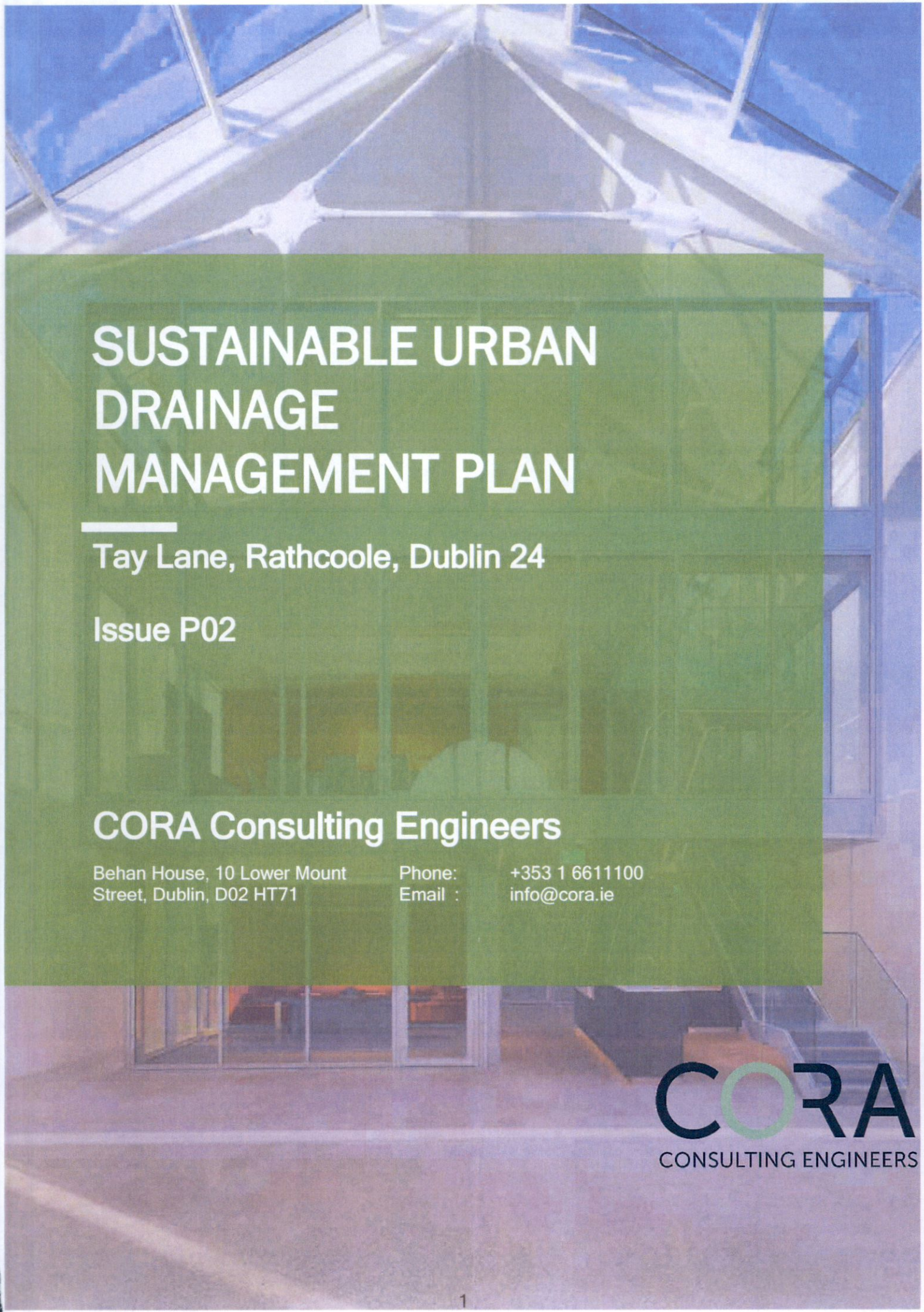

SUSTAINABLE URBAN DRAINAGE MANAGEMENT PLAN

Tay Lane, Rathcoole, Dublin 24

Issue P02

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CORA
CONSULTING ENGINEERS

Table of Contents

Executive Summary

- Development consists of 54no. age friendly residential apartments as revised at Further Information stage of the planning application
- Surface water discharge to an on-site soakaway for dispersal to the ground within the site area
- All hardstanding and pavements are to be permeable allowing water to drain to the ground below
- All remaining areas throughout the site shall be grassed or planted areas
- No surface water shall be discharged to the public sewer network
- Maintenance of the drainage solutions shall be incorporated into the overall building maintenance programme to minimise problems in the future

