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**Project Title :** Land at Minefield, Menheniot

**Project Reference :** HCE0965

**Date :** 08 March 2024

**Prepared by :** Jim Tamblyn

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Planning Permission was granted historically for two residential units to the rear of Minefield Cottages; subsequently the permission was altered to increase the size of the second plot and construct a double garage (Planning Permission PA19/04546 refers). The current proposal alters the double garage and extends its footprint to form a detached three bedroom dwelling with the two parking bays.

The site is located within Flood Zone 1 and not shown to be at risk of overland flow.

Foul and surface water drainage was constructed as part of the initial development with a surface water connection approved by South West Water which limited surface water flow from the site to 1.4 l/s for the 1 in 30 year rainfall event.

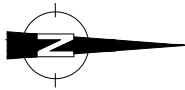
The revised scheme increases the impermeable area of the development and therefore additional surface water storage has been proposed which comprises oversized pipes and a private underground storage tank. The storage tank will control the flow from the new dwelling and release it at a restricted rate to the oversized sewer.

Surface water generated by the development will be managed for rainfall events up to the 1 in 100 year plus 40% climate change allowance.

A copy of the surface water drainage strategy and supporting calculations are reproduced in **Appendix A and Appendix B** for reference.

# Appendix A

## Surface Water Drainage Strategy



**NOTES: GENERAL**

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS STATED OTHERWISE
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT SCHEME DRAWINGS AND SPECIFICATIONS



PLOT 3 TO DRAIN TO UNDERGROUND STORAGE TANK CONSTRUCTED FROM PLASTIC CELLULAR CRATES WITH VORTEX FLOW CONTROL LIMITING FLOW TO 0.8 l/s

VORTEX FLOW CONTROL LIMITING FLOW TO 1.0 l/s

PREVIOUSLY CONSTRUCTED CONTROL CHAMBER LIMITING FLOW TO 1.4l/s (1in30 YR) AND 1.5 l/s (1in100 YR)

PREVIOUSLY CONSTRUCTED MANHOLE CONNECTION; FOUL (0.1 l/s) AND SURFACE WATER (1.4 l/s)



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Elliott Homes SW

LAND AT MINEFIELD  
MENHENIOT

SURFACE WATER DRAINAGE STRATEGY

| Rev   | Description | Drn      | Chk    | Date       |
|---|-------------|----------|--------|------------|
| REVISIONS   |             |          |        |            |
| Preliminary   | 08.03.24    | Approval | Tender | Const.     |
| DRAWING STATUS  |             |          |        |            |
| DATE  | MARCH '24   | DRAWN    | JT     | CHECKED -  |
| DRAWING No. 0965.103  |             | REV      | SCALE  | 1:200 @ A3 |
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## Appendix B

# Surface Water Storage Calculations

**Design Settings**

|                                      |        |                                    |               |
|--------------------------------------|--------|------------------------------------|---------------|
| Rainfall Methodology                 | FEH-22 | Minimum Velocity (m/s)             | 1.00          |
| Return Period (years)                | 10     | Connection Type                    | Level Soffits |
| Additional Flow (%)                  | 0      | Minimum Backdrop Height (m)        | 0.200         |
| CV                                   | 0.750  | Preferred Cover Depth (m)          | 1.200         |
| Time of Entry (mins)                 | 5.00   | Include Intermediate Ground        | ✓             |
| Maximum Time of Concentration (mins) | 30.00  | Enforce best practice design rules | ✓             |
| Maximum Rainfall (mm/hr)             | 50.0   |                                    |               |

