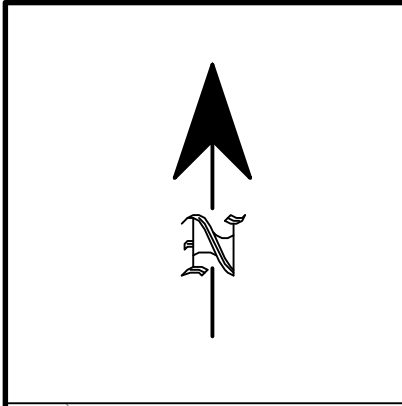
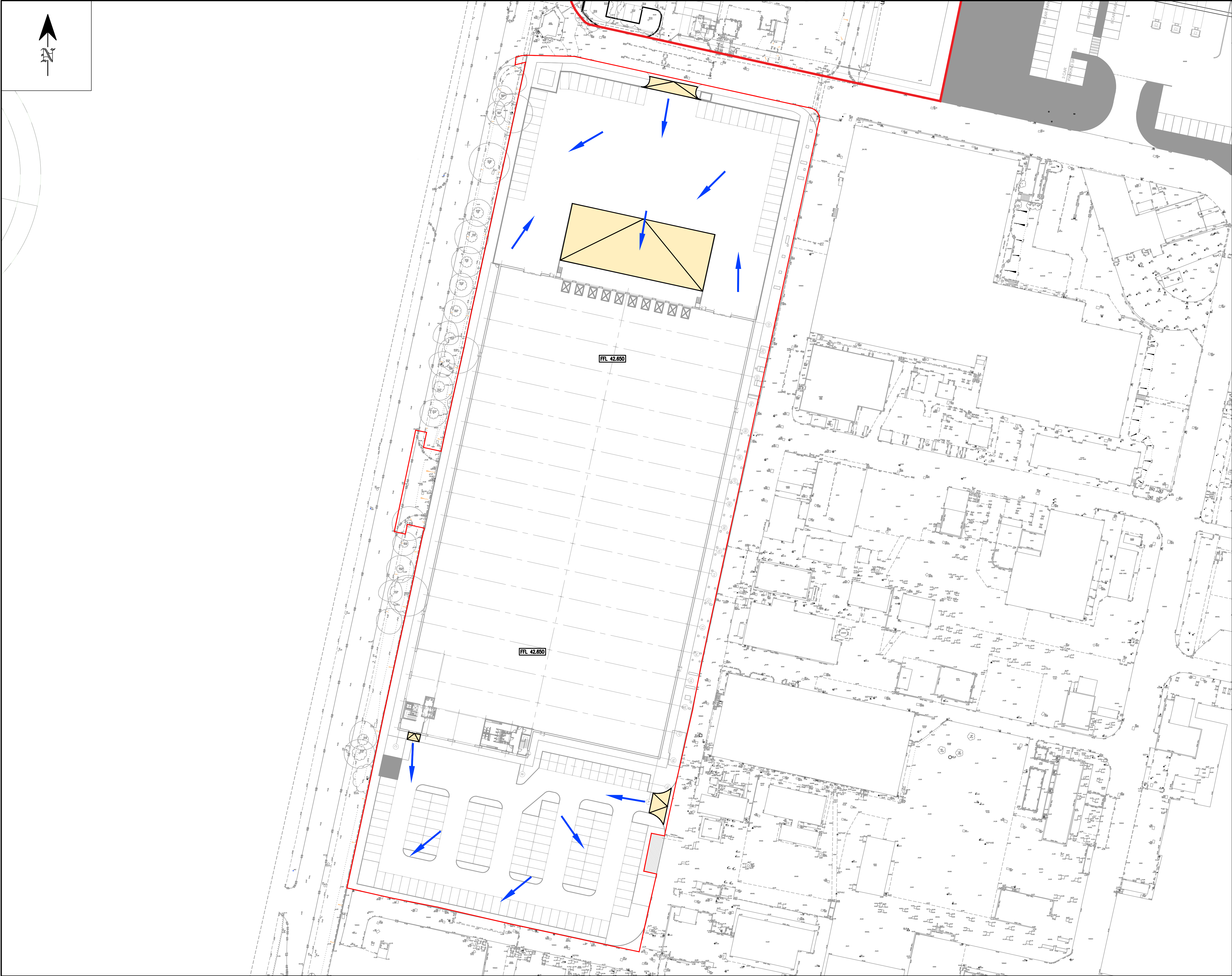


Appendix D – Exceedance Flow Path Plan



Notes:

- Do not scale from this drawing.
- In case of any discrepancies in drawings, details or bills, refer to engineers for clarification; unilateral decisions by the Contractor will not be accepted.
- This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
- The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

Overland Flood Exceedance Flow Route

Raised Areas

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DRAWING STATUS

COSTING

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P01	First Issue	GW	09.08.21	AH
REV	DESCRIPTION	BY	DATE	CHK'D

PROJECT TITLE

Image Business Park

Knowsley Site 3

DRAWING TITLE

Exceedance Route

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No
DRAWN	GW		9879
SCALE	1:500		REVISION
DRG SIZE	A1		P01

