



**WYNNSTAY TECHNOLOGY PARK,
RUABON, WREXHAM.**

DRAINAGE STRATEGY

Report No: T/16/1794-DS1/SGJ

CLIENT:-

NS Holdings Limited
c/o Cairstairs Avenue,
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CONSULTING ENGINEER:-

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Version	Issue Date	By	Notes
V1	17/05/2017	S Jones	
V2	06/06/2017	S Jones	Adoption Strategy Clarified

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- Existing Run-off Calculation
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- Proposed Drainage Strategy Drawing

1.0 INTRODUCTION

- 1.1 Tier Consult was appointed by NS Holdings to prepare a drainage strategy proposal for a proposed mixed use development of residential and commercial units at Wynnstay Technology Park near Ruabon, Wrexham.
- 1.2 The report aims to provide a basis for future agreement with the various authorities in terms of maintaining water quality and flood protection.
- 1.3 The report shall propose a strategy for the discharge of both foul and surface water from the development.

2.0 SITE DESCRIPTION AND DEVELOPMENT PROPOSAL

- 2.1 The site is located on the western side of Ruabon approximately 1.1 km from the town centre. The National Grid Reference for the centre of the site is Easting: 329199, Northing: 343567 at approx. postcode LL14 6EN. The site is an undeveloped plot within the existing technology park, which comprises light industrial units, and is bounded on all sides by existing roads.
- 2.2 The site has an overall area of 2.0 Ha, of which 1.7 Ha is developable. The site has been previously prepared for development so is moderately level and clear of major vegetation and obstructions, and has a gentle fall towards the existing park access road to the south. The site is classed as "Greenfield" for rainwater run-off estimation purposes.
- 2.3 The development proposal is for mixed use commercial and residential, comprising 6 light industrial units, 1 retail unit and 35 housing units, with associated access roads and parking areas.

3.0 EXISTING DRAINAGE

- 3.1 Although being part of a larger development proposal, this plot does not appear to have been provided with drainage connections to existing infrastructure.
- 3.2 Existing public sewers near to the site comprise separate foul and surface water sewers, which are shown on the attached drawings. The public sewer record extract is also appended to this report.
- 3.3 A culverted watercourse runs along and outside the west boundary of the site. An existing surface water sewer in the existing estate access road is shown to discharge into the culvert via a manhole located at the estate entrance junction.

4.0 SURFACE WATER DRAINAGE OPTIONS

- 4.1 The Building Regulations Part H prescribes a hierarchal approach to surface water discharge. In order of preference, surface water should be discharged to:
- a) Infiltration systems / soakaways
 - b) To a watercourse
 - c) To a public sewer.

4.2 INFILTRATION/SOAKAWAYS

- 4.2.1 The ground infiltration testing has not been carried out on the site as it is evident from the ground condition report that the site is unsuitable for soakaway systems due to c2.5m depth of unsuitable made ground overlying impermeable clay sub-stratum.
- 4.2.2 For further information, refer to separate geotechnical site investigation report by Tier Environmental, ref. T/16/1794 GIR, dated October 2016.

4.3 DISCHARGES TO WATERCOURSE

- 4.3.1 A culverted watercourse flows along the west boundary of the site from north to south in 450mm dia. pipework. Discharge to this culvert is feasible, subject to approval from Natural Resources Wales.

4.4 DISCHARGES TO PUBLIC SEWER

- 4.4.1 There are existing public surface water sewers near to the site in the access road. However discharge to the sewer is not pursued within this strategy due to the availability of the adjacent culverted watercourse.

5.0 PROPOSED SURFACE WATER DRAINAGE STRATEGY

- 5.1 New surface water drainage system for the site is proposed to discharge to adjacent culverted watercourses.
- 5.2 The storm water drainage system is to be designed in accordance with the requirements of the Wrexham County Borough Council, Planning Guidance Notes for "*MANAGEMENT OF SURFACE WATER GENERATED FROM NEW DEVELOPMENT*", to ensure that flood risk is not increased, either on or off site, for all storm events up to and including the 1 in 100 year + 30% climate change event.