Introduction

CORA Consulting Engineers have been commissioned by Riverside Projects Ltd to carry out the planning design of the foul, surface water and water supply networks to serve the site along with the completion of a SuDS Management Plan for the proposed clearance of the subject site, demolition of existing out-building and construction of a four storey apartment block containing 54no. self-contained age-friendly units with associated shared amenity facilities, high quality open space and parking as revised at Further Information stage at St Bridget's Tay Lane, Rathcoole, Dublin 24. This SuDS Management Plan has been prepared as a direct response to the Further Information item no. 12c) which states:

'a comprehensive SUDS Management Plan to demonstrate that the proposed SUDS features have reduced the rate of run off into the existing surface water drainage network. A maintenance plan should also be included as a demonstration of how the system will function following implementation.'

This SuDS Management Plan was prepared to comply with current planning legislation and forms part of the proposed planning application for the subject site.

Project Description

The project site is located at St Bridget's Tay Lane, Rathcoole, Dublin 24. The site, which is approximately 4,950m^2 is currently occupied by a single detached out-building with dense vegetation throughout the majority of the site. An aerial view of the site is indicated in Figure 1 below:

Figure 1 Site Location Plan (Image from Google Maps)

The site is bounded by St Bridget's Tay Lane to the west, a residential property and the N7 - Naas Road to the north, commercial premises to the east and commercial properties to the south along Main Street, Rathcoole as indicated on the map above. The north-western portion of the site is heavily overgrown with vegetation.

Access to the site is to the west of the site with pedestrian and vehicular access from St Bridget's Tay Lane.

The proposed development calls for the clearance of the vegetation and existing hard-standings on site to facilitate the construction of 54 no. apartments over 4 storeys with external car parking spaces, additional store areas and landscaping. The additional store areas include bin storage, bike storage, community spaces, sub-station and plant room facilities.

Existing Site Condition

The existing site is located south of the N7 dual-carriageway with Tay Lane and Eaton Drive to the western and eastern boundaries respectively. The site is largely overgrown with a single disused outbuilding toward the rear of the site. The site is not currently served by mains water or with either a foul or surface water drainage connection to the public sewers. It is proposed to provide new connections for both the supply of water and the disposal of foul and surface water.

The site is circa 4,950m^2 in area, with a slope from east to west. A topographic survey carried out on the site shows the site slopes from 111.760m AOD at the entrance on Tay Lane up to approximately 113.740m at the south east corner of the site.

The majority of the site, with the exception of the building and access road is covered in vegetation, particularly to the northern end of the site which is extensively covered in vegetative growth with limited access available currently.

Proposed Site Condition

The proposed development calls for the construction of new residential apartment buildings which will contain a total of 54 no. units. These apartments will be constructed over four stories with external car park areas providing 27 no. car parking spaces and 3 no. disabled car parking spaces. Separate bike storage spaces shall also be provided within the development.

The entrance will be retained at the western boundary of the site which will provide vehicular and pedestrian access to the site. An additional pedestrian entrance will be available on the

eastern boundary of the site also to allow access from Eaton Drive. The proposed site arrangement is shown in Figure 2 below.

