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# Engineering Services Report

## Foul Water Drainage,
## Storm Water Drainage
## Watermains

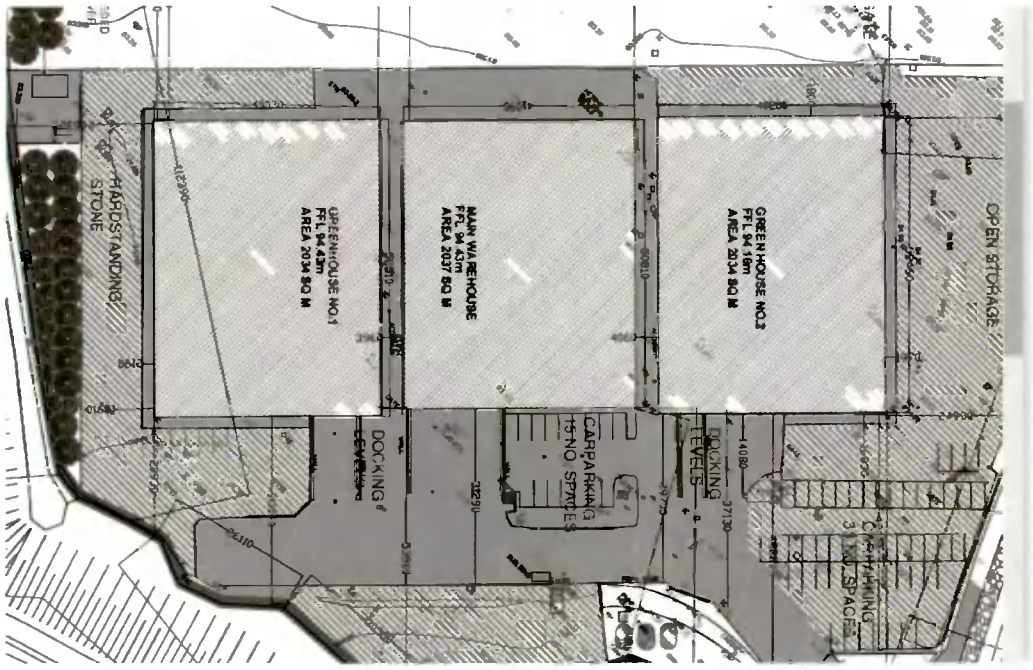
**Project:** Wilson Auctions,
Green Isle Road,
Corkagh, Dublin 22.

## 1 INTRODUCTION

### *1.1 Introduction*

Clarke has been commissioned by the applicant, RGR Holdings Ltd to assess the existing foul and surface water drainage scheme and watermains scheme for Wilsons Auction development at Green Isle Road, Corkagh,Dublin 22.

This development consists of 2 No Greenhouses, Warehouse, car parking and hard standing areas as shown below.




The schedule of drawings accompanying this report are:-

| Dwg No | Title | Scale | Size | Rev |
|---|---|---|---|---|
| 4996-02-P020 | Services Layout sheet 1 of 2 | 1:500 | A1 | 2 |
| 4996-02-P021 | Services Layout sheet 2 of 2 | 1:500 | A1 | 2 |
| 4996-02-P022 | Petrol Interceptor and Attenuation details | 1:200 | A1 | 0 |

## 1. Storm water

The surface water from hard standing area is collected by gulleys and roof water is collected by gutters and discharges to three No. rainwater harvesting storage tanks. This grey water is fed back to the building.

The excess water overflows from the storage tanks to a proposed silt trap and petrol/oil interceptor before discharging into Attenuation storm water management system (stormtec) with an out fall to the stream.

The areas contributing are:-

a) Green Areas ....7,213sqm
b) Roof Hard standing Area ..... .....8,952sqm

The rational method is used to determine peak runoff discharge for return periods of 5, 10, 20, 50 & 100 years with rainfall intensities obtained from the Meteorological Office. The impermeable area which includes roads, & paving is estimated to be 8,952$m^2$. The coefficient for the impervious area was 0.8. The allowable discharge for this scheme is 3.4 l/s which is deducted from the net flow from the site.

The volume of storage required for the site for a return period of 30 years is 255$m^3$. The volume of storage required for the site for a return period of 100 years is 407$m^3$.

