

**Report Title**

## Drainage Statement

**Property Address**

Proposed Industrial Units  
Industrial Estate  
Joe McBain Avenue  
Moresby Parks

**Client**

Energy Coast Property Services

**Our Reference**

24-471r001

**Date**

November 2024

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## **INTRODUCTION**

The purpose of this report is to provide technical design for the drainage at the proposed industrial units at Joe McBain Avenue, Moresby Parks, thereafter known as the site. This follows the detailed site review by Kingmoor Consulting Ltd.

Research has been undertaken on the site and observations made regarding the existing site and the drainage servicing the site.

Calculations associated with the drainage have been performed by software packages from a recognised resource. Where appropriate copies of calculations are provided in the Appendices of this report.

## **PROPOSED DEVELOPMENT**

It is proposed to construct new industrial units on the site.

New drainage shall be installed around the site to service the development.

## **THE SITE**

### **EXISTING DRAINAGE**

The existing site drainage has been traced where it is possible and plotted to identify the key surface and foul drainage serving the site.

There are currently no existing drainage systems located directly within the proposed site. All surface water is assumed to drain naturally into the ground.

Both surface and foul water sewers are located around the site. These systems flow from both directions along Joe McBain Avenue. Site investigation works were carried out on site to trace the existing drainage tails which were installed at the time of construction. These were traced and excavated to confirm their locations.

Both sewer systems eventually flow east towards their existing outfalls.

## GEOLOGY

### ***SUPERFICIAL DEPOSITS***

The published superficial geology by The British Geological Survey shows the site is overlain by Diamicton Till present comprising Clays and Silts.

### ***SOLID GEOLOGY***

The solid geology as published by the British Geological Survey shows the site to be underlain by mudstone, siltstone and sandstone.

Copies of all BGS information are appended to this report.

## DRAINAGE STRATEGY

### **FOUL DRAINAGE**

It is proposed that the proposed development shall be serviced by the existing mains sewer located on Joe McBain Avenue. Foul waste from the site will be discharged into the foul water sewer. The connections to this system will be made by utilising the existing tails from the required manholes.

### **SURFACE WATER DRAINAGE**

It is proposed to discharge the surface water to the existing surface water sewer also located on Joe McBain Avenue.

This follows the Hierarchy of Drainage, as stated in the National Planning Practice Guidance, the aim should be to discharge surface water run-off as high up the drainage hierarchy, as reasonably practicable:

- Into the ground (infiltration) - ***Not suitable***
- To a surface water body - ***Not available***
- To a surface water sewer, highway drain, or another drainage system - ***Available***
- To a combined sewer - ***Not available***

## **DETAILED DESIGN**

### **FOUL DRAINAGE**

It is proposed to install a new foul system around the site to service all of the proposed units. These systems will move waste from the site and discharge it into the existing foul water sewer.

No work will be required on the mains system directly as it is proposed to connect to the sewer via the existing drainage tails which branch into the site.

The internal arrangements for drainage shall be considered by the operator of the site.

### **SURFACE WATER DRAINAGE**

Principally the surface water drainage shall be calculated on the impermeable areas of the development, and shall discharge to the existing surface water sewer.

Surface water gathered on site is proposed to be stored in one main attenuation tank located within the site. The tank shall be suitably sized to allow us to discharge to the surface water mains through using a flow control system and discharging at the allowable rate of discharge (QBar).

## **HYDRAULIC DESIGN**

### **FOUL DRAINAGE**

Calculations have been undertaken on the foul network and are presented in the Appendices of this report.

The foul drainage shall be managed privately and shall carry foul waste to the existing foul sewer. A load of 1500 l/day per dwelling has been considered.

## SURFACE WATER DRAINAGE

Principally the surface water drainage has been calculated on the impermeable areas of the development, and modelled in Causeway Flow. Flows are attenuated and released to the surface water sewer at a rate of Q bar.

Modelling has been conducted on the following rainfall events:

- 1 in 10 years
- 1 in 30 years
- 1 in 100 years
- 1 in 100 years plus 50% increase due to climate change

An assessment of the proposed network has been undertaken to identify the requirements of the attenuation on the site.

The following parameters were adopted in the analysis. These were obtained from UK SUDS based on the site location and data held by HR Wallingford.

| Simulation Settings   |                       |                            |                       |                          |                       |                       |                       |     |     |     |      |
|-----------------------|-----------------------|----------------------------|-----------------------|--------------------------|-----------------------|-----------------------|-----------------------|-----|-----|-----|------|
| Rainfall Methodology  | FSR                   | Winter CV                  | 0.840                 | Check Discharge Rate(s)  | ✓                     |                       |                       |     |     |     |      |
| Rainfall Events       | Singular              | Analysis Speed             | Normal                | 100 year (l/s)           | 14.0                  |                       |                       |     |     |     |      |
| FSR Region            | England and Wales     | Skip Steady State          | x                     | Check Discharge Volume   | ✓                     |                       |                       |     |     |     |      |
| M5-60 (mm)            | 17.000                | Drain Down Time (mins)     | 240                   | 100 year 360 minute (m³) | 205                   |                       |                       |     |     |     |      |
| Ratio-R               | 0.400                 | Additional Storage (m³/ha) | 0.0                   |                          |                       |                       |                       |     |     |     |      |
| Summer CV             | 0.750                 | Starting Level (m)         |                       |                          |                       |                       |                       |     |     |     |      |
| Storm Durations       |                       |                            |                       |                          |                       |                       |                       |     |     |     |      |
| 15                    | 30                    | 60                         | 120                   | 180                      | 240                   | 360                   | 480                   | 600 | 720 | 960 | 1440 |
| Return Period (years) | Climate Change (CC %) | Additional Area (A %)      | Additional Flow (Q %) | Return Period (years)    | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |     |     |     |      |
| 10                    | 0                     | 0                          | 0                     | 100                      | 0                     | 0                     | 0                     |     |     |     |      |
| 30                    | 0                     | 0                          | 0                     | 100                      | 50                    | 0                     | 0                     |     |     |     |      |

### Pre Development Discharge Rates and Volumes

| <u>Pre-development Discharge Rate</u> |            |            |      |                        |      |                  |      |  |  |
|---------------------------------------|------------|------------|------|------------------------|------|------------------|------|--|--|
| Site Makeup                           | Greenfield | SAAR (mm)  | 1183 | Region                 | 10   | QBar             | 6.7  |  |  |
| Greenfield Method                     | IH124      | Soil Index | 4    | Growth Factor 100 year | 2.08 | Q 100 year (l/s) | 14.0 |  |  |
| Positively Drained Area (ha)          | 0.752      | SPR        | 0.47 | Betterment (%)         | 0    |                  |      |  |  |

| <u>Pre-development Discharge Volume</u> |            |            |         |                       |     |                    |       |  |  |
|-----------------------------------------|------------|------------|---------|-----------------------|-----|--------------------|-------|--|--|
| Site Makeup                             | Greenfield | Soil Index | 4       | Return Period (years) | 100 | Betterment (%)     | 0     |  |  |
| Greenfield Method                       | FSR/FEH    | SPR        | 0.47    | Climate Change (%)    | 0   | PR                 | 0.500 |  |  |
| Positively Drained Area (ha)            | 0.752      | CWI        | 125.458 | Storm Duration (mins) | 360 | Runoff Volume (m³) | 205   |  |  |

## DETAILED ENGINEERING

The detailed model presented in this report adopts the following engineering aspects specific to the site.

### Attenuation and Flow Control

Attenuation for the areas to be drained have been designed to prevent flooding occurring within and outside the site for the 1 in 100 years + 50% climate change event.

A flow control has been placed on the site to prevent flooding and store water in the system for slow release. One flow control device will be installed on site, this limits flows from the site to the calculated QBar value.

#### **Node 24 Online Hydro-Brake® Control**

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | x       | Sump Available          | ✓                              |
| Invert Level (m)         | 123.250 | Product Number          | CTL-SHE-0108-7300-2250-7300    |
| Design Depth (m)         | 2.250   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 7.3     | Min Node Diameter (mm)  | 0                              |

Overall, the site attenuates sufficient volume in the piped system to ensure that the volumes prevent flooding based on the 1 in 100 Y + 50% CC event.

#### **Node 10 Soakaway Storage Structure**

|                             |         |                           |         |                |        |                 |   |
|-----------------------------|---------|---------------------------|---------|----------------|--------|-----------------|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Porosity                  | 0.95    | Pit Width (m)  | 21.000 | Inf Depth (m)   |   |
| Side Inf Coefficient (m/hr) | 0.00000 | Invert Level (m)          | 124.210 | Pit Length (m) | 7.000  | Number Required | 1 |
| Safety Factor               | 1.0     | Time to half empty (mins) |         | Depth (m)      | 1.200  |                 |   |

## Summary

The following summary associated with the critical storm event is offered associated with loads and flows on the system and the potential for flooding to occur.

### Results for 10 year Critical Storm Duration. Lowest mass balance: 99.56%

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute winter  | 1       | 10          | 125.030   | 0.104     | 21.7         | 0.0296        | 0.0000     | OK         |
| 15 minute winter  | 2       | 10          | 125.453   | 0.053     | 4.6          | 0.0150        | 0.0000     | OK         |
| 15 minute winter  | 26      | 10          | 125.404   | 0.054     | 4.6          | 0.0153        | 0.0000     | OK         |
| 15 minute winter  | 5       | 10          | 125.457   | 0.057     | 4.6          | 0.0161        | 0.0000     | OK         |
| 15 minute winter  | 6       | 10          | 124.693   | 0.153     | 30.5         | 0.0434        | 0.0000     | OK         |
| 15 minute summer  | 13      | 10          | 125.097   | 0.117     | 26.5         | 0.0331        | 0.0000     | OK         |
| 15 minute winter  | 14      | 10          | 124.849   | 0.148     | 37.2         | 0.1280        | 0.0000     | OK         |
| 15 minute winter  | 3       | 10          | 125.400   | 0.075     | 12.5         | 0.0211        | 0.0000     | OK         |
| 15 minute summer  | 8       | 10          | 125.498   | 0.098     | 12.5         | 0.0278        | 0.0000     | OK         |
| 15 minute winter  | 7       | 10          | 124.648   | 0.189     | 42.5         | 0.0534        | 0.0000     | OK         |
| 120 minute winter | 9       | 110         | 124.604   | 0.210     | 12.9         | 0.0594        | 0.0000     | OK         |
| 120 minute winter | 10      | 108         | 124.603   | 0.393     | 32.6         | 55.3958       | 0.0000     | SURCHARGED |
| 120 minute winter | 24      | 108         | 124.602   | 1.352     | 15.4         | 2.3896        | 0.0000     | SURCHARGED |
| 15 minute winter  | 15      | 10          | 125.444   | 0.044     | 3.4          | 0.0126        | 0.0000     | OK         |
| 15 minute winter  | 16      | 10          | 125.350   | 0.067     | 6.8          | 0.0189        | 0.0000     | OK         |
| 15 minute summer  | 18      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 19      | 10          | 125.342   | 0.046     | 3.4          | 0.0130        | 0.0000     | OK         |
| 15 minute winter  | 17      | 10          | 125.118   | 0.072     | 13.6         | 0.0204        | 0.0000     | OK         |
| 15 minute summer  | 20      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 23      | 10          | 124.818   | 0.124     | 26.1         | 0.1070        | 0.0000     | OK         |
| 15 minute winter  | 21      | 10          | 125.075   | 0.075     | 12.7         | 0.0213        | 0.0000     | OK         |
| 15 minute winter  | 22      | 10          | 124.925   | 0.125     | 26.3         | 0.1086        | 0.0000     | OK         |
| 15 minute winter  | 11      | 10          | 125.375   | 0.050     | 5.6          | 0.0140        | 0.0000     | OK         |
| 15 minute winter  | 12      | 10          | 125.199   | 0.070     | 11.2         | 0.0199        | 0.0000     | OK         |
| 120 minute summer | 25      | 50          | 123.223   | 0.048     | 6.2          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 4       | 10          | 124.816   | 0.123     | 26.1         | 0.0195        | 0.0000     | OK         |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 99.56%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute winter  | 1       | 10          | 125.048   | 0.122     | 27.5         | 0.0344        | 0.0000     | OK         |
| 15 minute winter  | 2       | 10          | 125.461   | 0.061     | 5.9          | 0.0173        | 0.0000     | OK         |
| 15 minute winter  | 26      | 10          | 125.412   | 0.062     | 5.9          | 0.0177        | 0.0000     | OK         |
| 15 minute winter  | 5       | 10          | 125.466   | 0.066     | 5.9          | 0.0185        | 0.0000     | OK         |
| 15 minute winter  | 6       | 11          | 124.795   | 0.255     | 38.6         | 0.0722        | 0.0000     | SURCHARGED |
| 15 minute summer  | 13      | 10          | 125.117   | 0.137     | 33.7         | 0.0388        | 0.0000     | OK         |
| 15 minute winter  | 14      | 10          | 124.880   | 0.179     | 47.4         | 0.1552        | 0.0000     | OK         |
| 15 minute winter  | 3       | 10          | 125.409   | 0.084     | 15.7         | 0.0238        | 0.0000     | OK         |
| 15 minute winter  | 8       | 10          | 125.518   | 0.118     | 15.7         | 0.0333        | 0.0000     | OK         |
| 120 minute winter | 7       | 114         | 124.751   | 0.292     | 16.4         | 0.0826        | 0.0000     | SURCHARGED |
| 120 minute winter | 9       | 116         | 124.751   | 0.357     | 16.4         | 0.1009        | 0.0000     | SURCHARGED |
| 120 minute winter | 10      | 116         | 124.750   | 0.540     | 39.9         | 76.2446       | 0.0000     | SURCHARGED |
| 120 minute winter | 24      | 116         | 124.750   | 1.500     | 17.5         | 2.6506        | 0.0000     | SURCHARGED |
| 15 minute winter  | 15      | 10          | 125.450   | 0.050     | 4.3          | 0.0142        | 0.0000     | OK         |
| 15 minute winter  | 16      | 10          | 125.360   | 0.077     | 8.6          | 0.0218        | 0.0000     | OK         |
| 15 minute summer  | 18      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 19      | 10          | 125.348   | 0.052     | 4.3          | 0.0148        | 0.0000     | OK         |
| 15 minute winter  | 17      | 10          | 125.128   | 0.082     | 17.2         | 0.0231        | 0.0000     | OK         |
| 15 minute summer  | 20      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 23      | 10          | 124.838   | 0.144     | 33.0         | 0.1250        | 0.0000     | OK         |
| 15 minute winter  | 21      | 10          | 125.085   | 0.085     | 16.0         | 0.0241        | 0.0000     | OK         |
| 15 minute winter  | 22      | 10          | 124.948   | 0.148     | 33.2         | 0.1277        | 0.0000     | OK         |
| 15 minute winter  | 11      | 10          | 125.381   | 0.056     | 7.1          | 0.0158        | 0.0000     | OK         |
| 15 minute winter  | 12      | 10          | 125.209   | 0.080     | 14.2         | 0.0225        | 0.0000     | OK         |
| 60 minute summer  | 25      | 262         | 123.223   | 0.048     | 6.2          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 4       | 11          | 124.844   | 0.151     | 33.2         | 0.0240        | 0.0000     | OK         |

**Results for 100 year Critical Storm Duration. Lowest mass balance: 99.56%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute winter  | 1       | 11          | 125.122   | 0.196     | 35.3         | 0.0554        | 0.0000     | OK         |
| 15 minute winter  | 2       | 10          | 125.470   | 0.070     | 7.5          | 0.0198        | 0.0000     | OK         |
| 15 minute summer  | 26      | 10          | 125.422   | 0.072     | 7.5          | 0.0203        | 0.0000     | OK         |
| 15 minute summer  | 5       | 10          | 125.476   | 0.076     | 7.5          | 0.0214        | 0.0000     | OK         |
| 120 minute winter | 6       | 116         | 124.960   | 0.420     | 15.5         | 0.1190        | 0.0000     | SURCHARGED |
| 15 minute winter  | 13      | 10          | 125.151   | 0.171     | 43.2         | 0.0485        | 0.0000     | OK         |
| 15 minute winter  | 14      | 10          | 124.993   | 0.292     | 58.3         | 0.2526        | 0.0000     | SURCHARGED |
| 15 minute winter  | 3       | 10          | 125.422   | 0.097     | 20.3         | 0.0274        | 0.0000     | OK         |
| 15 minute winter  | 8       | 10          | 125.600   | 0.200     | 20.3         | 0.0566        | 0.0000     | SURCHARGED |
| 120 minute winter | 7       | 116         | 124.960   | 0.501     | 21.2         | 0.1419        | 0.0000     | SURCHARGED |
| 120 minute winter | 9       | 118         | 124.960   | 0.566     | 20.6         | 0.1602        | 0.0000     | SURCHARGED |
| 120 minute winter | 10      | 118         | 124.960   | 0.750     | 51.7         | 105.8040      | 0.0000     | SURCHARGED |
| 120 minute winter | 24      | 118         | 124.960   | 1.710     | 15.3         | 3.0208        | 0.0000     | SURCHARGED |
| 15 minute summer  | 15      | 10          | 125.458   | 0.058     | 5.6          | 0.0163        | 0.0000     | OK         |
| 15 minute winter  | 16      | 10          | 125.374   | 0.091     | 11.2         | 0.0258        | 0.0000     | OK         |
| 15 minute summer  | 18      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 19      | 10          | 125.356   | 0.060     | 5.6          | 0.0171        | 0.0000     | OK         |
| 15 minute winter  | 17      | 10          | 125.142   | 0.096     | 22.4         | 0.0271        | 0.0000     | OK         |
| 15 minute summer  | 20      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 120 minute winter | 23      | 118         | 124.960   | 0.266     | 13.2         | 0.2304        | 0.0000     | SURCHARGED |
| 15 minute summer  | 21      | 10          | 125.098   | 0.098     | 20.7         | 0.0277        | 0.0000     | OK         |
| 15 minute winter  | 22      | 10          | 124.982   | 0.182     | 43.0         | 0.1578        | 0.0000     | OK         |
| 15 minute winter  | 11      | 10          | 125.388   | 0.063     | 9.1          | 0.0179        | 0.0000     | OK         |
| 15 minute summer  | 12      | 10          | 125.220   | 0.091     | 18.2         | 0.0258        | 0.0000     | OK         |
| 120 minute winter | 25      | 118         | 123.223   | 0.048     | 6.3          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 4       | 11          | 125.045   | 0.352     | 39.3         | 0.0560        | 0.0000     | SURCHARGED |

**Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.56%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute winter  | 1       | 11          | 125.726   | 0.800     | 52.0         | 0.2264        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 2       | 11          | 125.791   | 0.391     | 11.3         | 0.1105        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 26      | 11          | 125.744   | 0.394     | 11.3         | 0.1114        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 5       | 12          | 125.588   | 0.188     | 11.3         | 0.0531        | 0.0000     | SURCHARGED |
| 180 minute winter | 6       | 176         | 125.478   | 0.938     | 16.5         | 0.2653        | 0.0000     | SURCHARGED |
| 15 minute winter  | 13      | 11          | 125.701   | 0.721     | 54.8         | 0.2040        | 0.0000     | FLOOD RISK |
| 180 minute winter | 14      | 176         | 125.477   | 0.776     | 20.8         | 0.6718        | 0.0000     | SURCHARGED |
| 15 minute winter  | 3       | 11          | 125.826   | 0.501     | 30.4         | 0.1419        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 8       | 10          | 125.931   | 0.531     | 30.4         | 0.1502        | 0.0000     | FLOOD RISK |
| 180 minute winter | 7       | 176         | 125.477   | 1.018     | 23.2         | 0.2882        | 0.0000     | SURCHARGED |
| 180 minute winter | 9       | 176         | 125.477   | 1.083     | 22.8         | 0.3065        | 0.0000     | SURCHARGED |
| 180 minute winter | 10      | 176         | 125.476   | 1.266     | 54.7         | 169.4620      | 0.0000     | SURCHARGED |
| 180 minute winter | 24      | 176         | 125.476   | 2.226     | 16.2         | 3.9332        | 0.0000     | FLOOD RISK |
| 180 minute winter | 15      | 176         | 125.477   | 0.077     | 1.9          | 0.0217        | 0.0000     | OK         |
| 180 minute winter | 16      | 176         | 125.477   | 0.194     | 3.8          | 0.0548        | 0.0000     | SURCHARGED |
| 180 minute winter | 18      | 176         | 125.477   | 0.077     | 0.3          | 0.0218        | 0.0000     | OK         |
| 180 minute winter | 19      | 176         | 125.477   | 0.181     | 1.9          | 0.0512        | 0.0000     | SURCHARGED |
| 180 minute winter | 17      | 176         | 125.477   | 0.431     | 7.6          | 0.1219        | 0.0000     | SURCHARGED |
| 180 minute winter | 20      | 176         | 125.477   | 0.077     | 0.2          | 0.0217        | 0.0000     | OK         |
| 180 minute winter | 23      | 176         | 125.477   | 0.783     | 14.7         | 0.6777        | 0.0000     | SURCHARGED |
| 180 minute winter | 21      | 176         | 125.477   | 0.477     | 7.1          | 0.1349        | 0.0000     | FLOOD RISK |
| 180 minute winter | 22      | 176         | 125.477   | 0.677     | 14.7         | 0.5860        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 11      | 11          | 125.754   | 0.428     | 13.7         | 0.1213        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 12      | 11          | 125.741   | 0.612     | 24.6         | 0.1732        | 0.0000     | FLOOD RISK |
| 180 minute winter | 25      | 176         | 123.226   | 0.051     | 7.2          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 4       | 12          | 125.573   | 0.880     | 49.1         | 0.1399        | 0.0000     | SURCHARGED |

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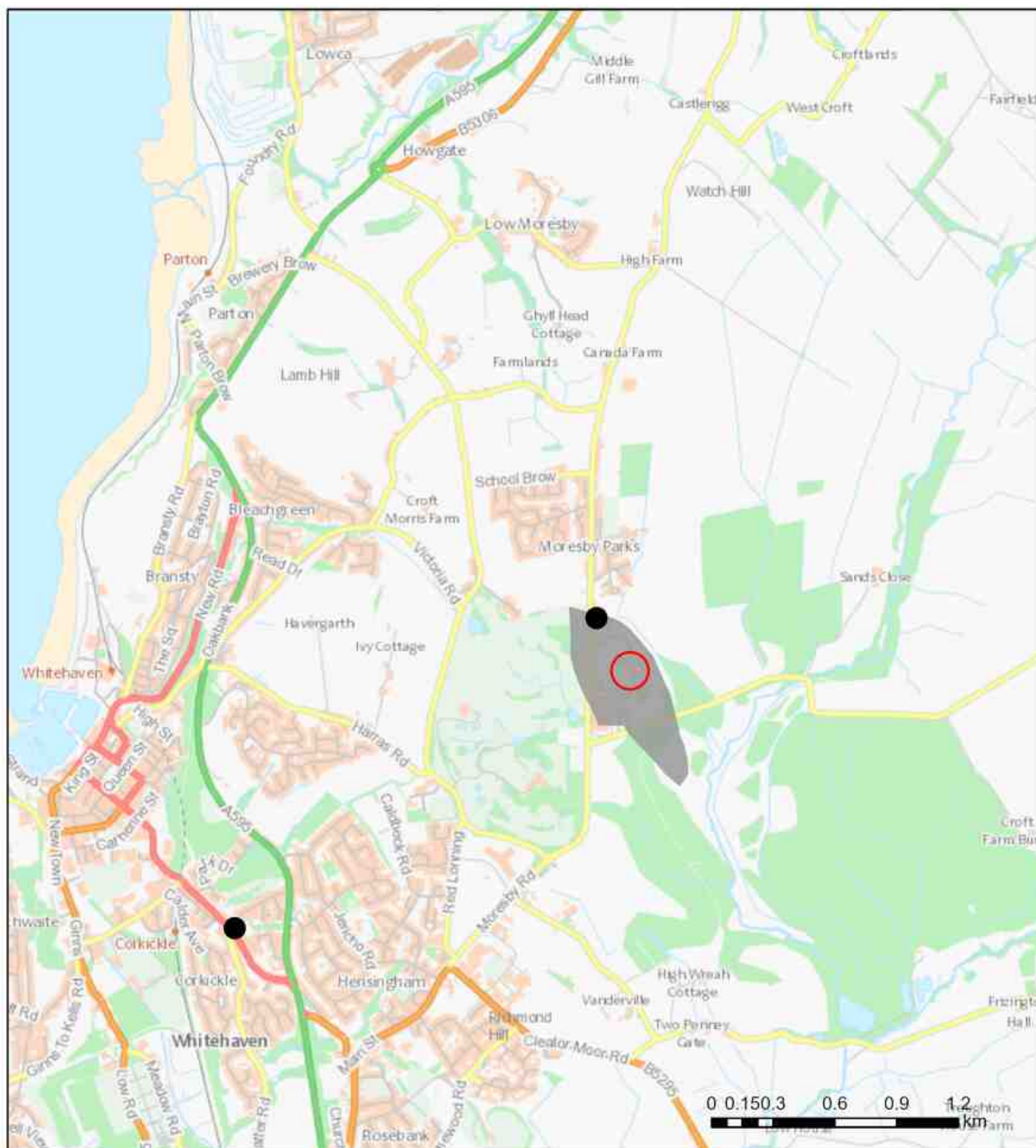
## **APPENDICES**

