

|                                                                                     |         |                                                                  |
|-------------------------------------------------------------------------------------|---------|------------------------------------------------------------------|
|  | Name    | Hamill Davies Ltd                                                |
|                                                                                     | Address | Ivydale<br>Lower Chase Road<br>Swanmore<br>Hampshire<br>SO32 2PB |
|                                                                                     | Tel     | 01489 893 596                                                    |

**North Street Arcade, Havant  
( 30 Units )**

**Drainage Strategy – March 2020**

## **1.0 Background Information**

- 1.1 The North Street Arcade is located at 1 – 3 North Street Arcade, Havant PO9 1PX as shown by the location plan included within Appendix A.
- 1.2 A topographical survey, HDL drawing no. 18-3139-900 P1, indicating existing features, is included within Appendix B. Appendix D also includes Southern Water sewer records showing existing drainage runs. Appendix D also includes a drawing showing the route of the adjacent Lavant Culvert.
- 1.3 The site is to be redeveloped to include the construction of 30 no. one and two bedroom apartments in a two storey extension fronting Prince George Street, together with provision of infill flexible use ( Classes A1/A2/A3 ) commercial floor space to the North Street frontage following the demolition of existing 1 and 2 storey retail development to the rear at North Street Arcade, 1 – 3 North Street Arcade, Havant. PLC Architects drawings showing the existing & proposed development are included within Appendix C.
- 1.4 The existing foul water drainage discharges to the adjacent public foul sewer as shown by HDL drawing no. 18-3139-501 P1 included within Appendix E.
- 1.5 The existing surface water discharges to the Lavant Culvert as shown by HDL drawing 18-3139-501 included within Appendix E
- 1.6 Foul water discharges from the redeveloped site will discharge to the adjacent Southern Water sewer as indicated on HDL drawing no. 18-3139-512 P1 included within Appendix F.
- 1.7 Surface Water run off from the redeveloped site is to be discharged to the Lavant Culvert using the existing connection as shown on HDL drawing nos. 18-3139-501 & 512 P1 included within Appendices E & F.

## **2.0 Sensitivity of Discharge Points**

- 2.1 HDL drawing no. 18-3139-501 P1, included within Appendix E, shows existing drainage layouts.
- 2.2 Foul water discharges currently discharge to the Southern Water public foul sewer as shown by the Southern Water sewer records, included within Appendix D, and the existing and proposed drainage layouts included within Appendices E & F. The method of discharge for the redeveloped foul flows will remain the same as the pre-development arrangement.

- 2.3 The surface water flows currently discharge to the Lavant Culvert as shown by HDL drawing no. 18-3139-501 P1 included within Appendix E. HDL drawing no. 18-3139-901 P2, included within Appendix G, shows that the post development impermeable areas are slightly less than the current pre development impermeable areas thus the method of discharge of surface water for the redeveloped site will remain as the current method as shown by HDL drawing nos. 18-3139-501 & 512 P1 included within Appendices E & F.

### **3.0 Existing Surface Water Flow Paths**

- 3.1 No evidence of and information on the existing surface water flow paths are required as the site is a brownfield site.

### **4.0 The Existing Drainage Network**

- 4.1 HDL drawing no. 18-3139-501 P1, included within Appendix E, shows the existing pre-development drainage layouts.
- 4.2 The foul drainage connects to the Southern Water public foul sewer.
- 4.3 The surface water sewer connect to the Lavant Culvert.

### **5.0 Failures in the Existing Drainage Regime**

- 5.1 There are no records of failures in the existing drainage regime.

### **6.0 Existing and Proposed Drainage Patterns**

- 6.1 HDL drawing nos. 18-3139-501 & 512 P1, included within Appendices E & F, show that the existing and proposed drainage patterns remain the same for the pre and post development site layouts. Drawings included within Appendix H show that the post development exceedance flows follow the same route as the pre-development exceedance flows.
- 6.2 Proposed foul discharges are to be discharged to the Southern Water Sewer following the same pattern as the existing.
- 6.3 Proposed surface water flows are to be discharged to the Lavant Culvert as per the existing.

## **7.0 Water Treatment Levels**

- 7.1 The surface water drainage layout has been designed to accord with CIRIA SuDS Manual C753.
- 7.2 Surface water run off from roofs is to be discharged to the proposed surface water drainage outfall via a catch pit and petrol interceptor.
- 7.3 Rainwater run off from hardstanding areas is collected via a trapped drainage channel before discharging to the Lavant Culvert via a catch pit and petrol interceptor.

## **8.0 Surface Water Drainage Design**

- 8.1 HDL drawing no. 18-3139-901 P2, included within Appendix G, shows that the post development impermeable areas are marginally less than the current pre-development impermeable areas. There will therefore be no increase in surface water flows when compared to the existing flows. The existing drainage regime will therefore be replicated for the proposed redevelopment site.
- 8.2 Calculations included within Appendix I demonstrate that sufficient on site storage is to be provided for the 1in 100 year storm with 40% climate change allowance.
- 8.3 Trapped drainage channels, catchpit and petrol interceptor are to be included within the proposed drainage layouts to improve water quality.

## **9.0 Exceedance Flows**

- 9.1 Drawings included within Appendices G & H show pre and post development exceedance flows. The proposed exceedance flows follow the same pattern as the existing exceedance flows directing exceedance flows away from properties.

## **10.0 Maintenance Regime**

- 10.1 The development comprises retail & residential units with associated hardstanding areas.
- 10.2 A management company is to be set up by the developer and the management company will be responsible for ongoing maintenance of the surface water drainage system.
- 10.4 The maintenance regime will be as follows:

- Every six months and after periods of heavy rain inspect the proposed trapped drainage channels and roof outlets for blockages due to leaf fall or debris and remove any debris.
- Undertake an annual inspection of the catch pit and petrol interceptor and clean out as necessary.

## **11.0 Urban Creep**

- 11.1 The post development proposals are for 100% development of the site thus no allowance has been made to take account of urban creep.