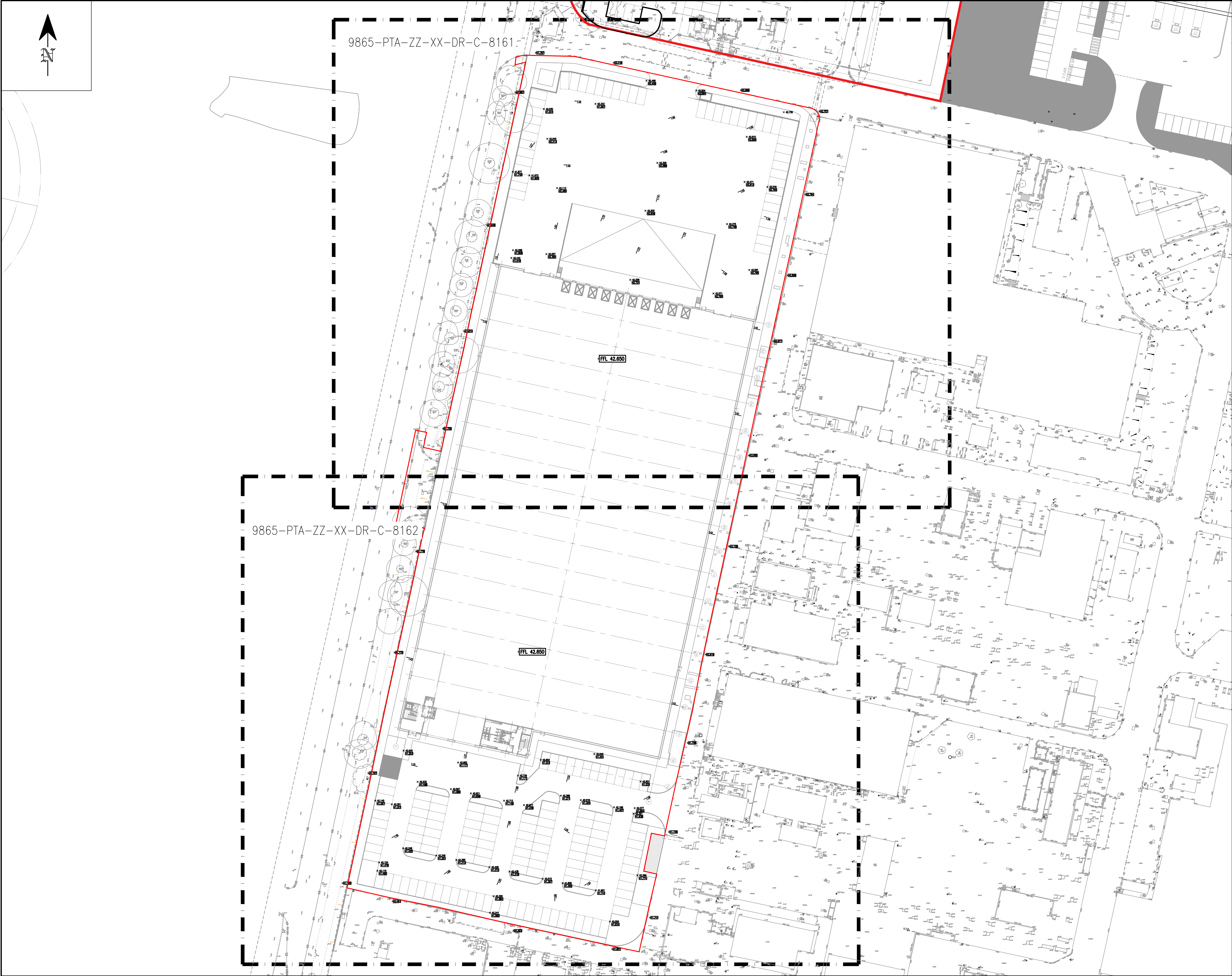
DRAWING No

9879-PTA-ZZ-XX-DR-C- 8150

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Key:

× 42.00 Proposed Site Level

× 42.00 Existing Site Level

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PROJECT TITLE

Image Business Park

Knowsley Site 3

DRAWING TITLE

Levels Plan

Overview

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No
DRAWN	GW		9879
SCALE	1:500		REVISION
DRG SIZE	A1		P01

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Key:

× 42.00 Proposed Site Level

× 42.00 Existing Site Level

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REV	DESCRIPTION	BY	DATE	CHK'D
PROJECT TITLE				
Image Business Park Knowsley Site 3				
DRAWING TITLE				
Levels Plan Sheet 1 of 2				
DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.		PTA PROJ No
DRAWN	GW			9879
SCALE	1:250			REVISION
ORIG SIZE	A1			P01