### **APPENDIX A - BGS GEOLOGICAL RECORDS**

# Solid Geology



British  
Geological  
Survey



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GeolIndex Onshore Data Sources: NERC, Natural England, English Heritage and Ordnance Survey

# Map Key

Bedrock geology 1:50,000 scale

|                                                                                    |                                                                                                        |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|    | <a href="#"><u>FIRST SHALE MEMBER - SANDSTONE, SILTSTONE AND MUDSTONE</u></a>                          |
|    | <a href="#"><u>PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u></a>       |
|    | <a href="#"><u>FIRST LIMESTONE (CUMBRIA) - LIMESTONE</u></a>                                           |
|    | <a href="#"><u>SECOND LIMESTONE (CUMBRIA) - LIMESTONE</u></a>                                          |
|    | <a href="#"><u>FIFTH LIMESTONE (CUMBRIA) - LIMESTONE</u></a>                                           |
|    | <a href="#"><u>ESKETT LIMESTONE FORMATION - LIMESTONE</u></a>                                          |
|    | <a href="#"><u>FRIZINGTON LIMESTONE FORMATION - LIMESTONE</u></a>                                      |
|    | <a href="#"><u>MILLYEAT MEMBER - MUDSTONE, SANDSTONE AND LIMESTONE</u></a>                             |
|    | <a href="#"><u>BUTTERMERE FORMATION - MUDSTONE AND SANDSTONE</u></a>                                   |
|    | <a href="#"><u>PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u></a>      |
|    | <a href="#"><u>STAINMORE FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u></a>                         |
|    | <a href="#"><u>ST BEES SANDSTONE MEMBER - SANDSTONE</u></a>                                            |
|    | <a href="#"><u>OREBANK SANDSTONE - SANDSTONE</u></a>                                                   |
|    | <a href="#"><u>ST BEES SHALE FORMATION - SILTSTONE AND MUDSTONE, INTERBEDDED</u></a>                   |
|    | <a href="#"><u>PENNINE LOWER COAL MEASURES FORMATION - SANDSTONE</u></a>                               |
|    | <a href="#"><u>PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE</u></a>                              |
|    | <a href="#"><u>WHITEHAVEN SANDSTONE FORMATION - SANDSTONE</u></a>                                      |
|   | <a href="#"><u>ST BEES EVAPORITE FORMATION - DOLOMITIC LIMESTONE, MUDSTONE AND ANHYDRITE-STONE</u></a> |
|  | <a href="#"><u>HENSINGHAM GRIT - SANDSTONE</u></a>                                                     |
|  | <a href="#"><u>BROCKRAM - BRECCIA</u></a>                                                              |

# Selection Results

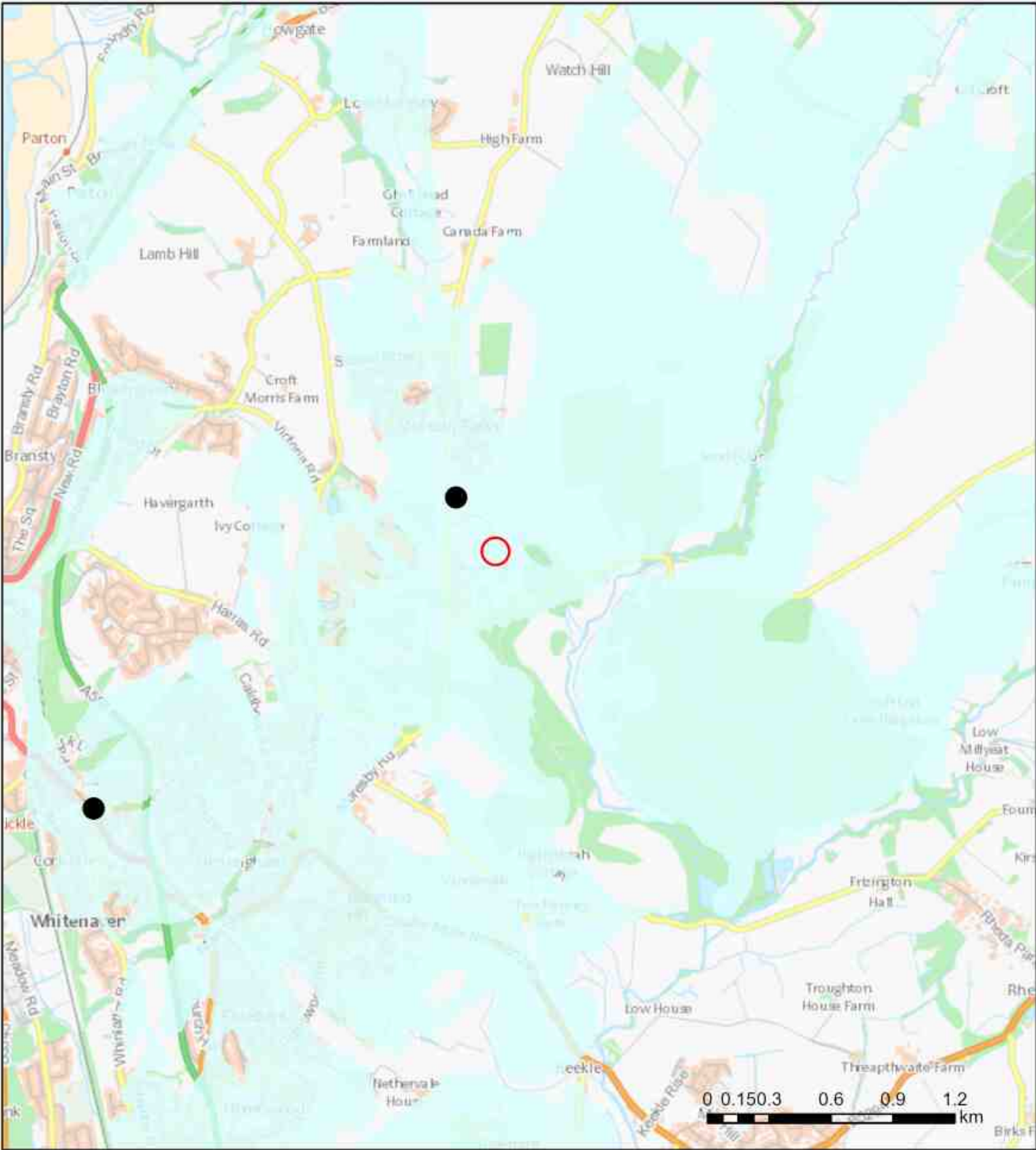
Bedrock geology 1:50,000 scale

| Description                                                                                     | Details                          |
|-------------------------------------------------------------------------------------------------|----------------------------------|
| PENNINE<br>MIDDLE COAL<br>MEASURES<br>FORMATION -<br>MUDSTONE,<br>SILTSTONE<br>AND<br>SANDSTONE | <a href="#">More Information</a> |

# Superficial Deposits



British Geological Survey



# Map Key

Superficial deposits 1:50,000 scale

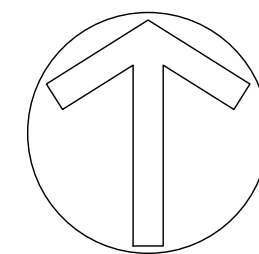
|                                                                                  |                                                                                                             |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  | <a href="#"><u>GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL</u></a>                                  |
|  | <a href="#"><u>GLACIOFLUVIAL ICE CONTACT DEPOSITS, DEVENSIAN - SAND AND GRAVEL</u></a>                      |
|  | <a href="#"><u>TILL, DEVENSIAN - DIAMICTON</u></a>                                                          |
|  | <a href="#"><u>ALLUVIUM - CLAY, SILT, SAND AND GRAVEL</u></a>                                               |
|  | <a href="#"><u>RAISED MARINE DEPOSITS - CLAY AND SILT</u></a>                                               |
|  | <a href="#"><u>RIVER TERRACE DEPOSITS, 1 - CLAY, SAND AND GRAVEL</u></a>                                    |
|  | <a href="#"><u>RIVER TERRACE DEPOSITS (UNDIFFERENTIATED) - CLAY, SAND AND GRAVEL</u></a>                    |
|  | <a href="#"><u>ALLUVIAL FAN DEPOSITS - SAND AND GRAVEL</u></a>                                              |
|  | <a href="#"><u>MARINE BEACH DEPOSITS - SAND AND GRAVEL</u></a>                                              |
|  | <a href="#"><u>PEAT - PEAT</u></a>                                                                          |
|  | <a href="#"><u>SUPERFICIAL THEME NOT MAPPED [FOR DIGITAL MAP USE ONLY] - UNKNOWN/UNCLASSIFIED ENTRY</u></a> |

# Selection Results

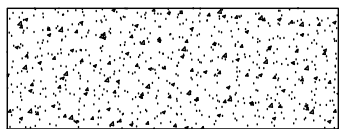
Superficial deposits 1:50,000 scale

| Description                       | Details                          |
|-----------------------------------|----------------------------------|
| TILL,<br>DEVENSIAN -<br>DIAMICTON | <a href="#">More Information</a> |

## **APPENDIX B - DRAWINGS**



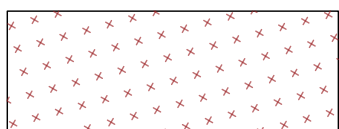
KEY



CONCRETE APRON



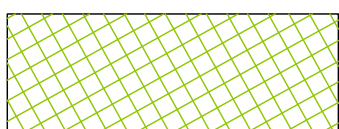
1.8m HIGH  
PALISADE FENCE



YARD SURFACE  
TO BE AGREED



VEHICLE BOLLARDS



GRANULAR SURFACE



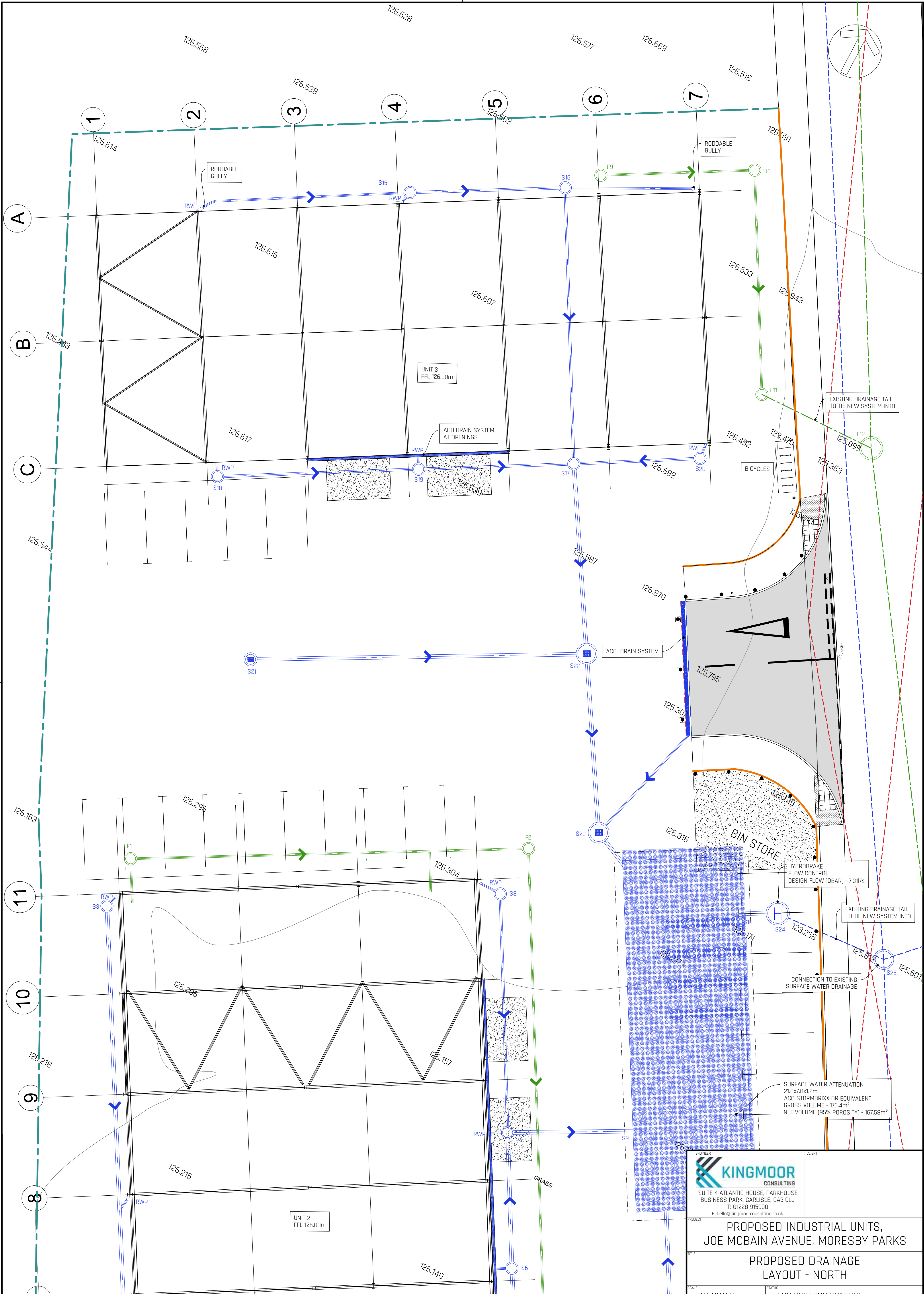
NEW FOOTPATH

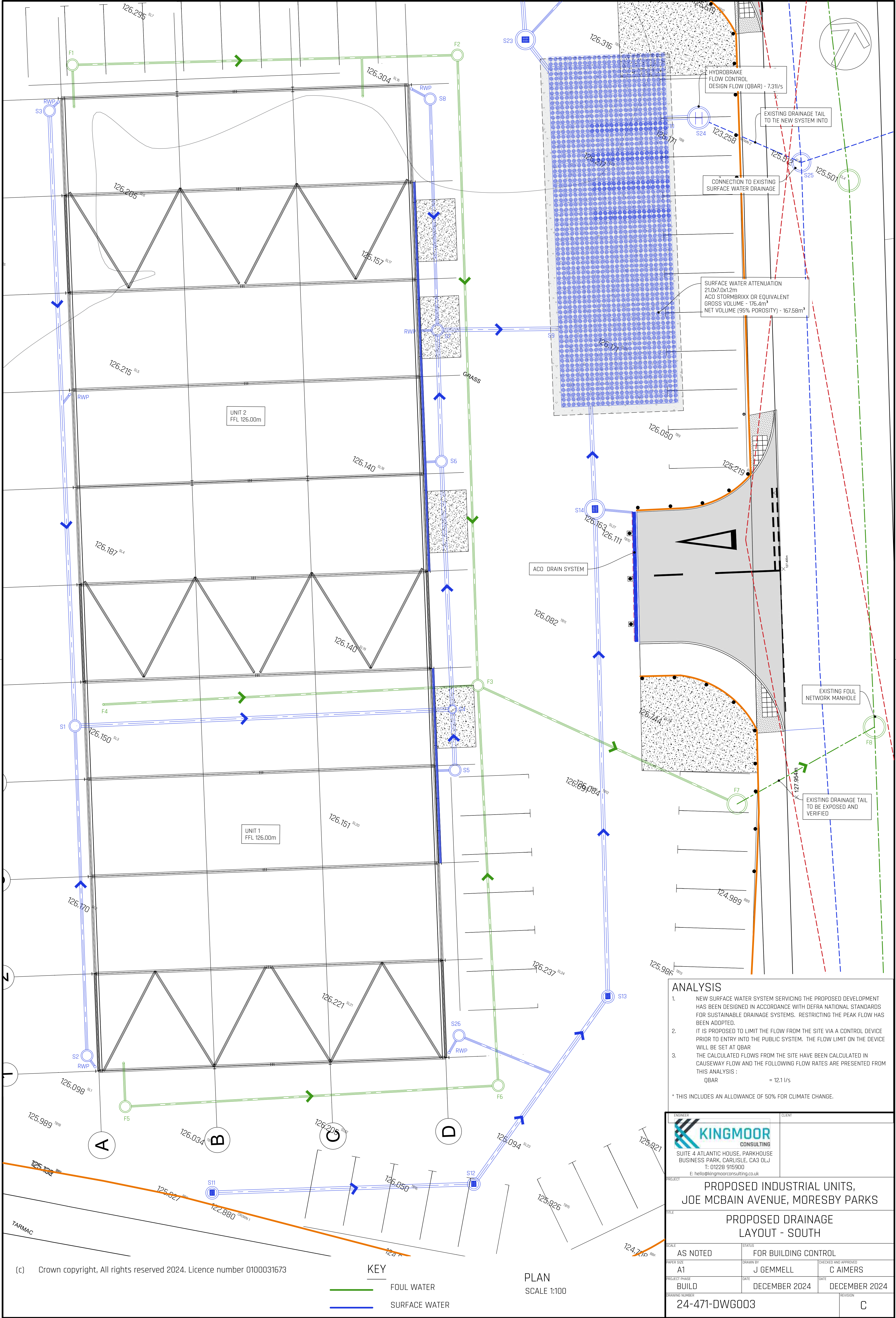
OVERALL SITE PLAN  
SCALE 1:200

GENERAL NOTES

- ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED AND NOT TO BE SCALED FROM DRAWINGS. USE WRITTEN DIMENSIONS ONLY AND CHECK ON SITE BEFORE ORDERING MATERIALS OR STEELWORK.
- ALL DRAWINGS TO BE READ IN CONJUNCTION WITH DRAWINGS PRODUCED BY OTHERS AND ANY ERRORS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO COMMENCEMENT OR INSTALLATION OF THE WORKS.
- ALL MATERIALS AND WORKMANSHIP TO BE UNDERTAKEN IN ACCORDANCE WITH BEST PRACTICE AND THE RELEVANT CODES INCLUDING BRITISH STANDARDS AND BUILDING REGULATIONS.
- THIS WORK MAY BE REQUIRED TO COMPLY WITH THE BUILDING SAFETY ACT 2023. IF WORK REQUIRES MORE THAN ONE CONTRACTOR TO UNDERTAKE THE WORKS, THE CLIENT IS REQUIRED TO APPOINT A PRINCIPAL DESIGNER TO COORDINATE DESIGN WORKS, AND ENSURE THAT ALL DESIGN AND WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS. IT CANNOT BE ASSUMED THAT KINGMOOR CONSULTING LTD ARE BY DEFAULT THE PRINCIPAL DESIGNER UNLESS APPOINTED SPECIFICALLY FOR THIS ROLE.

|                                                                                                                                                                            |                                       |                                         |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|--|
| ENGINEER<br><b>KINGMOOR</b><br>CONSULTING<br>SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br>BUSINESS PARK, CARLISLE, CA3 0LJ<br>T: 01228 915900<br>E: hello@kingmoorconsulting.co.uk |                                       | CLIENT                                  |  |
| PROJECT<br><b>PROPOSED INDUSTRIAL UNITS,<br/>JOE MCBAIN AVENUE, MORESBY PARKS</b>                                                                                          |                                       |                                         |  |
| TITLE<br><b>OVERALL SITE PLAN</b>                                                                                                                                          |                                       |                                         |  |
| SCALE<br><b>AS NOTED</b>                                                                                                                                                   | STATUS<br><b>FOR BUILDING CONTROL</b> |                                         |  |
| PAPER SIZE<br><b>A1</b>                                                                                                                                                    | DRAWN BY<br><b>J GEMMELL</b>          | CHECKED AND APPROVED<br><b>C AIMERS</b> |  |
| PROJECT PHASE<br><b>BUILD</b>                                                                                                                                              | DATE<br><b>DECEMBER 2024</b>          | DATE<br><b>DECEMBER 2024</b>            |  |
| DRAWING NUMBER<br><b>24-471-DWG001</b>                                                                                                                                     |                                       | REVISION<br><b>C</b>                    |  |



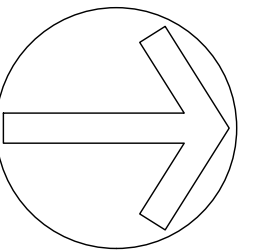
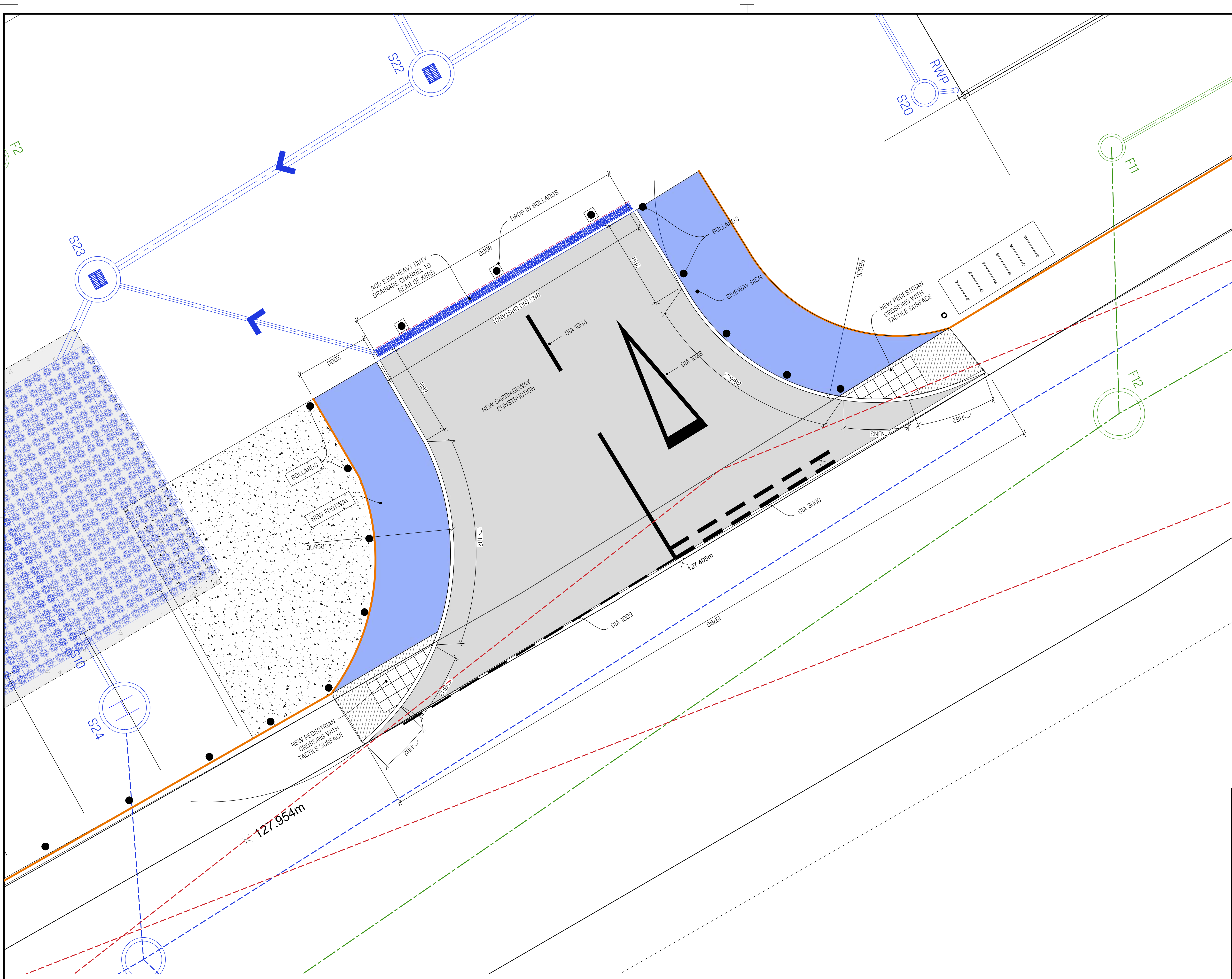