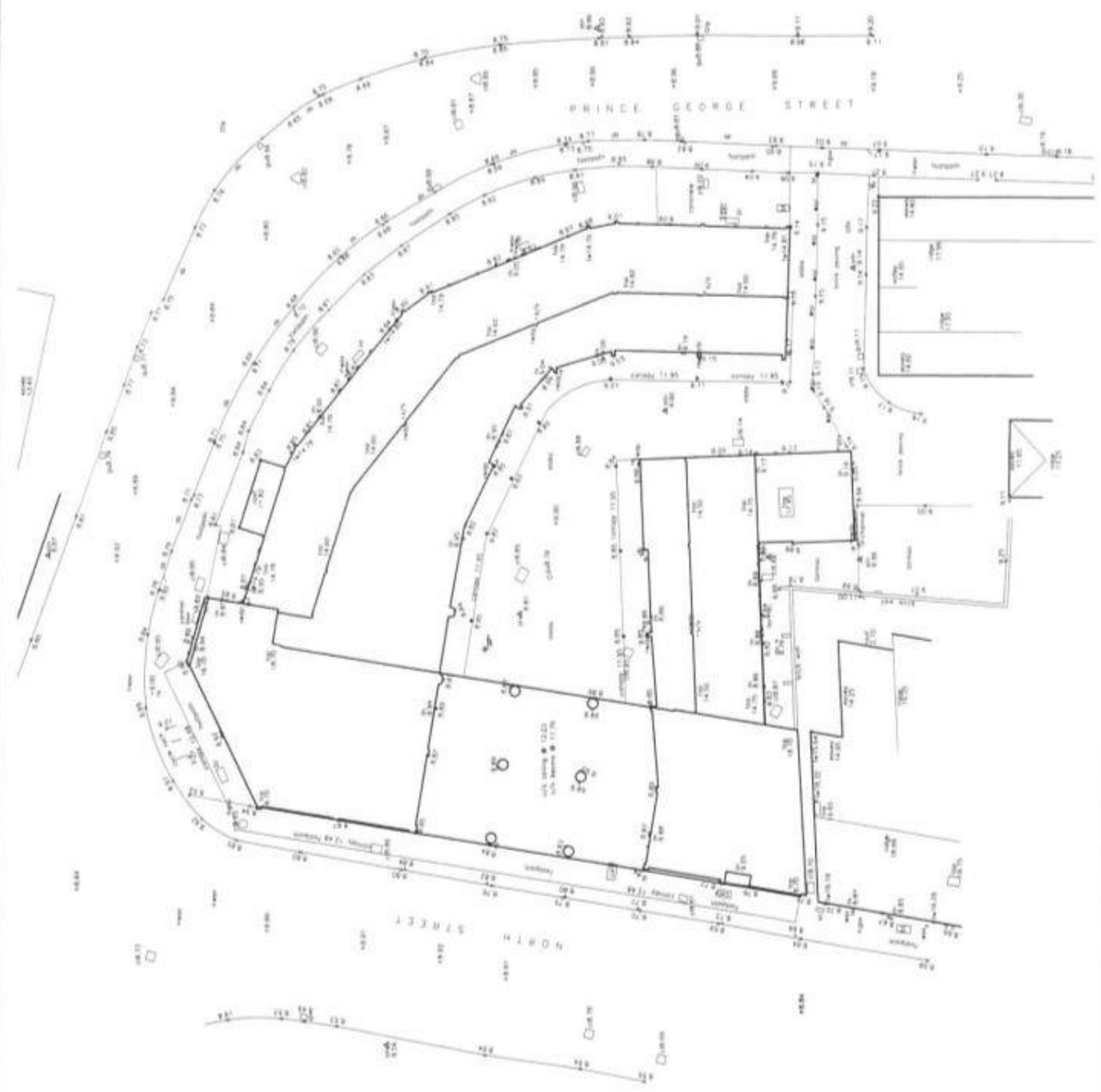
## **Appendix A**

### **Location Plan**



## **Appendix B**

### **Topographical Survey**



NOTES:  
1. THE DRAWING IS PRELIMINARY AND SHOULD NOT BE CONSIDERED A FINAL DESIGN.  
2. THE DRAWING IS FOR INFORMATION ONLY. THE CLIENTS RESPONSIBILITY IS TO OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AUTHORITIES.  
3. ANY INFORMATION NOT SHOWN HEREIN IS TO BE OBTAINED FROM THE CLIENTS RECORDS AND FIELD SURVEY.

PRELIMINARY

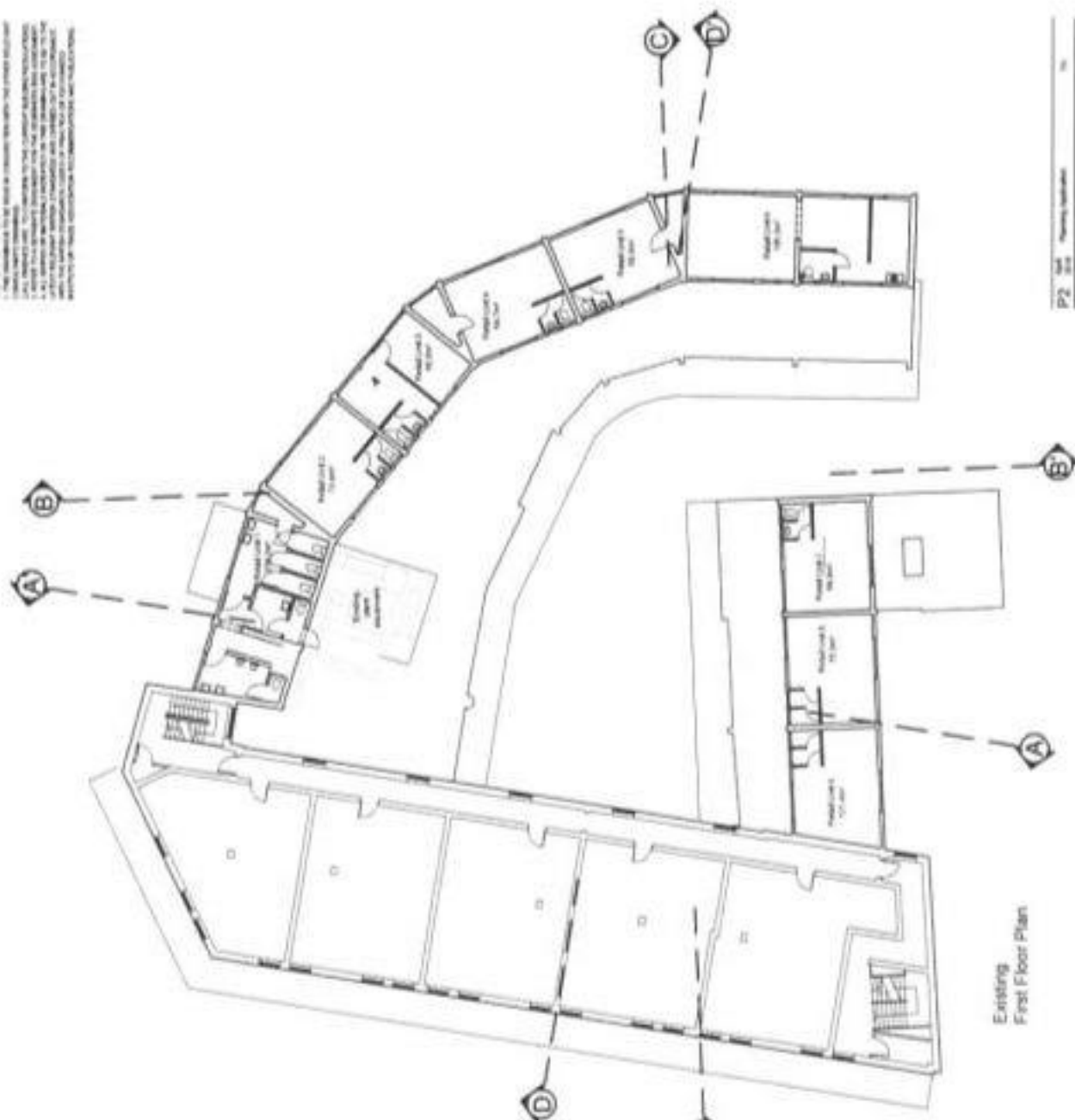
|                            |          |          |          |          |
|----------------------------|----------|----------|----------|----------|
| DATE                       | 15/05/18 | 15/05/18 | 15/05/18 | 15/05/18 |
| BY                         | 15/05/18 | 15/05/18 | 15/05/18 | 15/05/18 |
| REVISION                   | 15/05/18 | 15/05/18 | 15/05/18 | 15/05/18 |
| ORIGINAL DRAWING SIZE - A1 | 15/05/18 | 15/05/18 | 15/05/18 | 15/05/18 |
| DATE REV                   | 15/05/18 | 15/05/18 | 15/05/18 | 15/05/18 |

**HDT ENGINEERING LIMITED**  
Civil and Structural Engineers  
15-2131-900

PROJECT: NORTH STREET ROAD, WARRINGTON  
DRAWING: LAYOUT OF PROPOSED DEVELOPMENT  
DATE: 15/05/18  
BY: 15/05/18  
REVISION: 15/05/18  
ORIGINAL DRAWING SIZE - A1  
DATE REV: 15/05/18

## **Appendix C**

### **Existing & Proposed Site Layouts**

[illegible]

Existing  
First Floor Plan

Existing Site /  
Grouped Floor Plan

[illegible]

PLC

100%  
 100%  
 100%  
 100%

1

|             |        |        |        |
|-------------|--------|--------|--------|
| TYPE        | 200-11 | 200-11 | 200-11 |
| 15-2100-100 | 200-11 | 200-11 | 200-11 |



