The basins would be formed by constructing low bunds (a maximum of 0.6 m high) in the location of the principal overland flow pathways within each parcel. The bunds are located along the low points and tie into the ground as levels increase.
- 25. The outflow from the basins would be restricted to 2 l/s/ha in accordance with CIRIA SuDS Manual using a suitable outlet control device such as a Hydrobrake. Each bund would have a constructed spillway at its lowest point to ensure that overtopping occurs in a controlled and safe manner.
- 26. The modelled flow hydrographs for the design events for the pre-development (Baseline) and post-development (Proposed) scenarios are presented in **Figure 11** and the model outputs are presented in **Table 2**.
- 27. The hydrographs show that for all the modelled events the basins delay the onset of the peak flow. In addition, the attenuation basins significantly reduce the peak flow for the present day 1 in 30 AEP rainfall event. As such, the modelling demonstrates that the risk of flooding downstream for events up to and including the 1 in 30 AEP event would be significantly reduced.
- 28. It is stressed that the model outputs relate to a scenario in which rainfall is increased by 7% to simulate bare earth conditions. In reality, the increase in peak flow would almost certainly be reduced for the reasons set out above. As such, for the situation whereby the land occupied by the solar panels comprises management grass, the provision of the attenuation storage would be expected to significantly reduce downstream flood risk for all modelled events.

Rainfall Event	N	lorthern Parcel		Sou	uthern Parcel		Total Site
(AEP)	Peak Flow	Peak Flow	Difference	Peak Flow	Peak Flow	Difference	Difference
	Baseline	Proposed	(l/sec)	Baseline	Proposed	(I/sec)	(l/sec)
	(l/sec)	(l/sec)		(l/sec)	(l/sec)		
Present day 1:30	413.4	307.4	-106.0	234.7	194.9	-39.8	-145.8
1:30 (25% CC)	497.2	502.2	5.0	314.4	306.5	-7.9	-2.9
1:30 (35% CC)	576.5	575.2	-1.3	347.2	348.5	1.3	0.0
Present day1:100	547.6	550.5	2.9	335.2	334.2	-1.0	1.9
1:100 (25% CC)	768.4	766.3	-2.1	446.2	452.8	6.6	4.5
1:100 (40% CC)	940.9	935.3	-5.6	517.7	523.7	6.0	0.4

Table 2: Summary of Peak Flow Modelling

Summary and Conclusion

- 29. This document presents an overland runoff and surface water drainage strategy for the proposed development of land to the north and east of Great Wymondley, Hertfordshire, for a solar farm (planning reference 21/03380/FP).
- 30. The strategy includes a formal drainage system to manage surface water runoff from the access tracks and other areas of hardstanding, and attenuation basins to manage overland flows from the "greenfield" part of the site occupied by the solar panels.
- 31. The analysis demonstrates that the implementation of land management measures in addition to the surface water drainage scheme (for the access tracks and associated hardstanding) and overland flow strategy (for the greenfield part of the site occupied by the solar panels) would ensure that the proposal would not increase, and would actually reduce downstream flood risk.
- 32. It is concluded that the proposals comply with planning policy and relevant technical guidance.



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FIGURES

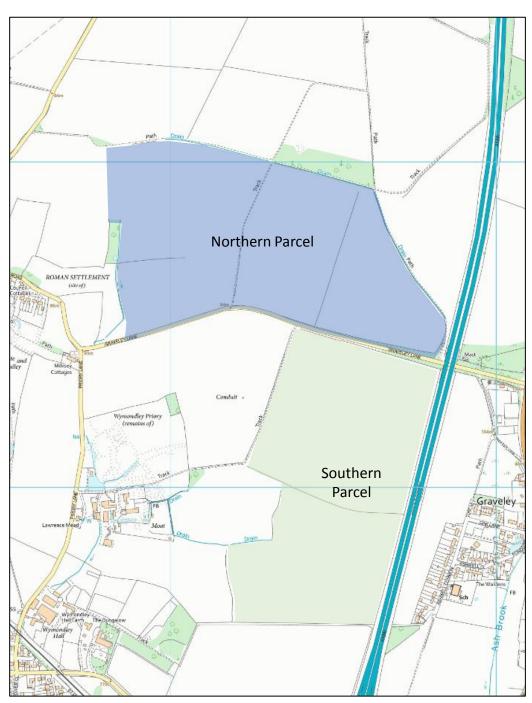
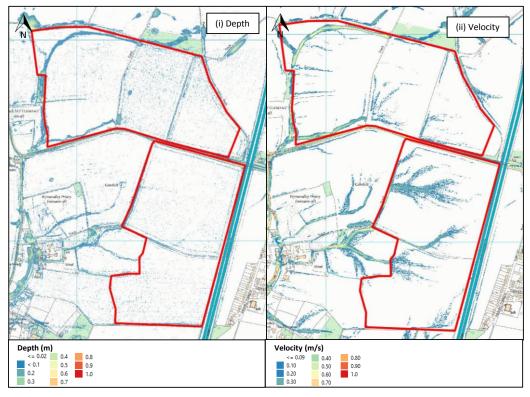