- 5.3 Discharge rates shall be limited to the existing “Greenfield” run-off rate to the watercourse, with attenuation storage provided to accommodate flows in excess of the greenfield rate for all storm events, up to and including 100 year event +30% climate change allowance.
- 5.5 Exceedance flows in excess of the design storm are to be directed through the site away from proposed buildings to follow the natural topography towards existing highways. This will ensure no increased flooding to properties either on or off site.
- 5.6 Water quality control is to be achieved by provision of trapped drainage fittings in conjunction with a petrol / oil separator units to serve the parking and delivery areas designed in accordance with The Pollution Prevention Guidelines - PPG3.
- 5.7 Attenuation storage for 30 year event is to be provided by oversized pipework located within the site highway infrastructure and adopted by water authority, with discharge rates restricted by a vortex control unit prior to discharge to the culvert.
- 5.8 Attenuation for storms exceeding 30 year upto 100 year + climate change is to be provided by offline modular crate tanks located in communal open space areas.

6.0 PROPOSED FOUL WATER DRAINAGE STRATEGY

- 6.1 A new foul water drainage system serving the site is proposed to re-use the existing connection to the public sewer system.
- 6.2 There are no industrial processes involved in the proposed development, with foul water drainage provided for amenity purposes only.
- 6.3 The development topography is favourable for gravity drainage, therefore pumping stations are not anticipated to be required.

7.0 PRELIMINARY STORM WATER STORAGE DESIGN

- 7.1 The average annual greenfield runoff rate from the existing site is calculated as “Qbar” using the methodology from the Institute of Hydrology Report 124. Microdrainage software was used to perform the calculation and estimates Qbar as 4.4 litres/second. Therefore the minimum practical rate of 5.0 litres/second is to be used in the design. The Microdrainage results are included in Appendix A of this report.
- 7.2 Microdrainage “Pond” calculations appended to this report demonstrate the storage volume required to accommodate the 100 year storm + 30% allowance for climate change, without flooding or exceeding the design discharge rate, is 773 m³.
- 7.3 The calculations also demonstrate the storage volume required to accommodate the 30 year storm event is 402 m³.
- 7.4 The difference between 100 and 30 year events (773 – 402) = 371 m³ is to be stored using offline modular crate tanks located in communal open space areas

- 7.5 The schematic drainage layout appended to this report illustrates the arrangement of the drainage systems, and identifies suitable locations for storage tanks, which together provide storage volume sufficient to accommodate the design volume of 773 m³ and can be further rationalised at detailed design stage.

8.0 SUMMARY

- 8.1 Development proposal is for mixed use residential and commercial units with access roads and parking on existing greenfield site.
- 8.2 Foul drainage will discharge to public sewer, with on site main drainage adopted and maintained by Welsh Water
- 8.1 Due to unfavourable ground conditions for infiltration drainage, the surface water drainage will discharge to adjacent culverted watercourse.
- 8.3 Surface water discharge rates are maintained to minimum acceptable flow rate of 5.0 litres/second for all storm events up to 100 year + 30% climate change allowance, without flooding of the system or buildings on or off site.
- 8.4 Surface water main drainage components located under new highways are proposed to be adopted and maintained by Welsh water
- 8.5 Surface water offline attenuation systems located in communal areas are to be managed and maintained by a development management company.
- 8.5 Water quality is maintained by provision of an appropriate oil separator units designed in accordance with The Pollution Prevention Guidelines - PPG3.