1:200 scale





|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>PLC</b><br>2014<br>2015<br>2016<br>2017<br>2018<br>2019<br>2020<br>2021<br>2022<br>2023<br>2024<br>2025<br>2026<br>2027<br>2028<br>2029<br>2030<br>2031<br>2032<br>2033<br>2034<br>2035<br>2036<br>2037<br>2038<br>2039<br>2040<br>2041<br>2042<br>2043<br>2044<br>2045<br>2046<br>2047<br>2048<br>2049<br>2050<br>2051<br>2052<br>2053<br>2054<br>2055<br>2056<br>2057<br>2058<br>2059<br>2060<br>2061<br>2062<br>2063<br>2064<br>2065<br>2066<br>2067<br>2068<br>2069<br>2070<br>2071<br>2072<br>2073<br>2074<br>2075<br>2076<br>2077<br>2078<br>2079<br>2080<br>2081<br>2082<br>2083<br>2084<br>2085<br>2086<br>2087<br>2088<br>2089<br>2090<br>2091<br>2092<br>2093<br>2094<br>2095<br>2096<br>2097<br>2098<br>2099<br>2100<br>2101<br>2102<br>2103<br>2104<br>2105<br>2106<br>2107<br>2108<br>2109<br>2110<br>2111<br>2112<br>2113<br>2114<br>2115<br>2116<br>2117<br>2118<br>2119<br>2120<br>2121<br>2122<br>2123<br>2124<br>2125<br>2126<br>2127<br>2128<br>2129<br>2130<br>2131<br>2132<br>2133<br>2134<br>2135<br>2136<br>2137<br>2138<br>2139<br>2140<br>2141<br>2142<br>2143<br>2144<br>2145<br>2146<br>2147<br>2148<br>2149<br>2150<br>2151<br>2152<br>2153<br>2154<br>2155<br>2156<br>2157<br>2158<br>2159<br>2160<br>2161<br>2162<br>2163<br>2164<br>2165<br>2166<br>2167<br>2168<br>2169<br>2170<br>2171<br>2172<br>2173<br>2174<br>2175<br>2176<br>2177<br>2178<br>2179<br>2180<br>2181<br>2182<br>2183<br>2184<br>2185<br>2186<br>2187<br>2188<br>2189<br>2190<br>2191<br>2192<br>2193<br>2194<br>2195<br>2196<br>2197<br>2198<br>2199<br>2200<br>2201<br>2202<br>2203<br>2204<br>2205<br>2206<br>2207<br>2208<br>2209<br>2210<br>2211<br>2212<br>2213<br>2214<br>2215<br>2216<br>2217<br>2218<br>2219<br>2220<br>2221<br>2222<br>2223<br>2224<br>2225<br>2226<br>2227<br>2228<br>2229<br>2230<br>2231<br>2232<br>2233<br>2234<br>2235<br>2236<br>2237<br>2238<br>2239<br>2240<br>2241<br>2242<br>2243<br>2244<br>2245<br>2246<br>2247<br>2248<br>2249<br>2250<br>2251<br>2252<br>2253<br>2254<br>2255<br>2256<br>2257<br>2258<br>2259<br>2260<br>2261<br>2262<br>2263<br>2264<br>2265<br>2266<br>2267<br>2268<br>2269<br>2270<br>2271<br>2272<br>2273<br>2274<br>2275<br>2276<br>2277<br>2278<br>2279<br>2280<br>2281<br>2282<br>2283<br>2284<br>2285<br>2286<br>2287<br>2288<br>2289<br>2290<br>2291<br>2292<br>2293<br>2294<br>2295<br>2296<br>2297<br>2298<br>2299<br>2300<br>2301<br>2302<br>2303<br>2304<br>2305<br>2306<br>2307<br>2308<br>2309<br>2310<br>2311<br>2312<br>2313<br>2314<br>2315<br>2316<br>2317<br>2318<br>2319<br>2320<br>2321<br>2322<br>2323<br>2324<br>2325<br>2326<br>2327<br>2328<br>2329<br>2330<br>2331<br>2332<br>2333<br>2334<br>2335<br>2336<br>2337<br>2338<br>2339<br>2340<br>2341<br>2342<br>2343<br>2344<br>2345<br>2346<br>2347<br>2348<br>2349<br>2350<br>2351<br>2352<br>2353<br>2354<br>2355<br>2356<br>2357<br>2358<br>2359<br>2360<br>2361<br>2362<br>2363<br>2364<br>2365<br>2366<br>2367<br>2368<br>2369<br>2370<br>2371<br>2372<br>2373<br>2374<br>2375<br>2376<br>2377<br>2378<br>2379<br>2380<br>2381<br>2382<br>2383<br>2384<br>2385<br>2386<br>2387<br>2388<br>2389<br>2390<br>2391<br>2392<br>2393<br>2394<br>2395<br>2396<br>2397<br>2398<br>2399<br>2400<br>2401<br>2402<br>2403<br>2404<br>2405<br>2406<br>2407<br>2408<br>2409<br>2410<br>2411<br>2412<br>2413<br>2414<br>2415<br>2416<br>2417<br>2418<br>2419<br>2420<br>2421<br>2422<br>2423<br>2424<br>2425<br>2426<br>2427<br>2428<br>2429<br>2430<br>2431<br>2432<br>2433<br>2434<br>2435<br>2436<br>2437<br>2438<br>2439<br>2440<br>2441<br>2442<br>2443<br>2444<br>2445<br>2446<br>2447<br>2448<br>2449<br>2450<br>2451<br>2452<br>2453<br>2454<br>2455<br>2456<br>2457<br>2458<br>2459<br>2460<br>2461<br>2462<br>2463 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

1000

Proposed Floor Plans

|     |     |     |    |    |       |      |       |        |         |          |           |            |             |              |               |                |                 |                  |                   |                    |                     |                      |                       |                        |                         |                          |                           |                            |                             |                              |                               |                                |                                 |                                  |                                   |                                    |                                     |                                      |                                       |                                        |                                         |                                          |                                           |                                            |                                             |                                              |                                               |                                                |                                                 |                                                  |                                                   |                                                    |                                                     |                                                      |                                                       |                                                      |                                                       |                                                        |                                                         |                                                          |                                                           |                                                            |                                                             |                                                              |                                                               |                                                               |                                                                |                                                                 |                                                                  |                                                                   |                                                                    |                                                                     |                                                                      |                                                                       |                                                                        |                                                                          |                                                                           |                                                                            |                                                                             |                                                                              |                                                                               |                                                                                |                                                                                 |                                                                                  |                                                                                   |                                                                                    |                                                       |
|-----|-----|-----|----|----|-------|------|-------|--------|---------|----------|-----------|------------|-------------|--------------|---------------|----------------|-----------------|------------------|-------------------|--------------------|---------------------|----------------------|-----------------------|------------------------|-------------------------|--------------------------|---------------------------|----------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------------|------------------------------------|-------------------------------------|--------------------------------------|---------------------------------------|----------------------------------------|-----------------------------------------|------------------------------------------|-------------------------------------------|--------------------------------------------|---------------------------------------------|----------------------------------------------|-----------------------------------------------|------------------------------------------------|-------------------------------------------------|--------------------------------------------------|---------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------|
| 700 | 200 | 100 | 50 | 25 | 12.50 | 6.25 | 3.125 | 1.5625 | 0.78125 | 0.390625 | 0.1953125 | 0.09765625 | 0.048828125 | 0.0244140625 | 0.01220703125 | 0.006103515625 | 0.0030517578125 | 0.00152587890625 | 0.000762939453125 | 0.0003814697265625 | 0.00019073486328125 | 0.000095367431640625 | 0.0000476837158203125 | 0.00002384185791015625 | 0.000011920928955078125 | 0.0000059604644775390625 | 0.00000298023223876953125 | 0.000001490116119384765625 | 0.0000007450580596923828125 | 0.00000037252902984619140625 | 0.000000186264514923095703125 | 0.0000000931322574615478515625 | 0.00000004656612873077392578125 | 0.000000023283064365386962890625 | 0.0000000116415321826934814453125 | 0.00000000582076609134674072265625 | 0.000000002910383045673370361328125 | 0.0000000014551915228366851806640625 | 0.00000000072759576141834259033203125 | 0.000000000363797880709171295166015625 | 0.0000000001818989403545856475830078125 | 0.00000000009094947017729282379150390625 | 0.000000000045474735088646411895751953125 | 0.0000000000227373675443232059478759765625 | 0.00000000001136868377216160297393798828125 | 0.000000000005684341886080801486968994140625 | 0.0000000000028421709430404007434844970703125 | 0.00000000000142108547152020037174224853515625 | 0.000000000000710542735760100185871124267578125 | 0.0000000000003552713678800500929355621337890625 | 0.00000000000017763568394002504646778106689453125 | 0.000000000000088817841970012523233890533447265625 | 0.0000000000000444089209850062616169452667236328125 | 0.00000000000002220446049250313080847263336181640625 | 0.000000000000011102230246251565404236316680908203125 | 0.00000000000000555111512312578270211815833404540625 | 0.000000000000002775557561562891351059079167022703125 | 0.0000000000000013877787807814456755295395835113515625 | 0.00000000000000069388939039072283776476979175567578125 | 0.000000000000000346944695195361418882384895877837890625 | 0.0000000000000001734723475976807094411924479389189453125 | 0.00000000000000008673617379884035472059622396945947265625 | 0.000000000000000043368086899420177360298111984729736328125 | 0.0000000000000000216840434497100886801490559923648681640625 | 0.00000000000000001084202172485504434007452799618243408203125 | 0.00000000000000000542101086242752217003726399809121714140625 | 0.000000000000000002710505431213761085018631999045608570703125 | 0.0000000000000000013552527156068805425093159995228042853515625 | 0.00000000000000000067762635780344027125465799976140214267578125 | 0.000000000000000000338813178901720135627328999880701071337890625 | 0.0000000000000000001694065894508600678136644999403505356689453125 | 0.00000000000000000008470329472543003390683224997017526783447265625 | 0.000000000000000000042351647362715016953416124985087633917236328125 | 0.0000000000000000000211758236813575084767080624925438169586181640625 | 0.00000000000000000001058791184067875423835403124627190847930908203125 | 0.0000000000000000000052939559203393771191770156231359542396545408203125 | 0.00000000000000000000264697796016968855958850781157977211982727041015625 | 0.000000000000000000001323488980084844279794253905789886059913635205078125 | 0.0000000000000000000006617444900424221398971269528949430299568176025390625 | 0.00000000000000000000033087224502121106994856347644747151497840880126953125 | 0.000000000000000000000165436122510605534974281738223735757489204400634765625 | 0.0000000000000000000000827180612553027674871408691118678787446022003173828125 | 0.00000000000000000000004135903062765138374357043455593393937230110015869140625 | 0.000000000000000000000020679515313825691871785217277966969686150550079345703125 | 0.0000000000000000000000103397576569128459358926086389834848430752750396728515625 | 0.00000000000000000000000516987882845642296794630431699174242153763751983642578125 | 0.000000000000000000000002584939414228211483973152158 |
|-----|-----|-----|----|----|-------|------|-------|--------|---------|----------|-----------|------------|-------------|--------------|---------------|----------------|-----------------|------------------|-------------------|--------------------|---------------------|----------------------|-----------------------|------------------------|-------------------------|--------------------------|---------------------------|----------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------------|------------------------------------|-------------------------------------|--------------------------------------|---------------------------------------|----------------------------------------|-----------------------------------------|------------------------------------------|-------------------------------------------|--------------------------------------------|---------------------------------------------|----------------------------------------------|-----------------------------------------------|------------------------------------------------|-------------------------------------------------|--------------------------------------------------|---------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------|