### ANALYSIS

- NEW SURFACE WATER SYSTEM SERVICING THE PROPOSED DEVELOPMENT HAS BEEN DESIGNED IN ACCORDANCE WITH DEFRA NATIONAL STANDARDS FOR SUSTAINABLE DRAINAGE SYSTEMS. RESTRICTING THE PEAK FLOW HAS BEEN ADOPTED.
- IT IS PROPOSED TO LIMIT THE FLOW FROM THE SITE VIA A CONTROL DEVICE PRIOR TO ENTRY INTO THE PUBLIC SYSTEM. THE FLOW LIMIT ON THE DEVICE WILL BE SET AT QBAR
- THE CALCULATED FLOWS FROM THE SITE HAVE BEEN CALCULATED IN CAUSEWAY FLOW AND THE FOLLOWING FLOW RATES ARE PRESENTED FROM THIS ANALYSIS :  
QBAR = 12.1 l/s

\* THIS INCLUDES AN ALLOWANCE OF 50% FOR CLIMATE CHANGE.

|                                                                                                                                                                                                                        |                      |                      |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|---|
| ENGINEER                                                                                                                                                                                                               | CLIENT               |                      |   |
| <br>SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br>BUSINESS PARK, CARLISLE, CA3 0LJ<br>T: 01228 915900<br>E: hello@kingmoorconsulting.co.uk |                      |                      |   |
| PROJECT                                                                                                                                                                                                                |                      |                      |   |
| PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                                                                                                         |                      |                      |   |
| TITLE                                                                                                                                                                                                                  |                      |                      |   |
| PROPOSED DRAINAGE<br>LAYOUT - SOUTH                                                                                                                                                                                    |                      |                      |   |
| SCALE                                                                                                                                                                                                                  | STATUS               |                      |   |
| AS NOTED                                                                                                                                                                                                               | FOR BUILDING CONTROL |                      |   |
| PAPER SIZE                                                                                                                                                                                                             | DRAWN BY             | CHECKED AND APPROVED |   |
| A1                                                                                                                                                                                                                     | J GEMMELL            | C AIMERS             |   |
| PROJECT PHASE                                                                                                                                                                                                          | DATE                 | DATE                 |   |
| BUILD                                                                                                                                                                                                                  | DECEMBER 2024        | DECEMBER 2024        |   |
| DRAWING NUMBER                                                                                                                                                                                                         | REVISION             |                      |   |
| 24-471-DWG003                                                                                                                                                                                                          |                      |                      | C |



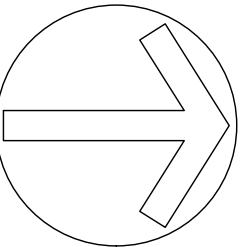
KERB NOTES

- HB 2 - HALF BATTER KERB
- BN 3 - BULL NOSE KERB
- EDGE - PIN KERB EDGE

- GENERAL NOTES
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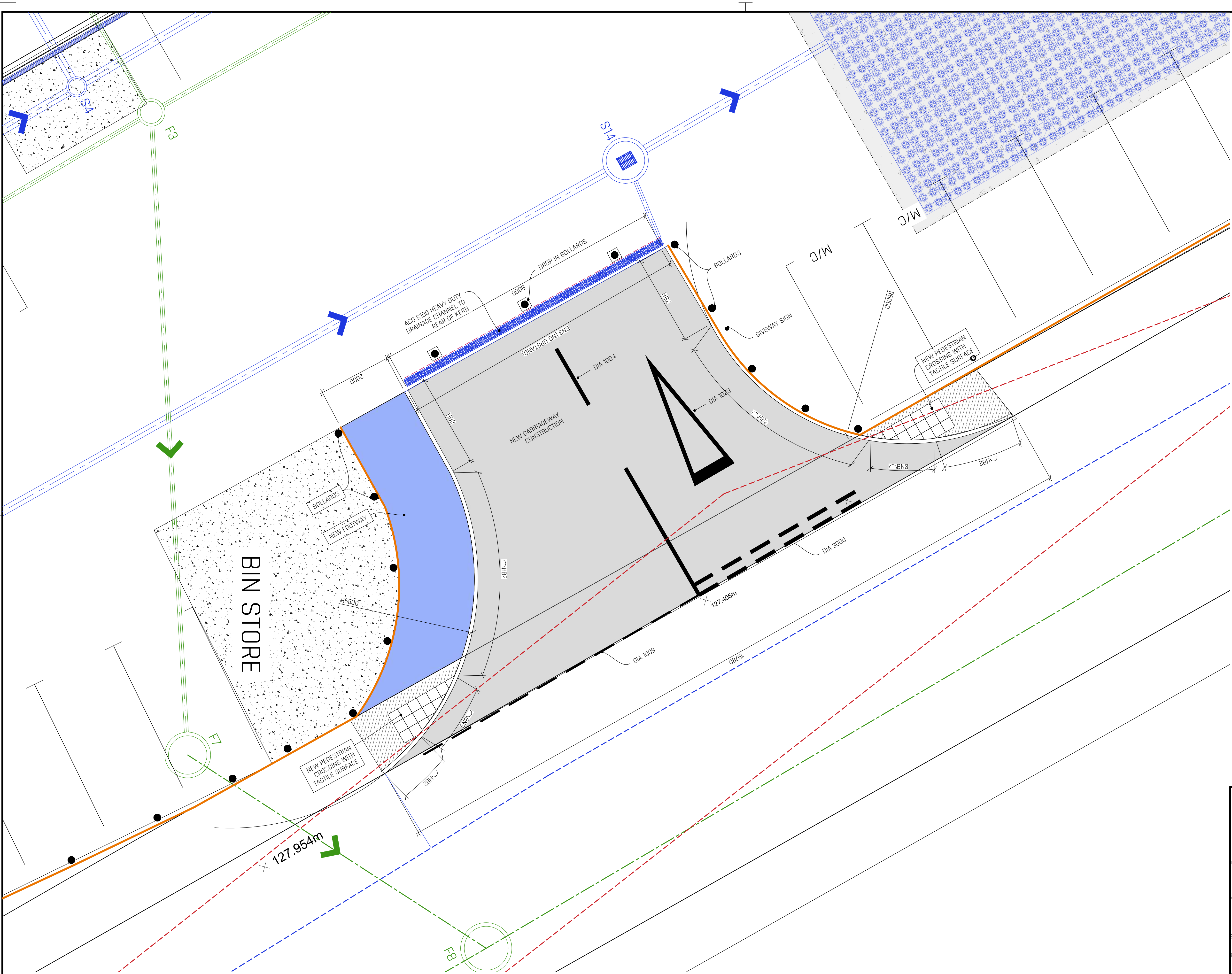
|                                                                                                                               |                      |                      |   |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|---|
| ENGINEER                                                                                                                      |                      | CLIENT               |   |
|                                                                                                                               |                      |                      |   |
| SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br>BUSINESS PARK, CARLISLE, CA3 0LJ<br>T: 01228 915900<br>E: hello@kingmoorconsulting.co.uk |                      |                      |   |
| PROJECT                                                                                                                       |                      |                      |   |
| PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                |                      |                      |   |
| TITLE                                                                                                                         |                      |                      |   |
| HIGHWAY WORKS<br>ENTRANCE - NORTH                                                                                             |                      |                      |   |
| SCALE                                                                                                                         | STATUS               |                      |   |
| AS NOTED                                                                                                                      | FOR BUILDING CONTROL |                      |   |
| PAPER SIZE                                                                                                                    | DRAWN BY             | CHECKED AND APPROVED |   |
| A1                                                                                                                            | J GEMMELL            | C AIMERS             |   |
| PROJECT PHASE                                                                                                                 | DATE                 | DATE                 |   |
| BUILD                                                                                                                         | DECEMBER 2024        | DECEMBER 2024        |   |
| DRAWING NUMBER                                                                                                                | REVISION             |                      |   |
| 24-471-DWG004                                                                                                                 |                      |                      | C |

PLAN  
SCALE 1:50



# KERB NOTES

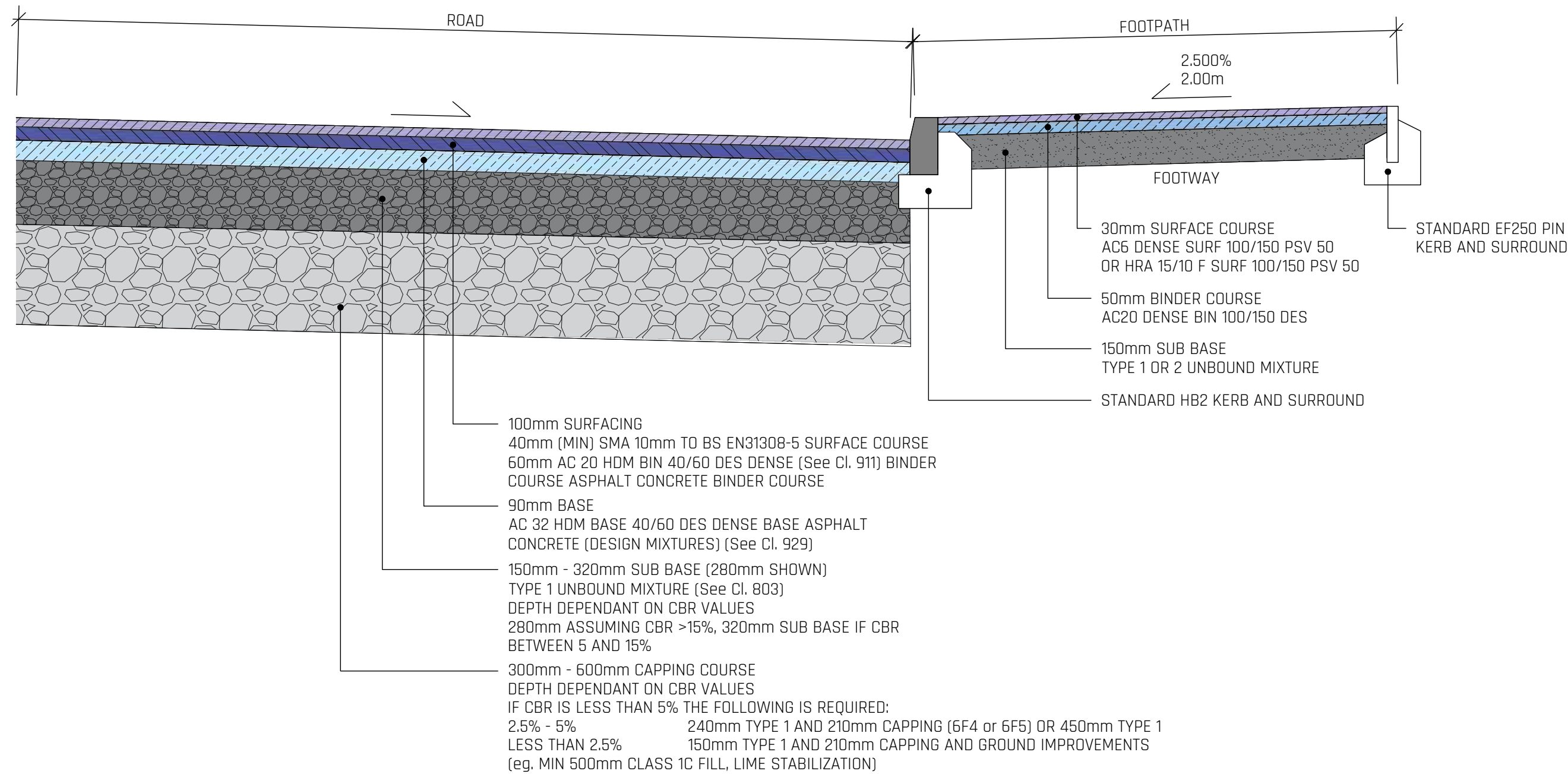
- HB 2 - HALF BATTER KERB
- BN 3 - BULL NOSE KERB
- EDGE - PIN KERB EDGE



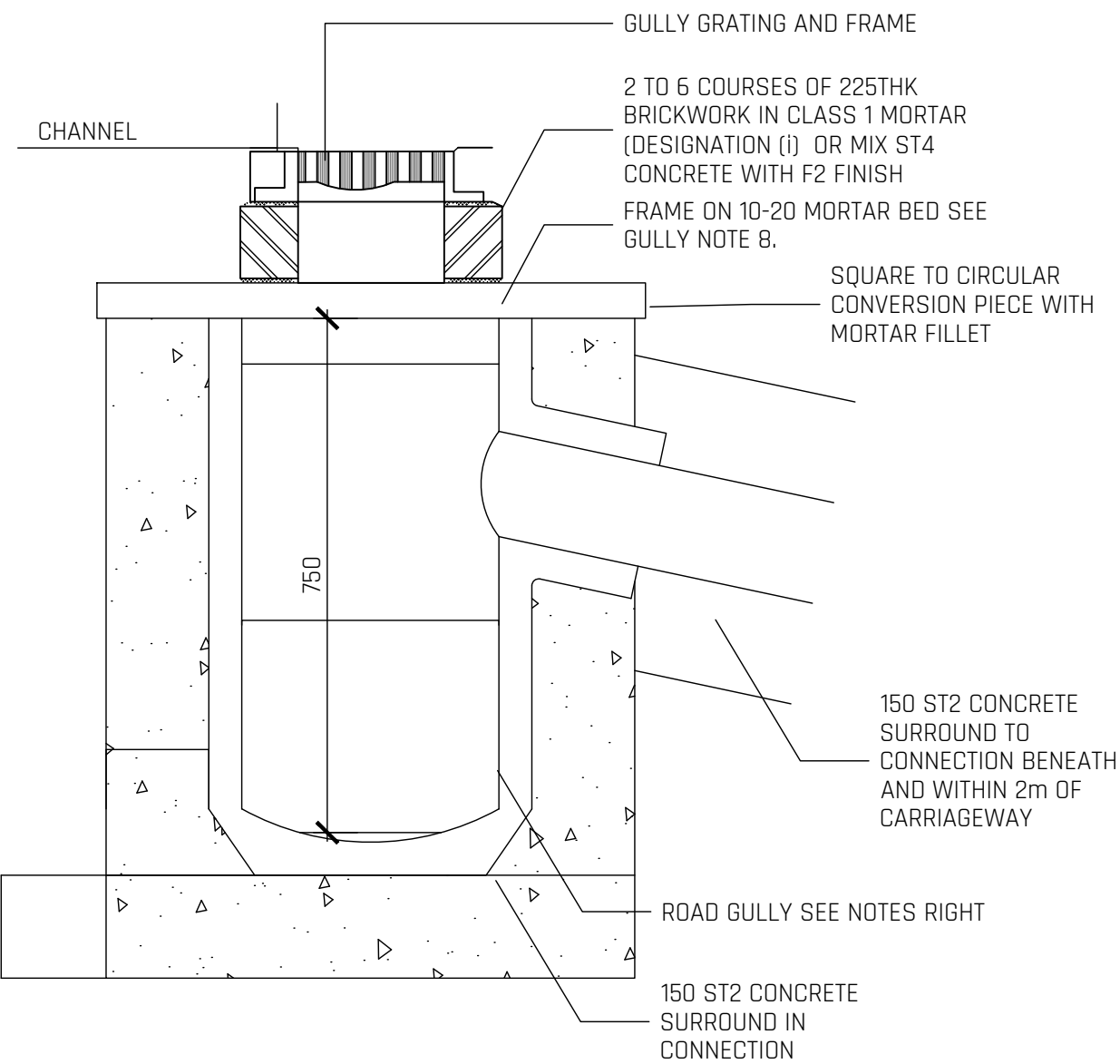
PLAN  
SCALE 1:50

- GENERAL NOTES
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|                                                                                                                                                                                                                                                                                                 |                       |                                  |               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------|---------------|
| <div>ENGINEER</div> <div> <b>KINGMOOR</b><br/>CONSULTING</div> <div>SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br/>BUSINESS PARK, CARLISLE, CA3 0LJ<br/>T: 01228 915900<br/>E: hello@kingmoorconsulting.co.uk</div> |                       | <div>CLIENT</div>                |               |
| PROJECT<br>PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                                                                                                                                                                       |                       |                                  |               |
| TITLE<br>HIGHWAY WORKS<br>ENTRANCE - SOUTH                                                                                                                                                                                                                                                      |                       |                                  |               |
| SCALE<br>AS NOTED                                                                                                                                                                                                                                                                               |                       | STATUS<br>FOR BUILDING CONTROL   |               |
| PAPER SIZE<br>A1                                                                                                                                                                                                                                                                                | DRAWN BY<br>J GEMMELL | CHECKED AND APPROVED<br>C AIMERS |               |
| PROJECT PHASE<br>BUILD                                                                                                                                                                                                                                                                          | DATE<br>DECEMBER 2024 | DATE<br>DECEMBER 2024            |               |
| DRAWING NUMBER<br>24-471-DWG005                                                                                                                                                                                                                                                                 |                       |                                  | REVISION<br>C |

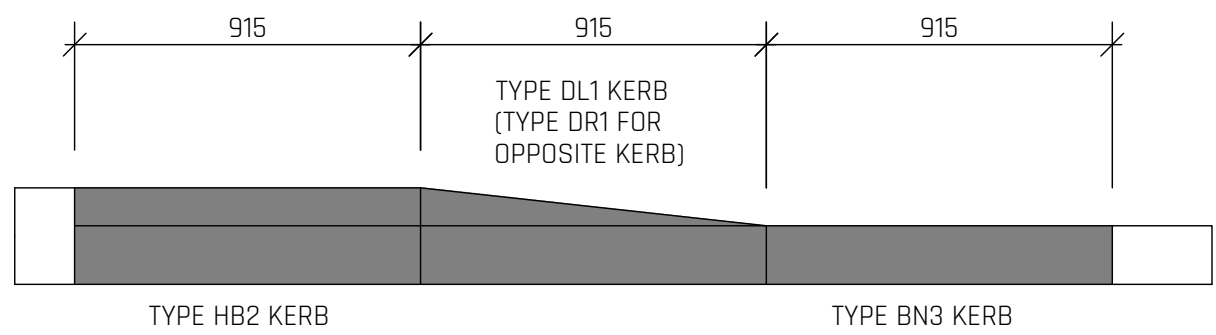


CARRIAGEWAY AND FOOTPATH CONSTRUCTION  
SCALE 1:20

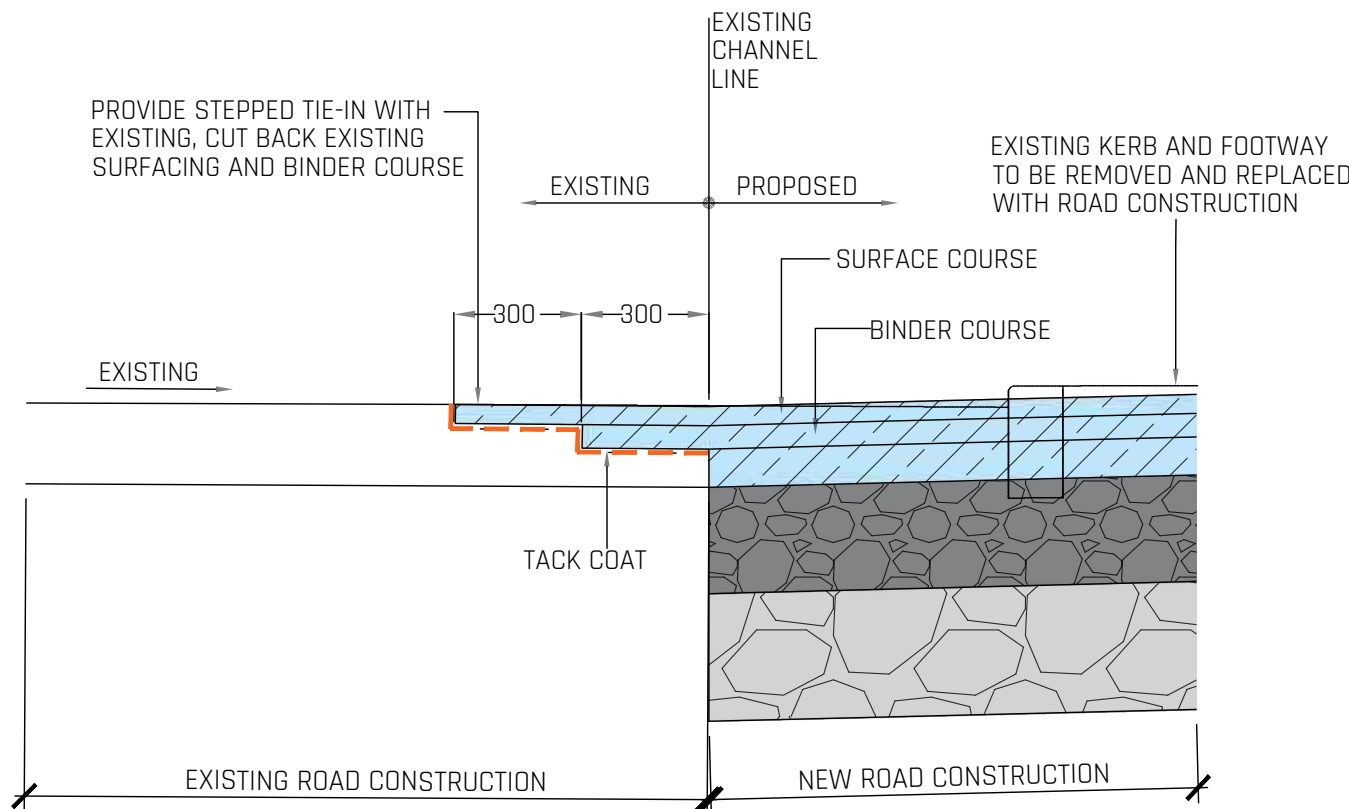


- GULLY NOTES:
1. PRECAST CONCRETE GULLIES SHALL BE UNREINFORCED AND COMPLY WITH BS 5911-3 AND BS EN 1917.
  2. VITRIFIED CLAY GULLIES SHALL COMPLY WITH THER REQUIREMENTS OF BS EN 295-6 FOR ROUND STREET GULLIES.
  3. PLASTIC AND HIGH DENSITY POLYETHELENE GULLIES SHALL BE OBTAINED FROM AN APPROVED MANUFACTURER AS APPROVED BY THE ENGINEER. GRATINGS AND FRAMES SHALL COMPLY WITH BS EN124 AND BE D400 LOAD CLASS (ANTI-VANDAL).
  4. WHERE GULLIES ARE USED IN CONJUNCTION WITH A255 OR 305 KERB THE GULLY POT OPENING SHOULD BE POSITIONED 70mm FROM THE KERB FACE AND THE GRATING SUPPORT WALL AT THIS FACE CONSTRUCTED IN BRICK ON EDGE IN LIEU OF 225 BRICKWORK.
  5. OVERBREAK AROUND CONC. SURROUND AND BRICKWORK TO BE BACKFILLED WITH ST2 MIX CONCRETE TO UNDERSIDE OF BINDER COURSE. A MIN. DEPTH OF 100mm OF BITUMENOUS SURFACE MUST BE PROVIDED OVER CONCRETE/BRICKWORK.
  6. CONCRETE AROUND GULLIES TO REACH MIN STRENGTH OF 20N/mm BEFORE BEING EXPOSED TO TRAFFIC.
  7. FRAME IS TO BE SET TO LEVELS BEFORE LAYING OF SURFACE COURSE. GULLY GRATING AND FRAME TO BE SET 6mm BELOW CHANNEL LEVEL. BEDDING MORTAR FOR GRATING AND FRAMES SHALL BE RESIN BASED PROPRIETARY MORTAR COMPLYING WITH CLAUSE 570R.