The method in which the storage volume is calculated is conservative. The calculation assumes no benefit from the storage capacity of the pipes or a reduction in rainfall intensities as with the modified rational method for time of concentration. The permissible flow was obtained from table 2.2 of Dublin Corporation flood studies report which is suited for a large urban catchments area. The table of rainfall intensities and design of the attenuation is indicated below:-

Modified Rational Method the design criteria:

- Pipe roughness coefficient, Ks = 0.6mm
- Time of entry = 3 minutes
- Storm return period = 5 to 100years
- Climate Change = 20% Additional Runoff

In addition it is assumed that roads, footpaths and parking bays are 80% impermeable with open spaces and gardens being 10% impermeable.

The impermeable area which includes Roofs, Roads & Paving is estimated to be 8,952$m^2$.The coefficient for the impervious area is 0.8.

Rational method Equation

**QT =1.2 kCiA**
Where :

- QT – Peak Flow (m3/s)
- k – 0.00278
- C – Run off Coefficient – 0.8
- i – Rainfall Intensity (mm/hr)
- A – Catchment Area – 0.40 ha
- *1.2* - Allowance for 20% Climate Change

Total Area 1.6Ha

Rainfall intensities From Dublin Airport Station( to 50 yrs)Modified Rational Method after 50 yrs.
Development

| | |
|---|---|
| IMPERMEABILTY FACTOR = 0.8<br>Paved Area = 8952 | IMPERMEABILITY FACTOR = 0.1<br>Green Area= 7213 |

RETURN PERIOD 100year

| Duration | Intensity | Existing flow | New flow | Flow to storage | Storage |
|---|---|---|---|---|---|
| (mins) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($M^3$) |
| | | | | | |
| 15 | 99.6 | 3.4 | 198.14 | 194.71 | 175 |
| 30 | 60 | 3.4 | 119.36 | 115.93 | 209 |
| 60 | 36.7 | 3.4 | 73.01 | 69.58 | 250 |
| 120 | 22.5 | 3.4 | 44.76 | 41.33 | 298 |
| 240 | 13.125 | 3.4 | 26.11 | 22.68 | 327 |
| 360 | 10.72 | 3.4 | 21.33 | 17.90 | 387 |
| 720 | 6.46 | 3.4 | 12.85 | 9.42 | 407 |
| 1440 | 3.76 | 3.4 | 7.48 | 4.05 | 350 |

RETURN PERIOD 50year

| Duration | Intensity | Existing flow | New flow | Flow to storage | Storage |
|---|---|---|---|---|---|
| (mins) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($M^3$) |
| 15 | 76 | 3.4 | 151.19 | 147.76 | 133 |
| 30 | 49.8 | 3.4 | 99.07 | 95.64 | 172 |
| 60 | 30 | 3.4 | 59.68 | 56.25 | 203 |
| 120 | 18.35 | 3.4 | 36.50 | 33.07 | 238 |
| 240 | 11.125 | 3.4 | 22.13 | 18.70 | 269 |
| 360 | 8.76 | 3.4 | 17.43 | 14.00 | 302 |
| 720 | 5.358 | 3.4 | 10.66 | 7.23 | 312 |
| 1440 | 3.23 | 3.4 | 6.43 | 3.00 | 259 |
| 2880 | 1.88 | 3.4 | 3.74 | 0.31 | 54 |

RETURN PERIOD 20year

| Duration | Intensity | Existing flow | New flow | Flow to storage | Storage |
|---|---|---|---|---|---|
| (mins) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($M^3$) |
| 5 | 87.6 | 3.4 | 174.27 | 170.84 | 51 |
| 10 | 64.8 | 3.4 | 128.91 | 125.48 | 75 |
| 15 | 58.8 | 3.4 | 116.97 | 113.54 | 102 |
| 30 | 38.4 | 3.4 | 76.39 | 72.96 | 131 |
| 60 | 23.4 | 3.4 | 46.55 | 43.12 | 155 |
| 120 | 14.65 | 3.4 | 29.14 | 25.71 | 185 |
| 240 | 9.125 | 3.4 | 18.15 | 14.72 | 212 |
| 360 | 7.2 | 3.4 | 14.32 | 10.89 | 235 |
| 720 | 4.43 | 3.4 | 8.81 | 5.38 | 233 |
| 1440 | 2.675 | 3.4 | 5.32 | 1.89 | 163 |

