

20047

PROPOSED DEVELOPMENT AT CLONBRONE, LUCAN

Civil Engineer's Response to Request for Clarification of Additional Information

Ref: SD22A/0390

Prepared For:
South Dublin County Council

Revision Register

Revision	Description	Prepared By	Checked By	Date
0	Issued to SDCC	IC	LK	01.06.23

1.0 Introduction

There follows a response to the civil engineering aspects of the request for Clarification of Additional Information requested by South Dublin County Council. This refers to Planning Register Reference SD22A/0390.

1. The Applicant is requested to provide the following clarification in relation to the proposed drainage and water services infrastructure:

(i) Submit a report showing site specific run-off rate and run-off volume calculations to clarify what water storage capacity is required to be attenuated to match the pre-developed greenfield run off rates on site.

The report shall include the following:

- a) The total area of site in km² or ha.
- b) Seasonally Adjusted Annual Rate (SAAR) in mm.
- c) Attenuation coefficients of soil.
- d) Qbar calculations and results in m³ /s or l/s.
- e) Enlist the different type of areas (such as roofs, yard, grassed area, permeable pavement) and including their Impermeability Factor. SuDS such as the proposed swale or tree pits should not be included in the grassed area, as their attenuation volume is calculated separately.
- f) Provide calculation for the total impermeable area in km² or ha. 1.2

Downes Associates response to item (i):

The Qbar calculation is included within our initial planning report. Extract below included for reference. As noted within our report – the Qbar value of 0.8L/sec is impractically low for a hydrobrake. A practical throttle rate of 2L/sec was agreed between Ian Connolly of Downes Associates and Ronan Toft of SDCC via email on 18 November 2021.

Pipes within the site carrying surface water shall be sized to cater for a rainfall intensity of 50mm per hour applied to all external impermeable areas and roofs. Surface water runoff from impermeable areas is calculated using the Modified Rational Method as follows:

$$Q = 2.78CvCriA \text{ (where } Q \text{ is in l/s, } i \text{ is in mm/hr and } A \text{ is in Ha)}$$

$$Cv = 0.75 \text{ and } Cr = 1.3$$

$$Q = 2.78iA$$

A roughness coefficient, ks of 0.6mm is used for surface water drains. Pipe size and gradient for each run are determined using the Causeway Flow+ Design Software.

Runoff Rate Calculation

The runoff rate for greenfield sites, Qbar, is estimated using the HR Wallingford estimation tool that refers to the Institute of Hydrology Report No. 124 – Flood Estimation for Small Catchments (see below).

The input used in the estimation is as follows:

Total Site Area: 0.3073 Ha

SOIL Type: 2

SPR is a parameter which is used by the Flood Studies Report (FSR). Standard Percentage Runoff is the percentage of rainfall that contributes to the increase of surface runoff based on analysis of data from flood events and adjusted for rainfall and catchment properties.

SPR: 0.3

Standard Average Annual Rainfall (SAAR) for Clonbrone, Lucan: 953mm

Qbar, rural = 0.8l/s for 0.3073 Ha (Site Area)

Attenuation Storage Analysis

Analyses of the surface water runoff from the areas contributing to the storage volumes were carried out using the Causeway Flow+ Design Software (see below). The analysis was carried out for the 100-year return period as appropriate to the design criterion. To allow for potential future climate change, 10% increase has been allowed for in calculations. Tree pits are also provided extensively throughout the development. Details of same are included on our attached drawings. Design Details The total storage volume required is split between a swale and an underground concrete attenuation tank. The available space on the site does not permit the entire storage volume requirement to be accommodated within the swale. As such, the swale is accompanied by the tank as described above. With regard to limiting outflow from the storage system, a 'Hydrobrake' (or similar approved) flow control device is to be fitted at the outlet manhole. The Hydrobrake is to meet the required flow characteristics for the system restricting the flow to 2.0L/sec as agreed with South Dublin County Council. Refer to attached drainage layout drawing for details of the proposed surface water drainage layout.

It should be noted that this full report requested above, including all calculations and output from the Causeway Flow stormwater modelling software was included with our original planning report.