## **Appendix D**

### **Southern Water Sewer Records**

# SEWER RECORDS PAGE 1 OF 2



|                                      |  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                          |                                                                                     |        |
|--------------------------------------|--|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|
| O.S. REF.<br><b>SU7106SE</b>         |  | Drawn by: rogersc | The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.<br>The actual positions should be determined on site.<br><small>copyright: S.W. Plans are a reproduction of British Standards. Copyright: S.W. Plans are a reproduction of British Standards. Copyright: S.W. Plans are a reproduction of British Standards. Copyright: S.W. Plans are a reproduction of British Standards.</small> | <br>N |  | 472062 |
| Title: 289048 - North Street Arcades |  | Scale: 1:1250     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                          |                                                                                     |        |
|                                      |  | Date: 16/04/2018  | Based upon Ordnance Survey Digital Data with the permission of the controller of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WJU 288530.                                                                                                                                                                                                                                                                                                                                   |                                                                                          |                                                                                     |        |

NOTES

1. The plan shows the location of the proposed works in relation to the surrounding area. The plan is not to scale and is for information only. The plan is not to be used for any other purpose.



Ordnance Survey (©) Crown Copyright 2017  
All rights reserved. Licence number 100022432

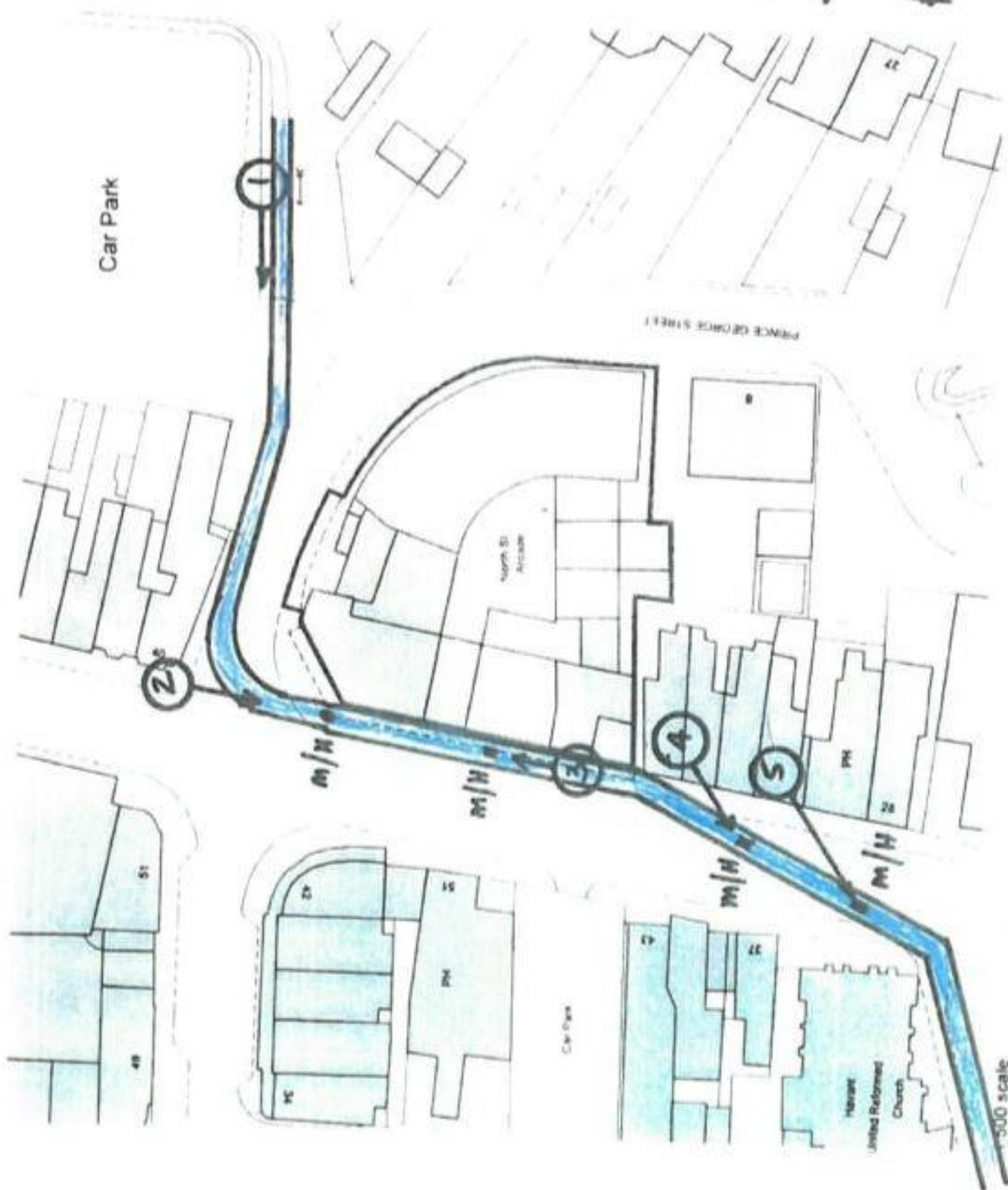


|                  |            |
|------------------|------------|
| Project Name     | 100022432  |
| Project Number   | 100022432  |
| Project Date     | 10/10/2017 |
| Project Location | 100022432  |
| Project Status   | 100022432  |
| Project Manager  | 100022432  |
| Project Engineer | 100022432  |
| Project Designer | 100022432  |
| Project Checker  | 100022432  |
| Project Approver | 100022432  |