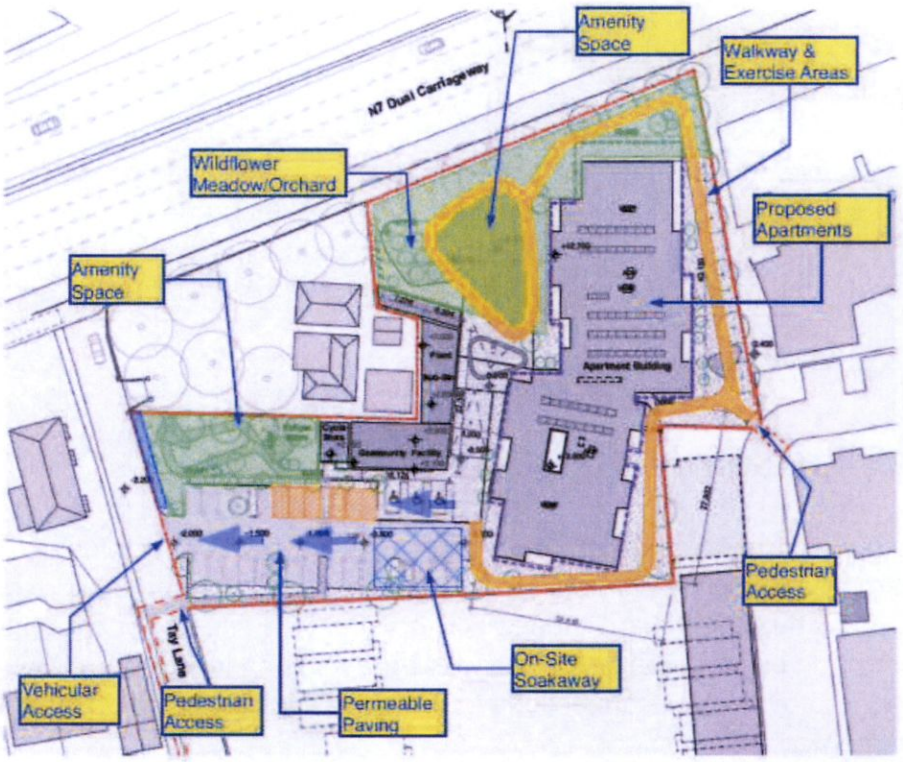

Figure 2 Proposed Site Layout

Surface Water Management

Introduction

This documents aims to define how the surface water management measures will reduce the impact of the proposed development on the surrounding environment. It is proposed to incorporate several SuDS measures to manage the surface water run-off within the site area. These measures shall make use of the natural environment, surface water management systems and flow control measures.

Additionally, these measures control the flow, volume and frequency of the water discharging from the proposed development. The implementation of SuDS measures should prevent pollution by intercepting silt and cleaning the run-off from the hard surfaces. The landscaping within the development will provide a nature based environment where possible which will allow the use of communal amenity spaces.

Design Criteria

Quantity

The proposed development shall include the construction of a new residential apartment building which will provide 54no. apartment units over four stories. The total roof area of the apartment block and additional out-buildings extends to 1660m^2. The surface water from these roof areas shall be collected through a network of rainwater outlets which shall discharge to the surface water below ground network. It is proposed to provide a surface water soakaway system which has been sized to provide adequate storage volume during the rainfall events.

The soakaway calculations were carried out in accordance with the recommendations provided by BRE365: Design of Soakaways (2016). These calculations include an allowance for a 20% increase in rainfall intensity due to climate change. Furthermore, site specific testing was undertaken to determine the soil infiltration rate in order to provide accurate data for the sizing of the proposed soakaway.

Figure 3 Soakaway Construction

It is proposed to provide a soakaway with dimensions of 12.0m x 10.0m x 0.8m deep which shall be constructed using proprietary cellular units which provide a void ratio of 95%. As the soakaway provides adequate storage of the surface water collected on the roof areas there will be no discharge of surface water from the proposed development to the public sewer system. The information recorded on site during the trial pit investigation works and the subsequent calculations are included in Appendix A of this report.

The remaining site area shall be constructed with materials which allow the surface water to drain to the ground below in a natural manner.

Quality

The vehicular access and parking areas shall be constructed with permeable block paving. With the presence of vehicles there is a risk of pollution to the paving surface. The build up of the paving shall allow the sediments to be captured within the laying course material whilst the geotextile layer provides additional protection. Where oil deposits drain through the initial layers they would be trapped in the permeable stone base layer where they would degrade over time.

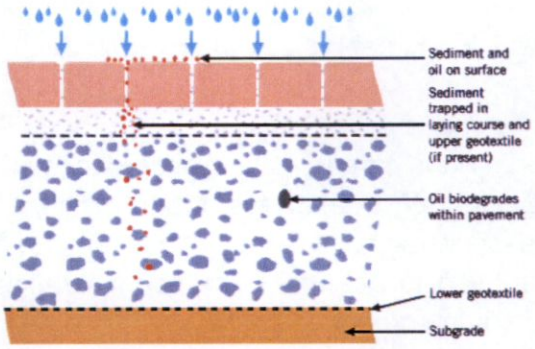

Figure 4 Permeable Paving Treatment

In order to achieve the required storage volume for the surface water from the roof it will be necessary to provide a proprietary cellular soakaway system which will be surrounded with a geotextile membrane to prevent migration of silt material from the surrounding subsoil. Furthermore, a silt trap will be provided on the inlet pipe to the soakaway system which will collect deleterious material contained within the surface water prior to entering the soakaway. Figure 5 below shows the silt trap chamber and the associated bucket for removal of silt on a regular basis.