(ii) Submit a report clearly showing the required and the provided volume of storm water attenuation, namely how surface water up to and including the 1:100 (1%) year critical storm with climate change allowance (20%) will be attenuated on site. Should there be a requirement to provide additional surface water attenuation, the above ground attenuation (such as SuDS) is preferred opposed to underground attenuation. In this case submit a report and drawings in plan and cross-sectional view with the inclusion of additional SuDS for the proposed development such as but not limited to the following:

- o Permeable pavement (for example driveways and rear patios).
- o Planter boxes with overflow connection to a public surface water sewer.
- o Swales and rill channels.
- o Grasscrete.
- o Green roofs and water butts.
- o Raingarden with overflow connection.
- o Bioretention rain gardens.
- o Water butts are additional features for SuDS but they are not considered as main features.

Downes Associates response to item (i):

The above is all covered in our original planning report. The total storage volume required is split between a swale and an underground concrete attenuation tank. The available space on the site does not permit the entire storage volume requirement to be accommodated within the swale. As such, the swale is accompanied by the tank as described above.

There follows a summary of the suitability of various SuDS features. The proposed solution includes a swale, permeable paving, grassed areas, underground attenuation and water butts which we feel is more than sufficient for a development of such a small scale.

Source Controls

Maximise permeability within a site to promote attenuation, treatment and infiltration reducing the need for offsite conveyance.

Ref	Measure	Suitable	Comment	Adopted
A.1	Green roofs	No	Not suitable for housing development with pitched roofs	No
A.2	Permeable paving	Yes	Permeable surface within driveway	Yes
A.3	Grass	Yes	It is proposed to maintain the maximum grassed and planted area coverage for the site	Yes
A.4	Reinforced grass	No	Not suitable in domestic.	No
A.5	Gravelled areas	No	Not suitable in housing estate. Permeable paving adopted instead.	No
A.6	Rainwater harvesting	Yes	Infrastructure will be constructed allowing the future adoption of such measures for individual owners gardening (non-potable) purposes only	No
A.7	RainTrap	Yes	Infrastructure will be constructed allowing the future adoption of such measures by owners.	No
A.8	Water Butt	Yes	Water butt indicated for each house	Yes

Swales and conveyance channels

Ref	Measure	Suitable	Comment	Adopted
B.1	Swales	Yes	Swale provided as indicated on attached drawing	Yes
B.2	Canals and rills	No	Not suited to topography	No

Filtration

Ref	Measure	Suitable	Comment	Adopted
C.1	Filter trench	No	No suitable infiltration rate available for this site.	No

Ref	Measure	Suitable	Comment	Adopted
C.2	Bioretention areas	Yes	Swale provided which will encourage biodiversity	Yes

Infiltration

Capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below.

Ref	Measure	Suitable	Comment	Adopted
D.1	Soakaways	No	No suitable infiltration rate in stiff clays	No
D.2	Infiltration basin	No	No suitable infiltration rate in stiff clays	No
D.3	Rain garden	No	Extent of landscaping available will not permit this	No

Retention and Detention

Designed to either provide storage, through the retention of surface water runoff, or attenuation through the detention of surface water runoff.

Ref	Measure	Suitable	Comment	Adopted
E.1	Detention basins	No	Not considered suitable for a development of this size.	No
E.2	Retention ponds	No	Not considered suitable for a development of this size. Not considered safe within housing development.	No
E.3	Geocellular systems	Yes	Underground Stormwater Attenuation system proposed. Concrete tank adopted given location	Yes

(iii) Submit details of the rainwater storage capacity in m³ for all proposed SuDS.
Prior to the providing the above outlined information, the Applicant is advised to liaise directly with the Drainage and Water Services Department of South Dublin County Council.

Downes Associates response to item (iii):

Details of the proposed solutions are included in our drawings. A summary of same is included below:

Swale Volume – 15m cu

Attenuation Volume – 30m cu

Permeable paving volume – not considered in design of attenuation and so is conservative

Water butts – Each house is to be fitted with a 200L water butt