Figure 1: Proposed Solar Farm Site

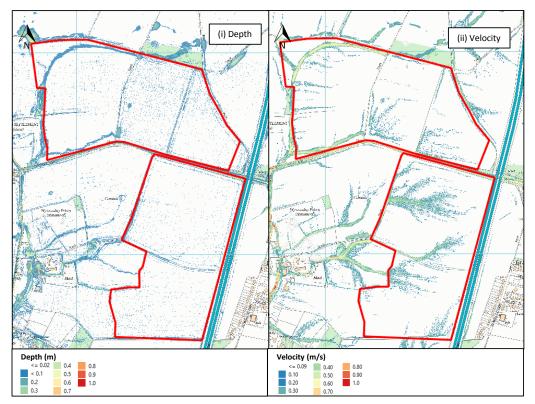


Figure 2: 2D Direct Rainfall-Runoff Modelling Outputs

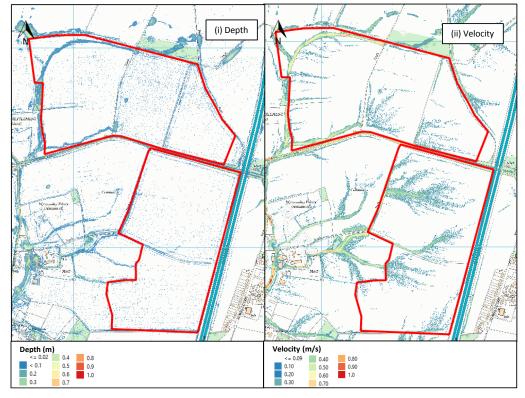


(a) Present Day 1 in 30 AEP Event

(b) 1 in 30 AEP Plus 25% Climate Change Event

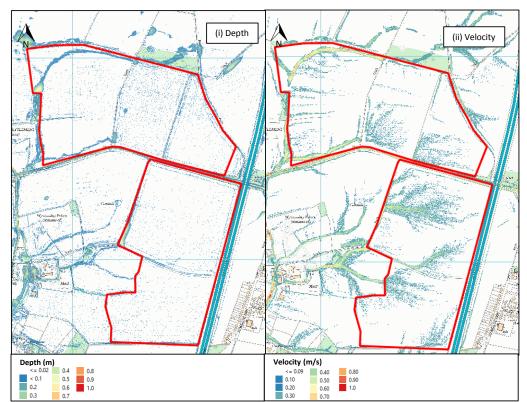




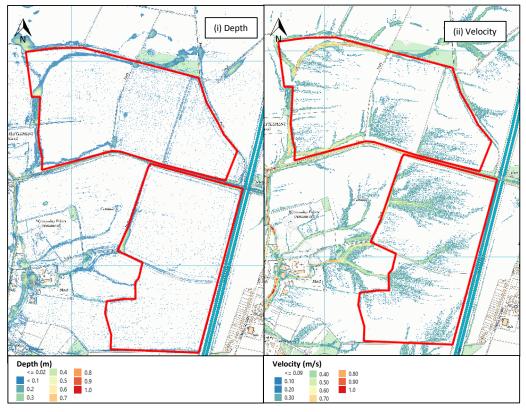


(c) 1 in 30 AEP Plus 35% Climate Change Event

(d) Present Day 1 in 100 AEP Event







(e) 1 in 100 AEP Event Plus 25% Climate Change

(f) 1 in 100 AEP Event Plus 40% Climate Change

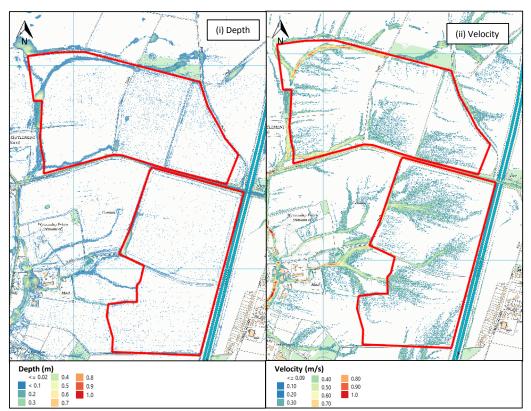




Figure 3: Northern Parcel Looking West

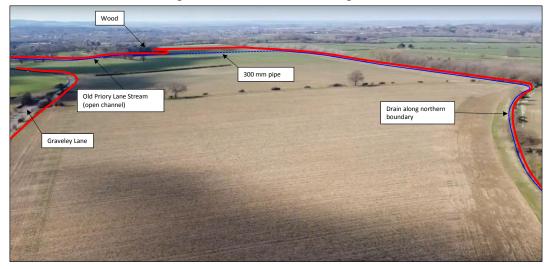


Figure 4: Northern Parcel – Existing Drainage Features

(b) Inlet to 300 mm pipe on

(a) Northern drainage ditch along northern boundary of northern parcel (looking west)





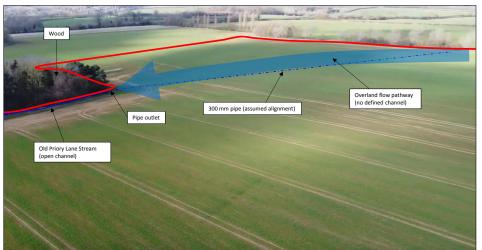


Figure 5: North-West Part of Northern Parcel Looking North-West

Figure 6a: South-West Part of Northern Parcel Looking South



Figure 6b: South-West Part of Northern Parcel Looking East

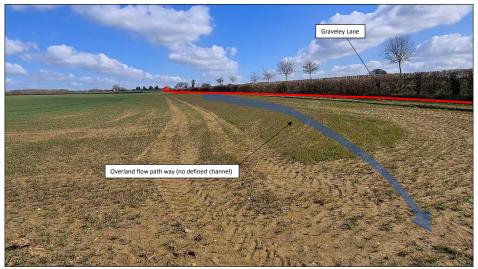




Figure 6c: South-West Part of Northern Parcel Looking West Towards Old Priory Stream



Figure 7: Southern Parcel Looking South-West

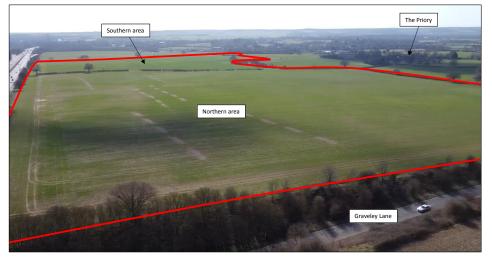
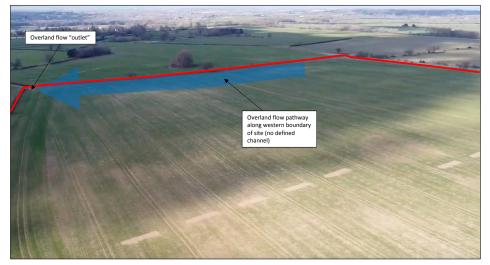


Figure 8: Northern Part of Southern Parcel Looking West





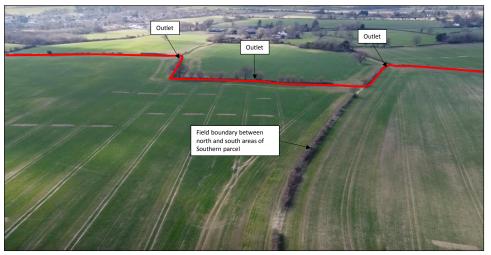


Figure 9: Southern Part of Southern Parcel Looking West

Figure 10: Location of Attenuation Basins

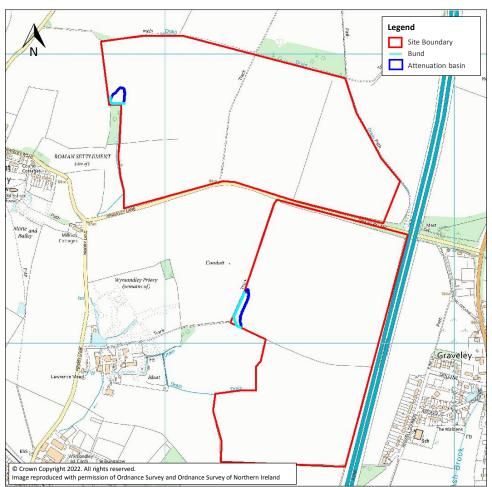
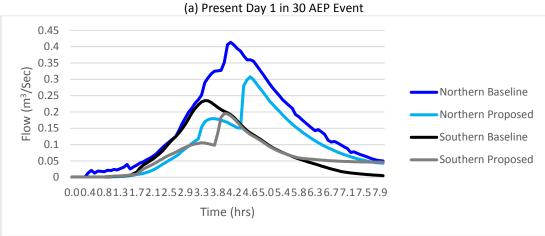
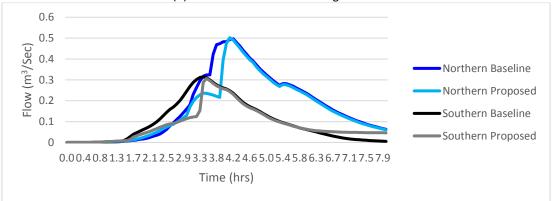


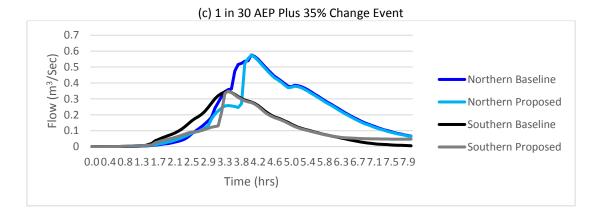


Figure 11: Pre (Baseline) and Post Development (Proposed) Hydrographs

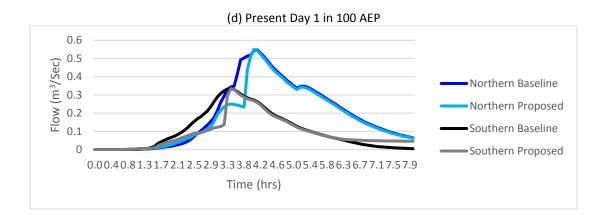


(b) 1 in 30 AEP Plus 25% Change Event

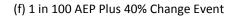


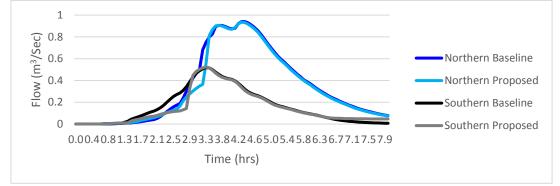






(e) 1 in 100 AEP Plus 25% Change Event 1 0.8 0.6 0.4 0.2 0.00.40.81.31.72.12.52.93.33.84.24.65.05.45.86.36.77.17.57.9 Time (hrs)