Key

PHOTO No. 1

LANE CUT



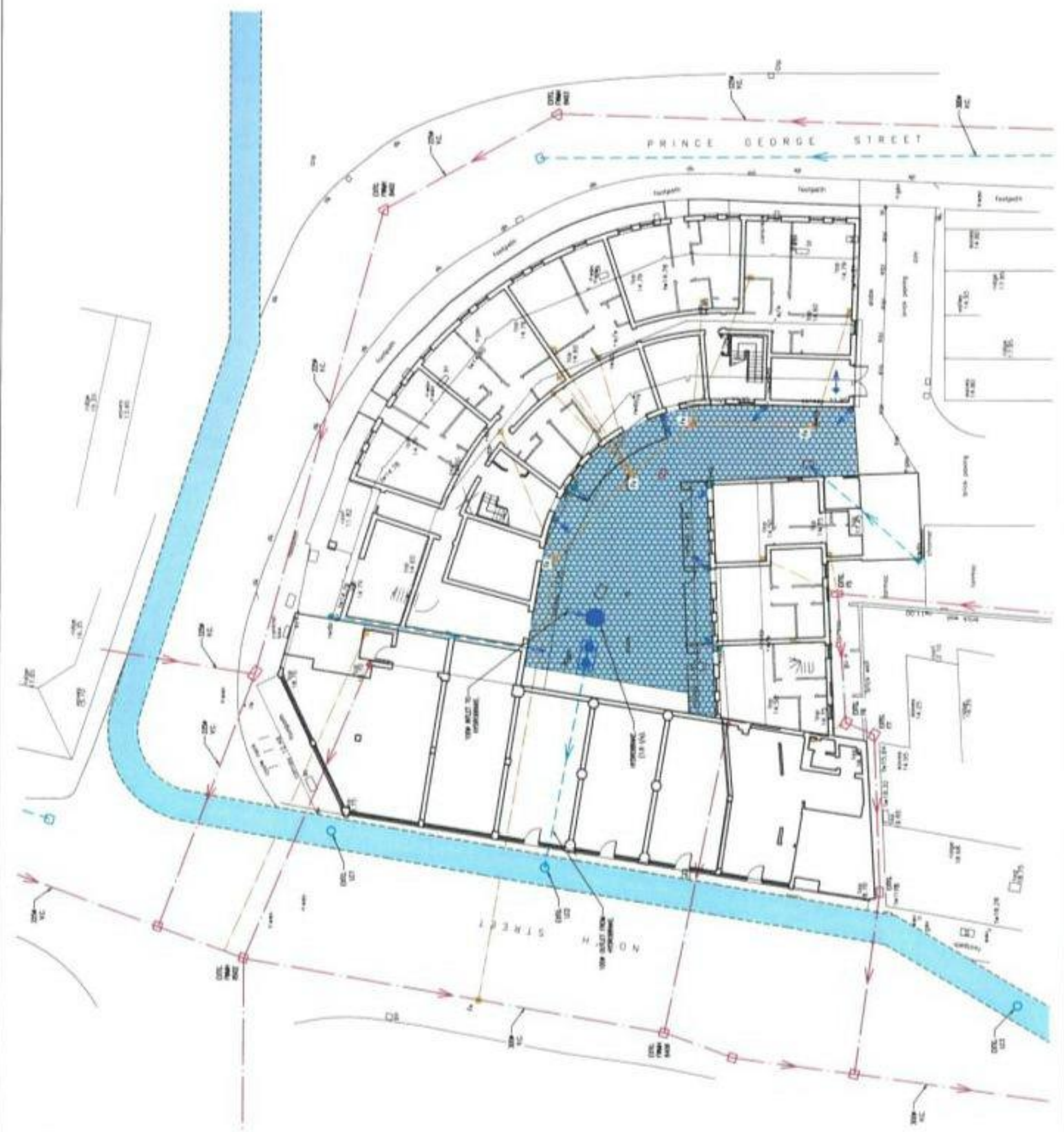
## **Appendix E**

### **Existing Drainage Layouts**



## **Appendix F**

### **Proposed Drainage Layouts**



- NOTES**
1. THE DRAWING IS COMPILED AND SHOULD NOT BE REPRODUCED WITHOUT APPROVAL.
  2. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF BOTH PARTIES IMMEDIATELY.
  3. ALL DIMENSIONS ARE TO BE DECIDED PRIOR TO THE COMMENCEMENT OF ANY WORK.

**EXISTING DRAINAGE KEY:**

- EXISTING FUEL WATER MAIN/DRAINAGE
- EXISTING SURFACE WATER MAIN/DRAINAGE
- EXISTING SWS IN NEW CONCRETE
- EXISTING MANHOLE DRAINAGE
- EXISTING LAMINATE SLUDGE

**PROPOSED DRAINAGE KEY:**

- SWS & NEW FWC (CONCRETE) / MANHOLE CHAMBER
- MANHOLE FWC (CONCRETE)
- FWC MANHOLE CHAMBER (CONCRETE)
- EXISTING MANHOLE CHAMBER (CONCRETE)

PRELIMINARY

| PI | PRELIMINARY | REV | DATE | BY | CHK |
|----|-------------|-----|------|----|-----|
| 1  |             |     |      |    |     |

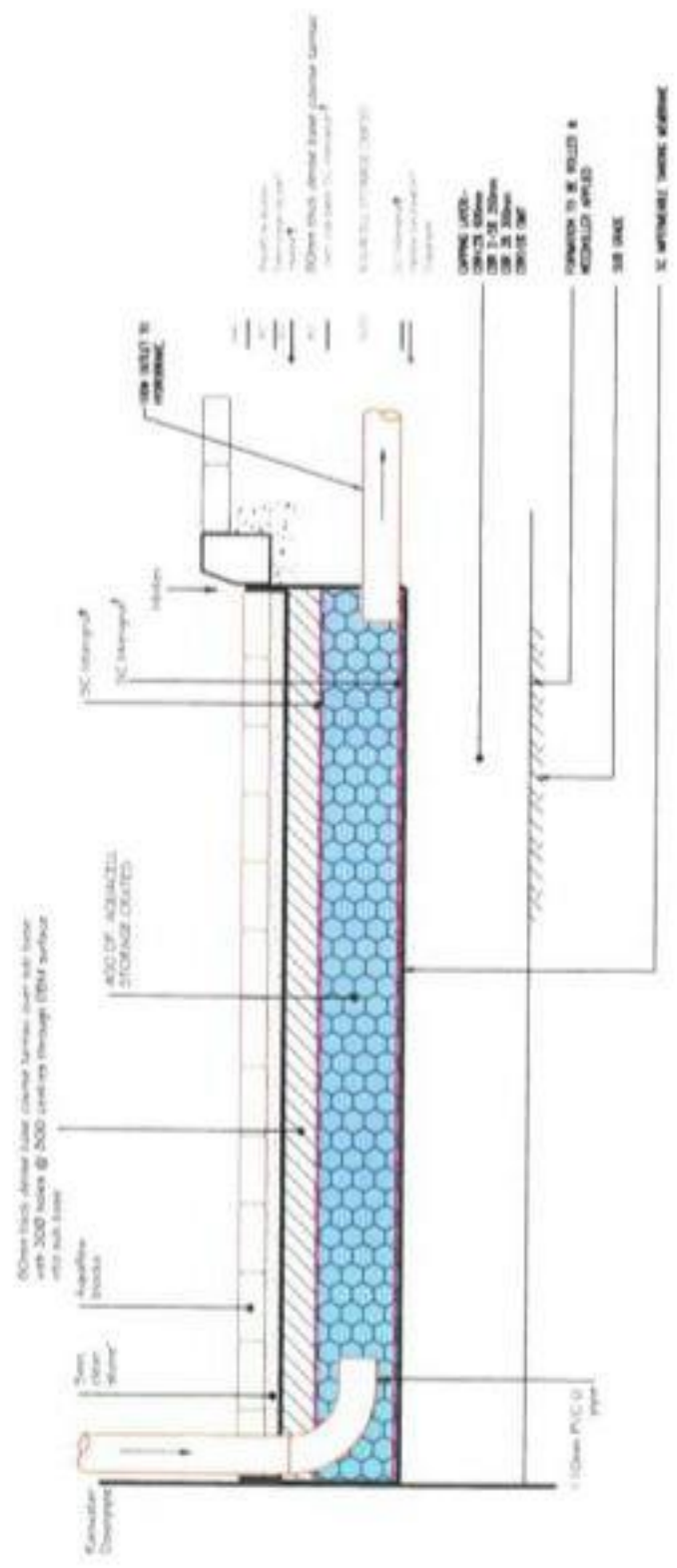
**ADL**  
ADL ENGINEERING LIMITED  
100 NORTH STREET, AUCKLAND, NEW ZEALAND  
TEL: 09 308 1234  
FAX: 09 308 1235  
EMAIL: info@adl.co.nz  
WEBSITE: www.adl.co.nz

**PROJECT INFORMATION**

PROJECT NAME: PRELIMINARY  
PROJECT NO: 12345  
CLIENT: ADL ENGINEERING LIMITED  
DATE: 15/03/2024  
DRAWN BY: J. SMITH  
CHECKED BY: M. JONES  
SCALE: 1:1000

NOTES:

1. THE DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED WITHOUT PERMISSION.
2. THE DRAWING IS TO BE READ IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS AND SPECIFICATIONS ARE TO BE PROVIDED TO THE ATTENTION OF BOTH PARTIES.
3. ALL DIMENSIONS/LEVELS INDICATED SHALL BE USED TO DETERMINE THE CONSTRUCTION OF THE WORK.



Downpipe drainage into Tanked System - Section

STORMWATER SOURCE CONTROL SYSTEM

PRELIMINARY

|     |             |          |          |          |
|-----|-------------|----------|----------|----------|
| NO. | DESCRIPTION | DATE     | BY       | CHECKED  |
| 1   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 2   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 3   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 4   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 5   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 6   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 7   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 8   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 9   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 10  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 11  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 12  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 13  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 14  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 15  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 16  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 17  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 18  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 19  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 20  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 21  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 22  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 23  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 24  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 25  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 26  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 27  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 28  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 29  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 30  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 31  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 32  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 33  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 34  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 35  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 36  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 37  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 38  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 39  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 40  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 41  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 42  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 43  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 44  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 45  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 46  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 47  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 48  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 49  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 50  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 51  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 52  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 53  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 54  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 55  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 56  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 57  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 58  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 59  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 60  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 61  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 62  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 63  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 64  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 65  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 66  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 67  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 68  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 69  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 70  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 71  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 72  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 73  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 74  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 75  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 76  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 77  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 78  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 79  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 80  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 81  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 82  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 83  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 84  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 85  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 86  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 87  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 88  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 89  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 90  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 91  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 92  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 93  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 94  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 95  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 96  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 97  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 98  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 99  | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |
| 100 | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |



**HDL**  
HAMIL CARPES  
LIMITED  
Consulting Civil  
and  
Structural Engineers

100 NORTH STREET BRIDGE, WARRINGTON  
CHESHIRE, WARRINGTON WA9 7JH  
TEL: 01925 444444  
FAX: 01925 444444  
EMAIL: info@hdc.co.uk  
WWW: www.hdc.co.uk

100 NORTH STREET BRIDGE, WARRINGTON  
CHESHIRE, WARRINGTON WA9 7JH  
TEL: 01925 444444  
FAX: 01925 444444  
EMAIL: info@hdc.co.uk  
WWW: www.hdc.co.uk

100 NORTH STREET BRIDGE, WARRINGTON  
CHESHIRE, WARRINGTON WA9 7JH  
TEL: 01925 444444  
FAX: 01925 444444  
EMAIL: info@hdc.co.uk  
WWW: www.hdc.co.uk

## **Appendix G**

### **Pre & Post Development Impermeable Areas**



PRE-DEVELOPMENT IMPERMEABLE AREAS



POST-DEVELOPMENT IMPERMEABLE AREAS

NOTES

1. THE DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED WITHOUT APPROVAL.
2. THE DRAWING IS TO BE READ IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS AND SPECIFICATIONS AND TO BE ADAPTED TO THE ATTENTION OF BOTH PARTIES INVOLVED.
3. ALL DIMENSIONS/NOTES INDICATED IN THE DRAWING ARE TO BE CONSIDERED AS APPROXIMATE AND NOT TO BE USED FOR THE CONSTRUCTION OF ANY WORK.