RETURN PERIOD 10year

| Duration | Intensity | Existing flow | New flow | Flow to storage | Storage |
|---|---|---|---|---|---|
| (mins) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($M^3$) |
| 5 | 75.6 | 3.4 | 150.39 | 146.96 | 44 |
| 10 | 55.2 | 3.4 | 109.81 | 106.38 | 64 |
| 15 | 45.6 | 3.4 | 90.71 | 87.28 | 79 |
| 30 | 30 | 3.4 | 59.68 | 56.25 | 101 |
| 60 | 19.2 | 3.4 | 38.20 | 34.77 | 125 |
| 120 | 12 | 3.4 | 23.87 | 20.44 | 147 |
| 240 | 7.5 | 3.4 | 14.92 | 11.49 | 165 |
| 360 | 6 | 3.4 | 11.94 | 8.51 | 184 |
| 720 | 3.75 | 3.4 | 7.46 | 4.03 | 174 |
| 1440 | 2.3 | 3.4 | 4.58 | 1.15 | 99 |

RETURN PERIOD 5 year

| Duration | Intensity | Existing flow | New flow | Flow to storage | Storage |
|---|---|---|---|---|---|
| (mins) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($M^3$) |
| 5 | 64.8 | 3.4 | 128.91 | 125.48 | 38 |
| 10 | 46.8 | 3.4 | 93.10 | 89.67 | 54 |
| 15 | 36.8 | 3.4 | 73.21 | 69.78 | 63 |
| 30 | 24.2 | 3.4 | 48.14 | 44.71 | 80 |
| 60 | 15.6 | 3.4 | 31.03 | 27.60 | 99 |
| 120 | 10 | 3.4 | 19.89 | 16.46 | 119 |
| 240 | 6.5 | 3.4 | 12.93 | 9.50 | 137 |
| 360 | 5 | 3.4 | 9.95 | 6.52 | 141 |
| 720 | 3.25 | 3.4 | 6.47 | 3.04 | 131 |
| 1440 | 1.96 | 3.4 | 3.90 | 0.47 | 41 |

| Time of concentration 10 min | | |
|---|---|---|
| Duration | Time Yrs | Storage m3 |
| 720 min | 5 | 131 |
| 720 min | 20 | 233 |
| 720 min | 100 | 407 |

The permissible discharge is calculated using the estimation method contained in the institute of Hydrology Report No: 124:
QBAR = 0.00108 X (AREA) 0.89 X (SAAR) 1.17 X (SOIL) 2.17

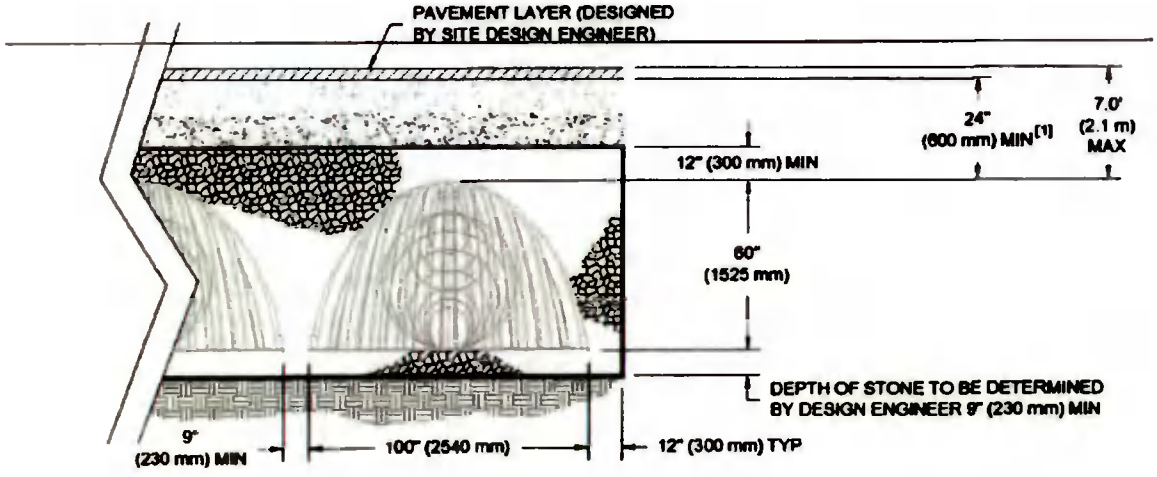
The peak Greenfield runoff rate is calculated using QBAR for 50 hectares and linearly interpolaflow rates for smaller area. The permissible discharge for this site is 3.4 l/s (Greenfield runoff rate 2.10 l/s/ha, assumed soil index 0.4).

The attenuation is designed for a storage volume of 407$m^3$ to attenuate flow of up to 100 year return period. It is designed with a sedimentation fore bay to reduce sediment input before the tank.