ANNEXES



ANNEX 1

MicroDrainage Modelling of Access Track and Hardstanding

Weetwood						Page 1
70 Cowcross	Street					
London						
EC1M 6EJ						Micco
Date 30/05/2	2022 12.30	Dog	and h	JamesAld	Iridao	Micro
			-	JamesAIC	iridge	Drainag
	N - NORTH 5_0 LS.		cked by			
XP Solutions	3	Soui	cce Cont	rol 2019.	1	
	Summary of Result	ts for 1	<u>)0 year</u>	Return Pe	eriod (+40%)	
	6 1				<u>.</u>	
	Storm Event		Max Ma		Status	
	Evenc		(m) (1/	rol Volume s) (m³)		
		(111)	(III) (1)	5) (111)		
	15 min Summer	91.544 0.	544	3.8 150.5	O K	
	30 min Summer	91.670 0.	670	4.2 193.3	0 K	
	60 min Summer				Flood Risk	
	120 min Summer		876	4.8 269.9	Flood Risk	
	180 min Summer				Flood Risk	
	240 min Summer				Flood Risk	
	360 min Summer 480 min Summer				Flood Risk Flood Risk	
	600 min Summer				Flood Risk	
	720 min Summer				Flood Risk	
	960 min Summer	91.908 0.			Flood Risk	
	1440 min Summer	91.867 0.	867	4.8 266.3	Flood Risk	
	2160 min Summer	91.803 0.	803	4.6 241.7	Flood Risk	
	2880 min Summer	91.743 0.	743	4.4 219.3	Flood Risk	
	4320 min Summer			4.1 182.4	O K	
	5760 min Summer			3.8 154.1		
	7200 min Summer 8640 min Summer			3.5 132.0		
	10080 min Summer			3.3 114.3 3.1 100.0		
	15 min Winter			3.8 150.5		
	30 min Winter		671	4.2 193.4	0 K	
	Storm	Rain	Flooded	Discharge	Time-Peak	
	Event	(mm/hr)	Volume	Volume	(mins)	
			(m³)	(m³)		
	15 min Summe	r 141.688	0.0	148.8	23	
	30 min Summe			192.4	38	
	60 min Summe	r 56.713	0.0	243.5	68	
	120 min Summe	r 33.838	0.0	290.6	126	
					186	
	180 min Summe		0.0	318.3		
	240 min Summe	r 19.656	0.0	337.6	246	
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	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 1440 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	337.6 365.2 386.2 403.1 417.1 439.8 471.6	246 364 440 494 558 686 956	
	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 1440 min Summe 2880 min Summe 4320 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308 r 2.611 r 1.869	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	337.6 365.2 386.2 403.1 417.1 439.8 471.6 513.6	246 364 440 494 558 686 956 1368 1764 2552	
	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 1440 min Summe 2160 min Summe 2880 min Summe 4320 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308 r 2.611 r 1.869 r 1.473	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	337.6 365.2 386.2 403.1 417.1 439.8 471.6 513.6 540.5 579.6 610.5	246 364 440 494 558 686 956 1368 1764 2552 3288	
	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 1440 min Summe 2160 min Summe 4320 min Summe 5760 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308 r 2.611 r 1.869 r 1.473 r 1.224	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	337.6 365.2 386.2 403.1 417.1 439.8 471.6 513.6 540.5 579.6 610.5 634.1	246 364 440 494 558 686 956 1368 1764 2552 3288 4032	
	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 2160 min Summe 2880 min Summe 4320 min Summe 5760 min Summe 8640 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308 r 2.611 r 1.869 r 1.473 r 1.224 r 1.052	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	337.6 365.2 386.2 403.1 417.1 439.8 471.6 513.6 540.5 579.6 610.5 634.1 653.7	246 364 440 494 558 686 956 1368 1764 2552 3288 4032 4752	
	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 1440 min Summe 2160 min Summe 4320 min Summe 5760 min Summe 7200 min Summe 8640 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308 r 2.611 r 1.869 r 1.473 r 1.224 r 1.052 r 0.925	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	337.6 365.2 386.2 403.1 417.1 439.8 471.6 513.6 540.5 579.6 610.5 634.1 653.7 670.1	246 364 440 494 558 686 956 1368 1764 2552 3288 4032 4752 5448	
	240 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe 960 min Summe 2160 min Summe 2880 min Summe 4320 min Summe 5760 min Summe 8640 min Summe	r 19.656 r 14.176 r 11.248 r 9.394 r 8.104 r 6.416 r 4.610 r 3.308 r 2.611 r 1.869 r 1.473 r 1.224 r 1.052 r 0.925 r 141.688	$\begin{array}{c} 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0\\ 0.0$	337.6 365.2 386.2 403.1 417.1 439.8 471.6 513.6 540.5 579.6 610.5 634.1 653.7	246 364 440 494 558 686 956 1368 1764 2552 3288 4032 4752	

70 Cowcross S						
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Date 30/05/20	10.20	D		d by Ja		
			2	-	amesalo	ariage
File 5208 SW	- NORTH 5_0 LS.		necked	-		
P Solutions		Sc	ource	Contro	1 2019.	1
S	ummary of Resul	ts for	100 5	vear Re	turn Pe	eriod (+40%
	_		_			
	Storm Event	Max Level	Max Denth	Max Control	Max	Status
	Lvenc	(m)	(m)	(1/s)	(m ³)	
		(,	()	(1,0)	()	
	60 min Winter	91.784	0.784	4.5	234.4	Flood Risk
	120 min Winter	91.877	0.877	4.8	270.2	Flood Risk
	180 min Winter					Flood Risk
	240 min Winter					Flood Risk
	360 min Winter					Flood Risk
	480 min Winter 600 min Winter					Flood Risk Flood Risk
	720 min Winter					Flood Risk Flood Risk
	960 min Winter					Flood Risk
	1440 min Winter					Flood Risk
	2160 min Winter					Flood Risk
	2880 min Winter	91.678	0.678	4.2	196.1	ОК
	4320 min Winter	91.545	0.545	3.8	150.8	O K
	5760 min Winter	91.443	0.443		118.6	
	7200 min Winter		0.365	3.0	95.1	O K
	8640 min Winter 10080 min Winter				77.9 65.0	O K O K
		91.258 Rain	0.258 n Flo ur) Vo:	2.5 oded Dis Lume V	65.0 scharge colume	
	10080 min Winter Storm	91.258 Rain	0.258 n Flo ur) Vo:	2.5 oded Dia	65.0 scharge	O K Time-Peak
	10080 min Winter Storm Event 60 min Wint	8 91.258 Rain (mm/h er 56.7	0.258 n Flo ur) Voi (r	2.5 oded Dis Lume V	65.0 scharge colume	O K Time-Peak
	10080 min Winter Storm Event 60 min Wint 120 min Wint	Rain (mm/h er 56.7 er 33.8	0.258 n Flo nr) Voi (r 13 38	2.5 oded Di: lume V n ³)	65.0 scharge olume (m ³) 243.5 290.6	OK Time-Peak (mins)
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7	0.258 n Flo nr) Voi (r 13 38 03	2.5 oded Dia lume V n ³) 0.0 0.0 0.0	65.0 scharge (m ³) 243.5 290.6 318.3	0 K Time-Peak (mins) 66 124 182
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6	0.258 n Flo nr) Vo: (r 13 38 03 556	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0	65.0 scharge 'olume (m ³) 243.5 290.6 318.3 337.6	0 K Time-Peak (mins) 66 124 182 240
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1	0.258 n Flo nr) Vo: (r 13 38 03 556 76	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0	65.0 scharge 'olume (m ³) 243.5 290.6 318.3 337.6 365.2	0 K Time-Peak (mins) 66 124 182 240 352
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2	0.258 n Flo nr) Vo: (r 13 38 03 56 76 48	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge 'olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2	O K Time-Peak (mins) 66 124 182 240 352 458
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3	0.258 n Flo nr) Vo: (r 13 38 03 556 76 48 994	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge 'olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1	O K Time-Peak (mins) 66 124 182 240 352 458 546
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1	0.258 n Flo nr) Vo: (r 13 38 03 56 76 48 94 04	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge 'olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1	O K Time-Peak (mins) 66 124 182 240 352 458 546 572
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4	0.258 n Flo nr) Vo: (r 13 38 03 56 76 48 94 04 16	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge 'olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1	O K Time-Peak (mins) 66 124 182 240 352 458 546
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint 960 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6	0.258 n Flo nr) Vo: (r 13 38 03 56 76 48 94 04 .16 50	2.5 oded Dia Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1 439.8	O K Time-Peak (mins) 66 124 182 240 352 458 546 572 726
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 720 min Wint 960 min Wint 1440 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3	0.258 n Flo (r 13 38 03 56 76 48 94 04 16 10 08	2.5 oded Dia Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1 439.8 471.7	O K Time-Peak (mins) 66 124 182 240 352 458 546 572 726 1028
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint 960 min Wint 1440 min Wint 2160 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6	0.258 n Flo nr) Vo: (r 13 38 03 556 76 48 94 04 16 10 08 11	2.5 oded Dia Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1 439.8 471.7 513.6	O K Time-Peak (mins) 66 124 182 240 352 458 546 572 726 1028 1456
	10080 min Winter Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint 960 min Wint 1440 min Wint 2880 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8	0.258 n Flo r) Vo: (r 13 38 03 556 76 48 94 04 16 10 08 11 69	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1 439.8 471.7 513.6 540.5	O K Time-Peak (mins) 66 124 182 240 352 458 546 572 726 1028 1456 1876
	10080 min Winter Storm Event 60 min Wint 120 min Wint 120 min Wint 240 min Wint 240 min Wint 360 min Wint 480 min Wint 720 min Wint 1440 min Wint 2160 min Wint 280 min Wint 5760 min Wint 7200 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2	0.258 n Flo (r) Vo: (r) (13) (38) 03) (56) 76 (48) 94 04 (16) 10) 08) (11) (69) 73) (24)	2.5 oded Dia lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1 439.8 471.7 513.6 540.5 579.6 610.6 634.1	O K Time-Peak (mins) 66 124 182 240 352 458 546 572 726 1028 1456 1028 1456 1876 2680 3408 4112
	10080 min Winter Storm Event 60 min Wint 120 min Wint 120 min Wint 240 min Wint 240 min Wint 360 min Wint 480 min Wint 720 min Wint 960 min Wint 1440 min Wint 2160 min Wint 280 min Wint 5760 min Wint	Rain (mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	0.258 n Flo r) Vo: (r 13 38 03 556 76 48 94 04 16 10 08 11 69 73 24 52	2.5 oded Dia Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	65.0 scharge olume (m ³) 243.5 290.6 318.3 337.6 365.2 386.2 403.1 417.1 439.8 471.7 513.6 540.5 579.6 610.6	O K Time-Peak (mins) 66 124 182 240 352 458 546 572 726 1028 1456 1028 1456 1876 2680 3408