PRELIMINARY

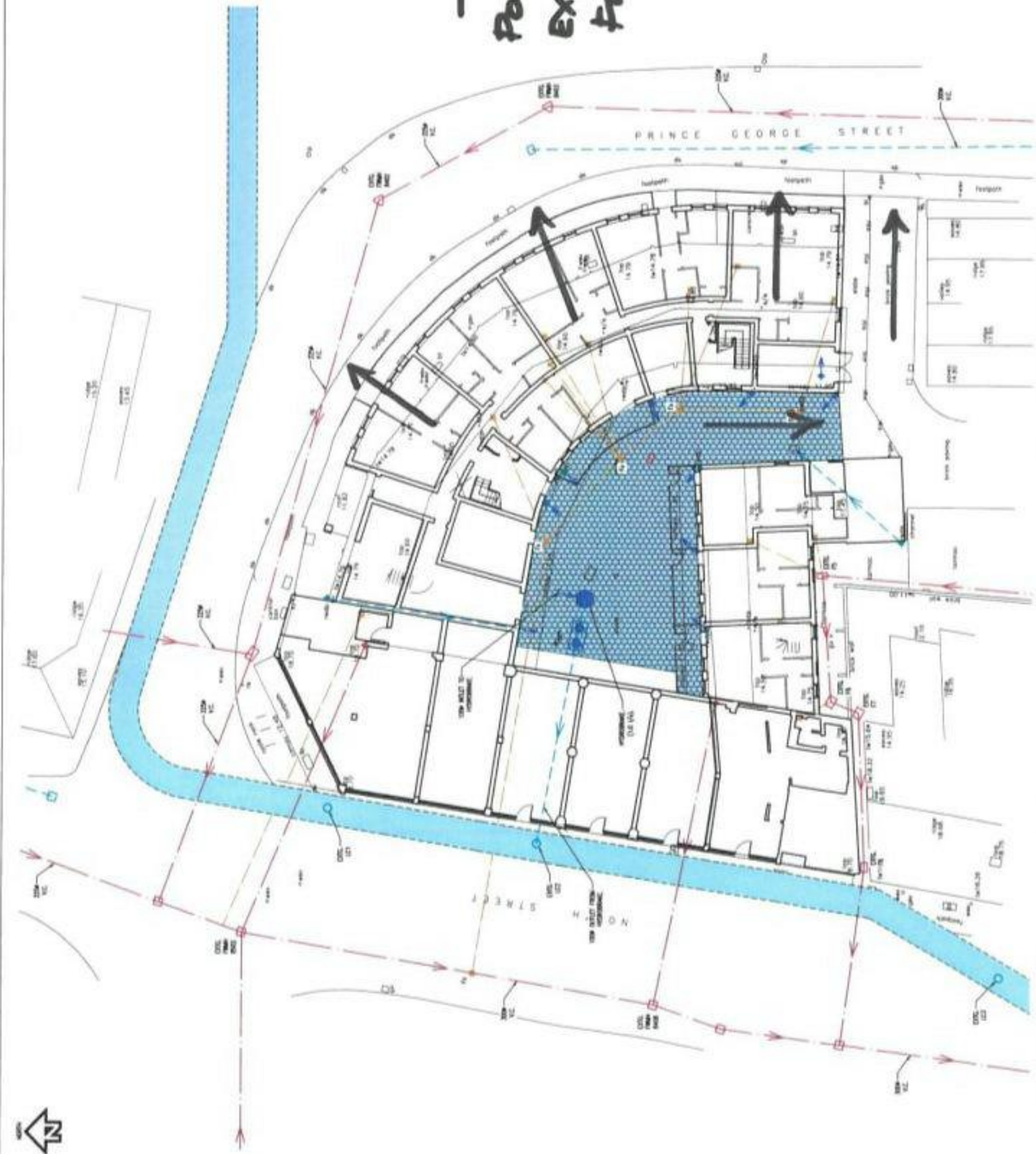
| REV  | DESCRIPTION | DATE     | BY       | CHKD     |
|------|-------------|----------|----------|----------|
| P1   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P2   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P3   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P4   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P5   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P6   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P7   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P8   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P9   | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P10  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P11  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P12  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P13  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P14  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P15  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P16  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P17  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P18  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P19  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P20  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P21  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P22  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P23  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P24  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P25  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P26  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P27  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P28  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P29  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P30  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P31  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P32  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P33  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P34  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P35  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P36  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P37  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P38  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P39  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P40  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P41  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P42  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P43  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P44  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P45  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P46  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P47  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P48  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P49  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P50  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P51  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P52  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P53  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P54  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P55  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P56  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P57  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P58  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P59  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P60  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P61  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P62  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P63  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P64  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P65  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P66  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P67  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P68  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P69  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P70  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P71  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P72  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P73  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P74  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P75  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P76  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P77  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P78  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P79  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P80  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P81  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P82  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P83  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P84  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P85  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P86  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P87  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P88  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P89  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P90  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P91  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P92  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P93  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P94  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P95  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P96  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P97  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P98  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P99  | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |
| P100 | PRELIMINARY | 18/03/20 | 18/03/20 | 18/03/20 |

|                         |  |
|-------------------------|--|
| HDT                     |  |
| HALL DAVIES LIMITED     |  |
| Consulting Civil        |  |
| Structural Engineers    |  |
| 11000 100th Ave SE      |  |
| Surrey, BC V3V 2K9      |  |
| Tel: 604-273-8888       |  |
| Fax: 604-273-8889       |  |
| Email: info@hdt.ca      |  |
| Web: www.hdt.ca         |  |
| Project No: 18-3138-001 |  |
| Sheet No: 12            |  |

## **Appendix H**

### **Exceedance Flows**





↑  
Past performance  
Exceeds  
from

PRELIMINARY

**NOTES:**

1. THE DRAWING IS PRELIMINARY AND SHOULD NOT BE REPRODUCED WITHOUT APPROVAL.
2. THE DRAWING IS TO BE USED IN CONNECTION WITH THE ARCHITECT'S DRAWINGS AND SPECIFICATIONS AND IS NOT TO BE USED FOR ANY OTHER PURPOSE.
3. ANY DIMENSIONS SHOWN ARE TO BE CHECKED AGAINST THE DIMENSIONS OF THE ACTUAL SITE.

**EXISTING DRAINAGE KEY:**

- EXISTING FLOOD WATER INFLOW/DRAINAGE
- EXISTING SURFACE WATER INFLOW/DRAINAGE
- EXISTING SOIL & ROCK DRAINAGE
- EXISTING SUBSURFACE DRAINAGE
- EXISTING LAND DRAINAGE

**PROPOSED DRAINAGE KEY:**

- SOIL & ROCK INFLOW / INFLOW DRAINAGE
- SUBSURFACE INFLOW (Hatched)
- FLOOD INFLOW (Hatched)
- FLOOD INFLOW (Hatched)
- SOIL & ROCK INFLOW (Hatched)

| NO. | DESCRIPTION | DATE     | BY       | CHECKED  |
|-----|-------------|----------|----------|----------|
| 1   | PRELIMINARY | 10/10/20 | 10/10/20 | 10/10/20 |

SCALE: 1:1000  
DATE: 10/10/20  
BY: 10/10/20  
CHECKED: 10/10/20

**PROJECT INFORMATION:**

PROJECT NAME: NORTH STREET ARCADE MARKET  
PROJECT LOCATION: NORTH STREET ARCADE MARKET  
PROJECT TYPE: PRELIMINARY  
PROJECT NO.: 10/10/20  
PROJECT DATE: 10/10/20  
PROJECT STATUS: 10/10/20