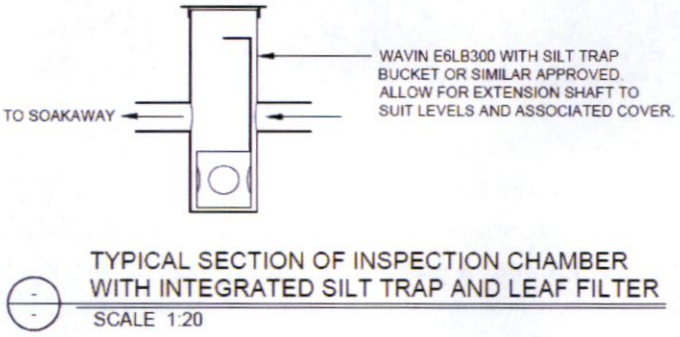

Figure 5 Silt Trap Chamber

Amenity

The provision of the green spaces within the development will allow the discharge of the rainfall in such areas to the ground below whilst also providing spaces of a visual quality. In conjunction with these green spaces it is proposed to provide areas which encourage leisure activities such as walking, exercising and wildlife habitats.

The hardstanding areas will be constructed with permeable paving which will allow the surface water to drain to the ground below and provides areas for car parking, vehicular and pedestrian access to the development. The use of permeable paving allows the water to be cleaned to a certain extent prior to the discharge to the ground below.

Biodiversity

The current site condition includes planted areas and hard surfaces. The proposed development shall continue to provide a combination of both the built environment and the natural landscape.

Features within the natural landscape areas shall include grassed lawns, wildflower meadow, orchard trees and raised vegetable gardens with further planting of trees and hedges.

Designing For Hydraulic Requirements

As the proposed development will include areas which are non-permeable i.e. solid roof surfaces, it is necessary to account for the discharge of this water in a sustainable manner. As stated previously, it is proposed to provide a below ground surface water soakaway which has been suitably sized to provide adequate storage of the surface water prior to draining to the subgrade below. Site specific information has been gathered to ensure that an accurate design has been provided. On-site testing has been completed and data collected from Met Eireann in relation to the site location was used in the design of the on-site soakaway. This information is included in Appendix A. The relevant information can be summarised as:

- Soil infiltration rate - 61.7×10^{-6}m/s
- Impermeable roof area - 1660m^2
- 60 min to 2 day rainfall ratio (5 year) - 0.266
- M5-60min - 19.8mm
- Climate change allowance - 20%

- Required storage volume - 82.8m^3
- Provided storage volume - 91.2m^3
- Time for empty to half volume - 10hr 35min

As adequate storage shall be provided for the roof areas of the proposed development, there will be no discharge of rainwater from the roofs to the local public sewer system. In the Figure overleaf it can be seen that the soil infiltration rate determined from on-site testing indicates that there is good draining material below ground.