Weetwood	Page 3
70 Cowcross Street	
London	
EC1M 6EJ	Micco
Date 30/05/2022 12:30	Designed by JamesAldridge Drainage
File 5208 SW - NORTH 5_0 LS	Checked by DidlidUP
XP Solutions	Source Control 2019.1
Rai	.nfall Details
Rainfall Model	FSR Winter Storms Yes
Return Period (years)	100 Cv (Summer) 1.000
	nd and Wales Cv (Winter) 1.000
Ratio R	20.000 Shortest Storm (mins) 15 0.430 Longest Storm (mins) 10080
	Yes Climate Change % +40
<u></u>	e Area Diagram
Tota	l Area (ha) 0.432
	Area Time (mins) Area
	(ha) From: To: (ha)
0 4	0.000 4 8 0.432
	2. 2010. Таказания с
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Weetwood		Page 4
70 Cowcross Street		
London		
EC1M 6EJ		Micro
Date 30/05/2022 12:30	Designed by JamesAldridge	- Micro Drainage
File 5208 SW - NORTH 5_0 LS		
XP Solutions	Source Control 2019.1	
	Model Details	
Storage is O	nline Cover Level (m) 92.000	
<u>Tank</u>	or Pond Structure	
	ert Level (m) 91.000	
Depth (m) An	rea (m ²) Depth (m) Area (m ²)	
0.000	230.0 1.000 419.6	
Orifi	ce Outflow Control	
Diameter (m) 0.050 Discharg	e Coefficient 0.600 Invert Level (m) 93	1.000

							Page 1
70 Cowcross Sti	reet						
ondon							
EC1M 6EJ							Micro
Date 24/05/2022	2 10:17	De	esigne	d by Ja	mesAld	lridge	
File 5208 SW -	SOUTH 1 5 0 L	Ch	necked	by			Drainag
XP Solutions			ource	Control	2019.	1	
Sum	nmary of Result	ts for	100 y	vear Ret	curn Pe	eriod (+40%)	
	-		-				
	Storm	Max	Max	Max	Max	Status	
	Event		-	Control			
		(m)	(m)	(1/s)	(m³)		
	15 min Summer	98.732	0.732	4.4	41.2	Flood Risk	
	30 min Summer					Flood Risk	
	60 min Summer					Flood Risk	
	120 min Summer 180 min Summer			5.0 4.9		Flood Risk Flood Risk	
	240 min Summer			4.9		Flood Risk	
	360 min Summer			4.8		Flood Risk	
	480 min Summer			4.7		Flood Risk	
	600 min Summer					Flood Risk	
	720 min Summer 960 min Summer			4.4		Flood Risk O K	
	1440 min Summer			4.2			
	2160 min Summer			3.3			
	2880 min Summer	98.335	0.335	2.9			
	4320 min Summer			2.3		O K	
	5760 min Summer			1.9			
	7200 min Summer 8640 min Summer			1.6 1.4		ОК	
:	10080 min Summer					O K	
	15 min Winter					Flood Risk	
	30 min Winter	98.842	0.842	4.7	51.5	Flood Risk	
	Storm	Rair	n Flo	oded Dis	charge	Time-Peak	
	Storm Event		r) Vol	Lume Vo	olume	Time-Peak (mins)	
			r) Vol	Lume Vo	-		
		(mm/h	r) Vol (1	Lume Vo	olume		
	Event 15 min Summe 30 min Summe	(mm/h er 141.6 er 91.8	(r 88 82	Lume Vo n ³) 0.0 0.0	olume (m ³) 44.2 57.4	(mins) 22 36	
	Event 15 min Summe 30 min Summe 60 min Summe	(mm/h er 141.6 er 91.8 er 56.7	(r 888 82 13	Lume Vo n ³) 0.0 0.0 0.0	olume (m ³) 44.2 57.4 70.9	(mins) 22 36 66	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8	r) Vol (r 88 82 13 38	Lume Vo n ³) 0.0 0.0 0.0 0.0	44.2 (m ³) 44.2 57.4 70.9 84.6	(mins) 22 36 66 106	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7	r) Vol (r 88 82 13 38 03	Lume Va a ³) 0.0 0.0 0.0 0.0 0.0 0.0	olume (m ³) 44.2 57.4 70.9 84.6 92.6	(mins) 22 36 66 106 138	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6	r) Vol (r 88 82 13 38 03 56	Lume Vo n ³) 0.0 0.0 0.0 0.0	44.2 (m ³) 44.2 57.4 70.9 84.6	(mins) 22 36 66 106	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 240 min Summe 360 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2	r) Vol (r 88 82 13 38 03 56 76 48	Lume Va a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	<pre>clume (m³) 44.2 57.4 70.9 84.6 92.6 98.3</pre>	(mins) 22 36 66 106 138 170 240 308	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 240 min Summe 360 min Summe 480 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3	r) Vol (r 888 82 13 38 03 56 76 48 94	Lume Va a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4	(mins) 22 36 66 106 138 170 240 308 374	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 720 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1	Yor 88 82 13 38 03 56 76 48 94 04	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6	(mins) 22 36 66 106 138 170 240 308 374 438	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 600 min Summe 960 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4	Yol 88 82 13 38 03 56 76 48 94 04 16	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3	(mins) 22 36 66 106 138 170 240 308 374 438 566	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 720 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6	r) Vo: (r 888 82 13 38 03 56 76 48 94 04 16 10	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6	(mins) 22 36 66 106 138 170 240 308 374 438	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 960 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3	r) Vo: (r 888 82 13 38 03 56 76 48 94 04 16 10 08	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3	(mins) 22 36 66 106 138 170 240 308 374 438 566 812	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 240 min Summe 360 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8	r) Vo: (r 888 82 13 38 03 56 76 48 94 04 16 10 08 11 69	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2	(mins) 22 36 66 106 138 170 240 308 374 438 566 812 1172 1532 2248	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 240 min Summe 360 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8 er 1.4	r) Vo: (r 888 82 13 38 03 56 76 48 94 04 16 10 08 11 69 73	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2 176.8	(mins) 22 36 66 106 138 170 240 308 374 438 566 812 1172 1532 2248 2944	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 240 min Summe 240 min Summe 360 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.4	r) Vo: (r 888 82 13 38 03 56 76 48 94 04 16 10 08 11 69 73 24	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2 176.8 183.6	(mins) 22 36 66 106 138 170 240 308 374 438 566 812 1172 1532 2248 2944 3672	
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	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 240 min Summe 240 min Summe 360 min Summe	(mm/h er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.0 er 0.9	r) Vo: (r 888 82 13 38 03 56 76 48 94 04 16 10 08 11 69 73 24 52 25	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 44.2 57.4 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2 176.8 183.6	(mins) 22 36 66 106 138 170 240 308 374 438 566 812 1172 1532 2248 2944 3672	