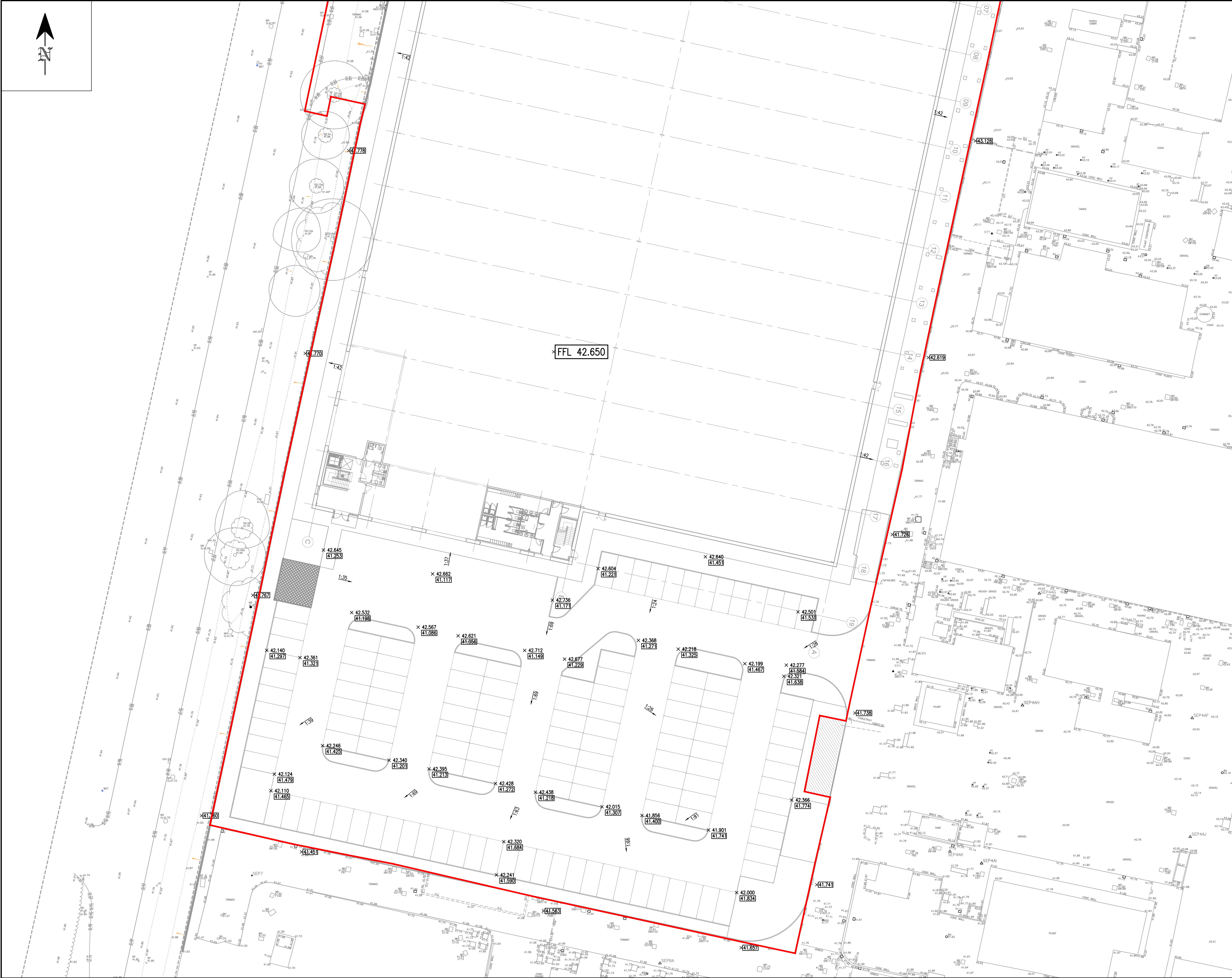
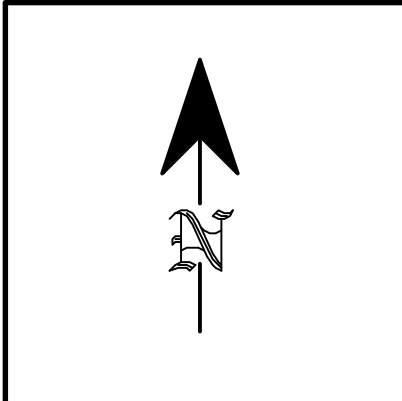
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3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

× 42.00 Proposed Site Level

K 42.00 Existing Site Level

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DESCRIPTION		BY	DATE	CHK'D
PROJECT TITLE				
Image Business Park Knowsley Site 3				
DRAWING TITLE				
Levels Plan Sheet 2 of 2				
DATE	June 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No	
DRAWN	GW		9879	
SCALE	1:250		REVISION	
NO SIZE	A1		P01	
DRAWING No				

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Appendix E – Existing Runoff Calculations

Pre-development 1-year Peak Rainfall

From Wallingford Procedure, Volume 3 - Maps

CC Allowance = %

Rainfall Depths (M5 - 60minutes)

M5-60 =

Rainfall Ratio (r)

r =

Design Storm Return Period

P =

Time of concentration

T_c =

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 0.615

Therefore M1-15 = 7.6 mm

Therefore, average point intensity = 30.4 mm/hr

Site Area = m²

C_v =

$$Q_p = 3.61 \times C_v \times i \times A$$

Therefore, $Q_p = 3.61 \times 0.75 \times 30.4366309333333 \times 22457$

= 185.06 litres/sec

Volume during storm = 171 m³

Pre-development 1-year Peak Rainfall

From Wallingford Procedure, Volume 3 - Maps

CC Allowance = %

Rainfall Depths (M5 - 60minutes)

M5-60 =

Rainfall Ratio (r)

r =

Design Storm Return Period

P =

Time of concentration

T_c =

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 1.507

Therefore M30-15 = 18.7 mm

Therefore, average point intensity = 74.6 mm/hr

Site Area = m²

C_v =

$$Q_p = 3.61 \times C_v \times i \times A$$

Therefore, $Q_p = 3.61 \times 0.75 \times 74.6240556444444 \times 22457$

= 453.73 litres/sec

Volume during storm = 419 m³

Pre-development 1-year Peak Rainfall

From Wallingford Procedure, Volume 3 - Maps

CC Allowance = %

Rainfall Depths (M5 - 60minutes)

M5-60 =

Rainfall Ratio (r)

r =

Design Storm Return Period

P =

Time of concentration

T_c =

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 1.947

Therefore M100-15 = 24.1 mm

Therefore, average point intensity = 96.4 mm/hr

Site Area = m²

C_v =

$$Q_p = 3.61 \times C_v \times i \times A$$

Therefore, $Q_p = 3.61 \times 0.75 \times 96.4107274666667 \times 22457$

= 586.20 litres/sec

Volume during storm = 541 m³

Pre-development 1-year Peak Rainfall

From Wallingford Procedure, Volume 3 - Maps

CC Allowance = %

Rainfall Depths (M5 - 60minutes)