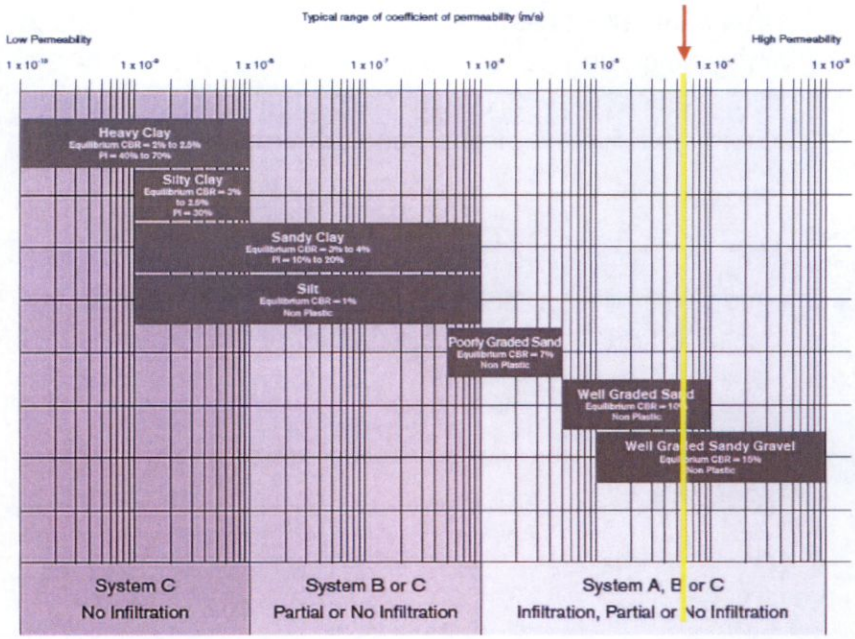

Figure 6 Soil Classification Guide

The hardstanding areas throughout the site will be constructed with permeable paving. It is expected that the percolation rate through the surface paving joints would be approximately 1440mm/hr/m^2. The lower layers shall have a significantly higher permeability allowing the water to drain to the subgrade below as required. However, it is important to consider future issues with the paving including the build up of deleterious materials within the joints of the paving and below. During the lifetime of the paving, the surface infiltration rate will decrease but stabilise somewhat over time. Figure 7 represents the expected infiltration rate of a typical permeable paving construction. It is noted that, after fifteen years of service, the paving would be still expected to allow the infiltration of rainfall of approximately 400mm/hour/m^2 which would exceed any expected rainfall event.

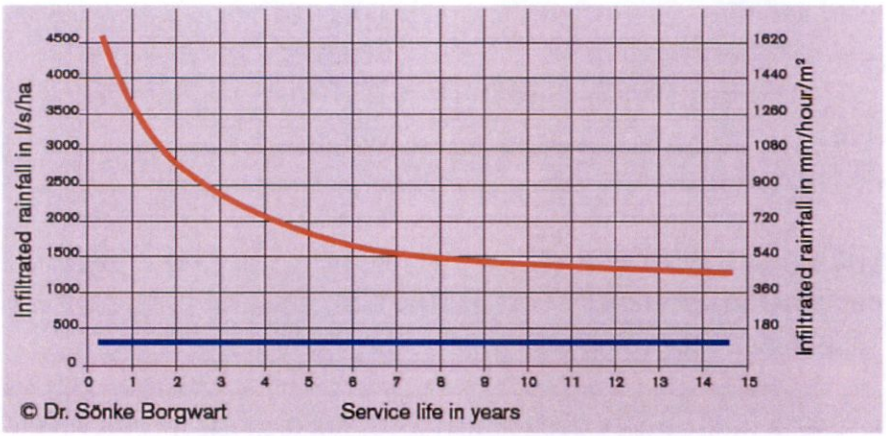

Figure 7 Reduction in surface water infiltration

To determine the minimum thickness of the permeable base below the paving, calculations are necessary to determine the extent of rainfall expected along with the site specific infiltration rate. The table overleaf shows the minimum thickness of sub-base that is required for the relevant storm event durations and allowance for climate change.

infiltration rate = 1 x 10^{-5}m/s

		1 in 10	1 in 30	1 in 100	1 in 100 + 20%	1 in 100 + 30%
M5-60	r	10	3.33	1	0.5	0.25
20	0.4	50	50	70	90	105
	0.3	50	50	65	85	100
	0.2	50	50	60	85	95
17	0.4	50	50	55	70	80
	0.3	50	50	50	65	75
	0.2	50	50	50	60	70
14	0.4					
	0.3	50	50	50	50	50
	0.2	50	50	50	50	50

Figure 8 Thickness of coarse graded aggregate (paving.org.uk)

The information for the subject site includes:

- Soil infiltration rate - 61.7 x 10^{-6}m/s
- 60 min to 2 day rainfall ratio (5 year), r - 0.266
- M5-60min - 19.8mm

According to the information provided on Figure 8, the minimum required thickness of coarse graded aggregate which provides a void ratio of 30% below the permeable paving is 100mm deep. This includes an additional allowance of 30% for future climate change. It is intended that the permeable paving will be constructed with a minimum thickness of 200mm which will provide additional capacity in the system which will be confirmed during a detail design for the structural requirements also.

A particular problem with new developments in urban areas is the collection of surface water in a network of pipes which direct a concentrated volume of water to a nearby water course or to a public sewer network. As the subject site is suitable for draining the surface water to the ground below there will be no surface water gullies provided in the paved areas.

To ensure the permeable paving continues to provide the required infiltration of the surface water it will be necessary to consider the surrounding environment and the continuing maintenance of the site. The measures to be considered include:

- Adjacent soft landscaping shall be detailed to prevent soil and mulch from being washed onto the permeable paving areas
- During construction it will be important to prevent soil and mud from entering the sub-base and the paving surface
- Ensure joints are filled with the correct jointing aggregate
- The paved areas should be swept regularly on a monthly basis with all loose material removed from the paved surfaces. Small weeds should be hand pulled or spot treated if necessary to prevent the risk of weedkiller substances entering the ground below
- On a annual basis, the paving should be brushed and vacuumed to prevent silt blockage of the system

Should the permeable paving become blocked and surface water fails to permeate to the ground below, jet washing of the paved areas with suction cleaning should reinstate the pavement to a satisfactory efficiency. In the event of water ponding on the surface following the aforementioned remedial treatments it may be necessary to reinstate the top layers of the pavement construction.