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	Storm	Max	Max	Max	Max	Status
	Event			Control		000000
		(m)	(m)	(1/s)	(m ³)	
	60 min Winte					Flood Risk
	120 min Winte					Flood Risk Flood Risk
	180 min Winte 240 min Winte					Flood Risk Flood Risk
	360 min Winte					Flood Risk Flood Risk
	480 min Winte					Flood Risk
	600 min Winte					Flood Risk
	720 min Winte					O K
	960 min Winte					ОК
	1440 min Winte	r 98.42	7 0.427	3.3	18.9	ОК
	2160 min Winte	r 98.28	5 0.285	2.7	11.1	O K
	2880 min Winte	r 98.203	3 0.203	2.2	7.4	0 K
	4320 min Winte	r 98.122	2 0.122			0 K
	5760 min Winte	r 98.08	5 0.086	1.3	2.8	ΟK
	7200 min Winte		9 0.069		2.2	O K
	8640 min Winte	r 98.062	9 0.069 2 0.062	0.9	2.2 2.0	0 K 0 K
		r 98.062	9 0.069 2 0.062	0.9	2.2 2.0	O K
	8640 min Winte	r 98.062	9 0.069 2 0.062	0.9	2.2 2.0	0 K 0 K
	8640 min Winte	r 98.062 r 98.05	9 0.069 2 0.062 7 0.057	0.9 0.8	2.2 2.0 1.8	0 K 0 K
	8640 min Winte 10080 min Winte	r 98.062 r 98.05 Ra :	9 0.069 2 0.062 7 0.057	0.9 0.8	2.2 2.0 1.8	0 K 0 K 0 K
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	8640 min Winte 10080 min Winte Storm Event	r 98.06: r 98.05 ⁻ Ra: (mm/	9 0.069 2 0.062 7 0.057 in Fla hr) Vo (0.9 0.8 Doded Dis lume V m ³)	2.2 2.0 1.8 scharge olume (m ³)	0 K 0 K 0 K Time-Peak (mins)
	8640 min Winte 10080 min Winte Storm Event 60 min Wint	r 98.063 r 98.05 Ra : (mm/	0.069 0.062 0.057 in Flat hr) Vo (13)	0.9 0.8 Doded Dis lume V m ³) 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9	<pre>0 K 0 K 0 K</pre> Time-Peak (mins) 64
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33.	<pre> 0.069 2 0.062 7 0.057 in Fla hr) Vo (713 838</pre>	0.9 0.8 Doded Dis lume V m ³) 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6	<pre>0 K 0 K 0 K</pre> Time-Peak (mins) 64 116
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24.	0.069 0.062 0.057 in Flat hr) Vo 713 838 703	0.9 0.8 Doded Dis lume V m ³) 0.0 0.0 0.0	2.2 2.0 1.8 scharge (m ³) 70.9 84.6 92.6	<pre>0 K 0 K 0 K</pre> Time-Peak (mins) 64 116 144
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24. cer 19.	 0.069 0.062 0.057 in Fland in Fland in (100) in (100)<td>0.9 0.8 Doded Dis lume V m³) 0.0 0.0 0.0 0.0 0.0</td><td>2.2 2.0 1.8 scharge olume (m³) 70.9 84.6 92.6 98.3</td><td>0 K 0 K 0 K Time-Peak (mins) 64 116 144 182</td>	0.9 0.8 Doded Dis lume V m ³) 0.0 0.0 0.0 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3	0 K 0 K 0 K Time-Peak (mins) 64 116 144 182
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24. cer 19. cer 14.	<pre> 0.069 0.062 0.057 in Fla hr) Vo (713 838 703 656 176 </pre>	0.9 0.8 Doded Dis lume V m ³) 0.0 0.0 0.0	2.2 2.0 1.8 scharge (m ³) 70.9 84.6 92.6	<pre>0 K 0 K 0 K</pre> Time-Peak (mins) 64 116 144
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	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24. cer 19. cer 14. cer 11. cer 11. cer 9. cer 8. cer 6.	<pre> 0.069 0.062 0.057 in Fla hr) Vo (713 838 703 656 176 248 394 104 </pre>	0.9 0.8 Doded Dis lume V m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6	0 K 0 K 0 K Time-Peak (mins) 64 116 144 182 256 328 396 462
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint 960 min Wint 1440 min Wint 2160 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 24. cer 19. cer 14. cer 11. cer 9. cer 14. cer 11. cer 8. cer 6. cer 4. cer 3.	<pre> 0.069 0.062 0.057 in Fla hr) Vc (713 838 703 656 176 248 394 104 416 610 308 </pre>	0.9 0.8 0.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8	<pre>O K O K O K</pre> <pre>Comparison Comporison Comporison Comparison Comparison Comparison Compa</pre>
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 600 min Wint 720 min Wint 960 min Wint 1440 min Wint 2880 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24. cer 19. cer 14. cer 11. cer 9. cer 14. cer 11. cer 9. cer 4. cer 3. cer 3. cer 3. cer 3.	<pre> 0.069 0.062 0.057 in Fla hr) Vc (713 838 703 656 176 248 394 104 416 610 308 611</pre>	0.9 0.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7	<pre>0 K 0 K 0 K</pre> Time-Peak (mins) 64 116 144 182 256 328 396 462 592 838 1192 1532
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	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 480 min Wint 720 min Wint 960 min Wint 1440 min Wint 2160 min Wint 2880 min Wint 5760 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 24. cer 19. cer 14. cer 11. cer 9. cer 14. cer 11. cer 9. cer 4. cer 3. cer 3. cer 3. cer 3. cer 1. cer 1. ce	<pre> 0.069 0.062 0.057 in Fla hr) Vc (713 838 703 656 176 248 394 104 416 610 308 611 869 473 </pre>	0.9 0.8 0.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2 176.8	0 K 0 K 0 K Time-Peak (mins) 64 116 144 182 256 328 396 462 592 838 1192 1532 2212 2936
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 480 min Wint 720 min Wint 1440 min Wint 2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint	r 98.063 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24. cer 19. cer 14. cer 11. cer 9. cer 4. cer 6. cer 3. cer 3. cer 3. cer 3. cer 1. cer	<pre> 0.069 0.062 0.057 in Fla hr) Vc (713 838 703 656 176 248 394 104 416 610 308 611 869 473 224 </pre>	0.9 0.8 0.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2 176.8 183.6	0 K 0 K 0 K 7 ime-Peak (mins) 64 116 144 182 256 328 396 462 592 838 1192 1532 2212 2936 3600
	8640 min Winte 10080 min Winte Storm Event 60 min Wint 120 min Wint 180 min Wint 240 min Wint 360 min Wint 480 min Wint 480 min Wint 720 min Wint 960 min Wint 1440 min Wint 2160 min Wint 2880 min Wint 5760 min Wint	r 98.065 r 98.05 r 98.05 Ra: (mm/ cer 56. cer 33. cer 24. cer 19. cer 14. cer 11. cer 9. cer 14. cer 3. cer 4. cer 3. cer 3. cer 2. cer 1. cer 1. c	<pre> 0.069 0.062 0.057 in Fla hr) Vc (713 838 703 656 176 248 394 104 416 610 308 611 869 473 </pre>	0.9 0.8 0.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.2 2.0 1.8 scharge olume (m ³) 70.9 84.6 92.6 98.3 106.3 112.5 117.4 121.6 128.3 138.3 148.8 156.7 168.2 176.8	0 K 0 K 0 K Time-Peak (mins) 64 116 144 182 256 328 396 462 592 838 1192 1532 2212 2936