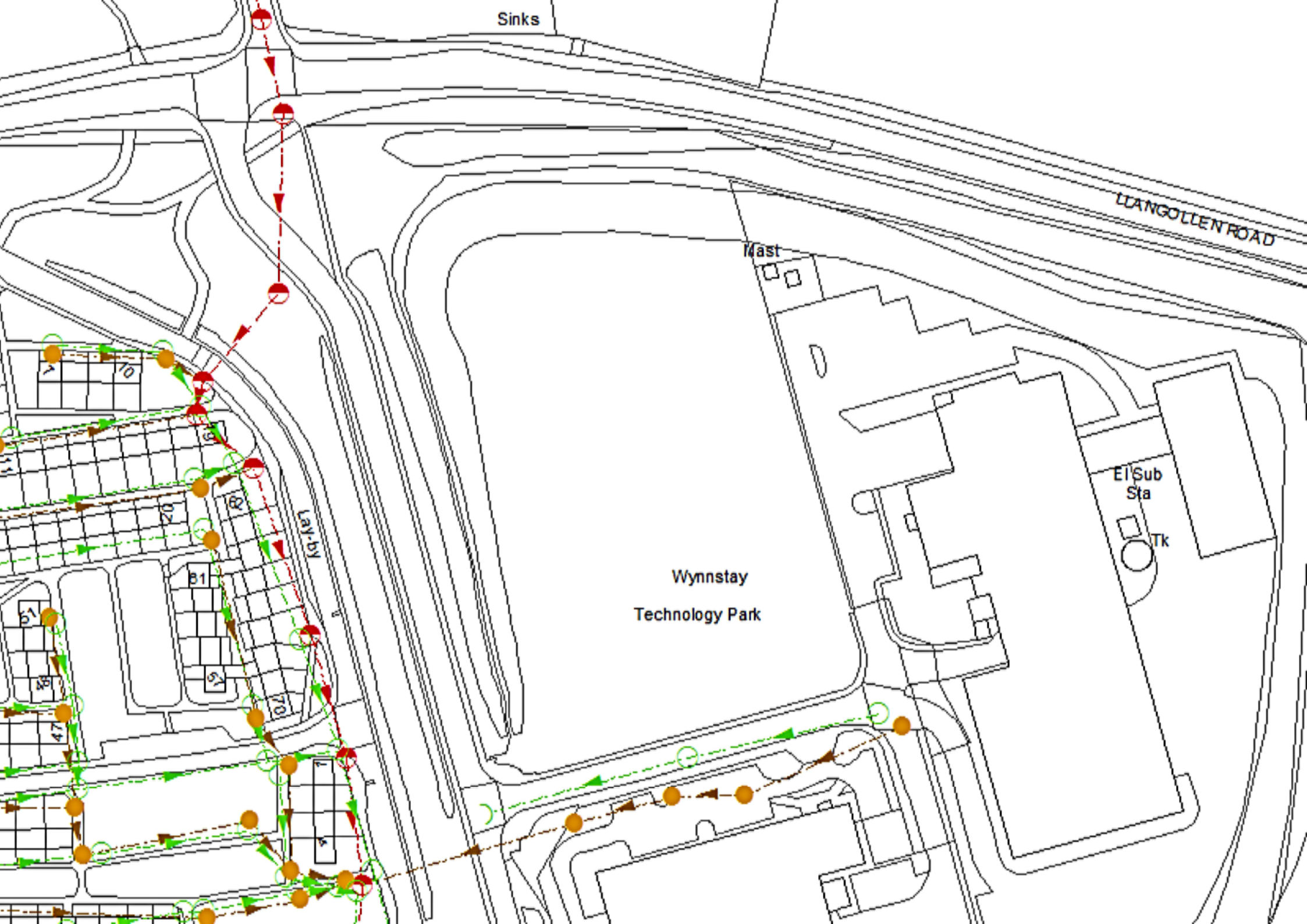
APPENDIX A

PUBLIC SEWER RECORDS

EXISTING RUN-OFF CALCULATION

MICRODRAINAGE STORAGE TANK CALCULATIONS

PROPOSED DRAINAGE STRATEGY DRAWING



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Richmond House Chester Bus. Park CH4 9QZ		
Date 07/04/2017 16:35 File 170405 STORAGE TANK.SRCX	Designed by SteveJones Checked by	
Micro Drainage Source Control 2016.1		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.300
Area (ha)	2.014	Urban	0.000
SAAR (mm)	822	Region Number	Region 9

Results l/s

QBAR Rural	4.4
QBAR Urban	4.4
Q2 years	4.1
Q1 year	3.9
Q30 years	7.8
Q100 years	9.7

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File 170405 STORAGE TANK.SRCX