## **Appendix I**

### **Surface Water Drainage Calculations**

NORTH STREET ALLIANCE

Date  
02/20

Job No.  
18/3137

Page  
01

SURFACE WATER (30 UNITS)

Office  
W

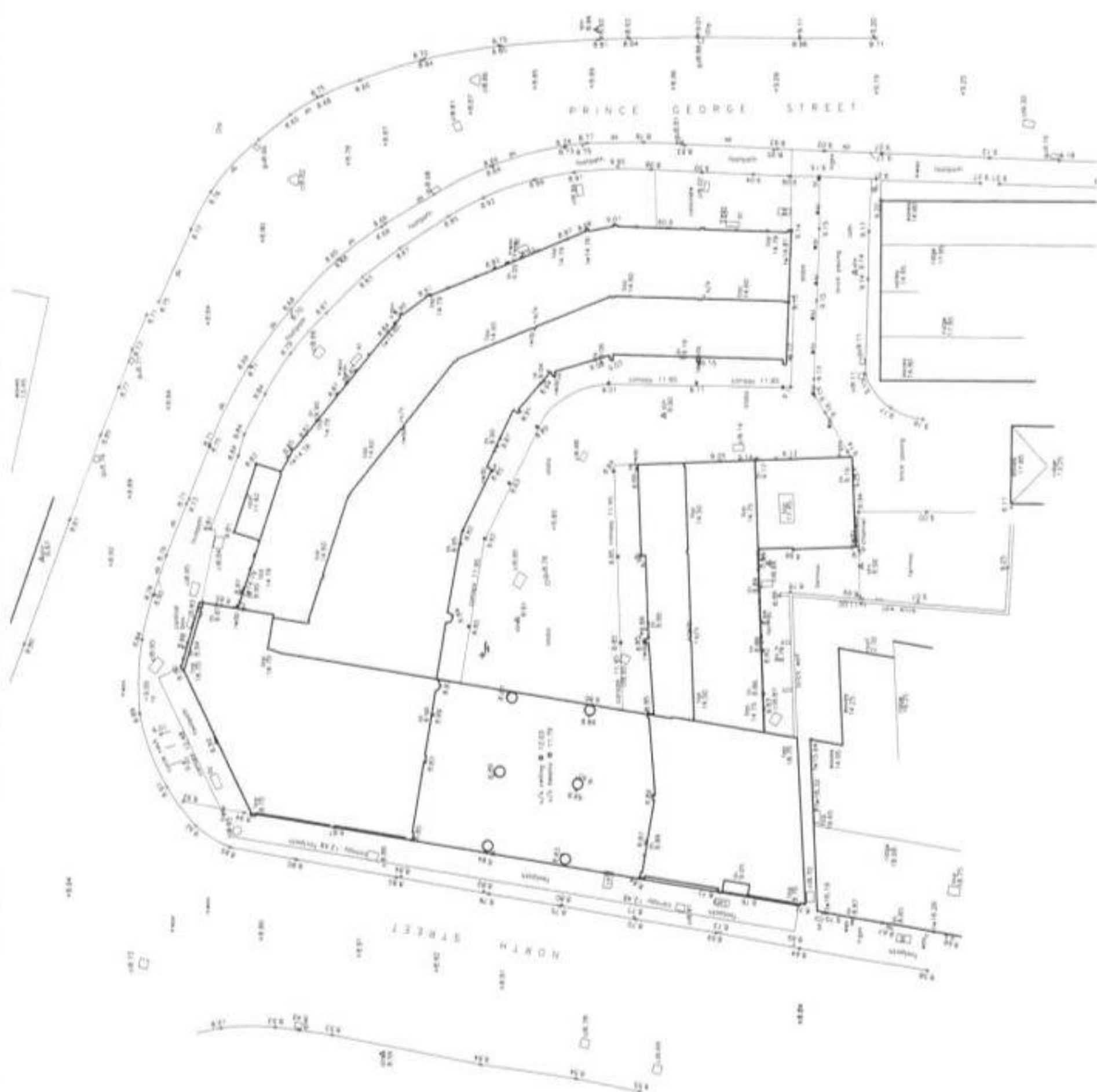
Engineer  
BH

Checked

SURFACE WATER

DRAINAGE CALCULATIONS.

1. THE BOARD OF DIRECTORS OF THE COMPANY HAS REVIEWED THE FINANCIAL STATEMENTS OF THE COMPANY FOR THE YEAR 2011 AND HAS APPROVED THE FINANCIAL STATEMENTS FOR THE YEAR 2011.



## PREFACE

[illegible]

|                                                                                            |  |                                                                        |  |
|--------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------|--|
|         |  | PRELIMINARY<br>Date: 11-15-90<br>Drawn: 11-15-90<br>Scale: 1" = 10'-0" |  |
| HDL<br>HANDEL ENGINEERING<br>Consulting Civil<br>Structural Engineers                      |  | Project: 18-3128-000<br>Date: 11-15-90                                 |  |
| 100 WESTWING LIMITED<br>100 NORTH STREET ACACIA, MARIETTA<br>EXISTING TOPOGRAPHICAL SURVEY |  | Title:                                                                 |  |



NOTES:

1. THE DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED WITHOUT APPROVAL.
2. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS AND SPECIFICATIONS ARE TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT (AS APPLICABLE).
3. ALL DIMENSIONS/LEVELS INDICATED IN THE DRAWING ARE TO BE ASSUMED TO BE CORRECT UNLESS OTHERWISE NOTED.
4. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS AND SPECIFICATIONS ARE TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT (AS APPLICABLE).

PRELIMINARY

|       |             |           |            |
|-------|-------------|-----------|------------|
| NO.   | DESCRIPTION | AREA (m²) | PERCENTAGE |
| 1     | PERMEABLE   | 409.00    | 21.30%     |
| 2     | IMPERMEABLE | 1511.00   | 78.70%     |
| TOTAL |             | 1920.00   | 100.00%    |

PERCENTAGE IMPERVIOUS = 78.70%

|                                              |  |
|----------------------------------------------|--|
| HDT                                          |  |
| HAMILTON DEVELOPMENT TRADING COMPANY LIMITED |  |
| 100 NORTH STREET, AUCKLAND, NEW ZEALAND      |  |
| TELEPHONE: 09-3139-801                       |  |
| FAX: 09-3139-801                             |  |
| E-MAIL: hdt@hdt.co.nz                        |  |
| WEBSITE: www.hdt.co.nz                       |  |
| PROJECT NO: 19-3139-801                      |  |
| DATE: 10/10/2019                             |  |
| DRAWN BY: HDT                                |  |
| CHECKED BY: HDT                              |  |
| APPROVED BY: HDT                             |  |

PRE-DEVELOPMENT IMPERMEABLE AREAS

POST-DEVELOPMENT IMPERMEABLE AREAS





NORTH STREET ALCADE.

Date  
02/20

Job No  
18/3139

Page  
04

SURFACE WATER (30 UNITS)

Office  
SW

Engineer  
BHI

Checked

### ATTENUATION STORAGE

1 IN 100 YEAR STORM  
(4 HOUR DURATION)

40% CLIMATE CHANGE

ALLOWED RUN OFF RATE  
 $0.47 \text{ l/s}$

STORAGE PROVIDED USING  
AQUACELL STORAGE CRATES (95% VOIDS)  
BELOW SURFACE OF PEDESTRIAN  
DRIVING AS PER ATTACHED HDL  
DRAWING NOS 18/3139/512 P1  
& 551 P2 & HYDROBLOCK WITH  
 $1.0 \text{ l/s}$  FLOW

• AREA OF AQUACELL STORAGE, PER  
HDL DRAWING NO. 18/3139/512 P1  
IS  $231 \text{ m}^2$ .

• VOLUME OF STORAGE REQ'D  $105.3 \text{ m}^3$  (ATTACHED  
CALC)

• DEPTH OF AQUACELL REQ'D  
 $= 105.3 / 231 \times 0.95 = 0.479 \text{ m}$

• PROVIDE  $231 \text{ m}^2$  STORAGE AT  $0.5 \text{ m}$  DEPTH  
AS PER ATTACHED HDL DRAWING  
NO. 18-3139-551 P2.