In summary, the aforementioned maintenance measures include:

1.0 General Requirements

Maintenance activities comprise · **Regular Maintenance** · **Occasional Tasks** · **Remedial Work**	**Frequency**
Generally **Litter** Collect all litter or other debris and remove from site at each site visit.	Monthly
Grass Mow amenity grass at regularly	As required
Wildflower meadow Strim at permitted times of the year to suit wildlife	Annually or as required

· **Avoid** use of weedkillers and pesticides to prevent chemical pollution

· **Avoid** de-icing agents wherever possible to allow bio-remediation of pollutants in permeable surfaces.

· **Protect** all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles.

2.0 Permeable Surfaces

· **Permeable surfaces** including permeable block paving, porous asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc. Permeable block paving and porous asphalt can be cleaned by suction brushing.

PERMEABLE AND POROUS SURFACES	
Regular Maintenance	**Frequency**
Cleaning Brush regularly and remove sweepings from all hard surfaces	Monthly
Occasional Tasks	**Frequency**
Permeable Pavements. Brush and vacuum surface once a year to prevent silt blockage and enhance design life.	Annually
Remedial Work	**Frequency**
Monitor effectiveness of permeable pavement and when water does not infiltrate immediately advise the client of the possible need for reinstatement of top layers or specialist cleaning. Recent experience suggests jet washing and suction cleaning will substantially reinstate pavement to 90% efficiency.	As required

3.0 INFILTRATION DEVICES - soakaways and grass/planted areas

· **Grass areas and soakaways** and most of the preceding SuDS features allow water to soak into the ground.

SOAKAWAYS AND GRASSED AREAS	
Regular Maintenance	**Frequency**
Grass areas Mow grass to a length of 50mm - 75mm or as specified to provide a cared for appearance and allow pedestrian access	Monthly or as required
Soakaway Inspect surface water manhole and silt trap for excessive silt deposits. Silt trap bucket to be used to remove silt and avoid clogging the soakaway system	As required

Conclusion

This SDMP concludes the following;

- The site has been assessed to ensure that the surface water collected on all surfaces shall be treated 'at source' rather than discharging to the public piped network

- The rainfall collected on the roof areas shall be directed to an on-site soakaway system which provides adequate storage capacity for the expected rainfall events with an additional allowance for climate change

- The hard standing areas at ground level will be constructed with permeable paving with sufficient storage volume provide in the sub-base layers

- All remaining areas shall be finished as grass or planted surfaces which will allow the rainfall to permeate to the ground below. Site specific testing was undertaken to determine the soil infiltration rate with the results showing that the ground has good drainage properties

- The proposed sustainable drainage measures shall reduce the rate of surface water run off into the existing drainage network through the provision of a surface water soakaway which has been sized based on site specific soil infiltration rates, the provision of permeable pavements for vehicular and pedestrian use with all other areas finished as soft landscaping features.

Appendix A

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Surface Water Soakaway Test

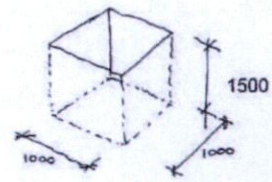
St. Bridgets Taylane, Rathcoole, Co. Dublin.

Procedure

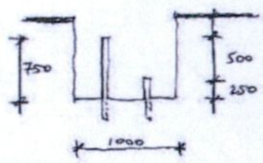
1. Excavate hole in garden to the following dimensions

   1.0m wide, 1.0m long, 1.5m deep

   Excavated hole to be located approx in centre of garden approx 5.0m from rear wall.



2. Confirm dimensions of excavated hole by measurement to the nearest centimetre.
3. Install timber stake measuring in bottom of hole that extends for 750mm above bottom of hole to allow water level to be measured against.
4. Install another timber stake measuring in bottom of hole that extends for 250mm above bottom of hole to allow water level to be measured against.



5. Infill hole with water to cover both stakes.
6. Take time measurement (in minutes and seconds) of when water level is at top of higher stake. Take further measurement in minutes and seconds for when water level reaches top of second lower stake.
7. Repeat this procedure 3 times to achieve 3 readings for the same excavated hole.