Micro Drainage

WYNNSTAY TECH PARK
RUABON
WREXHAM

Designed by SGJ
Checked by

Source Control 2016.1

Page 1



Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 1334 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	97.309	0.309	0.0	5.0	5.0	205.6	O K
30 min Summer	97.425	0.425	0.0	5.0	5.0	282.5	O K
60 min Summer	97.556	0.556	0.0	5.0	5.0	370.0	O K
120 min Summer	97.700	0.700	0.0	5.0	5.0	465.7	O K
180 min Summer	97.786	0.786	0.0	5.0	5.0	522.5	O K
240 min Summer	97.842	0.842	0.0	5.0	5.0	559.8	O K
360 min Summer	97.909	0.909	0.0	5.0	5.0	604.8	O K
480 min Summer	97.953	0.953	0.0	5.0	5.0	633.5	O K
600 min Summer	97.980	0.980	0.0	5.0	5.0	651.7	O K
720 min Summer	97.997	0.997	0.0	5.0	5.0	662.9	O K
960 min Summer	98.011	1.011	0.0	5.0	5.0	672.3	O K
1440 min Summer	98.005	1.005	0.0	5.0	5.0	668.2	O K
2160 min Summer	97.978	0.978	0.0	5.0	5.0	650.7	O K
2880 min Summer	97.945	0.945	0.0	5.0	5.0	628.2	O K
4320 min Summer	97.869	0.869	0.0	5.0	5.0	577.9	O K
5760 min Summer	97.788	0.788	0.0	5.0	5.0	523.8	O K
7200 min Summer	97.694	0.694	0.0	5.0	5.0	461.5	O K
8640 min Summer	97.608	0.608	0.0	5.0	5.0	404.3	O K
10080 min Summer	97.533	0.533	0.0	5.0	5.0	354.5	O K
15 min Winter	97.347	0.347	0.0	5.0	5.0	230.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	96.918	0.0	196.2	19
30 min Summer	67.029	0.0	271.8	34
60 min Summer	44.405	0.0	376.0	64
120 min Summer	28.487	0.0	482.4	124
180 min Summer	21.655	0.0	549.1	184
240 min Summer	17.694	0.0	596.8	242
360 min Summer	13.184	0.0	662.9	362
480 min Summer	10.704	0.0	710.2	482
600 min Summer	9.097	0.0	741.1	602
720 min Summer	7.960	0.0	753.9	720
960 min Summer	6.440	0.0	746.3	960
1440 min Summer	4.766	0.0	713.1	1226
2160 min Summer	3.518	0.0	1084.6	1620
2880 min Summer	2.831	0.0	1161.3	2020
4320 min Summer	2.079	0.0	1257.4	2856
5760 min Summer	1.668	0.0	1378.7	3696
7200 min Summer	1.408	0.0	1454.4	4472
8640 min Summer	1.226	0.0	1518.6	5192
10080 min Summer	1.090	0.0	1573.3	5944
15 min Winter	96.918	0.0	220.1	19