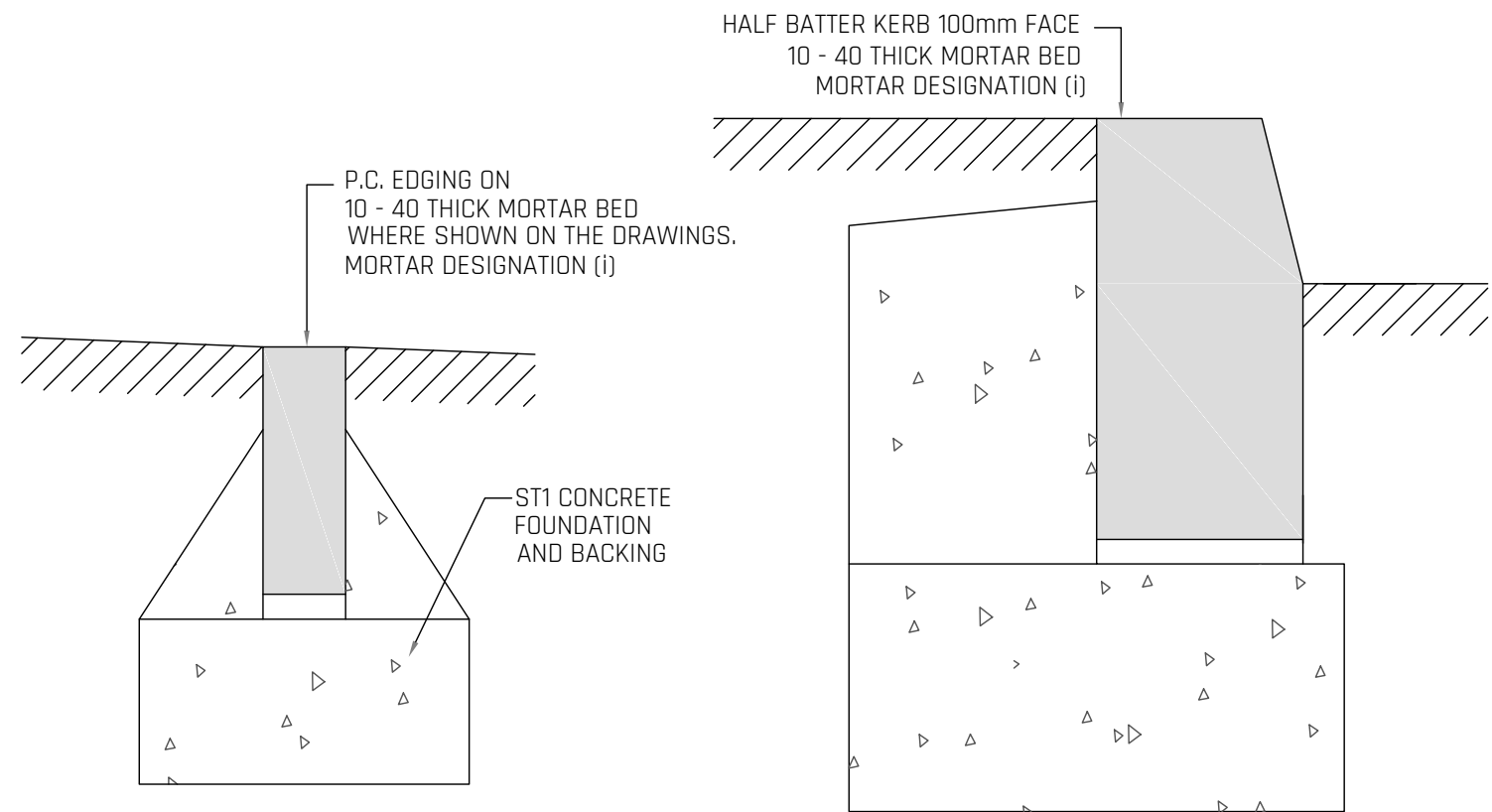
ADOPTABLE GULLY DETAILS  
SCALE 1:10



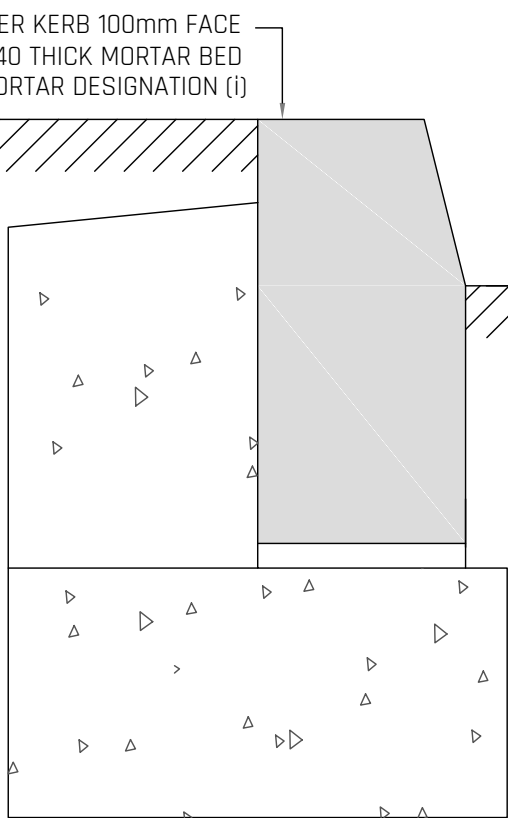
KERB TRANSITION DETAIL  
SCALE 1:20



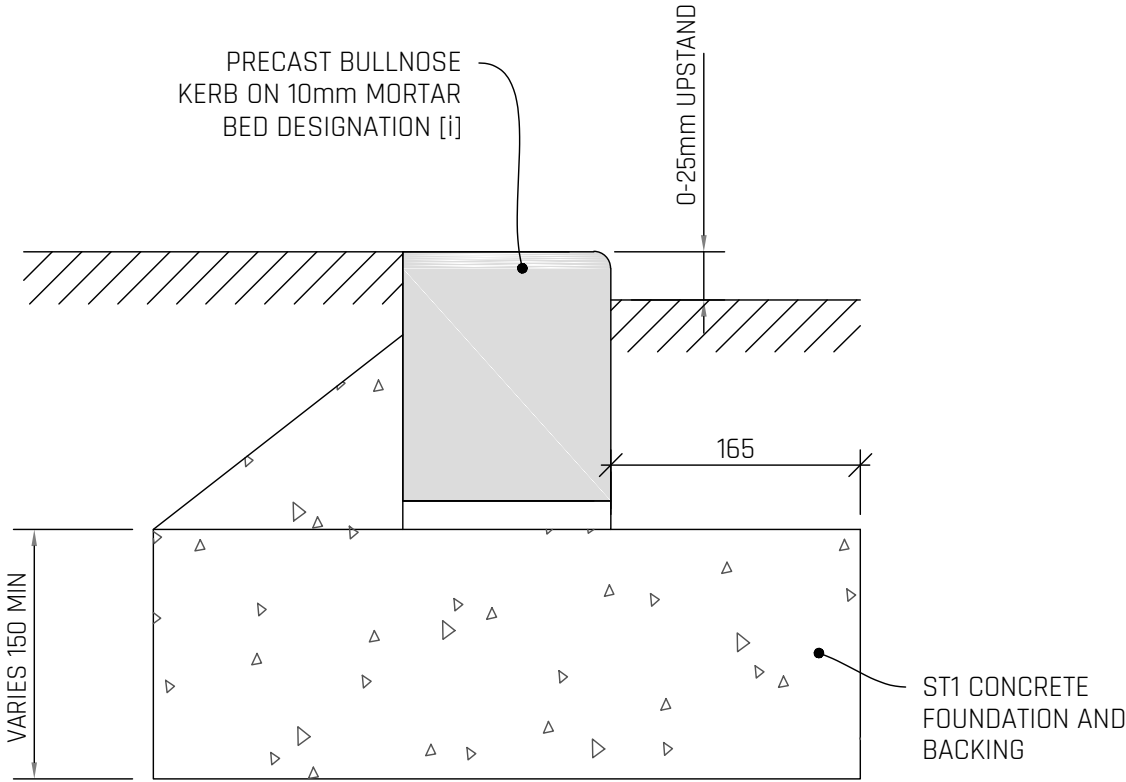
HIGHWAY TIE IN DETAILS  
SCALE 1:10



EF 250 KERB

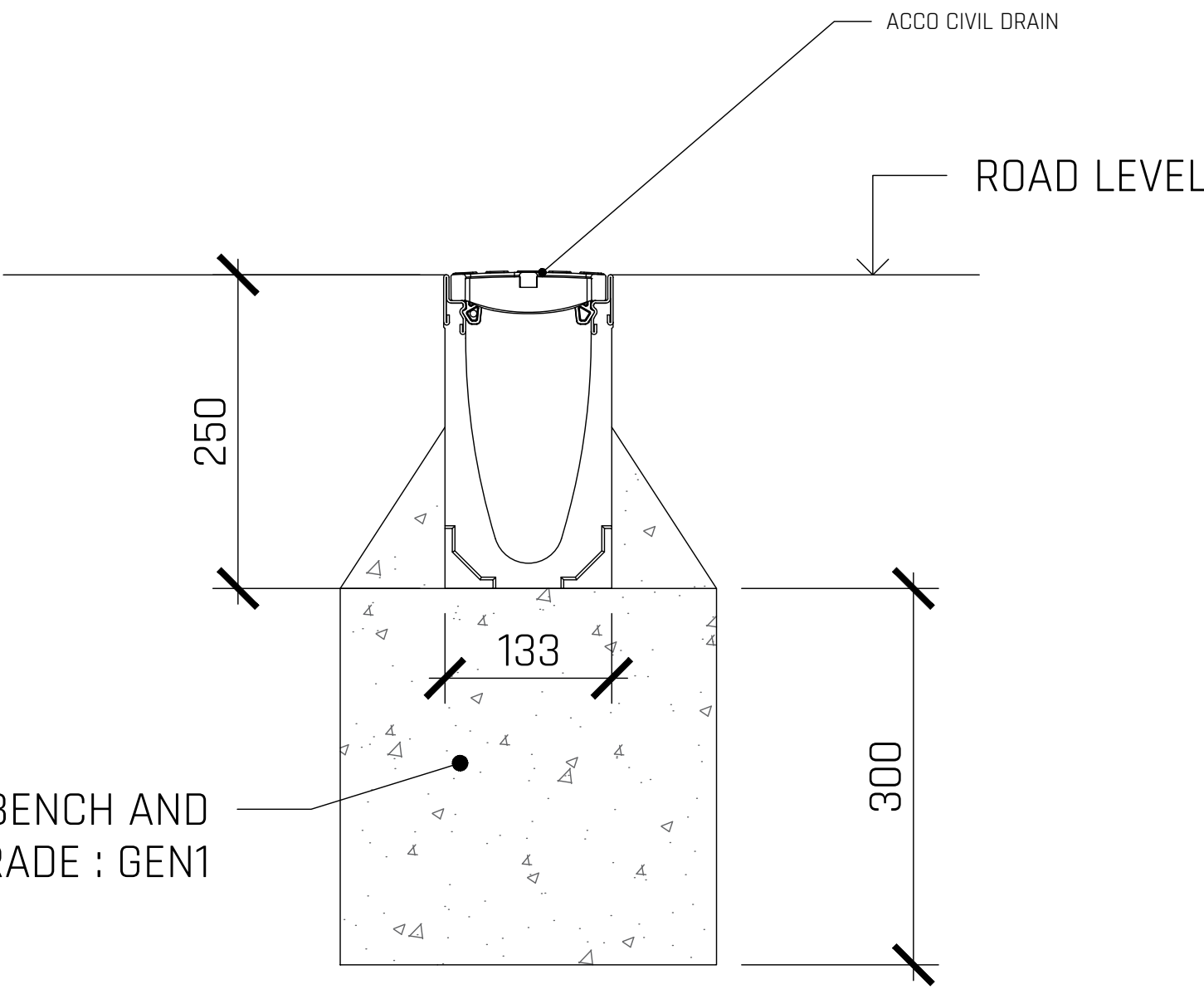


HB 2 TYPE



BN 3 TYPE

CONCRETE BENCH AND HAUNCH GRADE : GEN1



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|                                                                                                                                                                                                                        |  |                                |                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------|----------------------------------|
| ENGINEER                                                                                                                                                                                                               |  | CLIENT                         |                                  |
| <br>SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br>BUSINESS PARK, CARLISLE, CA3 0LJ<br>T: 01228 915900<br>E: hello@kingmoorconsulting.co.uk |  |                                |                                  |
| PROJECT<br>PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                                                                                              |  |                                |                                  |
| TITLE<br>HIGHWAY WORKS<br>SHEET 2                                                                                                                                                                                      |  |                                |                                  |
| SCALE<br>AS NOTED                                                                                                                                                                                                      |  | STATUS<br>FOR BUILDING CONTROL |                                  |
| PAPER SIZE<br>A1                                                                                                                                                                                                       |  | DRAWN BY<br>J GEMMELL          | CHECKED AND APPROVED<br>C AIMERS |
| PROJECT PHASE<br>BUILD                                                                                                                                                                                                 |  | DATE<br>DECEMBER 2024          | DATE<br>DECEMBER 2024            |
| DRAWING NUMBER<br>24-471-DWG006                                                                                                                                                                                        |  |                                | REVISION<br>C                    |

| Manhole Number |            | Cover Level     | Connections | Pipe        |                         |                               | Manhole Size      | Types   |         |        |
|----------------|------------|-----------------|-------------|-------------|-------------------------|-------------------------------|-------------------|---------|---------|--------|
| Coordinates    |            | Depth To Soffit |             | Code        | Inverts                 | Diams                         |                   | Manhole | Cover   |        |
| F1             |            | 126.000         |             |             |                         |                               | 600               | 4       | Unspec  |        |
| E.             | 299967.440 | 0.900           |             |             |                         |                               |                   |         |         |        |
| N.             | 518691.422 |                 |             |             |                         |                               |                   |         |         |        |
| F2             |            | 126.000         |             | 1           | 1.000                   | 124.604                       | 100               | 600     | 4       | Unspec |
| E.             | 299988.155 | 1.296           |             |             |                         |                               |                   |         |         |        |
| N.             | 518703.044 |                 |             |             |                         |                               |                   |         |         |        |
| F3             |            | 126.000         |             | 1<br>2<br>3 | 1.001<br>3.000<br>2.001 | 123.958<br>124.614<br>124.203 | 100<br>100<br>100 | 600     | 4       | Unspec |
| E.             | 300007.408 | 1.942           |             |             |                         |                               |                   |         |         |        |
| N.             | 518669.375 |                 |             |             |                         |                               |                   |         |         |        |
| F4             |            | 126.000         |             |             |                         |                               | 450               | 4       | Unspec  |        |
| E.             | 299987.529 | 0.900           |             |             |                         |                               |                   |         |         |        |
| N.             | 518657.446 |                 |             |             |                         |                               |                   |         |         |        |
| F5             |            | 126.000         |             |             |                         |                               | 600               | 4       | Unspec  |        |
| E.             | 300000.305 | 0.900           |             |             |                         |                               |                   |         |         |        |
| N.             | 518636.161 |                 |             |             |                         |                               |                   |         |         |        |
| F6             |            | 126.000         |             | 1           | 2.000                   | 124.616                       | 100               | 600     | 4       | Unspec |
| E.             | 300020.037 | 1.284           |             |             |                         |                               |                   |         |         |        |
| N.             | 518648.047 |                 |             |             |                         |                               |                   |         |         |        |
| F7             |            | 125.800         |             | 1           | 1.002                   | 123.665                       | 100               | 1050    | 3       | Unspec |
| E.             | 300024.958 | 2.300           |             |             |                         |                               |                   |         |         |        |
| N.             | 518670.271 |                 |             |             |                         |                               |                   |         |         |        |
| F8             |            | 125.400         |             | 1           | 1.003                   | 123.238                       | 100               | 1200    | 3       | Unspec |
| E.             | 300030.236 | 2.062           |             |             |                         |                               |                   |         |         |        |
| N.             | 518678.423 |                 |             |             |                         |                               |                   |         |         |        |
| F9             |            | 126.000         |             |             |                         |                               | 600               | Unknown | Unspec  |        |
| E.             | 299973.438 | 0.900           |             |             |                         |                               |                   |         |         |        |
| N.             | 518740.318 |                 |             |             |                         |                               |                   |         |         |        |
| F10            |            | 126.000         |             | 1           | 4.000                   | 124.840                       | 100               | 600     | Unknown | Unspec |
| E.             | 299981.809 | 1.060           |             |             |                         |                               |                   |         |         |        |
| N.             | 518744.997 |                 |             |             |                         |                               |                   |         |         |        |
| F11            |            | 126.000         |             | 1           | 4.001                   | 124.622                       | 100               | 600     | Unknown | Unspec |
| E.             | 299988.278 | 2.300           |             |             |                         |                               |                   |         |         |        |
| N.             | 518733.638 |                 |             |             |                         |                               |                   |         |         |        |
| F12            |            | 125.899         |             | 1           | 4.002                   | 123.487                       | 100               | 1200    | Unknown | Unspec |
| E.             | 299995.086 | 2.312           |             |             |                         |                               |                   |         |         |        |
| N.             | 518733.727 |                 |             |             |                         |                               |                   |         |         |        |

| FOUL Network 1 |               |               |             |                  |        |                    |        |        |        |
|----------------|---------------|---------------|-------------|------------------|--------|--------------------|--------|--------|--------|
| Pipe Code      | Diameter (mm) | Gradient (1:) | Pipe Length | Upstream Manhole |        | Downstream Manhole |        |        |        |
|                |               |               |             | Number           | Invert | Number             | Invert | Cover  | Cover  |
| 1.000          | 100           | 60            | 23.753      | F1               | 125.00 | F2                 | 124.60 | 126.00 | 126.00 |
| 1.001          | 100           | 60            | 38.785      | F2               | 124.60 | F3                 | 123.96 | 126.00 | 126.00 |
| 1.002          | 100           | 60            | 17.573      | F3               | 123.96 | F7                 | 123.66 | 126.00 | 125.80 |
| 1.003          | 100           | 60            | 9.711       | F7               | 123.40 | F8                 | 123.24 | 126.00 | 125.40 |
| 2.000          | 100           | 60            | 23.035      | F5               | 125.00 | F6                 | 124.62 | 126.00 | 126.00 |
| 2.001          | 100           | 60            | 24.787      | F6               | 124.62 | F3                 | 124.20 | 126.00 | 126.00 |
| 3.000          | 100           | 60            | 23.184      | F4               | 125.00 | F3                 | 124.61 | 126.00 | 126.00 |
| 4.000          | 100           | 60            | 9.590       | F9               | 125.00 | F10                | 124.84 | 126.00 | 126.00 |
| 4.001          | 100           | 60            | 13.072      | F10              | 124.84 | F11                | 124.62 | 126.00 | 126.00 |
| 4.002          | 100           | 60            | 6.809       | F11              | 123.60 | F12                | 123.49 | 126.00 | 125.90 |

| STORM Network 1 |               |               |             |                  |        |                    |        |        |        |
|-----------------|---------------|---------------|-------------|------------------|--------|--------------------|--------|--------|--------|
| Pipe Code       | Diameter (mm) | Gradient (1:) | Pipe Length | Upstream Manhole |        | Downstream Manhole |        |        |        |
|                 |               |               |             | Number           | Invert | Number             | Invert | Cover  | Cover  |
| 1.000           | 225           | 100           | 39.902      | S3               | 125.32 | S1                 | 124.93 | 126.00 | 126.00 |
| 1.001           | 225           | 100           | 23.295      | S1               | 124.93 | S4                 | 124.69 | 126.00 | 126.00 |
| 1.002           | 225           | 100           | 15.307      | S4               | 124.69 | S6                 | 124.54 | 126.00 | 126.00 |
| 1.003           | 225           | 100           | 8.096       | S6               | 124.54 | S7                 | 124.46 | 126.00 | 126.00 |
| 1.004           | 225           | 100           | 6.549       | S7               | 124.46 | S9                 | 124.39 | 125.90 | 125.90 |
| 1.005           | 225           | 100           | 10.929      | S9               | 124.39 | S10                | 124.28 | 125.85 | 125.85 |
| 1.006           | 300           | 100           | 5.632       | S10              | 124.21 | S24                | 124.15 | 125.50 | 125.50 |
| 2.000           | 150           | 100           | 22.786      | S2               | 125.40 | S1                 | 125.17 | 126.00 | 126.00 |
| 3.000           | 150           | 100           | 4.270       | S5               | 125.40 | S4                 | 125.36 | 126.00 | 126.00 |
| 4.000           | 150           | 100           | 16.397      | S8               | 125.40 | S7                 | 125.24 | 126.00 | 126.00 |
| 5.000           | 225           | 100           | 19.587      | S11              | 125.32 | S12                | 125.13 | 126.00 | 126.00 |
| 5.001           | 225           | 100           | 14.850      | S12              | 125.13 | S13                | 124.98 | 126.00 | 126.00 |
| 5.002           | 225           | 100           | 27.884      | S13              | 124.98 | S14                | 124.70 | 126.00 | 126.00 |
| 5.003           | 225           | 100           | 26.204      | S14              | 124.70 | S10                | 124.44 | 125.85 | 125.85 |
| 6.000           | 150           | 100           | 11.808      | S26              | 125.35 | S13                | 125.23 | 126.00 | 126.00 |
| 7.000           | 150           | 100           | 11.677      | S15              | 125.40 | S16                | 125.28 | 126.00 | 126.00 |
| 7.001           | 150           | 100           | 16.238      | S16              | 125.28 | S17                | 125.12 | 126.00 | 126.00 |
| 7.002           | 225           | 60            | 11.614      | S17              | 125.05 | S22                | 124.85 | 125.75 | 125.75 |
| 7.003           | 225           | 100           | 10.612      | S22              | 124.80 | S23                | 124.69 | 125.90 | 125.90 |
| 7.004           | 225           | 100           | 10.539      | S23              | 124.69 | S10                | 124.59 | 125.85 | 125.85 |
| 8.000           | 150           | 100           | 10.419      | S18              | 125.40 | S19                | 125.30 | 126.00 | 126.00 |
| 8.001           | 150           | 100           | 11.956      | S19              | 125.30 | S17                | 125.18 | 126.00 | 126.00 |
| 9.000           | 150           | 100           | 9.580       | S20              | 125.40 | S17                | 125.30 | 126.00 | 126.00 |
| 10.000          | 225           | 100           | 20.017      | S21              | 125.00 | S22                | 124.80 | 125.75 | 125.75 |