M5-60 =

Rainfall Ratio (r)

r =

Design Storm Return Period

P =

Time of concentration

T_c =

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 1.947

Therefore M100-15 = 33.7 mm

Therefore, average point intensity = 135.0 mm/hr

Site Area = m²

C_v =

$$Q_p = 3.61 \times C_v \times i \times A$$

Therefore, $Q_p = 3.61 \times 0.75 \times 134.975018453333 \times 22457$

= 820.68 litres/sec

Volume during storm = 758 m³

Appendix F – MicroDrainage Output Files

Powell Tolner Associates							Page 1																																																																																																																																																																																																																																																																																	
29 Red Lion Street Chesham Bucks HP5 1EJ			Building and Yard Area Summer Storm Events																																																																																																																																																																																																																																																																																					
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 44 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>40.836</td><td>0.947</td><td>0.0</td><td>89.9</td><td>89.9</td><td>315.0</td><td>O K</td></tr><tr><td>30 min Summer</td><td>41.018</td><td>1.129</td><td>0.0</td><td>89.9</td><td>89.9</td><td>375.4</td><td>O K</td></tr><tr><td>60 min Summer</td><td>41.042</td><td>1.153</td><td>0.0</td><td>89.9</td><td>89.9</td><td>383.3</td><td>O K</td></tr><tr><td>120 min Summer</td><td>40.947</td><td>1.058</td><td>0.0</td><td>89.9</td><td>89.9</td><td>351.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>40.813</td><td>0.924</td><td>0.0</td><td>89.9</td><td>89.9</td><td>307.4</td><td>O K</td></tr><tr><td>240 min Summer</td><td>40.673</td><td>0.784</td><td>0.0</td><td>89.9</td><td>89.9</td><td>260.6</td><td>O K</td></tr><tr><td>360 min Summer</td><td>40.420</td><td>0.531</td><td>0.0</td><td>89.9</td><td>89.9</td><td>176.5</td><td>O K</td></tr><tr><td>480 min Summer</td><td>40.223</td><td>0.334</td><td>0.0</td><td>89.9</td><td>89.9</td><td>111.0</td><td>O K</td></tr><tr><td>600 min Summer</td><td>40.082</td><td>0.193</td><td>0.0</td><td>89.4</td><td>89.4</td><td>64.0</td><td>O K</td></tr><tr><td>720 min Summer</td><td>39.985</td><td>0.096</td><td>0.0</td><td>87.9</td><td>87.9</td><td>31.8</td><td>O K</td></tr><tr><td>960 min Summer</td><td>39.891</td><td>0.002</td><td>0.0</td><td>85.1</td><td>85.1</td><td>0.8</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>62.2</td><td>62.2</td><td>0.0</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>44.9</td><td>44.9</td><td>0.0</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>35.6</td><td>35.6</td><td>0.0</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>25.7</td><td>25.7</td><td>0.0</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>20.3</td><td>20.3</td><td>0.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>16.9</td><td>16.9</td><td>0.0</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>14.6</td><td>14.6</td><td>0.0</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>39.889</td><td>0.000</td><td>0.0</td><td>12.8</td><td>12.8</td><td>0.0</td><td>O K</td></tr><tr><td>15 min Winter</td><td>40.987</td><td>1.098</td><td>0.0</td><td>89.9</td><td>89.9</td><td>365.1</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>134.653</td><td>0.0</td><td>399.8</td><td>17</td></tr><tr><td>30 min Summer</td><td>88.595</td><td>0.0</td><td>530.1</td><td>31</td></tr><tr><td>60 min Summer</td><td>55.544</td><td>0.0</td><td>660.9</td><td>52</td></tr><tr><td>120 min Summer</td><td>33.648</td><td>0.0</td><td>802.8</td><td>84</td></tr><tr><td>180 min Summer</td><td>24.762</td><td>0.0</td><td>889.3</td><td>118</td></tr><tr><td>240 min Summer</td><td>19.801</td><td>0.0</td><td>947.0</td><td>150</td></tr><tr><td>360 min Summer</td><td>14.390</td><td>0.0</td><td>1027.7</td><td>214</td></tr><tr><td>480 min Summer</td><td>11.476</td><td>0.0</td><td>1096.4</td><td>272</td></tr><tr><td>600 min Summer</td><td>9.622</td><td>0.0</td><td>1145.3</td><td>326</td></tr><tr><td>720 min Summer</td><td>8.328</td><td>0.0</td><td>1192.7</td><td>382</td></tr><tr><td>960 min Summer</td><td>6.625</td><td>0.0</td><td>1263.6</td><td>490</td></tr><tr><td>1440 min Summer</td><td>4.792</td><td>0.0</td><td>1371.4</td><td>0</td></tr><tr><td>2160 min Summer</td><td>3.460</td><td>0.0</td><td>1485.4</td><td>0</td></tr><tr><td>2880 min Summer</td><td>2.744</td><td>0.0</td><td>1570.4</td><td>0</td></tr><tr><td>4320 min Summer</td><td>1.975</td><td>0.0</td><td>1696.1</td><td>0</td></tr><tr><td>5760 min Summer</td><td>1.563</td><td>0.0</td><td>1789.6</td><td>0</td></tr><tr><td>7200 min Summer</td><td>1.303</td><td>0.0</td><td>1864.5</td><td>0</td></tr><tr><td>8640 min Summer</td><td>1.122</td><td>0.0</td><td>1927.4</td><td>0</td></tr><tr><td>10080 min Summer</td><td>0.989</td><td>0.0</td><td>1981.7</td><td>0</td></tr><tr><td>15 min Winter</td><td>134.653</td><td>0.0</td><td>450.5</td><td>17</td></tr></table>								Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	40.836	0.947	0.0	89.9	89.9	315.0	O K	30 min Summer	41.018	1.129	0.0	89.9	89.9	375.4	O K	60 min Summer	41.042	1.153	0.0	89.9	89.9	383.3	O K	120 min Summer	40.947	1.058	0.0	89.9	89.9	351.9	O K	180 min Summer	40.813	0.924	0.0	89.9	89.9	307.4	O K	240 min Summer	40.673	0.784	0.0	89.9	89.9	260.6	O K	360 min Summer	40.420	0.531	0.0	89.9	89.9	176.5	O K	480 min Summer	40.223	0.334	0.0	89.9	89.9	111.0	O K	600 min Summer	40.082	0.193	0.0	89.4	89.4	64.0	O K	720 min Summer	39.985	0.096	0.0	87.9	87.9	31.8	O K	960 min Summer	39.891	0.002	0.0	85.1	85.1	0.8	O K	1440 min Summer	39.889	0.000	0.0	62.2	62.2	0.0	O K	2160 min Summer	39.889	0.000	0.0	44.9	44.9	0.0	O K	2880 min Summer	39.889	0.000	0.0	35.6	35.6	0.0	O K	4320 min Summer	39.889	0.000	0.0	25.7	25.7	0.0	O K	5760 min Summer	39.889	0.000	0.0	20.3	20.3	0.0	O K	7200 min Summer	39.889	0.000	0.0	16.9	16.9	0.0	O K	8640 min Summer	39.889	0.000	0.0	14.6	14.6	0.0	O K	10080 min Summer	39.889	0.000	0.0	12.8	12.8	0.0	O K	15 min Winter	40.987	1.098	0.0	89.9	89.9	365.1	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	134.653	0.0	399.8	17	30 min Summer	88.595	0.0	530.1	31	60 min Summer	55.544	0.0	660.9	52	120 min Summer	33.648	0.0	802.8	84	180 min Summer	24.762	0.0	889.3	118	240 min Summer	19.801	0.0	947.0	150	360 min Summer	14.390	0.0	1027.7	214	480 min Summer	11.476	0.0	1096.4	272	600 min Summer	9.622	0.0	1145.3	326	720 min Summer	8.328	0.0	1192.7	382	960 min Summer	6.625	0.0	1263.6	490	1440 min Summer	4.792	0.0	1371.4	0	2160 min Summer	3.460	0.0	1485.4	0	2880 min Summer	2.744	0.0	1570.4	0	4320 min Summer	1.975	0.0	1696.1	0	5760 min Summer	1.563	0.0	1789.6	0	7200 min Summer	1.303	0.0	1864.5	0	8640 min Summer	1.122	0.0	1927.4	0	10080 min Summer	0.989	0.0	1981.7	0	15 min Winter	134.653	0.0	450.5	17