Results Table

Test Number	75%	25%	25% - 75%
1	10 AM	10·41 AM	41 mins
2	1 PM	1·45 PM	45 mins
3	10 AM	10·45 AM	45 mins

Date & Time 4/11/22 4·50 pm Signature Michael Mc Fa[illegible]

Key

75 % - Start time in minutes & seconds for water level is at level of top stake

25 % - Start time in minutes & seconds for water level is at level of bottom stake

25 % to 75% - the 25% time minus the 75 % time which gives the time for the water level to drop from 75% full to 25% full.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 301952, Northing: 226816,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.7,	4.0,	4.8,	5.9,	6.7,	7.3,	9.3,	11.6,	13.2,	15.5,	17.6,	19.2,	21.8,	23.7,	25.4,	N/A ,
10 mins	3.8,	5.6,	6.6,	8.2,	9.3,	10.1,	12.9,	16.2,	18.5,	21.6,	24.5,	26.8,	30.3,	33.1,	35.4,	N/A ,
15 mins	4.5,	6.6,	7.8,	9.6,	10.9,	11.9,	15.2,	19.1,	21.7,	25.5,	28.8,	31.5,	35.7,	38.9,	41.7,	N/A ,
30 mins	5.9,	8.7,	10.2,	12.5,	14.1,	15.3,	19.5,	24.4,	27.6,	32.3,	36.5,	39.8,	44.9,	49.0,	52.3,	N/A ,
1 hours	7.8,	11.3,	13.2,	16.2,	18.2,	19.8,	25.0,	31.1,	35.2,	41.0,	46.2,	50.3,	56.6,	61.6,	65.7,	N/A ,
2 hours	10.2,	14.7,	17.2,	21.0,	23.5,	25.5,	32.1,	39.7,	44.8,	52.0,	58.5,	63.5,	71.3,	77.5,	82.5,	N/A ,
3 hours	12.0,	17.2,	20.1,	24.4,	27.3,	29.6,	37.2,	45.8,	51.6,	59.8,	67.1,	72.8,	81.7,	88.6,	94.3,	N/A ,
4 hours	13.5,	19.2,	22.4,	27.1,	30.4,	32.9,	41.2,	50.7,	57.1,	66.0,	74.0,	80.3,	89.9,	97.4,	103.7,	N/A ,
6 hours	15.8,	22.5,	26.1,	31.6,	35.3,	38.2,	47.7,	58.5,	65.7,	75.9,	85.0,	92.0,	102.9,	111.4,	118.5,	N/A ,
9 hours	18.6,	26.3,	30.5,	36.7,	41.0,	44.3,	55.2,	67.5,	75.7,	87.3,	97.5,	105.5,	117.9,	127.5,	135.4,	N/A ,
12 hours	20.8,	29.4,	34.0,	40.9,	45.6,	49.2,	61.2,	74.7,	83.7,	96.3,	107.6,	116.3,	129.8,	140.2,	148.9,	N/A ,
18 hours	24.4,	34.3,	39.6,	47.6,	53.0,	57.2,	70.8,	86.2,	96.4,	110.8,	123.5,	133.4,	148.6,	160.4,	170.2,	N/A ,
24 hours	27.4,	38.3,	44.2,	53.0,	58.9,	63.5,	78.5,	95.5,	106.6,	122.3,	136.2,	147.0,	163.6,	176.4,	187.1,	224.4,
2 days	34.5,	46.9,	53.4,	63.0,	69.5,	74.4,	90.3,	107.9,	119.4,	135.3,	149.3,	160.0,	176.4,	189.0,	199.4,	235.4,
3 days	40.4,	54.0,	61.0,	71.3,	78.1,	83.4,	100.1,	118.4,	130.3,	146.6,	160.9,	171.8,	188.4,	201.1,	211.5,	247.3,
4 days	45.6,	60.2,	67.7,	78.6,	85.8,	91.3,	108.7,	127.8,	140.0,	156.7,	171.3,	182.4,	199.3,	212.1,	222.6,	258.7,
6 days	54.8,	71.1,	79.4,	91.3,	99.2,	105.1,	123.9,	144.1,	157.0,	174.6,	189.8,	201.3,	218.7,	231.9,	242.6,	279.3,
8 days	63.0,	80.8,	89.8,	102.6,	111.0,	117.3,	137.2,	158.5,	172.0,	190.3,	206.0,	217.9,	235.8,	249.4,	260.4,	297.8,
10 days	70.7,	89.8,	99.3,	112.9,	121.8,	128.5,	149.3,	171.6,	185.6,	204.5,	220.8,	233.1,	251.5,	265.3,	276.6,	314.7,
12 days	77.9,	98.1,	108.2,	122.6,	131.8,	138.8,	160.6,	183.7,	198.2,	217.8,	234.5,	247.1,	265.9,	280.1,	291.6,	330.4,
16 days	91.4,	113.7,	124.8,	140.4,	150.4,	158.0,	181.4,	206.0,	221.3,	242.0,	259.6,	272.8,	292.4,	307.2,	319.1,	359.2,
20 days	104.0,	128.2,	140.1,	156.9,	167.6,	175.6,	200.4,	226.3,	242.5,	264.1,	282.4,	296.1,	316.5,	331.8,	344.1,	385.3,
25 days	118.9,	145.3,	158.1,	176.1,	187.5,	196.1,	222.5,	249.9,	266.9,	289.6,	308.7,	323.0,	344.2,	360.1,	372.8,	415.4,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