MasterDrain  
HY 10.07

## HAMILL DAVIES LIMITED

Consulting Civil & Structural Engineers  
Ivydale, Lower Chase Road, Swanmore,  
Hampshire, SO32 2PB  
Tel: 01489 893 596 Fax: 01489 890 715  
brian.w.hamill@btopenworld.com

|                           |         |          |
|---------------------------|---------|----------|
| Job No.<br><b>18-3139</b> |         |          |
| Sheet no.<br><b>07</b>    |         |          |
| Date<br><b>02/03/20</b>   |         |          |
| By<br><b>B.H.</b>         | Checked | Reviewed |

Project North Street Arcade - 30 units  
Title BREEAM SUR1 calculations for HAVANT

### Data:-

|                         |  |                        |          |
|-------------------------|--|------------------------|----------|
| Hydrology (FSR):-       |  | WRAP                   | = 3      |
| Location = HAVANT ✓     |  | Grid reference         | = SU7106 |
| Long reference = 471106 |  | SAAR (mm/yr)           | = 750    |
| M5-60 (mm) = 19         |  | Soil                   | = 0.37   |
| r = 0.35                |  | Hyd. zone              | = 7      |
| Hyd. area = 7           |  | Area = England & Wales |          |
| Hydrograph = Summer     |  |                        |          |

### Site values used in design:-

|                                    |                                     |
|------------------------------------|-------------------------------------|
| Total site area = 0.1511 ha ✓      | Climate change factor = 40% ✓       |
| Pre-dev area drained = 0.1511 ha ✓ | Post-dev area drained = 0.1461 ha ✓ |
| Imperm runoff factor = 98%         | Perm runoff factor = 20%            |

### Pre-development

|                                |                                  |
|--------------------------------|----------------------------------|
| Area to soakaways = 0.0000 ha  | Area to other SUDS = 0.0000 ha   |
| Perv. area to SUDS = 0.0000 ha | Pre-dev flow to drain = 0.00 l/s |

### Post-development

|                                |                                     |
|--------------------------------|-------------------------------------|
| Area to soakaways = 0.0000 ha  | Area to other SUDS = 0.0000 ha      |
| Perv. area to SUDS = 0.0000 ha | Post-dev flow to drain = 1.00 l/s ✓ |

### Calculations:-

Revised Post-dev Imperm. area = 0.146 ha  
Equiv. Post-dev Imperm. area = 0.143 ha  
Equiv. Post-dev Perm. area = 0.001 ha  
Total Pre-dev equiv. area ha = 0.148 ha  
Total Post-dev equiv. area ha = 0.144 ha  
100 yr 6 hour mean intensity = 10.50mm/hr

### Results:-

#### Pre-dev peakflow runoff (l/s) (m³/s)

| R.P. | 15    | 30   | 60   | 120  | 240  | 360  | 480  | 600  | Max   | CCF | Final | R.P. |
|------|-------|------|------|------|------|------|------|------|-------|-----|-------|------|
| 1    | 45.8  | 31.0 | 19.6 | 12.5 | 7.9  | 6.1  | 4.9  | 4.2  | 45.8  | N/A | 45.8  | 1    |
| 30   | 111.0 | 73.9 | 47.1 | 29.2 | 17.7 | 13.1 | 10.6 | 8.9  | 111.0 | N/A | 111.0 | 30   |
| 100  | 143.5 | 96.5 | 61.9 | 38.4 | 23.0 | 16.9 | 13.6 | 11.5 | 143.5 | N/A | 143.5 | 100  |

#### Post-dev peakflow runoff (l/s)

| R.P. | 15    | 30   | 60   | 120  | 240  | 360  | 480  | 600  | Max   | CCF | Final | R.P. |
|------|-------|------|------|------|------|------|------|------|-------|-----|-------|------|
| 1    | 44.6  | 30.2 | 19.1 | 12.2 | 7.7  | 5.9  | 4.8  | 4.1  | 44.6  | 40  | 62.5  | 1    |
| 30   | 108.1 | 71.9 | 45.9 | 28.4 | 17.2 | 12.7 | 10.3 | 8.7  | 108.1 | 40  | 151.3 | 30   |
| 100  | 139.8 | 94.0 | 60.3 | 37.4 | 22.4 | 16.5 | 13.3 | 11.2 | 139.8 | 40  | 195.7 | 100  |

100 year 6 hour (x Climate Change Factor) storm gives:-

Pre-dev runoff volume m³ = 93.3m³  
Post-dev rainfall volume = 127.2m³  
Post-dev volume m³ (excess above SUDS) = 127.2m³  
→ 100 yr 6 hour mean intensity = 10.50mm/hr ←  
Pre-dev volume to drain at 0 l/s = 0.0 m³  
Post-dev volume to drain at 1 l/s = 22.0 m³  
→ Post-dev storage volume = 105.3m³ ←  
Post-dev 5mm imperm volume = 7.3 m³  
Post-dev 5mm perm volume = 0.2 m³

$Q_{BAR(rural)} = 0.471 \text{ l/s}$  or  $3.114 \text{ l/s/ha}$  or  $0.000 \text{ cumecs}$  - from IoH 124.

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.



MasterDrain  
HY 10.07

## HAMILL DAVIES LIMITED

Consulting Civil & Structural Engineers  
Ivydale, Lower Chase Road, Swanmore,  
Hampshire, SO32 2PB  
Tel: 01489 893 596 Fax: 01489 890 715  
brian.w.hamill@btopenworld.com

Job No.  
**18-3139**

Sheet no.

27 00

Date  
**02/03/20**

Project  
**North Street Arcade - 30 units**

Title  
**BREEAM SUR1 calculations for HAVANT**

By

**B.H.**

Checked

Reviewed

### Data summary.

Use the data below for the SUR1 form

#### Site areas:-

|                                   |   |           |                        |      |
|-----------------------------------|---|-----------|------------------------|------|
| Total site area                   | = | 0.1511 ha | ;1511.0 m <sup>2</sup> | [3A] |
| Pre-development impermeable area  | = | 0.1511 ha |                        | [3B] |
| Pre-development permeable area    | = | 0.0000 ha |                        |      |
| Post-development impermeable area | = | 0.1461 ha |                        | [3C] |
| Post-development permeable area   | = | 0.0050 ha |                        |      |

#### Peak runoff:-

|                                         |   |            |      |
|-----------------------------------------|---|------------|------|
| Pre-development 1 year storm (15min)    | = | 45.8 l/s   | [6A] |
| Pre-development 100 year storm (15min)  | = | 143.5 l/s  | [6C] |
| Post-development 1 year storm (15min)   | = | 44.6 l/s   | [6B] |
| Post-development 100 year storm (15min) | = | 139.76 l/s | [6D] |

#### Greenfield runoff:-

$Q_{BAR(rural)} = 0.471 \text{ l/s}$  or  $3.114 \text{ l/s/ha}$  or  $0.000 \text{ cumecs}$  - from IoH 124.

#### Climate change factor:-

CCF = 40%

#### Volumes:-

|                                                               |       |   |                     |
|---------------------------------------------------------------|-------|---|---------------------|
| Pre-development 100 yr/6hr storm                              | [12A] | = | 130.7m <sup>3</sup> |
| Post-development 100 yr/6hr storm ( add. volume with no SUDS) | [12B] | = | 127.2m <sup>3</sup> |
| Post-development 100 yr/6hr storm ( add. volume with SUDS)    |       | = | 127.2m <sup>3</sup> |
| Post-development add. predicted volume (No SUDS)              | [12C] | = | -3.4m <sup>3</sup>  |

#### You may also require

Data relating to the infiltration test calculations (if applicable)  
Evidence to show runoff reduction (if applicable)  
Information on calculation methods (if applicable see next sheet)

#### Note

Numbers in square brackets relate to the  
Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1

✓



MasterDrain  
HY 10.07

|                                                     |  |                                                                                                                                                                                    |         |                                                                                               |  |
|-----------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------|--|
| <b>HAMILL DAVIES<br/>LIMITED</b>                    |  | Consulting Civil & Structural Engineers<br>Ivydale, Lower Chase Road, Swanmore ,<br>Hampshire, SO32 2PB<br>Tel: 01489 893 596 Fax: 01489 890 715<br>brian.w.hamill@btopenworld.com |         | Job No.<br><b>18-3139</b>                                                                     |  |
|                                                     |  |                                                                                                                                                                                    |         | Sheet no.  |  |
|                                                     |  |                                                                                                                                                                                    |         | Date<br><b>02/03/20</b>                                                                       |  |
| Project<br><b>North Street Arcade - 30 units</b>    |  | By<br><b>B.H.</b>                                                                                                                                                                  | Checked | Reviewed                                                                                      |  |
| Title<br><b>BREEAM SUR1 calculations for HAVANT</b> |  |                                                                                                                                                                                    |         |                                                                                               |  |

## Definitions and methods

### Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

### Site values and factors

Areas of the site should be entered in hectares (10000 m<sup>2</sup>). If the Pre-development site is a green field, this box is blank.

Climate Change Factor is initially set at 20% - this may be changed as required.

Greenfield runoff is calculated using the method described in loH 124.

### Runoff factors

The impermeable runoff factor is initially set at 98%

The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development

The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

### Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.

All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff.

These are then summated.

This gives a total pre-development equivalent area, and a similar figure for the post-development area.

The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

### Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.

The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.

The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as l/s. Figures in red indicate m<sup>3</sup>/s

The peak value is measured, multiplied by the CCF and the total maximum rate is shown.

The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.

Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS.

Qbar(rural) is calculated in accordance with the procedure laid down in loH 124

✓