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15 min Winter	40.987	1.098	0.0	89.9	89.9	365.1	O K																																																																																																																																																																																																																																																																																	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																				
15 min Summer	134.653	0.0	399.8	17																																																																																																																																																																																																																																																																																				
30 min Summer	88.595	0.0	530.1	31																																																																																																																																																																																																																																																																																				
60 min Summer	55.544	0.0	660.9	52																																																																																																																																																																																																																																																																																				
120 min Summer	33.648	0.0	802.8	84																																																																																																																																																																																																																																																																																				
180 min Summer	24.762	0.0	889.3	118																																																																																																																																																																																																																																																																																				
240 min Summer	19.801	0.0	947.0	150																																																																																																																																																																																																																																																																																				
360 min Summer	14.390	0.0	1027.7	214																																																																																																																																																																																																																																																																																				
480 min Summer	11.476	0.0	1096.4	272																																																																																																																																																																																																																																																																																				
600 min Summer	9.622	0.0	1145.3	326																																																																																																																																																																																																																																																																																				
720 min Summer	8.328	0.0	1192.7	382																																																																																																																																																																																																																																																																																				
960 min Summer	6.625	0.0	1263.6	490																																																																																																																																																																																																																																																																																				
1440 min Summer	4.792	0.0	1371.4	0																																																																																																																																																																																																																																																																																				
2160 min Summer	3.460	0.0	1485.4	0																																																																																																																																																																																																																																																																																				
2880 min Summer	2.744	0.0	1570.4	0																																																																																																																																																																																																																																																																																				
4320 min Summer	1.975	0.0	1696.1	0																																																																																																																																																																																																																																																																																				
5760 min Summer	1.563	0.0	1789.6	0																																																																																																																																																																																																																																																																																				
7200 min Summer	1.303	0.0	1864.5	0																																																																																																																																																																																																																																																																																				
8640 min Summer	1.122	0.0	1927.4	0																																																																																																																																																																																																																																																																																				
10080 min Summer	0.989	0.0	1981.7	0																																																																																																																																																																																																																																																																																				
15 min Winter	134.653	0.0	450.5	17																																																																																																																																																																																																																																																																																				
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Powell Tolner Associates