Weetwood Page 3
70 Cowcross Street
London
EC1M 6EJ
Date 24/05/2022 10:17 Designed by JamesAldridge
Date 24/05/2022 10:17 File 5208 SW - SOUTH_1 5_0 L Designed by JamesAldridge Checked by
XP Solutions Source Control 2019.1
<u>Rainfall Details</u>
Rainfall Model FSR Winter Storms Yes
Return Period (years) 100 Cv (Summer) 1.000
Region England and Wales Cv (Winter) 1.000
M5-60 (mm) 20.000 Shortest Storm (mins) 15 Ratio R 0.430 Longest Storm (mins) 10080
Summer Storms Yes Climate Change % +40
<u>Time Area Diagram</u>
Total Area (ha) 0.125
Time (mins) Area Time (mins) Area From: To: (ha) From: To: (ha)
0 4 0.000 4 8 0.125
©1982-2019 Innovyze

Weetwood	Page	4
70 Cowcross Street		
London		
EC1M 6EJ	Mirc	
Date 24/05/2022 10:17	Designed by JamesAldridge Checked by	סחבר
File 5208 SW - SOUTH_1 5_0 L	Checked by	lage
XP Solutions	Source Control 2019.1	
<u>M</u>	Model Details	
Storage is On	nline Cover Level (m) 99.000	
Tank	or Pond Structure	
Inver	rt Level (m) 98.000	
	ea (m²) Depth (m) Area (m²)	
0.000	30.0 1.000 116.5	
Orific	ce Outflow Control	
Diameter (m) 0 050 Discharge	e Coefficient 0.600 Invert Level (m) 98.000	

70 Cowcross S							Page 1
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London							
EC1M 6EJ							Micco
Date 30/05/20	22 12:33	De	esigne	d by Ja	amesAld	lridae	Micro
	- SOUTH 2 5 0 L		hecked	-			Drainac
XP Solutions				Control	2010	1	
XP Solutions		50	ource	Control	2019.	Ţ	
0.			100 -	Del	D.		
<u>S1</u>	ummary of Resul	ts ior	100 3	<u>vear Ret</u>	turn Pe	eriod (+40%)	<u>) </u>
	Storm	Max	Max	Max	Max	Status	
	Event			Control		blacus	
		(m)	(m)	(1/s)	(m ³)		
	15 min Summer				128.8	OK	
	30 min Summer					Flood Risk Flood Risk	
	60 min Summer 120 min Summer					Flood Risk Flood Risk	
	180 min Summer					Flood Risk	
	240 min Summer					Flood Risk	
	360 min Summer					Flood Risk	
	480 min Summer	92.444	0.944	5.0	241.4	Flood Risk	
	600 min Summer	92.435	0.935			Flood Risk	
	720 min Summer					Flood Risk	
	960 min Summer					Flood Risk	
	1440 min Summer					Flood Risk	
	2160 min Summer 2880 min Summer					Flood Risk Flood Risk	
	4320 min Summer				134.3		
	5760 min Summer				110.6		
	7200 min Summer	91.935	0.435	3.3	92.7	O K	
	8640 min Summer	91.878	0.378				
	10080 min Summer					O K	
	15 min Winter				128.8	O K	
	30 min Winter	92.204	0./04	4.3	165.2	Flood Risk	
	Storm	Rai		oded Dis	charge	Time-Deak	
	Storm Event	Rai (mm/)			-	Time-Peak (mins)	
	Storm Event		nr) Vo	lume V	scharge olume (m³)	Time-Peak (mins)	
	Event	(mm/ł	nr) Vol (1	lume Vo n³)	olume (m³)	(mins)	
	Event 15 min Summe	(mm/) er 141.6	nr) Vo: (1	lume Vo n³) 0.0	olume (m ³) 129.2	(mins) 23	
	Event 15 min Summe 30 min Summe	(mm/) er 141.6 er 91.8	nr) Vo: (1 688 382	Lume Vo n³) 0.0 0.0	olume (m ³) 129.2 167.7	(mins) 23 37	
	Event 15 min Summe	(mm/) er 141.6 er 91.8 er 56.7	nr) Vo: (1 688 882 713	lume Vo n³) 0.0	olume (m ³) 129.2	(mins) 23	
	Event 15 min Summe 30 min Summe 60 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8	nr) Vo: (1 688 382 713 338	Lume Va n ³) 0.0 0.0 0.0	olume (m ³) 129.2 167.7 209.6	(mins) 23 37 68	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7	hr) Vo: (1 688 382 713 338 703	Lume Vo n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	clume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7	(mins) 23 37 68 126	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 240 min Summe 360 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1	hr) Vo (1 688 382 713 338 703 656 176	Lume Vo n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	colume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4	(mins) 23 37 68 126 186 244 348	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2	hr) Vo (1 688 382 713 338 703 656 176 248	Lume Vo n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	colume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6	(mins) 23 37 68 126 186 244 348 402	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 600 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3	No: 688 382 713 338 703 6556 176 248 394	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	olume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2	(mins) 23 37 68 126 186 244 348 402 462	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 600 min Summe 720 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1	No: 688 382 713 338 703 6556 176 248 394 104	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	colume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4	(mins) 23 37 68 126 186 244 348 402 462 524	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 600 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4	No: 688 382 713 338 703 6556 176 248 394 104 416	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	olume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2	(mins) 23 37 68 126 186 244 348 402 462	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 180 min Summe 360 min Summe 480 min Summe 600 min Summe 960 min Summe	(mm/l er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4	No: No: 6888 (1 6888 (1 338 (1 703 (1 6556 (1 104 (1 104 (1 610 (1	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	olume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2	(mins) 23 37 68 126 186 244 348 402 462 524 660	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 960 min Summe 1440 min Summe	(mm/l er 141.0 er 91.8 er 56.7 er 33.8 er 24.7 er 19.0 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.0	No: No: 6888 (1 6888 (1 338 (1 703 (1 6556 (1 104 (1 104 (1 610 (1	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	olume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2	(mins) 23 37 68 126 186 244 348 402 462 524 660 930	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 1440 min Summe 2880 min Summe 320 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6	No. Vo: 6888 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 588 (1 589 (1	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	olume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3	(mins) 23 37 68 126 186 244 348 402 462 524 660 930 1344 1736 2508	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 1440 min Summe 2480 min Summe 360 min Summe 360 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8	No. Vo: 6888 (1 588 (1 338 (1 703 (1 556 (1 104 (16 610 (10 308 (11 369 (173)	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3 524.4	(mins) 23 37 68 126 186 244 348 402 462 524 660 930 1344 1736 2508 3232	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 240 min Summe 360 min Summe 360 min Summe 360 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8 er 1.4	No: No: 6888 (1 588 (1 338 (1 703 (1 556 (1 104 (16 610 (10 308 (11 669 (173) 224 (11)	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c) Lume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3 524.4 544.7	(mins) 23 37 68 126 186 244 348 402 462 524 660 930 1344 1736 2508 3232 3960	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 240 min Summe 360 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6 er 1.8 er 1.4	No: No: 688 (1 588 (1 338 (1 703 (1 556 (1 104 (16 610 (1 308 (11 369 (173 224 (1)	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c)lume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 23 37 68 126 186 244 348 402 462 524 660 930 1344 1736 2508 3232 3960 4672	
	Event 15 min Summe 30 min Summe 60 min Summe 120 min Summe 120 min Summe 240 min Summe 360 min Summe 480 min Summe 720 min Summe 960 min Summe 240 min Summe 360 min Summe 360 min Summe 360 min Summe	(mm/) er 141.6 er 91.8 er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 1.6 er 1.6 er 1.6 er 1.6 er 1.6	No. (1 688 (1 688 (1 338 (1 703 (1 656 (1 104 (16 610 (1 308 (11 369 (173) 224 (12) 252 (12)	Lume Va n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	c) Lume (m ³) 129.2 167.7 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3 524.4 544.7	(mins) 23 37 68 126 186 244 348 402 462 524 660 930 1344 1736 2508 3232 3960	