**Pipeline Schedule**

| Link  | Length (m) | Slope (1:X) | Dia (mm) | Link Type | US CL (m) | US IL (m) | US Depth (m) | DS CL (m) | DS IL (m) | DS Depth (m) |
|-------|------------|-------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|--------------|
| 1.000 | 14.600     | 300.0       | 750      | Circular  | 103.400   | 101.000   | 1.650        | 103.100   | 100.951   | 1.399        |
| 2.000 | 4.501      | 100.0       | 150      | Circular  | 103.400   | 101.750   | 1.500        | 103.400   | 101.705   | 1.545        |
| 2.001 | 8.772      | 57.0        | 150      | Circular  | 103.400   | 101.705   | 1.545        | 103.100   | 101.551   | 1.399        |
| 1.001 | 8.700      | 300.0       | 750      | Circular  | 103.100   | 100.951   | 1.399        | 102.800   | 100.922   | 1.128        |
| 1.002 | 7.400      | 160.0       | 225      | Circular  | 102.800   | 100.922   | 1.653        | 102.760   | 100.876   | 1.659        |
| 1.003 | 6.600      | 160.0       | 225      | Circular  | 102.760   | 100.876   | 1.659        | 102.640   | 100.835   | 1.580        |
| 1.004 | 15.500     | 500.0       | 525      | Circular  | 102.640   | 100.535   | 1.580        | 101.940   | 100.504   | 0.911        |
| 1.005 | 5.000      | 100.0       | 150      | Circular  | 101.940   | 100.504   | 1.286        | 101.940   | 100.454   | 1.336        |

| Link  | US Node | Dia (mm) | Node Type | MH Type   | DS Node | Dia (mm) | Node Type | MH Type   |
|-------|---------|----------|-----------|-----------|---------|----------|-----------|-----------|
| 1.000 | 1       | 1800     | Manhole   | Adoptable | 2       | 1800     | Manhole   | Adoptable |
| 2.000 | 11      | 600      | Manhole   | Adoptable | 10      | 1200     | Manhole   | Adoptable |
| 2.001 | 10      | 1200     | Manhole   | Adoptable | 2       | 1800     | Manhole   | Adoptable |
| 1.001 | 2       | 1800     | Manhole   | Adoptable | 3       | 1200     | Manhole   | Adoptable |
| 1.002 | 3       | 1200     | Manhole   | Adoptable | 4       | 1200     | Manhole   | Adoptable |
| 1.003 | 4       | 1200     | Manhole   | Adoptable | 5       | 1200     | Manhole   | Adoptable |
| 1.004 | 5       | 1200     | Manhole   | Adoptable | 6       | 1500     | Manhole   | Adoptable |
| 1.005 | 6       | 1500     | Manhole   | Adoptable | 7       | 1500     | Manhole   | Adoptable |

**Node 10 Depth/Area Storage Structure**

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 101.705 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.95 | Time to half empty (mins) | 76      |

| Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) |
|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|
| 0.000     | 8.0                    | 0.0                        | 0.400     | 8.0                    | 0.0                        | 0.800     | 8.0                    | 0.0                        | 0.810     | 0.0                    | 0.0                        |

**Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m <sup>3</sup> ) | Flood (m <sup>3</sup> ) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 180 minute winter | 1       | 136         | 101.163   | 0.163     | 0.6          | 0.4234                     | 0.0000                  | OK         |
| 60 minute winter  | 10      | 41          | 101.774   | 0.069     | 1.0          | 0.6049                     | 0.0000                  | OK         |
| 15 minute winter  | 11      | 10          | 101.784   | 0.034     | 1.8          | 0.0149                     | 0.0000                  | OK         |
| 180 minute winter | 2       | 136         | 101.163   | 0.212     | 1.7          | 0.5903                     | 0.0000                  | OK         |
| 180 minute winter | 3       | 136         | 101.163   | 0.241     | 1.0          | 0.2723                     | 0.0000                  | SURCHARGED |
| 15 minute winter  | 4       | 11          | 100.903   | 0.027     | 1.2          | 0.0321                     | 0.0000                  | OK         |
| 120 minute winter | 5       | 82          | 100.682   | 0.147     | 1.7          | 0.1859                     | 0.0000                  | OK         |
| 120 minute winter | 6       | 82          | 100.682   | 0.178     | 1.7          | 0.3271                     | 0.0000                  | SURCHARGED |
| 15 minute summer  | 7       | 1           | 100.454   | 0.000     | 1.3          | 0.0000                     | 0.0000                  | OK         |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m <sup>3</sup> ) | Discharge Vol (m <sup>3</sup> ) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|----------------------------|---------------------------------|
| 180 minute winter           | 1       | 1.000        | 2       | 0.4           | 0.076          | 0.001    | 1.2590                     |                                 |
| 60 minute winter            | 10      | Hydro-Brake® | 2       | 0.6           |                |          |                            |                                 |
| 15 minute winter            | 11      | 2.000        | 10      | 1.8           | 0.736          | 0.100    | 0.0189                     |                                 |
| 180 minute winter           | 2       | 1.001        | 3       | 1.0           | 0.140          | 0.001    | 0.9737                     |                                 |
| 180 minute winter           | 3       | Hydro-Brake® | 4       | 0.7           |                |          |                            |                                 |
| 15 minute winter            | 4       | 1.003        | 5       | 1.2           | 0.453          | 0.030    | 0.0177                     |                                 |
| 120 minute winter           | 5       | 1.004        | 6       | 1.4           | 0.170          | 0.007    | 0.8825                     |                                 |
| 120 minute winter           | 6       | Hydro-Brake® | 7       | 1.4           |                |          |                            | 11.1                            |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m <sup>3</sup> ) | Flood (m <sup>3</sup> ) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 180 minute winter | 1       | 180         | 101.504   | 0.504     | 1.4          | 1.3085                     | 0.0000                  | OK         |
| 60 minute winter  | 10      | 47          | 101.932   | 0.227     | 2.5          | 1.9855                     | 0.0000                  | SURCHARGED |
| 60 minute winter  | 11      | 47          | 101.933   | 0.182     | 2.6          | 0.0803                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 2       | 180         | 101.504   | 0.553     | 3.2          | 1.5419                     | 0.0000                  | OK         |
| 180 minute winter | 3       | 180         | 101.504   | 0.582     | 1.4          | 0.6585                     | 0.0000                  | SURCHARGED |
| 60 minute winter  | 4       | 59          | 101.006   | 0.130     | 1.5          | 0.1527                     | 0.0000                  | OK         |
| 60 minute winter  | 5       | 59          | 101.006   | 0.471     | 4.3          | 0.5954                     | 0.0000                  | OK         |
| 60 minute winter  | 6       | 59          | 101.006   | 0.502     | 3.5          | 0.9222                     | 0.0000                  | SURCHARGED |
| 15 minute summer  | 7       | 1           | 100.454   | 0.000     | 1.4          | 0.0000                     | 0.0000                  | OK         |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m <sup>3</sup> ) | Discharge Vol (m <sup>3</sup> ) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|----------------------------|---------------------------------|
| 180 minute winter           | 1       | 1.000        | 2       | -0.8          | 0.070          | -0.001   | 4.8400                     |                                 |
| 60 minute winter            | 10      | Hydro-Brake® | 2       | 0.7           |                |          |                            |                                 |
| 60 minute winter            | 11      | 2.000        | 10      | 2.5           | 0.652          | 0.139    | 0.0792                     |                                 |
| 180 minute winter           | 2       | 1.001        | 3       | 1.4           | 0.140          | 0.002    | 3.1104                     |                                 |
| 180 minute winter           | 3       | Hydro-Brake® | 4       | 0.7           |                |          |                            |                                 |
| 60 minute winter            | 4       | 1.003        | 5       | 1.5           | 0.486          | 0.038    | 0.1854                     |                                 |
| 60 minute winter            | 5       | 1.004        | 6       | 2.5           | 0.222          | 0.012    | 3.2314                     |                                 |
| 60 minute winter            | 6       | Hydro-Brake® | 7       | 1.4           |                |          |                            | 18.6                            |

**Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m <sup>3</sup> ) | Flood (m <sup>3</sup> ) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 240 minute winter | 1       | 232         | 101.726   | 0.726     | 1.3          | 1.8828                     | 0.0000                  | OK         |
| 60 minute winter  | 10      | 51          | 102.024   | 0.319     | 3.0          | 2.7867                     | 0.0000                  | SURCHARGED |
| 60 minute winter  | 11      | 51          | 102.024   | 0.274     | 3.3          | 0.1207                     | 0.0000                  | SURCHARGED |
| 240 minute winter | 2       | 232         | 101.726   | 0.775     | 3.2          | 2.1587                     | 0.0000                  | SURCHARGED |
| 240 minute winter | 3       | 232         | 101.726   | 0.804     | 1.3          | 0.9088                     | 0.0000                  | SURCHARGED |
| 60 minute winter  | 4       | 59          | 101.344   | 0.468     | 2.0          | 0.5487                     | 0.0000                  | SURCHARGED |
| 60 minute winter  | 5       | 59          | 101.343   | 0.808     | 5.3          | 1.0217                     | 0.0000                  | SURCHARGED |
| 60 minute winter  | 6       | 59          | 101.343   | 0.839     | 4.2          | 1.5413                     | 0.0000                  | SURCHARGED |
| 15 minute summer  | 7       | 1           | 100.454   | 0.000     | 1.4          | 0.0000                     | 0.0000                  | OK         |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m <sup>3</sup> ) | Discharge Vol (m <sup>3</sup> ) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|----------------------------|---------------------------------|
| 240 minute winter           | 1       | 1.000        | 2       | -0.8          | 0.074          | -0.001   | 6.3956                     |                                 |
| 60 minute winter            | 10      | Hydro-Brake® | 2       | 0.7           |                |          |                            |                                 |
| 60 minute winter            | 11      | 2.000        | 10      | 3.0           | 0.675          | 0.171    | 0.0792                     |                                 |
| 240 minute winter           | 2       | 1.001        | 3       | 1.3           | 0.190          | 0.002    | 3.8291                     |                                 |
| 240 minute winter           | 3       | Hydro-Brake® | 4       | 0.8           |                |          |                            |                                 |
| 60 minute winter            | 4       | 1.003        | 5       | 1.9           | 0.502          | 0.048    | 0.2625                     |                                 |
| 60 minute winter            | 5       | 1.004        | 6       | 2.9           | 0.215          | 0.014    | 3.3485                     |                                 |
| 60 minute winter            | 6       | Hydro-Brake® | 7       | 1.5           |                |          |                            | 20.6                            |



**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m <sup>3</sup> ) | Flood (m <sup>3</sup> ) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 180 minute winter | 1       | 172         | 102.311   | 1.311     | 2.2          | 3.4022                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 10      | 180         | 102.320   | 0.615     | 2.0          | 5.3727                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 11      | 180         | 102.320   | 0.570     | 2.1          | 0.2510                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 2       | 172         | 102.311   | 1.360     | 5.0          | 3.7905                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 3       | 172         | 102.311   | 1.389     | 1.9          | 1.5710                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 4       | 132         | 101.926   | 1.050     | 1.4          | 1.2322                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 5       | 132         | 101.926   | 1.391     | 3.3          | 1.7588                     | 0.0000                  | SURCHARGED |
| 180 minute winter | 6       | 132         | 101.926   | 1.422     | 2.9          | 2.6130                     | 0.0000                  | FLOOD RISK |
| 15 minute summer  | 7       | 1           | 100.454   | 0.000     | 1.4          | 0.0000                     | 0.0000                  | OK         |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m <sup>3</sup> ) | Discharge Vol (m <sup>3</sup> ) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|----------------------------|---------------------------------|
| 180 minute winter           | 1       | 1.000        | 2       | -1.5          | 0.074          | -0.002   | 6.4258                     |                                 |
| 180 minute winter           | 10      | Hydro-Brake® | 2       | 0.7           |                |          |                            |                                 |
| 180 minute winter           | 11      | 2.000        | 10      | 2.0           | 0.514          | 0.110    | 0.0792                     |                                 |
| 180 minute winter           | 2       | 1.001        | 3       | 1.9           | 0.199          | 0.003    | 3.8291                     |                                 |
| 180 minute winter           | 3       | Hydro-Brake® | 4       | 0.9           |                |          |                            |                                 |
| 180 minute winter           | 4       | 1.003        | 5       | 1.2           | 0.453          | 0.030    | 0.2625                     |                                 |
| 180 minute winter           | 5       | 1.004        | 6       | 2.1           | 0.162          | 0.010    | 3.3485                     |                                 |
| 180 minute winter           | 6       | Hydro-Brake® | 7       | 1.9           |                |          |                            | 34.6                            |