Page 2

29 Red Lion Street

Chesham

Bucks HP5 1EJ

Building and Yard Area

Winter Storm Events

Date 27/08/2021 13:05

File Building and Service.SRCX

Designed by GeorgeW

Checked by

Innovyze

Source Control 2020.1

Summary of Results for 100 year Return Period (+40%)

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
30 min Winter	41.215	1.326	0.0	89.9	89.9	441.0	O K
60 min Winter	41.261	1.372	0.0	89.9	89.9	456.2	O K
120 min Winter	41.131	1.242	0.0	89.9	89.9	412.9	O K
180 min Winter	40.921	1.032	0.0	89.9	89.9	343.0	O K
240 min Winter	40.692	0.803	0.0	89.9	89.9	266.9	O K
360 min Winter	40.310	0.421	0.0	89.9	89.9	139.8	O K
480 min Winter	40.052	0.163	0.0	89.1	89.1	54.3	O K
600 min Winter	39.911	0.022	0.0	85.9	85.9	7.3	O K
720 min Winter	39.889	0.000	0.0	78.1	78.1	0.0	O K
960 min Winter	39.889	0.000	0.0	62.2	62.2	0.0	O K
1440 min Winter	39.889	0.000	0.0	45.0	45.0	0.0	O K
2160 min Winter	39.889	0.000	0.0	32.5	32.5	0.0	O K
2880 min Winter	39.889	0.000	0.0	25.7	25.7	0.0	O K
4320 min Winter	39.889	0.000	0.0	18.5	18.5	0.0	O K
5760 min Winter	39.889	0.000	0.0	14.7	14.7	0.0	O K
7200 min Winter	39.889	0.000	0.0	12.2	12.2	0.0	O K
8640 min Winter	39.889	0.000	0.0	10.5	10.5	0.0	O K
10080 min Winter	39.889	0.000	0.0	9.3	9.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	88.595	0.0	589.8	31
60 min Winter	55.544	0.0	744.3	58
120 min Winter	33.648	0.0	899.8	92
180 min Winter	24.762	0.0	988.3	130
240 min Winter	19.801	0.0	1054.6	162
360 min Winter	14.390	0.0	1150.3	224
480 min Winter	11.476	0.0	1224.1	276
600 min Winter	9.622	0.0	1284.7	320
720 min Winter	8.328	0.0	1334.7	0
960 min Winter	6.625	0.0	1415.7	0
1440 min Winter	4.792	0.0	1536.0	0
2160 min Winter	3.460	0.0	1663.7	0
2880 min Winter	2.744	0.0	1758.9	0
4320 min Winter	1.975	0.0	1899.7	0
5760 min Winter	1.563	0.0	2004.3	0
7200 min Winter	1.303	0.0	2088.3	0
8640 min Winter	1.122	0.0	2158.7	0
10080 min Winter	0.989	0.0	2219.5	0

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29 Red Lion Street Chesham Bucks HP5 1EJ	Building and Yard Area Site Details																															
Date 27/08/2021 13:05	Designed by GeorgeW																															
File Building and Service.SRCX	Checked by																															
Innovyze		Source Control 2020.1																														
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.600</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.396</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 1.590 <table> <tr> <td>Time (mins)</td> <td>Area</td> </tr> <tr> <td>From: To:</td> <td>(ha)</td> </tr> <tr> <td>0</td> <td>4 1.590</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.600	Shortest Storm (mins)	15	Ratio R	0.396	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	From: To:	(ha)	0	4 1.590
Rainfall Model	FSR	Winter Storms	Yes																													
Return Period (years)	100	Cv (Summer)	0.750																													
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Time (mins)	Area																															
From: To:	(ha)																															
0	4 1.590																															
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Powell Tolner Associates		Page 4
29 Red Lion Street Chesham Bucks HP5 1EJ	Building and Yard Area SuDS Details	
Date 27/08/2021 13:05 File Building and Service.SRCX	Designed by GeorgeW Checked by	
Innovyze Source Control 2020.1		

Model Details

Storage is Online Cover Level (m) 42.400

Cellular Storage Structure

Invert Level (m) 39.889 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	350.0	0.0	1.501	0.0	0.0
1.500	350.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0363-9000-2200-9000
Design Head (m)	2.200
Design Flow (l/s)	90.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	363
Invert Level (m)	39.500
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	90.0	Kick-Flo®	1.506	74.9
Flush-Flo™	0.694	89.9	Mean Flow over Head Range	-	76.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.4	1.200	85.5	3.000	104.6	7.000	158.1
0.200	36.4	1.400	80.2	3.500	112.7	7.500	163.5
0.300	68.0	1.600	77.1	4.000	120.3	8.000	168.8
0.400	85.5	1.800	81.6	4.500	127.4	8.500	173.8
0.500	88.3	2.000	85.9	5.000	134.1	9.000	178.8
0.600	89.6	2.200	90.0	5.500	140.5	9.500	183.6
0.800	89.6	2.400	93.8	6.000	146.6		
1.000	88.0	2.600	97.6	6.500	152.5		