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XP Solutions		S	ource	Contro	1 2019.	1	
Sun	nmary of Result	ts for	100 1	<u>year Re</u>	turn Pe	eriod (+40%))
	0 to 2000			N			
	Storm Event	Max	Max	Max	Max	Status	
	Evenc	(m)	(m)	Control (1/s)	(m ³)		
		(111)	(111)	(1/5)	(m-)		
	60 min Winter	92.316	0.816	4.6	199.5	Flood Risk	
	120 min Winter					Flood Risk	
	180 min Winter	92.441	0.941	5.0	240.4	Flood Risk	
	240 min Winter	92.455	0.955	5.0	245.2	Flood Risk	
	360 min Winter	92.457	0.957	5.0	245.8	Flood Risk	
	480 min Winter			5.0	241.7	Flood Risk	
	600 min Winter						
	720 min Winter					Flood Risk	
	960 min Winter			4.9	223.1	Flood Risk	
	1440 min Winter			4.7	200.7	Flood Risk	
	2160 min Winter					Flood Risk	
	2880 min Winter				143.6		
	4320 min Winter				105.5		
	5760 min Winter						
	7200 min Winter 8640 min Winter						
	10080 min Winter					O K	
	Storm Event	Rai (mm/h	n Flo nr) Vo		scharge Volume	Time-Peak (mins)	
			nr) Vo		-		
		(mm/1	nr) Vo (1	lume V	olume		
	Event	(mm/)	nr) Vo (1 713	lume V m³)	olume (m³)	(mins) 66	
	Event 60 min Winte 120 min Winte 180 min Winte	(mm/) er 56.7 er 33.8 er 24.7	r) Vo (1 713 338 703	lume V m ³) 0.0	olume (m ³) 209.6	(mins) 66	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte	(mm/) er 56.7 er 33.8 er 24.7 er 19.6	Vo. (1 713 338 703 556	lume V n ³) 0.0 0.0 0.0 0.0	Colume (m ³) 209.6 250.2 274.0 290.7	(mins) 66 124 182 238	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte	(mm/) er 56.7 er 33.8 er 24.7 er 19.6 er 14.1	Vo. (1 713 338 703 556 L 76	lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0	Colume (m ³) 209.6 250.2 274.0 290.7 314.4	(mins) 66 124 182 238 348	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte	(mm/) er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2	Vo. 713 338 703 556 176 248	lume V n³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6	(mins) 66 124 182 238 348 444	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte	(mm/) er 56.7 er 33.8 er 24.7 fer 19.6 er 14.1 er 11.2 er 9.3	Yo. (1) 713 338 703 556 176 248 394	lume V 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2	(mins) 66 124 182 238 348 444 476	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte	(mm/) er 56.7 er 33.8 er 24.7 fer 19.6 er 14.1 fer 11.2 er 9.3 er 8.1	Yo. 713 338 703 556 248 394 104	lume V 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	rolume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4	(mins) 66 124 182 238 348 444 476 552	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte	(mm/) er 56.7 er 33.8 er 24.7 fer 19.6 er 14.1 fer 11.2 er 9.3 er 8.1 er 6.4	Yo (1) 713 338 703 556 176 248 8394 104 104 116	lume V 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2	(mins) 66 124 182 238 348 444 476 552 706	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte	(mm/) er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6	Yo (1) 713 338 703 556 276 248 8394 104 116 510	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2	(mins) 66 124 182 238 348 444 476 552 706 1000	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2160 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 fer 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3	Yoo (1) 713 338 703 556 276 248 8394 104 116 510 808 551	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3	(mins) 66 124 182 238 348 444 476 552 706 1000 1428	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 4.6 er 3.3 er 2.6	Yo. (1) 713 338 703 556 276 248 8394 104 116 510 808 511	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2160 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8	Yoo (1) 713 338 703 556 276 248 8394 104 116 510 808 551	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3	(mins) 66 124 182 238 348 444 476 552 706 1000 1428	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 4320 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4	Yo. (1) 713 338 703 556 176 248 248 394 104 416 510 308 511 369	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 5760 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4	Yo. (1) 713 338 703 556 276 248 8394 104 116 510 808 511 869 173 224 224	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3 524.4	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 5760 min Winte 7200 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 276 248 8394 104 116 510 808 511 869 173 224 224	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 176 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 176 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 176 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 176 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 176 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 176 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	
	Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	(mm/h er 56.7 er 33.8 er 24.7 er 19.6 er 14.1 er 11.2 er 9.3 er 8.1 er 6.4 er 3.3 er 2.6 er 1.8 er 1.4 er 1.2 er 1.2	Yo. (1) 713 338 703 556 276 248 8394 104 116 510 808 511 869 173 224 552	Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Colume (m ³) 209.6 250.2 274.0 290.7 314.4 332.6 347.2 359.4 379.2 408.2 441.3 464.5 498.3 524.4 544.7 561.6	(mins) 66 124 182 238 348 444 476 552 706 1000 1428 1824 2596 3336 4040 4752	

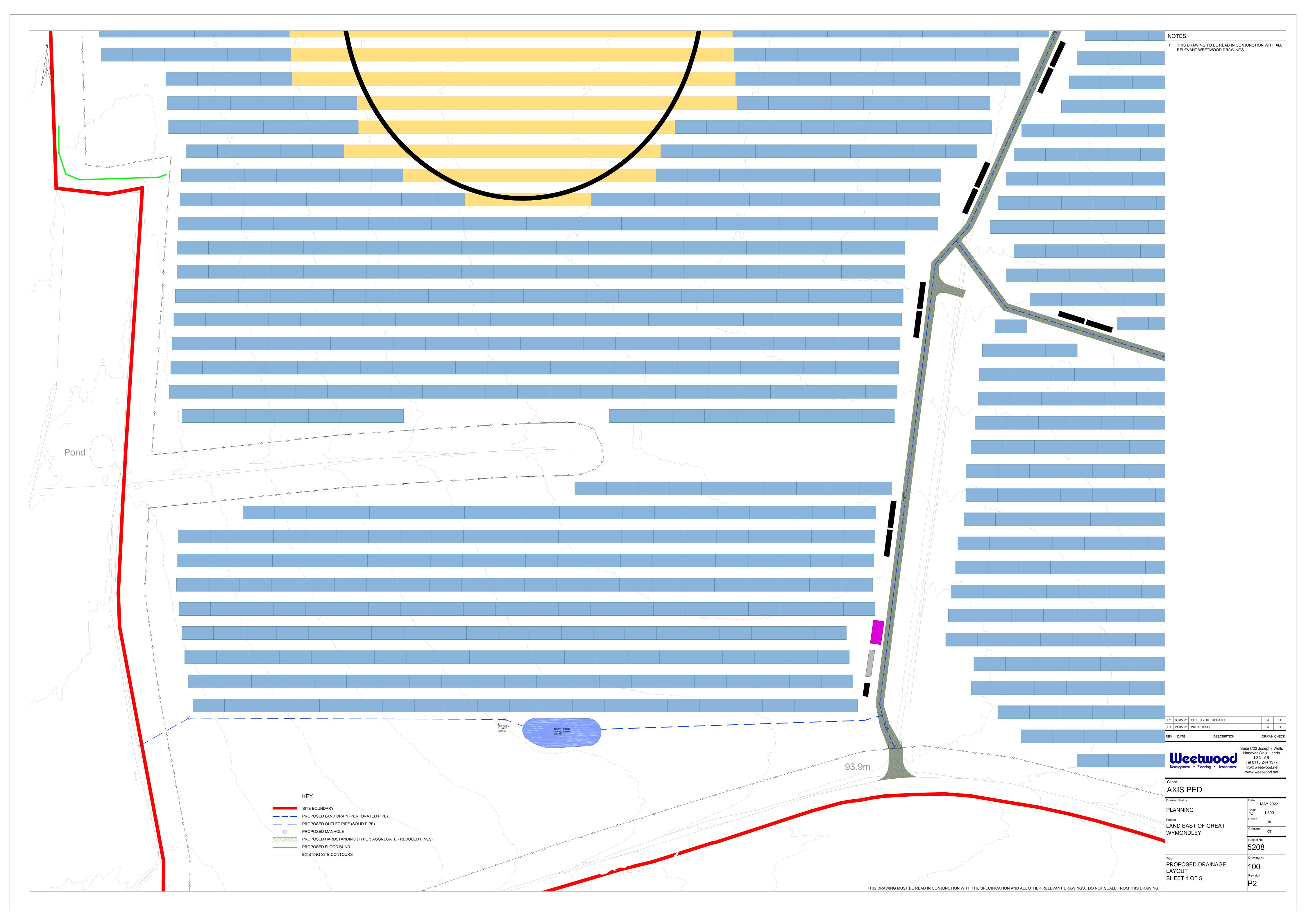
Weetwood	Page 3
70 Cowcross Street	
London	
EC1M 6EJ	Micco
Date 30/05/2022 12:33	Designed by JamesAldridge Checked by
File 5208 SW - SOUTH_2 5_0 L	Checked by
XP Solutions	Source Control 2019.1
Ra	infall Details
Rainfall Model	FSR Winter Storms Yes
Return Period (years)	100 Cv (Summer) 1.000
	and and Wales Cv (Winter) 1.000
M5-60 (mm) Ratio R	20.000 Shortest Storm (mins) 15
Summer Storms	0.430 Longest Storm (mins) 10080 Yes Climate Change % +40
Tin	ne Area Diagram
Tota	al Area (ha) 0.371
	Area Time (mins) Area (ha) From: To: (ha)
0 4	0.000 4 8 0.371
©198	32-2019 Innovyze