- DRAINAGE NOTES**
- This drawing is to be read in conjunction with all relevant Architects drawings and drawings by Kingmoor Consulting Ltd.
  - All private drainage construction is to be in accordance with the manufacturers recommendations and Approved Document H from the Building Regulations 2000.
  - Invert levels shown on all incoming and outgoing pipes for manholes/inspection chambers indicate the invert levels at the intersection of the pipes within the manhole.
  - CONCRETE BENCHING AND PIPE SURROUND**  
Concrete shall be placed in a single continuous operation from top of base slab to top of benching and pipe surround.
  - CONNECTION INTO MANHOLES**  
Connections into manholes shall be constructed with the soffits at the same level unless detailed differently on the contract drawings.
  - METALWORK**  
Ladders, handrailing and safety chains shall be constructed as shown on UU Standard Detail STND/01/002.  
All components to be fabricated in Stainless steel grade X6 Cr Ni Mo Ti 17-12-2 to BS EN 10088-1. Refer to UU Standard Detail STND/01/002 for details.
  - CONCRETE SURROUND TO MANHOLES**  
A concrete surround is not normally required to manholes unless installed in areas of unstable ground, under conditions of flotation or where subjected to exceptional or eccentric loads. In which cases a 150mm surround of at least 20N/mm<sup>2</sup> (GEN3) concrete shall be provided. Any joints should be staggered with pre-cast concrete joints.
  - MANHOLE ACCESSSES**  
For manhole access options and details refer to UU Standard Detail STND/01/013.  
Double steps shall be plastic encapsulated carbon steel to BS EN 1247-2 manhole steps.  
Double steps shall not be used where cover-to-soffit dimension is >3.0m.
  - COVER AND FRAME**  
150mm deep covers are to be used in Category 1, 2 & 3 Roads.  
100mm deep covers are to be used in Category 4 Roads.  
Double triangular covers are to be used in carriageway.  
Road category to be designated by the Highway Authority.  
Frame to be set as per manufacturers specification.  
Manhole cover and frame to be in accordance with BS EN 124 Class D400, class M1 mortar bed and haunch, with minimum clear opening of 600x600 unless noted otherwise.
  - ROCKER PIPES**  
Start of rocker pipe to be as close to face of manhole as possible and not greater than 750mm. Rocker pipes to be used until the pipe outside diameter exceeds the effective length of the rocker pipe.  
Rocker pipe effective length shall be as follows:  
600mm for pipes up to 600mm ø
  - BENCHING WIDTH**  
Minimum benching widths shall be as follows:  
For depth to soffit < 1.5m  
225mm min for all pipe sizes  
For depth to soffit ≥ 1.5m  
600mm min for 150mm ø to 375m ø pipes
  - CHANNEL FITTINGS**  
Proprietary channel fittings are to be used up to and including 300mm ø pipes, above which granolithic in-situ channels can be used. Incoming and outgoing 'T' junctions, square junctions and 90° bends are not acceptable especially on foul systems, to be replaced by 'Y' junctions, oblique junctions and 2 No. 45° bends respectively.

- GENERAL NOTES**
- ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED AND NOT TO BE SCALED FROM DRAWINGS. USE WRITTEN DIMENSIONS ONLY AND CHECK ON SITE BEFORE ORDERING MATERIALS OR STEELWORK.
  - ALL DRAWINGS TO BE READ IN CONJUNCTION WITH DRAWINGS PRODUCED BY OTHERS AND ANY ERRORS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO COMMENCEMENT OR INSTALLATION OF THE WORKS.
  - ALL MATERIALS AND WORKMANSHIP TO BE UNDERTAKEN IN ACCORDANCE WITH BEST PRACTICE AND THE RELEVANT CODES INCLUDING BRITISH STANDARDS AND BUILDING REGULATIONS.
  - THIS WORK MAY BE REQUIRED TO COMPLY WITH THE BUILDING SAFETY ACT 2023. IF WORK REQUIRES MORE THAN ONE CONTRACTOR TO UNDERTAKE THE WORKS, THE CLIENT IS REQUIRED TO APPOINT A PRINCIPAL DESIGNER TO COORDINATE DESIGN WORKS, AND ENSURE THAT ALL DESIGN AND WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS. IT CANNOT BE ASSUMED THAT KINGMOOR CONSULTING LTD ARE BY DEFAULT THE PRINCIPAL DESIGNER UNLESS APPOINTED SPECIFICALLY FOR THIS ROLE.

ENGINEER



KINGMOOR  
CONSULTING

CLIENT

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PROJECT

PROPOSED INDUSTRIAL UNITS,  
JOE MCBAIN AVENUE, MORESBY PARKS

TITLE

MANHOLE AND PIPE  
SCHEDULES

SCALE

AS NOTED

STATUS

FOR BUILDING CONTROL

PAPER SIZE

A1

DRAWN BY

J GEMMELL

CHECKED AND APPROVED

C AIMERS

PROJECT PHASE

BUILD

DATE

DECEMBER 2024

DATE

DECEMBER 2024

DRAWING NUMBER

24-471-DWG007

REVISION

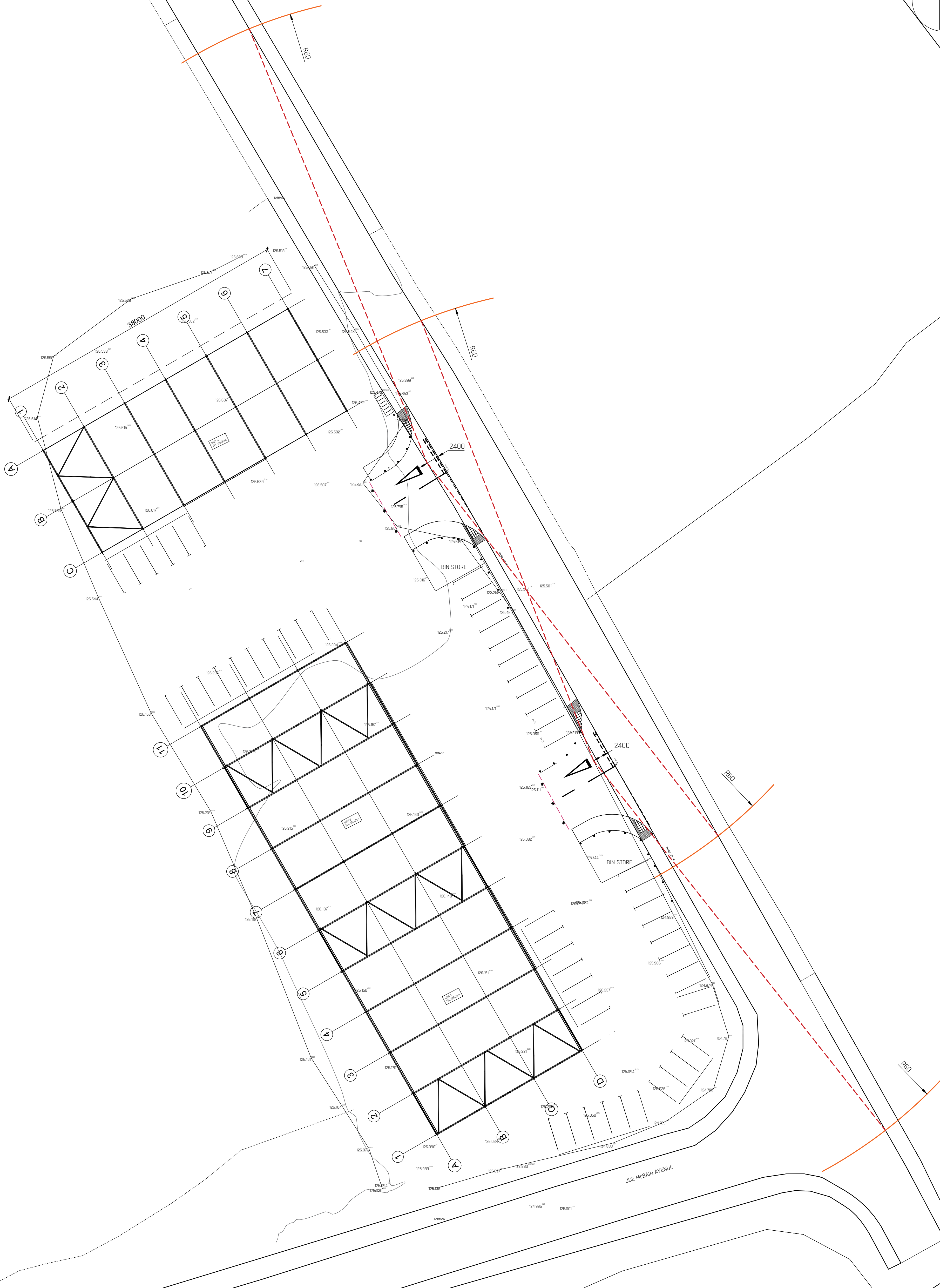
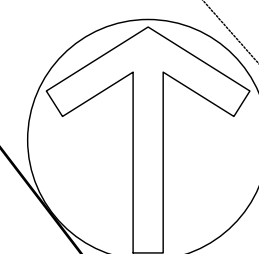
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| Manhole Number | Cover Level     | Connections | Pipe        |                         |                               |                   | Manhole Size | Types   |        |
|----------------|-----------------|-------------|-------------|-------------------------|-------------------------------|-------------------|--------------|---------|--------|
|                | Depth To Soffit |             | Code        |                         | Inverts                       | Diams             |              | Manhole | Cover  |
| S1             | 126.000         |             | 1<br>2      | 1.000<br>2.000          | 124.926<br>125.172            | 225<br>150        | 600          | 4       | Unspec |
| E. 299986.610  | 0.849           |             |             |                         |                               |                   |              |         |        |
| N. 518655.462  |                 |             | 0           | 1.001                   | 124.926                       | 225               |              |         |        |
| S2             | 126.000         |             |             |                         |                               |                   | 600          | 4       | Unspec |
| E. 299997.973  | 0.450           |             |             |                         |                               |                   |              |         |        |
| N. 518635.711  |                 |             | 0           | 2.000                   | 125.400                       | 150               |              |         |        |
| S3             | 126.000         |             |             |                         |                               |                   | 600          | 4       | Unspec |
| E. 299966.532  | 0.450           |             |             |                         |                               |                   |              |         |        |
| N. 518689.945  |                 |             | 0           | 1.000                   | 125.325                       | 225               |              |         |        |
| S4             | 126.000         |             | 1<br>2      | 1.001<br>3.000          | 124.693<br>125.357            | 225<br>150        | 450          | 4       | Unspec |
| E. 300006.709  | 1.082           |             |             |                         |                               |                   |              |         |        |
| N. 518667.239  |                 |             | 0           | 1.002                   | 124.693                       | 225               |              |         |        |
| S5             | 126.000         |             |             |                         |                               |                   | 600          | 4       | Unspec |
| E. 300008.792  | 0.450           |             |             |                         |                               |                   |              |         |        |
| N. 518663.511  |                 |             | 0           | 3.000                   | 125.400                       | 150               |              |         |        |
| S6             | 126.000         |             | 1           | 1.002                   | 124.540                       | 225               | 600          | 4       | Unspec |
| E. 299998.732  | 1.235           |             |             |                         |                               |                   |              |         |        |
| N. 518680.303  |                 |             | 0           | 1.003                   | 124.540                       | 225               |              |         |        |
| S7             | 126.000         |             | 1<br>2      | 4.000<br>1.003          | 125.236<br>124.459            | 150<br>225        | 600          | 4       | Unspec |
| E. 299994.732  | 1.316           |             |             |                         |                               |                   |              |         |        |
| N. 518687.342  |                 |             | 0           | 1.004                   | 124.459                       | 225               |              |         |        |
| S8             | 126.000         |             |             |                         |                               |                   | 600          | 4       | Unspec |
| E. 299986.630  | 0.450           |             |             |                         |                               |                   |              |         |        |
| N. 518701.597  |                 |             | 0           | 4.000                   | 125.400                       | 150               |              |         |        |
| S9             | 125.900         |             | 1           | 1.004                   | 124.394                       | 225               | 600          | 4       | Unspec |
| E. 300000.487  | 1.281           |             |             |                         |                               |                   |              |         |        |
| N. 518690.468  |                 |             | 0           | 1.005                   | 124.394                       | 225               |              |         |        |
| S10            | 125.850         |             | 1<br>2<br>3 | 7.004<br>1.005<br>5.003 | 124.589<br>124.285<br>124.439 | 225<br>225<br>225 | 1350         | 4       | Unspec |
| E. 300000.919  | 1.340           |             |             |                         |                               |                   |              |         |        |
| N. 518701.388  |                 |             | 0           | 1.006                   | 124.210                       | 300               |              |         |        |
| S11            | 126.000         |             |             |                         |                               |                   | 600          | 4       | Unspec |
| E. 300006.061  | 0.450           |             |             |                         |                               |                   |              |         |        |
| N. 518630.405  |                 |             | 0           | 5.000                   | 125.325                       | 225               |              |         |        |
| S12            | 126.000         |             | 1           | 5.000                   | 125.129                       | 225               | 600          | 4       | Unspec |
| E. 300022.919  | 0.646           |             |             |                         |                               |                   |              |         |        |
| N. 518640.378  |                 |             | 0           | 5.001                   | 125.129                       | 225               |              |         |        |
| S13            | 126.000         |             | 1<br>2      | 6.000<br>5.001          | 125.232<br>124.980            | 150<br>225        | 600          | 4       | Unspec |
| E. 300027.746  | 0.795           |             |             |                         |                               |                   |              |         |        |
| N. 518654.422  |                 |             | 0           | 5.002                   | 124.980                       | 225               |              |         |        |

| Manhole Number | Cover Level     | Connections | Pipe        |                         |                               |                   | Manhole Size | Types |        |
|----------------|-----------------|-------------|-------------|-------------------------|-------------------------------|-------------------|--------------|-------|--------|
|                | Depth To Soffit |             | Code        | Inverts                 | Diams                         | Manhole           |              | Cover |        |
| S14            | 126.000         |             | 1           | 5.002                   | 124.701                       | 225               | 1050         | 4     | Unspec |
| E. 300013.859  | 1.074           |             |             |                         |                               |                   |              |       |        |
| N. 518678.602  |                 |             | 0           | 5.003                   | 124.701                       | 225               |              |       |        |
| S15            | 126.000         |             |             |                         |                               |                   | 600          | 4     | Unspec |
| E. 299961.529  | 0.450           |             |             |                         |                               |                   |              |       |        |
| N. 518733.181  |                 |             | 0           | 7.000                   | 125.400                       | 150               |              |       |        |
| S16            | 126.000         |             | 1           | 7.000                   | 125.283                       | 150               | 600          | 4     | Unspec |
| E. 299971.683  | 0.567           |             |             |                         |                               |                   |              |       |        |
| N. 518738.948  |                 |             | 0           | 7.001                   | 125.283                       | 150               |              |       |        |
| S17            | 126.000         |             | 1<br>2<br>3 | 9.000<br>7.001<br>8.001 | 125.304<br>125.121<br>125.176 | 150<br>150<br>150 | 600          | 4     | Unspec |
| E. 299979.702  | 0.729           |             |             |                         |                               |                   |              |       |        |
| N. 518724.828  |                 |             | 0           | 7.002                   | 125.046                       | 225               |              |       |        |
| S18            | 126.000         |             |             |                         |                               |                   | 600          | 4     | Unspec |
| E. 299960.303  | 0.450           |             |             |                         |                               |                   |              |       |        |
| N. 518713.678  |                 |             | 0           | 8.000                   | 125.400                       | 150               |              |       |        |
| S19            | 126.000         |             | 1           | 8.000                   | 125.296                       | 150               | 600          | 4     | Unspec |
| E. 299969.326  | 0.554           |             |             |                         |                               |                   |              |       |        |
| N. 518718.887  |                 |             | 0           | 8.001                   | 125.296                       | 150               |              |       |        |
| S20            | 126.000         |             |             |                         |                               |                   | 600          | 4     | Unspec |
| E. 299987.971  | 0.450           |             |             |                         |                               |                   |              |       |        |
| N. 518729.665  |                 |             | 0           | 9.000                   | 125.400                       | 150               |              |       |        |
| S21            | 125.750         |             |             |                         |                               |                   | 600          | 4     | Unspec |
| E. 299968.218  | 0.525           |             |             |                         |                               |                   |              |       |        |
| N. 518705.364  |                 |             | 0           | 10.000                  | 125.000                       | 225               |              |       |        |
| S22            | 125.750         |             | 1<br>2      | 7.002<br>10.000         | 124.852<br>124.800            | 225<br>225        | 1050         | 4     | Unspec |
| E. 299985.795  | 0.725           |             |             |                         |                               |                   |              |       |        |
| N. 518714.941  |                 |             | 0           | 7.003                   | 124.800                       | 225               |              |       |        |
| S23            | 125.900         |             | 1           | 7.003                   | 124.694                       | 225               | 1050         | 4     | Unspec |
| E. 299991.412  | 0.981           |             |             |                         |                               |                   |              |       |        |
| N. 518705.937  |                 |             | 0           | 7.004                   | 124.694                       | 225               |              |       |        |
| S24            | 125.500         |             | 1           | 1.006                   | 124.154                       | 300               | 1500         | 4     | Unspec |
| E. 300003.119  | 1.950           |             |             |                         |                               |                   |              |       |        |
| N. 518706.572  |                 |             | 0           | 1.007                   | 123.250                       | 300               |              |       |        |
| S25            | 125.500         |             | 1           | 1.007                   | 123.175                       | 300               | 1200         | 3     | Unspec |
| E. 300010.622  | 2.025           |             |             |                         |                               |                   |              |       |        |
| N. 518705.984  |                 |             |             |                         |                               |                   |              |       |        |
| S26            | 126.000         |             |             |                         |                               |                   | 600          | 4     | Unspec |
| E. 300018.131  | 0.500           |             |             |                         |                               |                   |              |       |        |
| N. 518647.568  |                 |             | 0           | 6.000                   | 125.350                       | 150               |              |       |        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| GENERAL NOTES                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| 1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED AND NOT TO BE SCALED FROM DRAWINGS. USE WRITTEN DIMENSIONS ONLY AND CHECK ON SITE BEFORE ORDERING MATERIALS OR STEELWORK.                                                                                                                                                                                                                                                                                               |  |
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| 3. ALL MATERIALS AND WORKMANSHIP TO BE UNDERTAKEN IN ACCORDANCE WITH BEST PRACTICE AND THE RELEVANT CODES INCLUDING BRITISH STANDARDS AND BUILDING REGULATIONS.                                                                                                                                                                                                                                                                                                       |  |
| 4. THIS WORK MAY BE REQUIRED TO COMPLY WITH THE BUILDING SAFETY ACT 2023. IF WORK REQUIRES MORE THAN ONE CONTRACTOR TO UNDERTAKE THE WORKS, THE CLIENT IS REQUIRED TO APPOINT A PRINCIPAL DESIGNER TO COORDINATE DESIGN WORKS, AND ENSURE THAT ALL DESIGN AND WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS. IT CANNOT BE ASSUMED THAT KINGMOOR CONSULTING LTD ARE BY DEFAULT THE PRINCIPAL DESIGNER UNLESS APPOINTED SPECIFICALLY FOR THIS ROLE. |  |

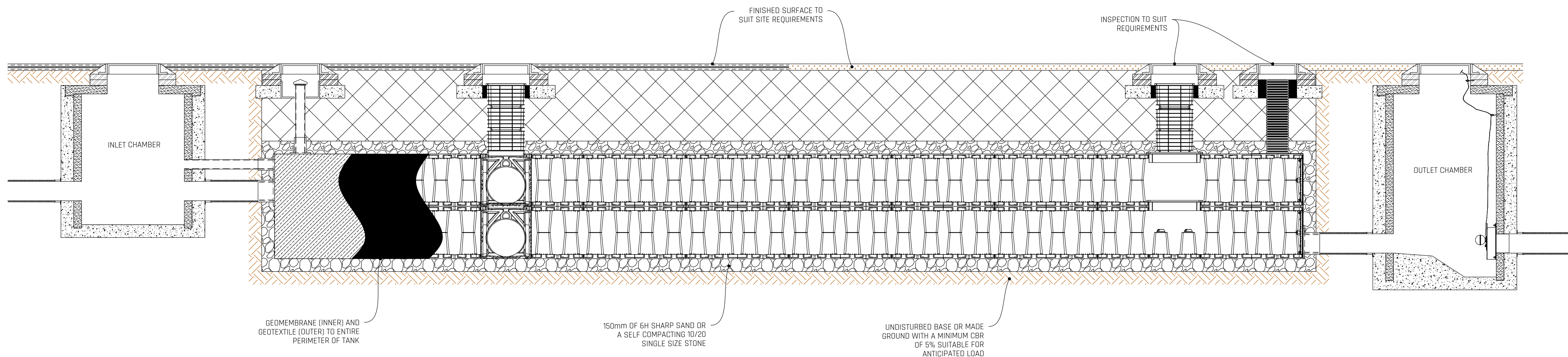
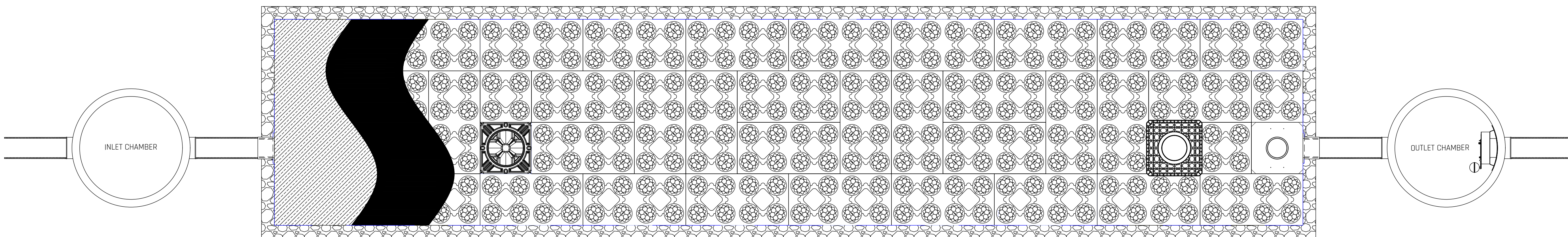
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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------|----------------------------------|
| <div>ENGINEER</div> <div><div>SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br/>BUSINESS PARK, CARLISLE, CA3 0LJ<br/>T: 01228 915900<br/>E: hello@kingmoorconsulting.co.uk</div></div> |  | <div>CLIENT</div>              |                                  |
| PROJECT<br>PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                                                                                                                                       |  |                                |                                  |
| TITLE<br>MANHOLE AND PIPE<br>SCHEDULES                                                                                                                                                                                                                          |  |                                |                                  |
| SCALE<br>AS NOTED                                                                                                                                                                                                                                               |  | STATUS<br>FOR BUILDING CONTROL |                                  |
| PAPER SIZE<br>A1                                                                                                                                                                                                                                                |  | DRAWN BY<br>J GEMMELL          | CHECKED AND APPROVED<br>C AIMERS |
| PROJECT PHASE<br>BUILD                                                                                                                                                                                                                                          |  | DATE<br>DECEMBER 2024          | DATE<br>DECEMBER 2024            |
| DRAWING NUMBER<br>24-471-DWG008                                                                                                                                                                                                                                 |  |                                | REVISION<br>C                    |