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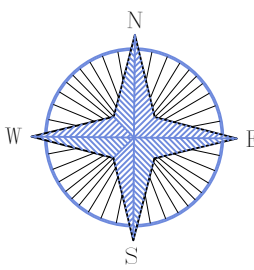
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Richmond House Chester Bus. Park CH4 9QZ	WYNNSTAY TECH PARK RUABON WREXHAM																																		
Date 7/4/17 File 170405 STORAGE TANK.SRCX	Designed by SGJ Checked by																																		
Micro Drainage		Source Control 2016.1																																	
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Date 7/4/17 File 170606 30 yr Storage.srcx		Designed by SGJ Checked by			
Micro Drainage		Source Control 2016.1			
<u>Summary of Results for 30 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	97.271	0.271	4.9	121.8	O K
30 min Summer	97.366	0.366	5.0	164.8	O K
60 min Summer	97.471	0.471	5.0	212.0	O K
120 min Summer	97.582	0.582	5.0	261.8	O K
180 min Summer	97.644	0.644	5.0	289.8	O K
240 min Summer	97.684	0.684	5.0	307.8	O K
360 min Summer	97.730	0.730	5.0	328.6	O K
480 min Summer	97.756	0.756	5.0	340.2	O K
600 min Summer	97.767	0.767	5.0	345.1	O K
720 min Summer	97.769	0.769	5.0	346.2	O K
960 min Summer	97.768	0.768	5.0	345.5	O K
1440 min Summer	97.747	0.747	5.0	336.3	O K
2160 min Summer	97.696	0.696	5.0	313.4	O K
2880 min Summer	97.641	0.641	5.0	288.3	O K
4320 min Summer	97.532	0.532	5.0	239.3	O K
5760 min Summer	97.435	0.435	5.0	195.8	O K
7200 min Summer	97.356	0.356	5.0	160.1	O K
8640 min Summer	97.293	0.293	5.0	131.9	O K
10080 min Summer	97.244	0.244	4.9	110.0	O K
15 min Winter	97.304	0.304	5.0	136.7	O K
30 min Winter	97.411	0.411	5.0	185.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	58.028	0.0	120.2	19	
30 min Summer	39.669	0.0	165.4	33	
60 min Summer	26.061	0.0	222.2	64	
120 min Summer	16.659	0.0	284.5	122	
180 min Summer	12.683	0.0	325.1	182	
240 min Summer	10.398	0.0	355.4	242	
360 min Summer	7.808	0.0	400.3	362	
480 min Summer	6.372	0.0	435.5	480	
600 min Summer	5.438	0.0	464.4	600	
720 min Summer	4.776	0.0	489.1	672	
960 min Summer	3.887	0.0	530.1	788	
1440 min Summer	2.904	0.0	591.1	1050	
2160 min Summer	2.166	0.0	670.5	1444	
2880 min Summer	1.757	0.0	725.1	1844	
4320 min Summer	1.306	0.0	807.5	2596	
5760 min Summer	1.057	0.0	874.4	3344	
7200 min Summer	0.898	0.0	928.3	4040	
8640 min Summer	0.786	0.0	974.6	4752	
10080 min Summer	0.702	0.0	1014.6	5448	
15 min Winter	58.028	0.0	135.0	18	
30 min Winter	39.669	0.0	185.5	33	
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Richmond House Chester Bus. Park CH4 9QZ		WYNNSTAY TECH PARK RUABON WREXHAM			
Date 7/4/17 File 170606 30 yr Storage.srcx		Designed by SGJ Checked by			
Micro Drainage		Source Control 2016.1			
<u>Summary of Results for 30 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	97.531	0.531	5.0	238.8	O K
120 min Winter	97.658	0.658	5.0	296.1	O K
180 min Winter	97.732	0.732	5.0	329.6	O K
240 min Winter	97.782	0.782	5.0	351.7	O K
360 min Winter	97.838	0.838	5.0	377.0	O K
480 min Winter	97.869	0.869	5.0	390.9	O K
600 min Winter	97.885	0.885	5.0	398.1	O K
720 min Winter	97.891	0.891	5.0	400.9	O K
960 min Winter	97.886	0.886	5.0	398.6	O K
1440 min Winter	97.858	0.858	5.0	386.2	O K
2160 min Winter	97.791	0.791	5.0	355.9	O K
2880 min Winter	97.695	0.695	5.0	312.9	O K
4320 min Winter	97.513	0.513	5.0	230.7	O K
5760 min Winter	97.368	0.368	5.0	165.6	O K
7200 min Winter	97.265	0.265	4.9	119.4	O K
8640 min Winter	97.197	0.197	4.7	88.5	O K
10080 min Winter	97.152	0.152	4.5	68.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	26.061	0.0	249.1	62	
120 min Winter	16.659	0.0	318.8	120	
180 min Winter	12.683	0.0	364.2	180	
240 min Winter	10.398	0.0	398.1	238	
360 min Winter	7.808	0.0	448.3	354	
480 min Winter	6.372	0.0	487.5	466	
600 min Winter	5.438	0.0	519.8	578	
720 min Winter	4.776	0.0	547.3	686	
960 min Winter	3.887	0.0	592.7	888	
1440 min Winter	2.904	0.0	657.4	1112	
2160 min Winter	2.166	0.0	751.0	1580	
2880 min Winter	1.757	0.0	812.1	2016	
4320 min Winter	1.306	0.0	904.9	2772	
5760 min Winter	1.057	0.0	979.5	3512	
7200 min Winter	0.898	0.0	1039.9	4176	
8640 min Winter	0.786	0.0	1091.8	4832	
10080 min Winter	0.702	0.0	1137.0	5448	
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DRAINAGE STRATEGY AND DESIGN NOTES

SURFACE WATER DISCHARGE & CONNECTION
TO BE RESTRICTED TO 5.0 LITRE/SEC BY VORTEX CONTROL UNIT PRIOR TO CONNECTION TO CULVERTED WATERCOURSE - SUBJECT TO AGREEMENT OF LOCAL FLOOD OFFICER.