The outfall for the surface water is to discharge to the stream on South West boundary.
*Proposed Attenuation Tank*

Tank Summary:

- MC4500 Chambers
- 76 chambers
- 22.90m x 14.41m
- Capacity: 407m3

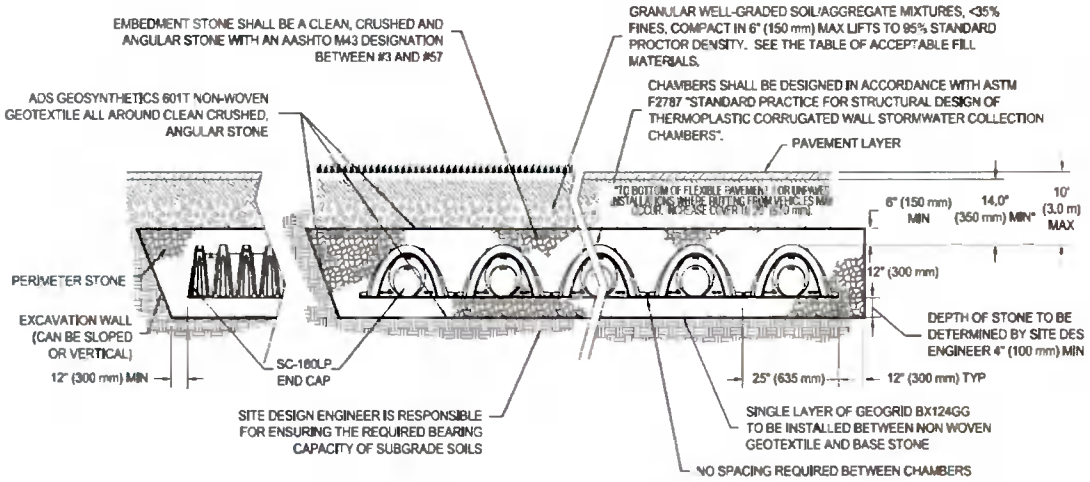



[1] - TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm)

## Proposed Storm water Management System

Stormwater detention systems temporarily holds water while it is released at a defined rate through an outlet.

A StormTech chamber system requires the application of clean, crushed, angular stone below, between and above the chambers. The stone serves as a structural component while allowing conveyance and storage of stormwater. Storage volume are calculated with an assumption that the stone has an industry standard porosity of 40%.




The surface water run-off is initially collected in rainwater harvesting holding tanks with the excess water overflowing to an attenuation system. Prior to entering this attenuation system the water passes through a silt trap and a petrol/oil interceptor. This system is detailed on drawing 4996-02-P020.

This SuDS system aims to minimise or eliminate discharges from the site, thus reducing its impact.

## Proposed Interceptor Details

All surface water from the hard standing areas should pass through a silt trap and a petrol/Oil interceptor.

Kingspan Klargester oil/petrol full retention separator NSFA 12525 to be installed upstream of attenuation system to containing oil and other hydrocarbons that have entered a drainage system.

Full-retention separator is designed and tested in accordance with BS EN858-1-2 and is proven to effectively separate oil and water under test to less than 1 parts per million and, therefore, protect the environment and public safety.

Under the new PPG3 guidelines all separators must be provided with an alarm system. This automatic warning device indicates that the separator is in need of immediate maintenance for it to continue to work effectively. A full technical and service package is available which can include product specification, separator & alarm installation, commissioning, oil and silt removal, service and maintenance.

## 2. Foul Water

The Foul Sewerage discharges via a 150mm pipe network to a Waste water treatment system, Klargester Model BE Biodisc Unit. The final effluent discharges to a percolation area. Refer to drawing 4996-02-P020

This Treatment system consists of three zones

- Primary Settlement
- Secondary Treatment (oxidation by rotating biological contactor
- Humus Settlement

The tertiary treatment is a percolation area where the discharge rate through the trench base and sidewalls is controlled by biomat on floor and side walls. The wastewater flows out through orifices in the distribution pipes into a gravel underlay which then distributes it to the soil where it undergoes biological, physical and chemical interactions.

The treatment system is designed to cater for 40 persons in an industrial environment. The design loading is

- 1200 l/day (6PE)
- 800g BOD/day

## WATERMAINS

A 150mm water main connections off the existing public watermain and is laid in a loop around the premises.

There is a bulk meter and a sluice valve placed outside the boundary of the premises.