VISIBILITY SPLAYS  
SCALE 1:250

- GENERAL NOTES
- ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED AND NOT TO BE SCALED FROM DRAWINGS. USE WRITTEN DIMENSIONS ONLY AND CHECK ON SITE BEFORE ORDERING MATERIALS OR STEELWORK.
  - ALL DRAWINGS TO BE READ IN CONJUNCTION WITH DRAWINGS PRODUCED BY OTHERS AND ANY ERRORS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO COMMENCEMENT OR INSTALLATION OF THE WORKS.
  - ALL MATERIALS AND WORKMANSHIP TO BE UNDERTAKEN IN ACCORDANCE WITH BEST PRACTICE AND THE RELEVANT CODES INCLUDING BRITISH STANDARDS AND BUILDING REGULATIONS.
  - THIS WORK MAY BE REQUIRED TO COMPLY WITH THE BUILDING SAFETY ACT 2023. IF WORK REQUIRES MORE THAN ONE CONTRACTOR TO UNDERTAKE THE WORKS, THE CLIENT IS REQUIRED TO APPOINT A PRINCIPAL DESIGNER TO COORDINATE DESIGN WORKS, AND ENSURE THAT ALL DESIGN AND WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS. IT CANNOT BE ASSUMED THAT KINGMOOR CONSULTING LTD ARE BY DEFAULT THE PRINCIPAL DESIGNER UNLESS APPOINTED SPECIFICALLY FOR THIS ROLE.

|                                                                                                                               |                      |                      |   |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|---|
| ENGINEER                                                                                                                      |                      | CLIENT               |   |
|                                                                                                                               |                      |                      |   |
| SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br>BUSINESS PARK, CARLISLE, CA3 0LJ<br>T: 01228 915900<br>E: hello@kingmoorconsulting.co.uk |                      |                      |   |
| PROJECT                                                                                                                       |                      |                      |   |
| PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                |                      |                      |   |
| TITLE                                                                                                                         |                      |                      |   |
| VISABILITY SPLAYS                                                                                                             |                      |                      |   |
| SCALE                                                                                                                         |                      | STATUS               |   |
| AS NOTED                                                                                                                      | FOR BUILDING CONTROL |                      |   |
| PAPER SIZE                                                                                                                    | DRAWN BY             | CHECKED AND APPROVED |   |
| A1                                                                                                                            | J GEMMELL            | C AIMERS             |   |
| PROJECT PHASE                                                                                                                 | DATE                 | DATE                 |   |
| BUILD                                                                                                                         | DECEMBER 2024        | DECEMBER 2024        |   |
| DRAWING NUMBER                                                                                                                | REVISION             |                      |   |
| 24-471-DWG009                                                                                                                 |                      |                      | C |



ACO STORMBRIXX HD 2 LAYER ATTENUATION TANK  
SCALE 1:25

- GENERAL NOTES
- ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED AND NOT TO BE SCALED FROM DRAWINGS. USE WRITTEN DIMENSIONS ONLY AND CHECK ON SITE BEFORE ORDERING MATERIALS OR STEELWORK.
  - ALL DRAWINGS TO BE READ IN CONJUNCTION WITH DRAWINGS PRODUCED BY OTHERS AND ANY ERRORS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO COMMENCEMENT OR INSTALLATION OF THE WORKS.
  - ALL MATERIALS AND WORKMANSHIP TO BE UNDERTAKEN IN ACCORDANCE WITH BEST PRACTICE AND THE RELEVANT CODES INCLUDING BRITISH STANDARDS AND BUILDING REGULATIONS.
  - THIS WORK MAY BE REQUIRED TO COMPLY WITH THE BUILDING SAFETY ACT 2023. IF WORK REQUIRES MORE THAN ONE CONTRACTOR TO UNDERTAKE THE WORKS, THE CLIENT IS REQUIRED TO APPOINT A PRINCIPAL DESIGNER TO COORDINATE DESIGN WORKS, AND ENSURE THAT ALL DESIGN AND WORKS ARE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS. IT CANNOT BE ASSUMED THAT KINGMOOR CONSULTING LTD ARE BY DEFAULT THE PRINCIPAL DESIGNER UNLESS APPOINTED SPECIFICALLY FOR THIS ROLE.

|                                                                                                                                                      |                                       |                                         |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|----------------------|
| <b>ENGINEER</b><br><br>SUITE 4 ATLANTIC HOUSE, PARKHOUSE<br>BUSINESS PARK, CARLISLE, CA3 0LJ<br>T: 01228 915900<br>E: hello@kingmoorconsulting.co.uk |                                       | <b>CLIENT</b>                           |                      |
| <b>PROJECT</b><br>PROPOSED INDUSTRIAL UNITS,<br>JOE MCBAIN AVENUE, MORESBY PARKS                                                                     |                                       |                                         |                      |
| <b>TITLE</b><br>DRAINAGE DETAIL                                                                                                                      |                                       |                                         |                      |
| <b>SCALE</b><br>AS NOTED                                                                                                                             | <b>STATUS</b><br>FOR BUILDING CONTROL |                                         |                      |
| <b>PAPER SIZE</b><br>A1                                                                                                                              | <b>DRAWN BY</b><br>J GEMMELL          | <b>CHECKED AND APPROVED</b><br>C AIMERS |                      |
| <b>PROJECT PHASE</b><br>BUILD                                                                                                                        | <b>DATE</b><br>DECEMBER 2024          | <b>DATE</b><br>DECEMBER 2024            |                      |
| <b>DRAWING NUMBER</b><br>24-471-DWG010                                                                                                               |                                       |                                         | <b>REVISION</b><br>C |

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## APPENDIX C - UK SUDS INFORMATION

|                |                           |
|----------------|---------------------------|
| Calculated by: | Josh Gemmell              |
| Site name:     | Proposed Industrial Units |
| Site location: | Moresby Parks             |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

|            |                   |
|------------|-------------------|
| Latitude:  | 54.55330° N       |
| Longitude: | 3.54799° W        |
| Reference: | 1821571082        |
| Date:      | Nov 12 2024 14:06 |

## Runoff estimation approach

IH124

## Site characteristics

|                       |      |
|-----------------------|------|
| Total site area (ha): | 0.82 |
|-----------------------|------|

## Methodology

|                                     |                             |
|-------------------------------------|-----------------------------|
| Q <sub>BAR</sub> estimation method: | Calculate from SPR and SAAR |
| SPR estimation method:              | Calculate from SOIL type    |

## Notes

(1) Is Q<sub>BAR</sub> < 2.0 l/s/ha?

When Q<sub>BAR</sub> is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

## Soil characteristics

|              | Default | Edited |
|--------------|---------|--------|
| SOIL type:   | 4       | 4      |
| HOST class:  | N/A     | N/A    |
| SPR/SPRHOST: | 0.47    | 0.47   |

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## Hydrological characteristics

|                                | Default | Edited |
|--------------------------------|---------|--------|
| SAAR (mm):                     | 1183    | 1183   |
| Hydrological region:           | 10      | 10     |
| Growth curve factor 1 year:    | 0.87    | 0.87   |
| Growth curve factor 30 years:  | 1.7     | 1.7    |
| Growth curve factor 100 years: | 2.08    | 2.08   |
| Growth curve factor 200 years: | 2.37    | 2.37   |

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

Default

Edited

|                               |       |       |
|-------------------------------|-------|-------|
| <b>Q<sub>BAR</sub> (l/s):</b> | 7.31  | 7.31  |
| <b>1 in 1 year (l/s):</b>     | 6.36  | 6.36  |
| <b>1 in 30 years (l/s):</b>   | 12.43 | 12.43 |
| <b>1 in 100 year (l/s):</b>   | 15.21 | 15.21 |
| <b>1 in 200 years (l/s):</b>  | 17.34 | 17.34 |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at [www.uksuds.com](http://www.uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at [www.uksuds.com/terms-and-conditions.htm](http://www.uksuds.com/terms-and-conditions.htm). The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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## APPENDIX D - CALCULATIONS

Design Settings

|                                   |      |                             |               |                             |       |
|-----------------------------------|------|-----------------------------|---------------|-----------------------------|-------|
| Frequency of use (kDU)            | 1.00 | Additional Flow (%)         | 0             | Preferred Cover Depth (m)   | 0.900 |
| Flow per dwelling per day (l/day) | 1500 | Minimum Velocity (m/s)      | 1.00          | Include Intermediate Ground | ✓     |
| Domestic Flow (l/s/ha)            | 0.0  | Connection Type             | Level Soffits |                             |       |
| Industrial Flow (l/s/ha)          | 0.0  | Minimum Backdrop Height (m) | 0.200         |                             |       |

Nodes

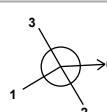
| Name | Cover Level (m) | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|------|-----------------|---------------|-------------|--------------|-----------|
| 1    | 126.000         | 600           | 299967.440  | 518691.422   | 1.000     |
| 2    | 126.000         | 600           | 299988.155  | 518703.044   | 1.396     |
| 3    | 126.000         | 600           | 300007.408  | 518669.375   | 2.042     |
| 4    | 126.000         | 450           | 299987.529  | 518657.446   | 1.000     |
| 5    | 126.000         | 600           | 300000.305  | 518636.161   | 1.000     |
| 6    | 126.000         | 600           | 300020.037  | 518648.047   | 1.384     |
| 7    | 125.800         | 1050          | 300024.958  | 518670.271   | 2.400     |
| 8    | 125.400         | 1200          | 300030.236  | 518678.423   | 2.162     |
| 9    | 126.000         | 600           | 299973.438  | 518740.318   | 1.000     |
| 10   | 126.000         | 600           | 299981.809  | 518744.997   | 1.160     |
| 11   | 126.000         | 600           | 299988.278  | 518733.638   | 2.400     |
| 12   | 125.899         | 1200          | 299995.086  | 518733.727   | 2.412     |

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 | 23.753     | 60.0        | 100      | Circular  | 126.000   | 125.000   | 0.900        | 126.000   | 124.604   | 1.296        |
| 1.001 | 38.785     | 60.0        | 100      | Circular  | 126.000   | 124.604   | 1.296        | 126.000   | 123.958   | 1.942        |
| 3.000 | 23.184     | 60.0        | 100      | Circular  | 126.000   | 125.000   | 0.900        | 126.000   | 124.614   | 1.286        |
| 2.000 | 23.035     | 60.0        | 100      | Circular  | 126.000   | 125.000   | 0.900        | 126.000   | 124.616   | 1.284        |
| 2.001 | 24.787     | 60.0        | 100      | Circular  | 126.000   | 124.616   | 1.284        | 126.000   | 124.203   | 1.697        |
| 1.002 | 17.573     | 60.0        | 100      | Circular  | 126.000   | 123.958   | 1.942        | 125.800   | 123.665   | 2.035        |
| 1.003 | 9.711      | 60.0        | 100      | Circular  | 125.800   | 123.400   | 2.300        | 125.400   | 123.238   | 2.062        |
| 4.000 | 9.590      | 60.0        | 100      | Circular  | 126.000   | 125.000   | 0.900        | 126.000   | 124.840   | 1.060        |
| 4.001 | 13.072     | 60.0        | 100      | Circular  | 126.000   | 124.840   | 1.060        | 126.000   | 124.622   | 1.278        |
| 4.002 | 6.809      | 60.0        | 100      | Circular  | 126.000   | 123.600   | 2.300        | 125.899   | 123.487   | 2.312        |

| Link  | US Node | Dia (mm) | Node Type | MH Type   | DS Node | Dia (mm) | Node Type | MH Type   |
|-------|---------|----------|-----------|-----------|---------|----------|-----------|-----------|
| 1.000 | 1       | 600      | Manhole   | Adoptable | 2       | 600      | Manhole   | Adoptable |
| 1.001 | 2       | 600      | Manhole   | Adoptable | 3       | 600      | Manhole   | Adoptable |
| 3.000 | 4       | 450      | Manhole   | Adoptable | 3       | 600      | Manhole   | Adoptable |
| 2.000 | 5       | 600      | Manhole   | Adoptable | 6       | 600      | Manhole   | Adoptable |
| 2.001 | 6       | 600      | Manhole   | Adoptable | 3       | 600      | Manhole   | Adoptable |
| 1.002 | 3       | 600      | Manhole   | Adoptable | 7       | 1050     | Manhole   | Adoptable |
| 1.003 | 7       | 1050     | Manhole   | Adoptable | 8       | 1200     | Manhole   | Adoptable |
| 4.000 | 9       | 600      | Manhole   | Adoptable | 10      | 600      | Manhole   | Adoptable |
| 4.001 | 10      | 600      | Manhole   | Adoptable | 11      | 600      | Manhole   | Adoptable |
| 4.002 | 11      | 600      | Manhole   | Adoptable | 12      | 1200     | Manhole   | Adoptable |

Manhole Schedule

| Node | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections                                                                           | Link  | IL<br>(m) | Dia<br>(mm) |     |
|------|----------------|-----------------|-----------|--------------|-------------|---------------------------------------------------------------------------------------|-------|-----------|-------------|-----|
| 1    | 299967.440     | 518691.422      | 126.000   | 1.000        | 600         |  | 0     | 1.000     | 125.000     | 100 |
| 2    | 299988.155     | 518703.044      | 126.000   | 1.396        | 600         |  | 1     | 1.000     | 124.604     | 100 |
| 3    | 300007.408     | 518669.375      | 126.000   | 2.042        | 600         |  | 0     | 1.001     | 124.604     | 100 |
|      |                |                 |           |              |             |                                                                                       | 1     | 3.000     | 124.614     | 100 |
|      |                |                 |           |              |             |                                                                                       | 2     | 2.001     | 124.203     | 100 |
|      |                |                 |           |              |             |                                                                                       | 3     | 1.001     | 123.958     | 100 |
|      |                |                 |           |              |             | 0                                                                                     | 1.002 | 123.958   | 100         |     |
| 4    | 299987.529     | 518657.446      | 126.000   | 1.000        | 450         |  | 0     | 3.000     | 125.000     | 100 |
| 5    | 300000.305     | 518636.161      | 126.000   | 1.000        | 600         |  | 0     | 2.000     | 125.000     | 100 |
| 6    | 300020.037     | 518648.047      | 126.000   | 1.384        | 600         |  | 1     | 2.000     | 124.616     | 100 |
| 7    | 300024.958     | 518670.271      | 125.800   | 2.400        | 1050        |  | 0     | 2.001     | 124.616     | 100 |
|      |                |                 |           |              |             |                                                                                       | 1     | 1.002     | 123.665     | 100 |
|      |                |                 |           |              |             |                                                                                       | 0     | 1.003     | 123.400     | 100 |

Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m)  | Depth (m) | Dia (mm) | Connections                                                                            | Link  | IL (m)  | Dia (mm) |
|------|-------------|--------------|---------|-----------|----------|----------------------------------------------------------------------------------------|-------|---------|----------|
| 8    | 300030.236  | 518678.423   | 125.400 | 2.162     | 1200     |  1  | 1.003 | 123.238 | 100      |
| 9    | 299973.438  | 518740.318   | 126.000 | 1.000     | 600      |  0  | 4.000 | 125.000 | 100      |
| 10   | 299981.809  | 518744.997   | 126.000 | 1.160     | 600      |  10 | 4.000 | 124.840 | 100      |
| 11   | 299988.278  | 518733.638   | 126.000 | 2.400     | 600      |  10 | 4.001 | 124.622 | 100      |
| 12   | 299995.086  | 518733.727   | 125.899 | 2.412     | 1200     |  1  | 4.002 | 123.600 | 100      |

Simulation Settings

Analysis Speed   Normal   |   Skip Steady State   x   |   Drain Down Time (mins)   240   |   Foul Event Duration (mins)   15

Storm Durations

15   |   30   |   60   |   120   |   180   |   240   |   360   |   480   |   600   |   720   |   960   |   1440

Pre-development Discharge Rate

|                              |            |            |      |                        |      |                  |      |
|------------------------------|------------|------------|------|------------------------|------|------------------|------|
| Site Makeup                  | Greenfield | SAAR (mm)  | 1183 | Region                 | 10   | QBar             | 6.7  |
| Greenfield Method            | IH124      | Soil Index | 4    | Growth Factor 100 year | 2.08 | Q 100 year (l/s) | 14.0 |
| Positively Drained Area (ha) | 0.752      | SPR        | 0.47 | Betterment (%)         | 0    |                  |      |

Pre-development Discharge Volume

|                              |            |            |         |                       |     |                    |       |
|------------------------------|------------|------------|---------|-----------------------|-----|--------------------|-------|
| Site Makeup                  | Greenfield | Soil Index | 4       | Return Period (years) | 100 | Betterment (%)     | 0     |
| Greenfield Method            | FSR/FEH    | SPR        | 0.47    | Climate Change (%)    | 0   | PR                 | 0.500 |
| Positively Drained Area (ha) | 0.752      | CWI        | 125.458 | Storm Duration (mins) | 360 | Runoff Volume (m³) | 205   |

Results for Foul Event Critical Storm Duration. Lowest mass balance: 100.00%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|------------|---------|-------------|-----------|-----------|--------------|---------------|------------|--------|
| Foul Event | 1       | 1           | 125.000   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 2       | 1           | 124.604   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 3       | 1           | 123.958   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 4       | 1           | 125.000   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 5       | 1           | 125.000   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 6       | 1           | 124.616   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 7       | 1           | 123.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 8       | 1           | 123.238   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 9       | 1           | 125.000   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 10      | 1           | 124.840   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 11      | 1           | 123.600   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |
| Foul Event | 12      | 1           | 123.487   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK     |

| Link Event (Upstream Depth) | US Node | Link  | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|-------|---------|---------------|----------------|----------|---------------|--------------------|
| Foul Event                  | 1       | 1.000 | 2       | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 2       | 1.001 | 3       | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 3       | 1.002 | 7       | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 4       | 3.000 | 3       | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 5       | 2.000 | 6       | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 6       | 2.001 | 3       | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 7       | 1.003 | 8       | 0.0           | 0.000          | 0.000    | 0.0000        | 0.0                |
| Foul Event                  | 9       | 4.000 | 10      | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 10      | 4.001 | 11      | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| Foul Event                  | 11      | 4.002 | 12      | 0.0           | 0.000          | 0.000    | 0.0000        | 0.0                |

Design Settings

|                       |                   |                                      |               |
|-----------------------|-------------------|--------------------------------------|---------------|
| Rainfall Methodology  | FSR               | Maximum Time of Concentration (mins) | 30.00         |
| Return Period (years) | 100               | Maximum Rainfall (mm/hr)             | 50.0          |
| Additional Flow (%)   | 40                | Minimum Velocity (m/s)               | 1.00          |
| FSR Region            | England and Wales | Connection Type                      | Level Soffits |
| M5-60 (mm)            | 17.000            | Minimum Backdrop Height (m)          | 0.200         |
| Ratio-R               | 0.400             | Preferred Cover Depth (m)            | 0.450         |
| CV                    | 0.750             | Include Intermediate Ground          | ✓             |
| Time of Entry (mins)  | 4.00              | Enforce best practice design rules   | ✓             |

Nodes

| Name | Area<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|------|--------------|------------------|-----------------------|------------------|----------------|-----------------|--------------|
| 1    | 0.019        | 4.00             | 126.000               | 600              | 299986.610     | 518655.462      | 1.074        |
| 2    | 0.019        | 4.00             | 126.000               | 600              | 299997.973     | 518635.711      | 0.600        |
| 26   | 0.019        | 4.00             | 126.000               | 600              | 300018.131     | 518647.568      | 0.650        |
| 5    | 0.019        | 4.00             | 126.000               | 600              | 300008.792     | 518663.511      | 0.600        |
| 6    | 0.019        | 4.00             | 126.000               | 600              | 299998.732     | 518680.303      | 1.460        |
| 13   | 0.044        | 4.00             | 126.000               | 600              | 300027.746     | 518654.422      | 1.020        |
| 14   | 0.044        | 4.00             | 126.000               | 1050             | 300013.859     | 518678.602      | 1.299        |
| 3    | 0.051        | 4.00             | 126.000               | 600              | 299966.532     | 518689.945      | 0.675        |
| 8    | 0.051        | 4.00             | 126.000               | 600              | 299986.630     | 518701.597      | 0.600        |
| 7    |              |                  | 126.000               | 600              | 299994.732     | 518687.342      | 1.541        |
| 9    |              |                  | 125.900               | 600              | 300000.487     | 518690.468      | 1.506        |
| 10   |              |                  | 125.850               | 1350             | 300000.919     | 518701.388      | 1.640        |
| 24   |              |                  | 125.500               | 1500             | 300003.119     | 518706.572      | 2.250        |
| 15   | 0.014        | 4.00             | 126.000               | 600              | 299961.529     | 518733.181      | 0.600        |
| 16   | 0.014        | 4.00             | 126.000               | 600              | 299971.683     | 518738.948      | 0.717        |
| 18   |              | 4.00             | 126.000               | 600              | 299960.303     | 518713.678      | 0.600        |
| 19   | 0.014        | 4.00             | 126.000               | 600              | 299969.326     | 518718.887      | 0.704        |
| 17   | 0.014        | 4.00             | 126.000               | 600              | 299979.702     | 518724.828      | 0.954        |
| 20   |              | 4.00             | 126.000               | 600              | 299987.971     | 518729.665      | 0.600        |
| 23   |              |                  | 125.900               | 1050             | 299991.412     | 518705.937      | 1.206        |
| 21   | 0.052        | 4.00             | 125.750               | 600              | 299968.218     | 518705.364      | 0.750        |
| 22   |              |                  | 125.750               | 1050             | 299985.795     | 518714.941      | 0.950        |
| 11   | 0.023        | 4.00             | 126.000               | 600              | 300006.061     | 518630.405      | 0.675        |
| 12   | 0.023        | 4.00             | 126.000               | 600              | 300022.919     | 518640.378      | 0.871        |
| 25   |              |                  | 125.500               | 1200             | 300010.622     | 518705.984      | 2.325        |
| 4    |              |                  | 126.000               | 450              | 300006.709     | 518667.239      | 1.307        |

