Carbury Housing
Co. Kildare

StormWater Management Plan Report for the Residential development at Herbert Place

April 2024

2316

Issue No. 1

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1 Introduction

1.1 General

This report addresses the storm water management for the proposed domestic development at Carbury Co. Kildare

A description of the proposed development is as follows:

- The construction of a 4 new domestic units on a greenfield site.
- The redevelopment of an existing building on the stie into a new domestic unit.
- All associated site works.

1.2 Proposed Stormwater Management Plan Summary

In order to comply with modern standards, stormwater shall be treated using nature based solutions as far as possible in line with the KCC Development Plan.

The new development shall include a combination of soft landscaping throughout the site and all paving and hard surfacing shall be formed with permeable and porous systems.

Run-off from the roofs of the new domestic dwellings shall be contained within the curtilage of each unit and soak to ground via new soakaway systems.

2 Stormwater Management Plan

2.1.1 Existing Site

The site is occupied by two existing building with access from the public road via a tarmacadam driveway/ parking. There are no noticeable stormwater management features on site the site but all stormwater will soak to ground as the receiving strata has good permeability.

2.1.2 Proposed StormWater Management.

The proposed new development shall incorporate Nature based solutions for the treatment of stormwater and all stormwater shall be contained within the site.

New Buildings - Sedum/ Blue Roofs

The roofs of the units are proposed as traditional pitched roofs sloping to the front and rear. Therefore blue and green roofs and not considered suitable for this development.

Soakaways

Site investigations have shown that the ground conditions are suitable for soakaways.

Run-off from the roofs of the domestic units shall be directed to soakaways in the front and rear garden.

All ground level surfacing within the curtilage of each unit shall be finishes with a combination of soft landscaping and permeable surfaces.

External Areas and Ground Level Treatment – Permeable Finishes and Soft Landscaping.

All external ground level area will be finished with a combination of permeable finishes and soft landscaping. The subbase of these systems shall be formed with a clean crushed stone to provide an adequate volume to allow the storm water to soak to ground which will also improve the water quality.

Details of the stormwater management are shown on CORA drawings 2316C0003

2.1.3 Conclusion of Stormwater Management Plan

The above stormwater management plan proposes *nature based solutions* to treat stormwater on the site. All suite of measures included in the proposed development shall make a significant improvement to the current situation where all stormwater is directed to the public combined sewers.

Appendix A – Soakaway Calculations

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Co. Kildare
Impermeable area drained to the system	A = **50.0** m^2
Return period	Period = **50** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.300**
5-year return period rainfall of 60 minutes duration	M5_60min = **17.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **0** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **800** mm
Width of pit	w = **2000** mm
Length of pit	l = **2000** mm
Percentage free volume	V_{free} = **95** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **300** mm
Width of trial pit	b_{trial} = **300** mm
Depth of trial pit (below invert)	d_{trial} = **800** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	d_{75} = (d_{trial} × 0.75) = **600.00** mm
50% depth of pit	d_{50} = (d_{trial} × 0.50) = **400.00** mm
25% depth of pit	d_{25} = (d_{trial} × 0.25) = **200.00** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **42** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **44** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **55** min
Longest time to fall from 75% depth to 25% depth	t_{lg} = max(T1, T2, T3) = **55** min
Storage volume from 75% to 25% depth	V_{p75_25} = (l_{trial} × b_{trial} × (d_{75} - d_{25})) × V_{trial} = **0.04** m^3
Internal surface area to 50% depth	a_{p50} = ((l_{trial} × b_{trial}) + (l_{trial} + b_{trial}) × 2 × d_{50}) = **0.57** m^2
Surface area of soakaway to 50% storage depth	A_{s50} = 2 × (l_{trial} + b_{trial}) × d_{trial} / 2 = **0.480** m^2
Soil infiltration rate	f = V_{p75_25} / (a_{p50} × t_{lg}) = **19.1×10^{-6}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **3200000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M50 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	50 year rainfall, M50 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.34;	5.8;	1.63;	9.4;	0.47;	0.02;	0.45
10	0.49;	8.3;	1.67;	13.9;	0.69;	0.04;	0.66
15	0.59;	10.0;	1.69;	17.0;	0.85;	0.06;	0.79
30	0.77;	13.1;	1.70;	22.2;	1.11;	0.11;	1.00

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	50 year rainfall, M50 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
60	1.00;	17.0;	1.68;	28.6;	1.43;	0.22;	1.21
120	1.25;	21.3;	1.65;	35.2;	1.76;	0.44;	1.32
240	1.57;	26.7;	1.63;	43.5;	2.18;	0.88;	1.29
360	1.78;	30.3;	1.61;	48.7;	2.43;	1.32;	1.11
600	2.12;	36.0;	1.58;	56.9;	2.85;	2.20;	0.64
1440	2.84;	48.3;	1.53;	73.7;	3.69;	5.29;	0.00

Required storage volume S_{req} = **1.32** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **3.04** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 2hr 59min 37s

PASS - Soakaway discharge time less than or equal to 24 hours