Weetwood		Page 4		
70 Cowcross Street				
London				
EC1M 6EJ		Micro		
Date 30/05/2022 12:33	Designed by JamesAldridge	Drainage		
File 5208 SW - SOUTH_2 5_0 L	Checked by	Digiliada		
XP Solutions	Source Control 2019.1	<u> </u>		
<u> </u>	<u>Model Details</u>			
Storage is On	line Cover Level (m) 92.500			
Tank or Pond Structure				
Invert Level (m) 91.500				
	ea (m ²) Depth (m) Area (m ²)			
0.000	180.0 1.000 351.0			
Orific	ce Outflow Control			
Diameter (m) 0.050 Discharge	Coefficient 0.600 Invert Level (m) 91	.500		



ANNEX 2

Preliminary Drainage Layout

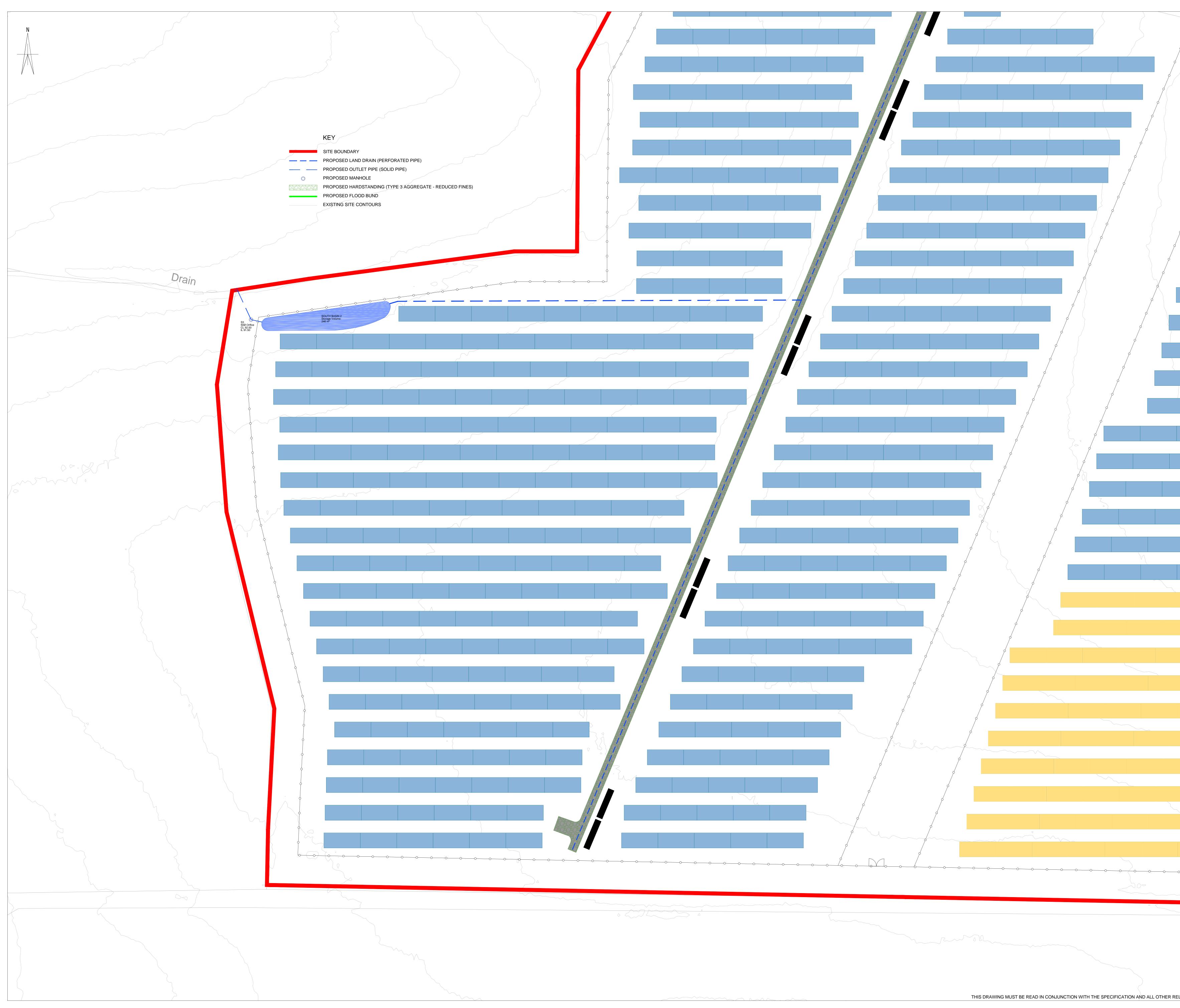








	NOTE		
		IS DRAWING TO BE READ LEVANT WEETWOOD DR/) IN CONJUNCTION WITH AI AWINGS.
\$, d		
	\$		
<u> </u>			
	P2 30.05 P1 24.05 REV DA	.22 INITIAL ISSUE	JA K JA K ION DRAWN CH
			Suite C22 Josephs We
	Develop	eetwoo ment • Planning • Environ	LS3 1AB Tel 0113 244 1377 info@weetwood.net www.weetwood.net
		S PED	
	Drawing Sta PLANN		Date MAY 2022 Scale (A0) 1:500
		EAST OF GREAT NDLEY	Drawn JA Checked KT
	Title		Project No 5208 Drawing No
	PROP LAYOU	OSED DRAINAGE JT 7 4 OF 5	103 Revision
GS. DO NOT SCALE FROM THIS			P2



	NOTES 1. THIS DRAWING TO BE READ IN CON RELEVANT WEETWOOD DRAWINGS	
	P230.05.22SITE LAYOUT UPDATEDP124.05.22INITIAL ISSUEREVDATEDESCRIPTION	JA KT JA KT DRAWN CHECK
	Development · Planning · Environment	uite C22 Josephs Wells Hanover Walk, Leeds LS3 1AB Tel 0113 244 1377 info@weetwood.net www.weetwood.net
	Client AXIS PED Drawing Status PLANNING	Date MAY 2022 Scale
	Project LAND EAST OF GREAT WYMONDLEY	(A0) 1:500 Drawn JA Checked KT Project No
ELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.	Title PROPOSED DRAINAGE LAYOUT SHEET 5 OF 5	5208 Drawing No 104 Revision P2



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