Pipeline Schedule

| Link  | Length<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | Link<br>Type | US CL<br>(m) | US IL<br>(m) | US Depth<br>(m) | DS CL<br>(m) | DS IL<br>(m) | DS Depth<br>(m) |
|-------|---------------|----------------|-------------|--------------|--------------|--------------|-----------------|--------------|--------------|-----------------|
| 1.000 | 39.902        | 100.0          | 225         | Circular     | 126.000      | 125.325      | 0.450           | 126.000      | 124.926      | 0.849           |
| 2.000 | 22.786        | 100.0          | 150         | Circular     | 126.000      | 125.400      | 0.450           | 126.000      | 125.172      | 0.678           |
| 6.000 | 11.808        | 100.0          | 150         | Circular     | 126.000      | 125.350      | 0.500           | 126.000      | 125.232      | 0.618           |
| 5.002 | 27.884        | 100.0          | 225         | Circular     | 126.000      | 124.980      | 0.795           | 126.000      | 124.701      | 1.074           |
| 5.003 | 26.204        | 100.0          | 225         | Circular     | 126.000      | 124.701      | 1.074           | 125.850      | 124.439      | 1.186           |
| 1.003 | 8.096         | 100.0          | 225         | Circular     | 126.000      | 124.540      | 1.235           | 126.000      | 124.459      | 1.316           |
| 1.004 | 6.549         | 100.0          | 225         | Circular     | 126.000      | 124.459      | 1.316           | 125.900      | 124.394      | 1.281           |
| 4.000 | 16.397        | 100.0          | 150         | Circular     | 126.000      | 125.400      | 0.450           | 126.000      | 125.236      | 0.614           |
| 7.000 | 11.677        | 100.0          | 150         | Circular     | 126.000      | 125.400      | 0.450           | 126.000      | 125.283      | 0.567           |
| 7.001 | 16.238        | 100.0          | 150         | Circular     | 126.000      | 125.283      | 0.567           | 126.000      | 125.121      | 0.729           |
| 8.001 | 11.956        | 100.0          | 150         | Circular     | 126.000      | 125.296      | 0.554           | 126.000      | 125.176      | 0.674           |
| 9.000 | 9.580         | 100.0          | 150         | Circular     | 126.000      | 125.400      | 0.450           | 126.000      | 125.304      | 0.546           |
| 7.004 | 10.539        | 100.0          | 225         | Circular     | 125.900      | 124.694      | 0.981           | 125.850      | 124.589      | 1.036           |

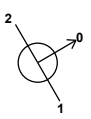
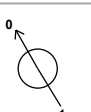
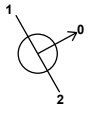
| Link  | US<br>Node | Dia<br>(mm) | Node<br>Type | MH<br>Type | DS<br>Node | Dia<br>(mm) | Node<br>Type | MH<br>Type |
|-------|------------|-------------|--------------|------------|------------|-------------|--------------|------------|
| 1.000 | 3          | 600         | Manhole      | Adoptable  | 1          | 600         | Manhole      | Adoptable  |
| 2.000 | 2          | 600         | Manhole      | Adoptable  | 1          | 600         | Manhole      | Adoptable  |
| 6.000 | 26         | 600         | Manhole      | Adoptable  | 13         | 600         | Manhole      | Adoptable  |
| 5.002 | 13         | 600         | Manhole      | Adoptable  | 14         | 1050        | Manhole      | Adoptable  |
| 5.003 | 14         | 1050        | Manhole      | Adoptable  | 10         | 1350        | Manhole      | Adoptable  |
| 1.003 | 6          | 600         | Manhole      | Adoptable  | 7          | 600         | Manhole      | Adoptable  |
| 1.004 | 7          | 600         | Manhole      | Adoptable  | 9          | 600         | Manhole      | Adoptable  |
| 4.000 | 8          | 600         | Manhole      | Adoptable  | 7          | 600         | Manhole      | Adoptable  |
| 7.000 | 15         | 600         | Manhole      | Adoptable  | 16         | 600         | Manhole      | Adoptable  |
| 7.001 | 16         | 600         | Manhole      | Adoptable  | 17         | 600         | Manhole      | Adoptable  |
| 8.001 | 19         | 600         | Manhole      | Adoptable  | 17         | 600         | Manhole      | Adoptable  |
| 9.000 | 20         | 600         | Manhole      | Adoptable  | 17         | 600         | Manhole      | Adoptable  |
| 7.004 | 23         | 1050        | Manhole      | Adoptable  | 10         | 1350        | Manhole      | Adoptable  |

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) |
|--------|------------|-------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|--------------|
| 5.000  | 19.587     | 100.0       | 225      | Circular  | 126.000   | 125.325   | 0.450        | 126.000   | 125.129   | 0.646        |
| 8.000  | 10.419     | 100.0       | 150      | Circular  | 126.000   | 125.400   | 0.450        | 126.000   | 125.296   | 0.554        |
| 10.000 | 20.017     | 100.0       | 225      | Circular  | 125.750   | 125.000   | 0.525        | 125.750   | 124.800   | 0.725        |
| 7.002  | 11.614     | 60.0        | 225      | Circular  | 126.000   | 125.046   | 0.729        | 125.750   | 124.852   | 0.673        |
| 7.003  | 10.612     | 100.0       | 225      | Circular  | 125.750   | 124.800   | 0.725        | 125.900   | 124.694   | 0.981        |
| 1.006  | 5.632      | 100.0       | 300      | Circular  | 125.850   | 124.210   | 1.340        | 125.500   | 124.154   | 1.046        |
| 1.005  | 10.929     | 100.0       | 225      | Circular  | 125.900   | 124.394   | 1.281        | 125.850   | 124.285   | 1.340        |
| 1.007  | 7.526      | 100.0       | 300      | Circular  | 125.500   | 123.250   | 1.950        | 125.500   | 123.175   | 2.025        |
| 5.001  | 14.850     | 100.0       | 225      | Circular  | 126.000   | 125.129   | 0.646        | 126.000   | 124.980   | 0.795        |
| 1.001  | 23.295     | 100.0       | 225      | Circular  | 126.000   | 124.926   | 0.849        | 126.000   | 124.693   | 1.082        |
| 3.000  | 4.270      | 100.0       | 150      | Circular  | 126.000   | 125.400   | 0.450        | 126.000   | 125.357   | 0.493        |
| 1.002  | 15.307     | 100.0       | 225      | Circular  | 126.000   | 124.693   | 1.082        | 126.000   | 124.540   | 1.235        |

| Link   | US Node | Dia (mm) | Node Type | MH Type   | DS Node | Dia (mm) | Node Type | MH Type   |
|--------|---------|----------|-----------|-----------|---------|----------|-----------|-----------|
| 5.000  | 11      | 600      | Manhole   | Adoptable | 12      | 600      | Manhole   | Adoptable |
| 8.000  | 18      | 600      | Manhole   | Adoptable | 19      | 600      | Manhole   | Adoptable |
| 10.000 | 21      | 600      | Manhole   | Adoptable | 22      | 1050     | Manhole   | Adoptable |
| 7.002  | 17      | 600      | Manhole   | Adoptable | 22      | 1050     | Manhole   | Adoptable |
| 7.003  | 22      | 1050     | Manhole   | Adoptable | 23      | 1050     | Manhole   | Adoptable |
| 1.006  | 10      | 1350     | Manhole   | Adoptable | 24      | 1500     | Manhole   | Adoptable |
| 1.005  | 9       | 600      | Manhole   | Adoptable | 10      | 1350     | Manhole   | Adoptable |
| 1.007  | 24      | 1500     | Manhole   | Adoptable | 25      | 1200     | Manhole   | Adoptable |
| 5.001  | 12      | 600      | Manhole   | Adoptable | 13      | 600      | Manhole   | Adoptable |
| 1.001  | 1       | 600      | Manhole   | Adoptable | 4       | 450      | Manhole   | Adoptable |
| 3.000  | 5       | 600      | Manhole   | Adoptable | 4       | 450      | Manhole   | Adoptable |
| 1.002  | 4       | 450      | Manhole   | Adoptable | 6       | 600      | Manhole   | Adoptable |

Manhole Schedule

| Node | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections                                                                           | Link | IL<br>(m) | Dia<br>(mm) |     |
|------|----------------|-----------------|-----------|--------------|-------------|---------------------------------------------------------------------------------------|------|-----------|-------------|-----|
| 1    | 299986.610     | 518655.462      | 126.000   | 1.074        | 600         |  | 1    | 2.000     | 125.172     | 150 |
|      |                |                 |           |              |             |                                                                                       | 2    | 1.000     | 124.926     | 225 |
|      |                |                 |           |              |             |                                                                                       | 0    | 1.001     | 124.926     | 225 |
| 2    | 299997.973     | 518635.711      | 126.000   | 0.600        | 600         |  | 0    | 2.000     | 125.400     | 150 |
|      |                |                 |           |              |             |                                                                                       |      |           |             |     |
| 26   | 300018.131     | 518647.568      | 126.000   | 0.650        | 600         |  | 0    | 6.000     | 125.350     | 150 |
|      |                |                 |           |              |             |                                                                                       |      |           |             |     |
| 5    | 300008.792     | 518663.511      | 126.000   | 0.600        | 600         |  | 0    | 3.000     | 125.400     | 150 |
|      |                |                 |           |              |             |                                                                                       |      |           |             |     |
| 6    | 299998.732     | 518680.303      | 126.000   | 1.460        | 600         |  | 1    | 1.002     | 124.540     | 225 |
|      |                |                 |           |              |             |                                                                                       | 0    | 1.003     | 124.540     | 225 |
| 13   | 300027.746     | 518654.422      | 126.000   | 1.020        | 600         |  | 1    | 6.000     | 125.232     | 150 |
|      |                |                 |           |              |             |                                                                                       | 2    | 5.001     | 124.980     | 225 |
| 14   | 300013.859     | 518678.602      | 126.000   | 1.299        | 1050        |  | 0    | 5.002     | 124.980     | 225 |
|      |                |                 |           |              |             |                                                                                       | 1    | 5.002     | 124.701     | 225 |
| 3    | 299966.532     | 518689.945      | 126.000   | 0.675        | 600         |  | 0    | 1.000     | 125.325     | 225 |
|      |                |                 |           |              |             |                                                                                       |      |           |             |     |
| 8    | 299986.630     | 518701.597      | 126.000   | 0.600        | 600         |  | 0    | 4.000     | 125.400     | 150 |
|      |                |                 |           |              |             |                                                                                       |      |           |             |     |
| 7    | 299994.732     | 518687.342      | 126.000   | 1.541        | 600         |  | 1    | 4.000     | 125.236     | 150 |
|      |                |                 |           |              |             |                                                                                       | 2    | 1.003     | 124.459     | 225 |
| 9    | 300000.487     | 518690.468      | 125.900   | 1.506        | 600         |  | 0    | 1.004     | 124.459     | 225 |
|      |                |                 |           |              |             |                                                                                       | 1    | 1.004     | 124.394     | 225 |
|      |                |                 |           |              |             |                                                                                       | 0    | 1.005     | 124.394     | 225 |

Manhole Schedule

| Node | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections | Link | IL<br>(m) | Dia<br>(mm) |     |
|------|----------------|-----------------|-----------|--------------|-------------|-------------|------|-----------|-------------|-----|
| 10   | 300000.919     | 518701.388      | 125.850   | 1.640        | 1350        |             | 1    | 7.004     | 124.589     | 225 |
|      |                |                 |           |              |             |             | 2    | 5.003     | 124.439     | 225 |
|      |                |                 |           |              |             |             | 3    | 1.005     | 124.285     | 225 |
|      |                |                 |           |              |             |             | 0    | 1.006     | 124.210     | 300 |
|      |                |                 |           |              |             |             |      |           |             |     |
| 24   | 300003.119     | 518706.572      | 125.500   | 2.250        | 1500        |             | 1    | 1.006     | 124.154     | 300 |
|      |                |                 |           |              |             |             | 0    | 1.007     | 123.250     | 300 |
| 15   | 299961.529     | 518733.181      | 126.000   | 0.600        | 600         |             |      |           |             |     |
|      |                |                 |           |              |             |             | 0    | 7.000     | 125.400     | 150 |
| 16   | 299971.683     | 518738.948      | 126.000   | 0.717        | 600         |             | 1    | 7.000     | 125.283     | 150 |
|      |                |                 |           |              |             |             | 0    | 7.001     | 125.283     | 150 |
| 18   | 299960.303     | 518713.678      | 126.000   | 0.600        | 600         |             |      |           |             |     |
|      |                |                 |           |              |             |             | 0    | 8.000     | 125.400     | 150 |
| 19   | 299969.326     | 518718.887      | 126.000   | 0.704        | 600         |             | 1    | 8.000     | 125.296     | 150 |
|      |                |                 |           |              |             |             | 0    | 8.001     | 125.296     | 150 |
| 17   | 299979.702     | 518724.828      | 126.000   | 0.954        | 600         |             | 1    | 9.000     | 125.304     | 150 |
|      |                |                 |           |              |             |             | 2    | 8.001     | 125.176     | 150 |
|      |                |                 |           |              |             |             | 3    | 7.001     | 125.121     | 150 |
|      |                |                 |           |              |             |             | 0    | 7.002     | 125.046     | 225 |
| 20   | 299987.971     | 518729.665      | 126.000   | 0.600        | 600         |             |      |           |             |     |
|      |                |                 |           |              |             |             | 0    | 9.000     | 125.400     | 150 |
| 23   | 299991.412     | 518705.937      | 125.900   | 1.206        | 1050        |             | 1    | 7.003     | 124.694     | 225 |
|      |                |                 |           |              |             |             | 0    | 7.004     | 124.694     | 225 |
| 21   | 299968.218     | 518705.364      | 125.750   | 0.750        | 600         |             |      |           |             |     |
|      |                |                 |           |              |             |             | 0    | 10.000    | 125.000     | 225 |
| 22   | 299985.795     | 518714.941      | 125.750   | 0.950        | 1050        |             | 1    | 10.000    | 124.800     | 225 |
|      |                |                 |           |              |             |             | 2    | 7.002     | 124.852     | 225 |
|      |                |                 |           |              |             |             | 0    | 7.003     | 124.800     | 225 |
| 11   | 300006.061     | 518630.405      | 126.000   | 0.675        | 600         |             |      |           |             |     |
|      |                |                 |           |              |             |             | 0    | 5.000     | 125.325     | 225 |
| 12   | 300022.919     | 518640.378      | 126.000   | 0.871        | 600         |             | 1    | 5.000     | 125.129     | 225 |
|      |                |                 |           |              |             |             | 0    | 5.001     | 125.129     | 225 |
| 25   | 300010.622     | 518705.984      | 125.500   | 2.325        | 1200        |             | 1    | 1.007     | 123.175     | 300 |
| 4    | 300006.709     | 518667.239      | 126.000   | 1.307        | 450         |             | 1    | 3.000     | 125.357     | 150 |
|      |                |                 |           |              |             |             | 2    | 1.001     | 124.693     | 225 |
|      |                |                 |           |              |             |             | 0    | 1.002     | 124.693     | 225 |

Simulation Settings

|                      |                   |                            |        |                          |      |
|----------------------|-------------------|----------------------------|--------|--------------------------|------|
| Rainfall Methodology | FSR               | Winter CV                  | 0.840  | Check Discharge Rate(s)  | ✓    |
| Rainfall Events      | Singular          | Analysis Speed             | Normal | 100 year (l/s)           | 14.0 |
| FSR Region           | England and Wales | Skip Steady State          | x      | Check Discharge Volume   | ✓    |
| M5-60 (mm)           | 17.000            | Drain Down Time (mins)     | 240    | 100 year 360 minute (m³) | 205  |
| Ratio-R              | 0.400             | Additional Storage (m³/ha) | 0.0    |                          |      |
| Summer CV            | 0.750             | Starting Level (m)         |        |                          |      |

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) | Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 10                    | 0                     | 0                     | 0                     | 100                   | 0                     | 0                     | 0                     |
| 30                    | 0                     | 0                     | 0                     | 100                   | 50                    | 0                     | 0                     |

Pre-development Discharge Rate

|                              |            |            |      |                        |      |                  |      |
|------------------------------|------------|------------|------|------------------------|------|------------------|------|
| Site Makeup                  | Greenfield | SAAR (mm)  | 1183 | Region                 | 10   | QBar             | 6.7  |
| Greenfield Method            | IH124      | Soil Index | 4    | Growth Factor 100 year | 2.08 | Q 100 year (l/s) | 14.0 |
| Positively Drained Area (ha) | 0.752      | SPR        | 0.47 | Betterment (%)         | 0    |                  |      |

Pre-development Discharge Volume

|                              |            |            |         |                       |     |                    |       |
|------------------------------|------------|------------|---------|-----------------------|-----|--------------------|-------|
| Site Makeup                  | Greenfield | Soil Index | 4       | Return Period (years) | 100 | Betterment (%)     | 0     |
| Greenfield Method            | FSR/FEH    | SPR        | 0.47    | Climate Change (%)    | 0   | PR                 | 0.500 |
| Positively Drained Area (ha) | 0.752      | CWI        | 125.458 | Storm Duration (mins) | 360 | Runoff Volume (m³) | 205   |

Node 24 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | x       | Sump Available          | ✓                              |
| Invert Level (m)         | 123.250 | Product Number          | CTL-SHE-0108-7300-2250-7300    |
| Design Depth (m)         | 2.250   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 7.3     | Min Node Diameter (mm)  | 0                              |

Node 10 Soakaway Storage Structure

|                             |         |                           |         |                |        |                 |   |
|-----------------------------|---------|---------------------------|---------|----------------|--------|-----------------|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Porosity                  | 0.95    | Pit Width (m)  | 21.000 | Inf Depth (m)   |   |
| Side Inf Coefficient (m/hr) | 0.00000 | Invert Level (m)          | 124.210 | Pit Length (m) | 7.000  | Number Required | 1 |
| Safety Factor               | 1.0     | Time to half empty (mins) |         | Depth (m)      | 1.200  |                 |   |

Approval Settings

|                         |         |                                     |       |                              |       |
|-------------------------|---------|-------------------------------------|-------|------------------------------|-------|
| Node Size               | ✓       | Maximum Cover Depth (m)             | 3.000 | Surcharged Depth             | ✓     |
| Node Losses             | ✓       | Backdrops                           | ✓     | Return Period (years)        |       |
| Link Size               | ✓       | Minimum Backdrop Height (m)         |       | Maximum Surcharged Depth (m) | 0.100 |
| Minimum Diameter (mm)   | 150     | Maximum Backdrop Height (m)         | 1.500 | Flooding                     | ✓     |
| Link Length             | ✓       | Full Bore Velocity                  | ✓     | Return Period (years)        | 30    |
| Maximum Length (m)      | 100.000 | Minimum Full Bore Velocity (m/s)    |       | Time to Half Empty           | x     |
| Coordinates             | ✓       | Maximum Full Bore Velocity (m/s)    | 3.000 | Discharge Rates              | ✓     |
| Accuracy (m)            | 1.000   | Proportional Velocity               | ✓     | Discharge Volume             | ✓     |
| Crossings               | ✓       | Return Period (years)               |       | 100 year 360 minute (m³)     |       |
| Cover Depth             | ✓       | Minimum Proportional Velocity (m/s) | 0.750 |                              |       |
| Minimum Cover Depth (m) |         | Maximum Proportional Velocity (m/s) | 3.000 |                              |       |

| Results for 10 year Critical Storm Duration. Lowest mass balance: 99.56% |         |             |           |               |                |               |               |                    |
|--------------------------------------------------------------------------|---------|-------------|-----------|---------------|----------------|---------------|---------------|--------------------|
| Node Event                                                               | US Node | Peak (mins) | Level (m) | Depth (m)     | Inflow (l/s)   | Node Vol (m³) | Flood (m³)    | Status             |
| 15 minute winter                                                         | 1       | 10          | 125.030   | 0.104         | 21.7           | 0.0296        | 0.0000        | OK                 |
| 15 minute winter                                                         | 2       | 10          | 125.453   | 0.053         | 4.6            | 0.0150        | 0.0000        | OK                 |
| 15 minute winter                                                         | 26      | 10          | 125.404   | 0.054         | 4.6            | 0.0153        | 0.0000        | OK                 |
| 15 minute winter                                                         | 5       | 10          | 125.457   | 0.057         | 4.6            | 0.0161        | 0.0000        | OK                 |
| 15 minute winter                                                         | 6       | 10          | 124.693   | 0.153         | 30.5           | 0.0434        | 0.0000        | OK                 |
| 15 minute summer                                                         | 13      | 10          | 125.097   | 0.117         | 26.5           | 0.0331        | 0.0000        | OK                 |
| 15 minute winter                                                         | 14      | 10          | 124.849   | 0.148         | 37.2           | 0.1280        | 0.0000        | OK                 |
| 15 minute winter                                                         | 3       | 10          | 125.400   | 0.075         | 12.5           | 0.0211        | 0.0000        | OK                 |
| 15 minute summer                                                         | 8       | 10          | 125.498   | 0.098         | 12.5           | 0.0278        | 0.0000        | OK                 |
| 15 minute winter                                                         | 7       | 10          | 124.648   | 0.189         | 42.5           | 0.0534        | 0.0000        | OK                 |
| 120 minute winter                                                        | 9       | 110         | 124.604   | 0.210         | 12.9           | 0.0594        | 0.0000        | OK                 |
| 120 minute winter                                                        | 10      | 108         | 124.603   | 0.393         | 32.6           | 55.3958       | 0.0000        | SURCHARGED         |
| 120 minute winter                                                        | 24      | 108         | 124.602   | 1.352         | 15.4           | 2.3896        | 0.0000        | SURCHARGED         |
| 15 minute winter                                                         | 15      | 10          | 125.444   | 0.044         | 3.4            | 0.0126        | 0.0000        | OK                 |
| 15 minute winter                                                         | 16      | 10          | 125.350   | 0.067         | 6.8            | 0.0189        | 0.0000        | OK                 |
| 15 minute summer                                                         | 18      | 1           | 125.400   | 0.000         | 0.0            | 0.0000        | 0.0000        | OK                 |
| 15 minute winter                                                         | 19      | 10          | 125.342   | 0.046         | 3.4            | 0.0130        | 0.0000        | OK                 |
| 15 minute winter                                                         | 17      | 10          | 125.118   | 0.072         | 13.6           | 0.0204        | 0.0000        | OK                 |
| 15 minute summer                                                         | 20      | 1           | 125.400   | 0.000         | 0.0            | 0.0000        | 0.0000        | OK                 |
| 15 minute winter                                                         | 23      | 10          | 124.818   | 0.124         | 26.1           | 0.1070        | 0.0000        | OK                 |
| 15 minute winter                                                         | 21      | 10          | 125.075   | 0.075         | 12.7           | 0.0213        | 0.0000        | OK                 |
| 15 minute winter                                                         | 22      | 10          | 124.925   | 0.125         | 26.3           | 0.1086        | 0.0000        | OK                 |
| 15 minute winter                                                         | 11      | 10          | 125.375   | 0.050         | 5.6            | 0.0140        | 0.0000        | OK                 |
| 15 minute winter                                                         | 12      | 10          | 125.199   | 0.070         | 11.2           | 0.0199        | 0.0000        | OK                 |
| 120 minute summer                                                        | 25      | 50          | 123.223   | 0.048         | 6.2            | 0.0000        | 0.0000        | OK                 |
| 15 minute winter                                                         | 4       | 10          | 124.816   | 0.123         | 26.1           | 0.0195        | 0.0000        | OK                 |
| Link Event (Upstream Depth)                                              | US Node | Link        | DS Node   | Outflow (l/s) | Velocity (m/s) | Flow/Cap      | Link Vol (m³) | Discharge Vol (m³) |
| 15 minute winter                                                         | 1       | 1.001       | 4         | 21.5          | 1.073          | 0.414         | 0.4677        | 89.4               |
| 15 minute winter                                                         | 2       | 2.000       | 1         | 4.6           | 0.835          | 0.258         | 0.1251        |                    |
| 15 minute winter                                                         | 26      | 6.000       | 13        | 4.6           | 0.825          | 0.259         | 0.0658        |                    |
| 15 minute winter                                                         | 5       | 3.000       | 4         | 4.6           | 0.800          | 0.259         | 0.0246        |                    |
| 15 minute winter                                                         | 6       | 1.003       | 7         | 30.0          | 0.931          | 0.577         | 0.2608        |                    |
| 15 minute summer                                                         | 13      | 5.002       | 14        | 26.5          | 1.091          | 0.509         | 0.6753        |                    |
| 15 minute winter                                                         | 14      | 5.003       | 10        | 36.6          | 1.380          | 0.705         | 0.6966        |                    |
| 15 minute winter                                                         | 3       | 1.000       | 1         | 12.5          | 0.855          | 0.240         | 0.5886        |                    |
| 15 minute summer                                                         | 8       | 4.000       | 7         | 12.5          | 1.058          | 0.704         | 0.1936        |                    |
| 15 minute winter                                                         | 7       | 1.004       | 9         | 42.0          | 1.233          | 0.808         | 0.2230        |                    |
| 120 minute winter                                                        | 9       | 1.005       | 10        | 13.0          | 1.004          | 0.250         | 0.4281        |                    |
| 120 minute winter                                                        | 10      | 1.006       | 24        | 15.4          | 0.946          | 0.139         | 0.3966        |                    |
| 120 minute winter                                                        | 24      | 1.007       | 25        | 6.2           | 0.824          | 0.056         | 0.0568        |                    |
| 15 minute winter                                                         | 15      | 7.000       | 16        | 3.4           | 0.578          | 0.191         | 0.0697        |                    |
| 15 minute winter                                                         | 16      | 7.001       | 17        | 6.8           | 0.918          | 0.381         | 0.1198        |                    |
| 15 minute summer                                                         | 18      | 8.000       | 19        | 0.0           | 0.000          | 0.000         | 0.0238        |                    |
| 15 minute winter                                                         | 19      | 8.001       | 17        | 3.4           | 0.762          | 0.191         | 0.0532        |                    |
| 15 minute winter                                                         | 17      | 7.002       | 22        | 13.6          | 1.238          | 0.202         | 0.1288        |                    |
| 15 minute summer                                                         | 20      | 9.000       | 17        | 0.0           | 0.000          | 0.000         | 0.0000        |                    |
| 15 minute winter                                                         | 23      | 7.004       | 10        | 25.9          | 1.236          | 0.499         | 0.2211        |                    |
| 15 minute winter                                                         | 21      | 10.000      | 22        | 12.7          | 0.762          | 0.244         | 0.3438        |                    |
| 15 minute winter                                                         | 22      | 7.003       | 23        | 26.1          | 1.160          | 0.503         | 0.2391        |                    |
| 15 minute winter                                                         | 11      | 5.000       | 12        | 5.6           | 0.661          | 0.108         | 0.1671        |                    |
| 15 minute winter                                                         | 12      | 5.001       | 13        | 11.2          | 0.716          | 0.215         | 0.2334        |                    |
| 15 minute winter                                                         | 4       | 1.002       | 6         | 25.9          | 1.016          | 0.499         | 0.3901        |                    |