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29 Red Lion Street Chesham Bucks HP5 1EJ			Car Park Area Summer Storm Events																																																																																																																																																																																																																																																																																					
Date 27/08/2021 13:04 File Parking Area.SRCX			Designed by GeorgeW Checked by																																																																																																																																																																																																																																																																																					
Innovyze			Source Control 2020.1																																																																																																																																																																																																																																																																																					
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 269 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>41.714</td><td>0.214</td><td>0.0</td><td>7.7</td><td>7.7</td><td>121.8</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>41.779</td><td>0.279</td><td>0.0</td><td>7.8</td><td>7.8</td><td>159.1</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>41.838</td><td>0.338</td><td>0.0</td><td>7.9</td><td>7.9</td><td>192.7</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>41.877</td><td>0.377</td><td>0.0</td><td>8.0</td><td>8.0</td><td>214.9</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>41.882</td><td>0.382</td><td>0.0</td><td>8.0</td><td>8.0</td><td>218.0</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>41.874</td><td>0.374</td><td>0.0</td><td>8.0</td><td>8.0</td><td>213.0</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>41.852</td><td>0.352</td><td>0.0</td><td>8.0</td><td>8.0</td><td>200.5</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>41.835</td><td>0.335</td><td>0.0</td><td>7.9</td><td>7.9</td><td>190.7</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>41.819</td><td>0.319</td><td>0.0</td><td>7.9</td><td>7.9</td><td>181.8</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>41.803</td><td>0.303</td><td>0.0</td><td>7.9</td><td>7.9</td><td>173.0</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>41.774</td><td>0.274</td><td>0.0</td><td>7.8</td><td>7.8</td><td>155.9</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>41.717</td><td>0.217</td><td>0.0</td><td>7.7</td><td>7.7</td><td>123.8</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>41.644</td><td>0.144</td><td>0.0</td><td>7.6</td><td>7.6</td><td>82.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>41.588</td><td>0.088</td><td>0.0</td><td>7.5</td><td>7.5</td><td>49.9</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>41.518</td><td>0.018</td><td>0.0</td><td>7.4</td><td>7.4</td><td>10.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>41.500</td><td>0.000</td><td>0.0</td><td>6.9</td><td>6.9</td><td>0.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>41.500</td><td>0.000</td><td>0.0</td><td>5.7</td><td>5.7</td><td>0.0</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>41.500</td><td>0.000</td><td>0.0</td><td>4.9</td><td>4.9</td><td>0.0</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>41.500</td><td>0.000</td><td>0.0</td><td>4.3</td><td>4.3</td><td>0.0</td><td>O K</td></tr><tr><td>15 min Winter</td><td>41.743</td><td>0.243</td><td>0.0</td><td>7.8</td><td>7.8</td><td>138.3</td><td>Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>134.653</td><td>0.0</td><td>127.9</td><td>18</td></tr><tr><td>30 min Summer</td><td>88.595</td><td>0.0</td><td>171.5</td><td>33</td></tr><tr><td>60 min Summer</td><td>55.544</td><td>0.0</td><td>217.3</td><td>62</td></tr><tr><td>120 min Summer</td><td>33.648</td><td>0.0</td><td>265.2</td><td>122</td></tr><tr><td>180 min Summer</td><td>24.762</td><td>0.0</td><td>293.5</td><td>180</td></tr><tr><td>240 min Summer</td><td>19.801</td><td>0.0</td><td>313.3</td><td>224</td></tr><tr><td>360 min Summer</td><td>14.390</td><td>0.0</td><td>342.3</td><td>282</td></tr><tr><td>480 min Summer</td><td>11.476</td><td>0.0</td><td>364.4</td><td>344</td></tr><tr><td>600 min Summer</td><td>9.622</td><td>0.0</td><td>381.9</td><td>412</td></tr><tr><td>720 min Summer</td><td>8.328</td><td>0.0</td><td>396.9</td><td>482</td></tr><tr><td>960 min Summer</td><td>6.625</td><td>0.0</td><td>420.8</td><td>616</td></tr><tr><td>1440 min Summer</td><td>4.792</td><td>0.0</td><td>455.3</td><td>880</td></tr><tr><td>2160 min Summer</td><td>3.460</td><td>0.0</td><td>491.5</td><td>1256</td></tr><tr><td>2880 min Summer</td><td>2.744</td><td>0.0</td><td>517.8</td><td>1612</td></tr><tr><td>4320 min Summer</td><td>1.975</td><td>0.0</td><td>555.4</td><td>2252</td></tr><tr><td>5760 min Summer</td><td>1.563</td><td>0.0</td><td>582.3</td><td>0</td></tr><tr><td>7200 min Summer</td><td>1.303</td><td>0.0</td><td>602.3</td><td>0</td></tr><tr><td>8640 min Summer</td><td>1.122</td><td>0.0</td><td>618.2</td><td>0</td></tr><tr><td>10080 min Summer</td><td>0.989</td><td>0.0</td><td>631.2</td><td>0</td></tr><tr><td>15 min Winter</td><td>134.653</td><td>0.0</td><td>144.7</td><td>18</td></tr></table>								Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	41.714	0.214	0.0	7.7	7.7	121.8	Flood Risk	30 min Summer	41.779	0.279	0.0	7.8	7.8	159.1	Flood Risk	60 min Summer	41.838	0.338	0.0	7.9	7.9	192.7	Flood Risk	120 min Summer	41.877	0.377	0.0	8.0	8.0	214.9	Flood Risk	180 min Summer	41.882	0.382	0.0	8.0	8.0	218.0	Flood Risk	240 min Summer	41.874	0.374	0.0	8.0	8.0	213.0	Flood Risk	360 min Summer	41.852	0.352	0.0	8.0	8.0	200.5	Flood Risk	480 min Summer	41.835	0.335	0.0	7.9	7.9	190.7	Flood Risk	600 min Summer	41.819	0.319	0.0	7.9	7.9	181.8	Flood Risk	720 min Summer	41.803	0.303	0.0	7.9	7.9	173.0	Flood Risk	960 min Summer	41.774	0.274	0.0	7.8	7.8	155.9	Flood Risk	1440 min Summer	41.717	0.217	0.0	7.7	7.7	123.8	Flood Risk	2160 min Summer	41.644	0.144	0.0	7.6	7.6	82.3	O K	2880 min Summer	41.588	0.088	0.0	7.5	7.5	49.9	O K	4320 min Summer	41.518	0.018	0.0	7.4	7.4	10.5	O K	5760 min Summer	41.500	0.000	0.0	6.9	6.9	0.0	O K	7200 min Summer	41.500	0.000	0.0	5.7	5.7	0.0	O K	8640 min Summer	41.500	0.000	0.0	4.9	4.9	0.0	O K	10080 min Summer	41.500	0.000	0.0	4.3	4.3	0.0	O K	15 min Winter	41.743	0.243	0.0	7.8	7.8	138.3	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	134.653	0.0	127.9	18	30 min Summer	88.595	0.0	171.5	33	60 min Summer	55.544	0.0	217.3	62	120 min Summer	33.648	0.0	265.2	122	180 min Summer	24.762	0.0	293.5	180	240 min Summer	19.801	0.0	313.3	224	360 min Summer	14.390	0.0	342.3	282	480 min Summer	11.476	0.0	364.4	344	600 min Summer	9.622	0.0	381.9	412	720 min Summer	8.328	0.0	396.9	482	960 min Summer	6.625	0.0	420.8	616	1440 min Summer	4.792	0.0	455.3	880	2160 min Summer	3.460	0.0	491.5	1256	2880 min Summer	2.744	0.0	517.8	1612	4320 min Summer	1.975	0.0	555.4	2252	5760 min Summer	1.563	0.0	582.3	0	7200 min Summer	1.303	0.0	602.3	0	8640 min Summer	1.122	0.0	618.2	0	10080 min Summer	0.989	0.0	631.2	0	15 min Winter	134.653	0.0	144.7	18
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																																																																																																																																																																																																																																																																																	
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60 min Summer	41.838	0.338	0.0	7.9	7.9	192.7	Flood Risk																																																																																																																																																																																																																																																																																	
120 min Summer	41.877	0.377	0.0	8.0	8.0	214.9	Flood Risk																																																																																																																																																																																																																																																																																	
180 min Summer	41.882	0.382	0.0	8.0	8.0	218.0	Flood Risk																																																																																																																																																																																																																																																																																	
240 min Summer	41.874	0.374	0.0	8.0	8.0	213.0	Flood Risk																																																																																																																																																																																																																																																																																	
360 min Summer	41.852	0.352	0.0	8.0	8.0	200.5	Flood Risk																																																																																																																																																																																																																																																																																	
480 min Summer	41.835	0.335	0.0	7.9	7.9	190.7	Flood Risk																																																																																																																																																																																																																																																																																	
600 min Summer	41.819	0.319	0.0	7.9	7.9	181.8	Flood Risk																																																																																																																																																																																																																																																																																	
720 min Summer	41.803	0.303	0.0	7.9	7.9	173.0	Flood Risk																																																																																																																																																																																																																																																																																	
960 min Summer	41.774	0.274	0.0	7.8	7.8	155.9	Flood Risk																																																																																																																																																																																																																																																																																	