SURFACE WATER STORAGE
30 YEAR STORAGE VOLUMES TO BE ACCOMMODATED WITHIN 1.2m DIA PIPEWORK LOCATED BENEATH PUBLIC HIGHWAYS AND TO BE ADOPTED BY WATER AUTHORITY VIA S104 AGREEMENT. PROVIDES 400m³ STORAGE VOLUME

EXCESS STORAGE VOLUMES FOR 100 YEAR + 30% CLIMATE CHANGE DESIGN STORAGE VOLUME TO BE ACCOMMODATED WITHIN THE 2 TANKS SHOWN WHICH PROVIDE COMBINED STORAGE VOLUME OF 375m³.

TOTAL STORAGE VOLUME PROVIDED = 773 m³ FINAL TANK SIZES TO BE CONFIRMED AT DETAILED DESIGN STAGE.

POLLUTION CONTROL
SURFACE WATER RUN-OFF FROM COMMERCIAL DELIVERY AND PARKING AREA IS TO BE TREATED BY PROPRIETARY PETROL/OIL SEPARATOR UNITS DESIGNED IN ACCORDANCE WITH PP63

FOUL WATER DRAINAGE
IS TO CONNECT TO EXISTING PUBLIC SEWER AT THE MAIN SITE ENTRANCE OFF HAMPDEN WAY. SUBJECT TO AGREEMENT WITH DWR CYMRU WELSH WATER.

MAINTENANCE & MANAGEMENT
MAIN SURFACE AND FOUL WATER DRAINAGE WILL BE MANAGED AND MAINTAINED BY DCWW (WELSH WATER) UNDER A SECTION 104 ADOPTION AGREEMENT.

NON-ADOPTABLE ELEMENTS OF THE DRAINAGE SYSTEM SUCH AS OFFLINE STORAGE TANKS & SEPARATORS WILL BE MANAGED & MAINTAINED BY A DEVELOPMENT MANAGEMENT COMPANY

DO NOT SCALE

NOTES

THE LOCATION LINE & LEVEL OF ALL KNOWN EXISTING DRAINAGE PIPEWORK INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY.

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATION.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO CHECK ALL DIMENSIONS ON SITE. DIMENSIONS MUST NOT BE SCALED FROM THIS DRAWING. ANY DISCREPANCIES TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT IN WRITING.

ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

ALL LEVELS ARE IN METRES, UNLESS NOTED OTHERWISE.

LEGEND

DEVELOPMENT BOUNDARY

EXISTING FOUL DRAIN

EXISTING STORM DRAIN

PROPOSED FOUL WATER DRAINAGE

PROPOSED SURFACE WATER DRAINAGE

VORTEX CONTROL CHAMBER "HYDROBRAKE"

PETROL/OIL SEPARATOR UNIT

CELLULAR STORAGE TANK

P3	06.06.17	SGJ	SW STORAGE ARRANGEMENT REVISED	MCH	MCH
P2	17.05.17	SGJ	UPDATED TO SITE PLAN OPTION 8	MCH	MCH
P1	10.04.17	SGJ	ISSUED FOR INFORMATION	MCH	MCH

REV	DATE	BY	DESCRIPTION	CHK	APD

DRAWING STATUS: INFORMATION

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PROJECT: WYNNSTAY TECHNOLOGY PARK
RUABON, WREXHAM

TITLE: PROPOSED DRAINAGE STRATEGY

SCALE @ SIZE: 1:500 @ A1	CHECKED: MCH	APPROVED: MCH
CAD FILE:	DESIGN/DRAWN: SGJ	DATE: APR17
PROJECT No: T/16/1794	DRAWING No: CL(00)01	REV: P3