| Results for 30 year Critical Storm Duration. Lowest mass balance: 99.56% |         |             |           |               |                |               |               |                    |
|--------------------------------------------------------------------------|---------|-------------|-----------|---------------|----------------|---------------|---------------|--------------------|
| Node Event                                                               | US Node | Peak (mins) | Level (m) | Depth (m)     | Inflow (l/s)   | Node Vol (m³) | Flood (m³)    | Status             |
| 15 minute winter                                                         | 1       | 10          | 125.048   | 0.122         | 27.5           | 0.0344        | 0.0000        | OK                 |
| 15 minute winter                                                         | 2       | 10          | 125.461   | 0.061         | 5.9            | 0.0173        | 0.0000        | OK                 |
| 15 minute winter                                                         | 26      | 10          | 125.412   | 0.062         | 5.9            | 0.0177        | 0.0000        | OK                 |
| 15 minute winter                                                         | 5       | 10          | 125.466   | 0.066         | 5.9            | 0.0185        | 0.0000        | OK                 |
| 15 minute winter                                                         | 6       | 11          | 124.795   | 0.255         | 38.6           | 0.0722        | 0.0000        | SURCHARGED         |
| 15 minute summer                                                         | 13      | 10          | 125.117   | 0.137         | 33.7           | 0.0388        | 0.0000        | OK                 |
| 15 minute winter                                                         | 14      | 10          | 124.880   | 0.179         | 47.4           | 0.1552        | 0.0000        | OK                 |
| 15 minute winter                                                         | 3       | 10          | 125.409   | 0.084         | 15.7           | 0.0238        | 0.0000        | OK                 |
| 15 minute winter                                                         | 8       | 10          | 125.518   | 0.118         | 15.7           | 0.0333        | 0.0000        | OK                 |
| 120 minute winter                                                        | 7       | 114         | 124.751   | 0.292         | 16.4           | 0.0826        | 0.0000        | SURCHARGED         |
| 120 minute winter                                                        | 9       | 116         | 124.751   | 0.357         | 16.4           | 0.1009        | 0.0000        | SURCHARGED         |
| 120 minute winter                                                        | 10      | 116         | 124.750   | 0.540         | 39.9           | 76.2446       | 0.0000        | SURCHARGED         |
| 120 minute winter                                                        | 24      | 116         | 124.750   | 1.500         | 17.5           | 2.6506        | 0.0000        | SURCHARGED         |
| 15 minute winter                                                         | 15      | 10          | 125.450   | 0.050         | 4.3            | 0.0142        | 0.0000        | OK                 |
| 15 minute winter                                                         | 16      | 10          | 125.360   | 0.077         | 8.6            | 0.0218        | 0.0000        | OK                 |
| 15 minute summer                                                         | 18      | 1           | 125.400   | 0.000         | 0.0            | 0.0000        | 0.0000        | OK                 |
| 15 minute winter                                                         | 19      | 10          | 125.348   | 0.052         | 4.3            | 0.0148        | 0.0000        | OK                 |
| 15 minute winter                                                         | 17      | 10          | 125.128   | 0.082         | 17.2           | 0.0231        | 0.0000        | OK                 |
| 15 minute summer                                                         | 20      | 1           | 125.400   | 0.000         | 0.0            | 0.0000        | 0.0000        | OK                 |
| 15 minute winter                                                         | 23      | 10          | 124.838   | 0.144         | 33.0           | 0.1250        | 0.0000        | OK                 |
| 15 minute winter                                                         | 21      | 10          | 125.085   | 0.085         | 16.0           | 0.0241        | 0.0000        | OK                 |
| 15 minute winter                                                         | 22      | 10          | 124.948   | 0.148         | 33.2           | 0.1277        | 0.0000        | OK                 |
| 15 minute winter                                                         | 11      | 10          | 125.381   | 0.056         | 7.1            | 0.0158        | 0.0000        | OK                 |
| 15 minute winter                                                         | 12      | 10          | 125.209   | 0.080         | 14.2           | 0.0225        | 0.0000        | OK                 |
| 60 minute summer                                                         | 25      | 262         | 123.223   | 0.048         | 6.2            | 0.0000        | 0.0000        | OK                 |
| 15 minute winter                                                         | 4       | 11          | 124.844   | 0.151         | 33.2           | 0.0240        | 0.0000        | OK                 |
| Link Event (Upstream Depth)                                              | US Node | Link        | DS Node   | Outflow (l/s) | Velocity (m/s) | Flow/Cap      | Link Vol (m³) | Discharge Vol (m³) |
| 15 minute winter                                                         | 1       | 1.001       | 4         | 27.3          | 1.137          | 0.526         | 0.5687        | 111.5              |
| 15 minute winter                                                         | 2       | 2.000       | 1         | 5.9           | 0.892          | 0.331         | 0.1503        |                    |
| 15 minute winter                                                         | 26      | 6.000       | 13        | 5.9           | 0.880          | 0.332         | 0.0792        |                    |
| 15 minute winter                                                         | 5       | 3.000       | 4         | 5.9           | 0.852          | 0.332         | 0.0296        |                    |
| 15 minute winter                                                         | 6       | 1.003       | 7         | 36.8          | 0.925          | 0.708         | 0.3220        |                    |
| 15 minute summer                                                         | 13      | 5.002       | 14        | 33.9          | 1.137          | 0.651         | 0.8250        |                    |
| 15 minute winter                                                         | 14      | 5.003       | 10        | 46.5          | 1.439          | 0.895         | 0.8507        |                    |
| 15 minute winter                                                         | 3       | 1.000       | 1         | 15.7          | 0.899          | 0.302         | 0.7062        |                    |
| 15 minute winter                                                         | 8       | 4.000       | 7         | 15.7          | 1.098          | 0.884         | 0.2341        |                    |
| 120 minute winter                                                        | 7       | 1.004       | 9         | 16.4          | 1.080          | 0.315         | 0.2605        |                    |
| 120 minute winter                                                        | 9       | 1.005       | 10        | 16.0          | 1.032          | 0.307         | 0.4347        |                    |
| 120 minute winter                                                        | 10      | 1.006       | 24        | 17.5          | 0.949          | 0.157         | 0.3966        |                    |
| 120 minute winter                                                        | 24      | 1.007       | 25        | 6.2           | 0.824          | 0.056         | 0.0566        |                    |
| 15 minute winter                                                         | 15      | 7.000       | 16        | 4.3           | 0.611          | 0.242         | 0.0831        |                    |
| 15 minute winter                                                         | 16      | 7.001       | 17        | 8.6           | 0.972          | 0.483         | 0.1432        |                    |
| 15 minute summer                                                         | 18      | 8.000       | 19        | 0.0           | 0.000          | 0.000         | 0.0283        |                    |
| 15 minute winter                                                         | 19      | 8.001       | 17        | 4.3           | 0.811          | 0.242         | 0.0633        |                    |
| 15 minute winter                                                         | 17      | 7.002       | 22        | 17.2          | 1.234          | 0.255         | 0.1685        |                    |
| 15 minute summer                                                         | 20      | 9.000       | 17        | 0.0           | 0.000          | 0.000         | 0.0000        |                    |
| 15 minute winter                                                         | 23      | 7.004       | 10        | 32.8          | 1.304          | 0.632         | 0.2654        |                    |
| 15 minute winter                                                         | 21      | 10.000      | 22        | 16.0          | 0.794          | 0.308         | 0.4135        |                    |
| 15 minute winter                                                         | 22      | 7.003       | 23        | 33.0          | 1.213          | 0.636         | 0.2891        |                    |
| 15 minute winter                                                         | 11      | 5.000       | 12        | 7.1           | 0.706          | 0.137         | 0.1981        |                    |
| 15 minute winter                                                         | 12      | 5.001       | 13        | 14.2          | 0.751          | 0.273         | 0.2809        |                    |
| 15 minute winter                                                         | 4       | 1.002       | 6         | 32.7          | 1.024          | 0.629         | 0.5206        |                    |

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.56%

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute winter  | 1       | 11          | 125.122   | 0.196     | 35.3         | 0.0554        | 0.0000     | OK         |
| 15 minute winter  | 2       | 10          | 125.470   | 0.070     | 7.5          | 0.0198        | 0.0000     | OK         |
| 15 minute summer  | 26      | 10          | 125.422   | 0.072     | 7.5          | 0.0203        | 0.0000     | OK         |
| 15 minute summer  | 5       | 10          | 125.476   | 0.076     | 7.5          | 0.0214        | 0.0000     | OK         |
| 120 minute winter | 6       | 116         | 124.960   | 0.420     | 15.5         | 0.1190        | 0.0000     | SURCHARGED |
| 15 minute winter  | 13      | 10          | 125.151   | 0.171     | 43.2         | 0.0485        | 0.0000     | OK         |
| 15 minute winter  | 14      | 10          | 124.993   | 0.292     | 58.3         | 0.2526        | 0.0000     | SURCHARGED |
| 15 minute winter  | 3       | 10          | 125.422   | 0.097     | 20.3         | 0.0274        | 0.0000     | OK         |
| 15 minute winter  | 8       | 10          | 125.600   | 0.200     | 20.3         | 0.0566        | 0.0000     | SURCHARGED |
| 120 minute winter | 7       | 116         | 124.960   | 0.501     | 21.2         | 0.1419        | 0.0000     | SURCHARGED |
| 120 minute winter | 9       | 118         | 124.960   | 0.566     | 20.6         | 0.1602        | 0.0000     | SURCHARGED |
| 120 minute winter | 10      | 118         | 124.960   | 0.750     | 51.7         | 105.8040      | 0.0000     | SURCHARGED |
| 120 minute winter | 24      | 118         | 124.960   | 1.710     | 15.3         | 3.0208        | 0.0000     | SURCHARGED |
| 15 minute summer  | 15      | 10          | 125.458   | 0.058     | 5.6          | 0.0163        | 0.0000     | OK         |
| 15 minute winter  | 16      | 10          | 125.374   | 0.091     | 11.2         | 0.0258        | 0.0000     | OK         |
| 15 minute summer  | 18      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 19      | 10          | 125.356   | 0.060     | 5.6          | 0.0171        | 0.0000     | OK         |
| 15 minute winter  | 17      | 10          | 125.142   | 0.096     | 22.4         | 0.0271        | 0.0000     | OK         |
| 15 minute summer  | 20      | 1           | 125.400   | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |
| 120 minute winter | 23      | 118         | 124.960   | 0.266     | 13.2         | 0.2304        | 0.0000     | SURCHARGED |
| 15 minute summer  | 21      | 10          | 125.098   | 0.098     | 20.7         | 0.0277        | 0.0000     | OK         |
| 15 minute winter  | 22      | 10          | 124.982   | 0.182     | 43.0         | 0.1578        | 0.0000     | OK         |
| 15 minute winter  | 11      | 10          | 125.388   | 0.063     | 9.1          | 0.0179        | 0.0000     | OK         |
| 15 minute summer  | 12      | 10          | 125.220   | 0.091     | 18.2         | 0.0258        | 0.0000     | OK         |
| 120 minute winter | 25      | 118         | 123.223   | 0.048     | 6.3          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 4       | 11          | 125.045   | 0.352     | 39.3         | 0.0560        | 0.0000     | SURCHARGED |

| Link Event<br>(Upstream Depth) | US Node | Link   | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|--------------------------------|---------|--------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute winter               | 1       | 1.001  | 4       | 32.0          | 1.105          | 0.616    | 0.8904        | 119.5              |
| 15 minute winter               | 2       | 2.000  | 1       | 7.5           | 0.949          | 0.422    | 0.1798        |                    |
| 15 minute summer               | 26      | 6.000  | 13      | 7.5           | 0.934          | 0.423    | 0.0948        |                    |
| 15 minute summer               | 5       | 3.000  | 4       | 7.5           | 0.903          | 0.422    | 0.0355        |                    |
| 120 minute winter              | 6       | 1.003  | 7       | 15.0          | 0.826          | 0.289    | 0.3220        |                    |
| 15 minute winter               | 13      | 5.002  | 14      | 41.0          | 1.176          | 0.789    | 1.0065        |                    |
| 15 minute winter               | 14      | 5.003  | 10      | 57.4          | 1.447          | 1.105    | 1.0042        |                    |
| 15 minute winter               | 3       | 1.000  | 1       | 20.3          | 0.949          | 0.390    | 1.0299        |                    |
| 15 minute winter               | 8       | 4.000  | 7       | 20.0          | 1.143          | 1.128    | 0.2766        |                    |
| 120 minute winter              | 7       | 1.004  | 9       | 20.6          | 1.080          | 0.397    | 0.2605        |                    |
| 120 minute winter              | 9       | 1.005  | 10      | 19.9          | 1.021          | 0.383    | 0.4347        |                    |
| 120 minute winter              | 10      | 1.006  | 24      | 15.3          | 0.937          | 0.138    | 0.3966        |                    |
| 120 minute winter              | 24      | 1.007  | 25      | 6.3           | 0.828          | 0.057    | 0.0576        |                    |
| 15 minute summer               | 15      | 7.000  | 16      | 5.6           | 0.652          | 0.315    | 0.1017        |                    |
| 15 minute winter               | 16      | 7.001  | 17      | 11.2          | 1.032          | 0.629    | 0.1757        |                    |
| 15 minute summer               | 18      | 8.000  | 19      | 0.0           | 0.000          | 0.000    | 0.0346        |                    |
| 15 minute winter               | 19      | 8.001  | 17      | 5.6           | 0.870          | 0.315    | 0.0769        |                    |
| 15 minute winter               | 17      | 7.002  | 22      | 22.3          | 1.235          | 0.332    | 0.2318        |                    |
| 15 minute summer               | 20      | 9.000  | 17      | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| 120 minute winter              | 23      | 7.004  | 10      | 13.2          | 1.049          | 0.253    | 0.4191        |                    |
| 15 minute summer               | 21      | 10.000 | 22      | 20.7          | 0.841          | 0.398    | 0.5105        |                    |
| 15 minute winter               | 22      | 7.003  | 23      | 42.7          | 1.264          | 0.821    | 0.3582        |                    |
| 15 minute winter               | 11      | 5.000  | 12      | 9.1           | 0.755          | 0.175    | 0.2372        |                    |
| 15 minute summer               | 12      | 5.001  | 13      | 18.2          | 0.776          | 0.350    | 0.3483        |                    |
| 15 minute winter               | 4       | 1.002  | 6       | 36.5          | 1.023          | 0.702    | 0.6088        |                    |

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.56%

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute winter  | 1       | 11          | 125.726   | 0.800     | 52.0         | 0.2264        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 2       | 11          | 125.791   | 0.391     | 11.3         | 0.1105        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 26      | 11          | 125.744   | 0.394     | 11.3         | 0.1114        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 5       | 12          | 125.588   | 0.188     | 11.3         | 0.0531        | 0.0000     | SURCHARGED |
| 180 minute winter | 6       | 176         | 125.478   | 0.938     | 16.5         | 0.2653        | 0.0000     | SURCHARGED |
| 15 minute winter  | 13      | 11          | 125.701   | 0.721     | 54.8         | 0.2040        | 0.0000     | FLOOD RISK |
| 180 minute winter | 14      | 176         | 125.477   | 0.776     | 20.8         | 0.6718        | 0.0000     | SURCHARGED |
| 15 minute winter  | 3       | 11          | 125.826   | 0.501     | 30.4         | 0.1419        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 8       | 10          | 125.931   | 0.531     | 30.4         | 0.1502        | 0.0000     | FLOOD RISK |
| 180 minute winter | 7       | 176         | 125.477   | 1.018     | 23.2         | 0.2882        | 0.0000     | SURCHARGED |
| 180 minute winter | 9       | 176         | 125.477   | 1.083     | 22.8         | 0.3065        | 0.0000     | SURCHARGED |
| 180 minute winter | 10      | 176         | 125.476   | 1.266     | 54.7         | 169.4620      | 0.0000     | SURCHARGED |
| 180 minute winter | 24      | 176         | 125.476   | 2.226     | 16.2         | 3.9332        | 0.0000     | FLOOD RISK |
| 180 minute winter | 15      | 176         | 125.477   | 0.077     | 1.9          | 0.0217        | 0.0000     | OK         |
| 180 minute winter | 16      | 176         | 125.477   | 0.194     | 3.8          | 0.0548        | 0.0000     | SURCHARGED |
| 180 minute winter | 18      | 176         | 125.477   | 0.077     | 0.3          | 0.0218        | 0.0000     | OK         |
| 180 minute winter | 19      | 176         | 125.477   | 0.181     | 1.9          | 0.0512        | 0.0000     | SURCHARGED |
| 180 minute winter | 17      | 176         | 125.477   | 0.431     | 7.6          | 0.1219        | 0.0000     | SURCHARGED |
| 180 minute winter | 20      | 176         | 125.477   | 0.077     | 0.2          | 0.0217        | 0.0000     | OK         |
| 180 minute winter | 23      | 176         | 125.477   | 0.783     | 14.7         | 0.6777        | 0.0000     | SURCHARGED |
| 180 minute winter | 21      | 176         | 125.477   | 0.477     | 7.1          | 0.1349        | 0.0000     | FLOOD RISK |
| 180 minute winter | 22      | 176         | 125.477   | 0.677     | 14.7         | 0.5860        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 11      | 11          | 125.754   | 0.428     | 13.7         | 0.1213        | 0.0000     | FLOOD RISK |
| 15 minute winter  | 12      | 11          | 125.741   | 0.612     | 24.6         | 0.1732        | 0.0000     | FLOOD RISK |
| 180 minute winter | 25      | 176         | 123.226   | 0.051     | 7.2          | 0.0000        | 0.0000     | OK         |
| 15 minute winter  | 4       | 12          | 125.573   | 0.880     | 49.1         | 0.1399        | 0.0000     | SURCHARGED |

| Link Event (Upstream Depth) | US Node | Link   | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|--------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute winter            | 1       | 1.001  | 4       | 41.2          | 1.109          | 0.792    | 0.9265        | 155.8              |
| 15 minute winter            | 2       | 2.000  | 1       | 11.4          | 0.971          | 0.642    | 0.4011        |                    |
| 15 minute winter            | 26      | 6.000  | 13      | 11.0          | 0.966          | 0.619    | 0.2079        |                    |
| 15 minute winter            | 5       | 3.000  | 4       | 11.3          | 0.993          | 0.637    | 0.0752        |                    |
| 180 minute winter           | 6       | 1.003  | 7       | 16.2          | 0.774          | 0.311    | 0.3220        |                    |
| 15 minute winter            | 13      | 5.002  | 14      | 54.7          | 1.375          | 1.052    | 1.1090        |                    |
| 180 minute winter           | 14      | 5.003  | 10      | 19.6          | 1.091          | 0.377    | 1.0422        |                    |
| 15 minute winter            | 3       | 1.000  | 1       | 29.3          | 1.012          | 0.563    | 1.5869        |                    |
| 15 minute winter            | 8       | 4.000  | 7       | 30.0          | 1.702          | 1.687    | 0.2857        |                    |
| 180 minute winter           | 7       | 1.004  | 9       | 22.8          | 1.038          | 0.439    | 0.2605        |                    |
| 180 minute winter           | 9       | 1.005  | 10      | 22.5          | 0.888          | 0.432    | 0.4347        |                    |
| 180 minute winter           | 10      | 1.006  | 24      | 16.2          | 0.907          | 0.146    | 0.3966        |                    |
| 180 minute winter           | 24      | 1.007  | 25      | 7.2           | 0.858          | 0.065    | 0.0631        |                    |
| 180 minute winter           | 15      | 7.000  | 16      | 1.9           | 0.492          | 0.107    | 0.1557        |                    |
| 180 minute winter           | 16      | 7.001  | 17      | 3.8           | 0.789          | 0.214    | 0.2859        |                    |
| 180 minute winter           | 18      | 8.000  | 19      | -0.3          | -0.029         | -0.016   | 0.1391        |                    |
| 180 minute winter           | 19      | 8.001  | 17      | 1.9           | 0.649          | 0.107    | 0.2105        |                    |
| 180 minute winter           | 17      | 7.002  | 22      | 7.6           | 1.097          | 0.113    | 0.4619        |                    |
| 180 minute winter           | 20      | 9.000  | 17      | 0.3           | 0.028          | 0.014    | 0.1277        |                    |
| 180 minute winter           | 23      | 7.004  | 10      | 13.7          | 1.027          | 0.264    | 0.4191        |                    |
| 180 minute winter           | 21      | 10.000 | 22      | 7.1           | 0.695          | 0.136    | 0.7961        |                    |
| 180 minute winter           | 22      | 7.003  | 23      | 14.7          | 1.021          | 0.282    | 0.4221        |                    |
| 15 minute winter            | 11      | 5.000  | 12      | 13.2          | 0.793          | 0.255    | 0.7790        |                    |
| 15 minute winter            | 12      | 5.001  | 13      | 23.9          | 0.780          | 0.460    | 0.5906        |                    |
| 15 minute winter            | 4       | 1.002  | 6       | 47.0          | 1.182          | 0.905    | 0.6088        |                    |



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