1440 min Summer	41.717	0.217	0.0	7.7	7.7	123.8	Flood Risk																																																																																																																																																																																																																																																																																	
2160 min Summer	41.644	0.144	0.0	7.6	7.6	82.3	O K																																																																																																																																																																																																																																																																																	
2880 min Summer	41.588	0.088	0.0	7.5	7.5	49.9	O K																																																																																																																																																																																																																																																																																	
4320 min Summer	41.518	0.018	0.0	7.4	7.4	10.5	O K																																																																																																																																																																																																																																																																																	
5760 min Summer	41.500	0.000	0.0	6.9	6.9	0.0	O K																																																																																																																																																																																																																																																																																	
7200 min Summer	41.500	0.000	0.0	5.7	5.7	0.0	O K																																																																																																																																																																																																																																																																																	
8640 min Summer	41.500	0.000	0.0	4.9	4.9	0.0	O K																																																																																																																																																																																																																																																																																	
10080 min Summer	41.500	0.000	0.0	4.3	4.3	0.0	O K																																																																																																																																																																																																																																																																																	
15 min Winter	41.743	0.243	0.0	7.8	7.8	138.3	Flood Risk																																																																																																																																																																																																																																																																																	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																				
15 min Summer	134.653	0.0	127.9	18																																																																																																																																																																																																																																																																																				
30 min Summer	88.595	0.0	171.5	33																																																																																																																																																																																																																																																																																				
60 min Summer	55.544	0.0	217.3	62																																																																																																																																																																																																																																																																																				
120 min Summer	33.648	0.0	265.2	122																																																																																																																																																																																																																																																																																				
180 min Summer	24.762	0.0	293.5	180																																																																																																																																																																																																																																																																																				
240 min Summer	19.801	0.0	313.3	224																																																																																																																																																																																																																																																																																				
360 min Summer	14.390	0.0	342.3	282																																																																																																																																																																																																																																																																																				
480 min Summer	11.476	0.0	364.4	344																																																																																																																																																																																																																																																																																				
600 min Summer	9.622	0.0	381.9	412																																																																																																																																																																																																																																																																																				
720 min Summer	8.328	0.0	396.9	482																																																																																																																																																																																																																																																																																				
960 min Summer	6.625	0.0	420.8	616																																																																																																																																																																																																																																																																																				
1440 min Summer	4.792	0.0	455.3	880																																																																																																																																																																																																																																																																																				
2160 min Summer	3.460	0.0	491.5	1256																																																																																																																																																																																																																																																																																				
2880 min Summer	2.744	0.0	517.8	1612																																																																																																																																																																																																																																																																																				
4320 min Summer	1.975	0.0	555.4	2252																																																																																																																																																																																																																																																																																				
5760 min Summer	1.563	0.0	582.3	0																																																																																																																																																																																																																																																																																				
7200 min Summer	1.303	0.0	602.3	0																																																																																																																																																																																																																																																																																				
8640 min Summer	1.122	0.0	618.2	0																																																																																																																																																																																																																																																																																				
10080 min Summer	0.989	0.0	631.2	0																																																																																																																																																																																																																																																																																				
15 min Winter	134.653	0.0	144.7	18																																																																																																																																																																																																																																																																																				
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Powell Tolner Associates		Page 3																														
29 Red Lion Street Chesham Bucks HP5 1EJ	Car Park Area Site Details																															
Date 27/08/2021 13:04 File Parking Area.SRCX	Designed by GeorgeW Checked by																															
Innovyze		Source Control 2020.1																														
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.600</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.396</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.546 <table> <tr> <td>Time (mins)</td> <td>Area</td> </tr> <tr> <td>From:</td> <td>To: (ha)</td> </tr> <tr> <td>0</td> <td>4 0.546</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.600	Shortest Storm (mins)	15	Ratio R	0.396	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	From:	To: (ha)	0	4 0.546
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<u>Model Details</u> Storage is Online Cover Level (m) 42.000 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>190.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>10.0</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>527.8</td> <td>Slope (1:X)</td> <td>0.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>41.500</td> <td>Membrane Depth (m)</td> <td>0</td> </tr> </table> <u>Orifice Outflow Control</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 39.500			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	190.0	Membrane Percolation (mm/hr)	1000	Length (m)	10.0	Max Percolation (l/s)	527.8	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	41.500	Membrane Depth (m)	0
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