CORA CONSULTING ENGINEERS CORA Consulting Engineers Behan House 10 Lower Mount Street	Project: Tay Lane, Rathcoole				Job no.: 2127	
	Calcs for: Surface Water Soakaway				Start page no./Revision: 1 /A	
	Calcs by: KF	Calcs date: 07/11/2022	Checked by:	Checked date:	Approved by:	Approved date:

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **1660.0** m²
Return period	Period = **30** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.266**
5-year return period rainfall of 60 minutes duration	M5_60min = **19.8** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **800** mm
Width of pit	w = **10000** mm
Length of pit	l = **12000** mm
Percentage free volume	V_{free} = **95** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **1000** mm
Width of trial pit	b_{trial} = **1000** mm
Depth of trial pit (below invert)	d_{trial} = **1000** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	d_{75} = (d_{trial} × 0.75) = **750.00** mm
50% depth of pit	d_{50} = (d_{trial} × 0.50) = **500.00** mm
25% depth of pit	d_{25} = (d_{trial} × 0.25) = **250.00** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **41** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **45** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **45** min
Longest time to fall from 75% depth to 25% depth	t_g = max(T1, T2, T3) = **45** min
Storage volume from 75% to 25% depth	V_{p75_25} = (l_{trial} × b_{trial} × (d_{75} - d_{25})) × V_{trial} = **0.50** m³
Internal surface area to 50% depth	a_{p50} = ((l_{trial} × b_{trial}) + (l_{trial} + b_{trial}) × 2 × d_{50}) = **3.00** m²
Surface area of soakaway to 50% storage depth	A_{s50} = 2 × (l_{trial} + b_{trial}) × d_{trial} / 2 = **2.000** m²
Soil infiltration rate	f = V_{p75_25} / (a_{p50} × t_g) = **61.7×10⁻⁶** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **17600000** mm²

Table equations

Inflow (cl.3.3.1)	I = M30 × 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	30 year rainfall, M30 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
5	0.33;	7.8;	1.47;	11.4;	18.95;	0.33;	18.62
10	0.48;	11.3;	1.49;	16.9;	28.07;	0.65;	27.42
15	0.58;	13.7;	1.49;	20.5;	33.99;	0.98;	33.01

CORA CONSULTING ENGINEERS CORA Consulting Engineers Behan House 10 Lower Mount Street	Project: Tay Lane, Rathcoole				Job no.: 2127	
	Calcs for: Surface Water Soakaway				Start page no./Revision: 2 /A	
	Calcs by: KF	Calcs date: 07/11/2022	Checked by:	Checked date:	Approved by:	Approved date:

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	30 year rainfall, M30 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
30	0.76;	18.0;	1.48;	26.7;	44.32;	1.96;	42.37
60	1.00;	23.8;	1.46;	34.8;	57.72;	3.91;	53.80
120	1.27;	30.3;	1.44;	43.7;	72.48;	7.82;	64.66
240	1.65;	39.2;	1.42;	55.5;	92.10;	15.64;	76.45
360	1.90;	45.0;	1.39;	62.8;	104.18;	23.47;	80.71
600	2.26;	53.7;	1.37;	73.4;	121.91;	39.11;	82.80
1440	3.13;	74.4;	1.33;	99.1;	164.48;	93.87;	70.62

Required storage volume S_{req} = **82.80** m^3

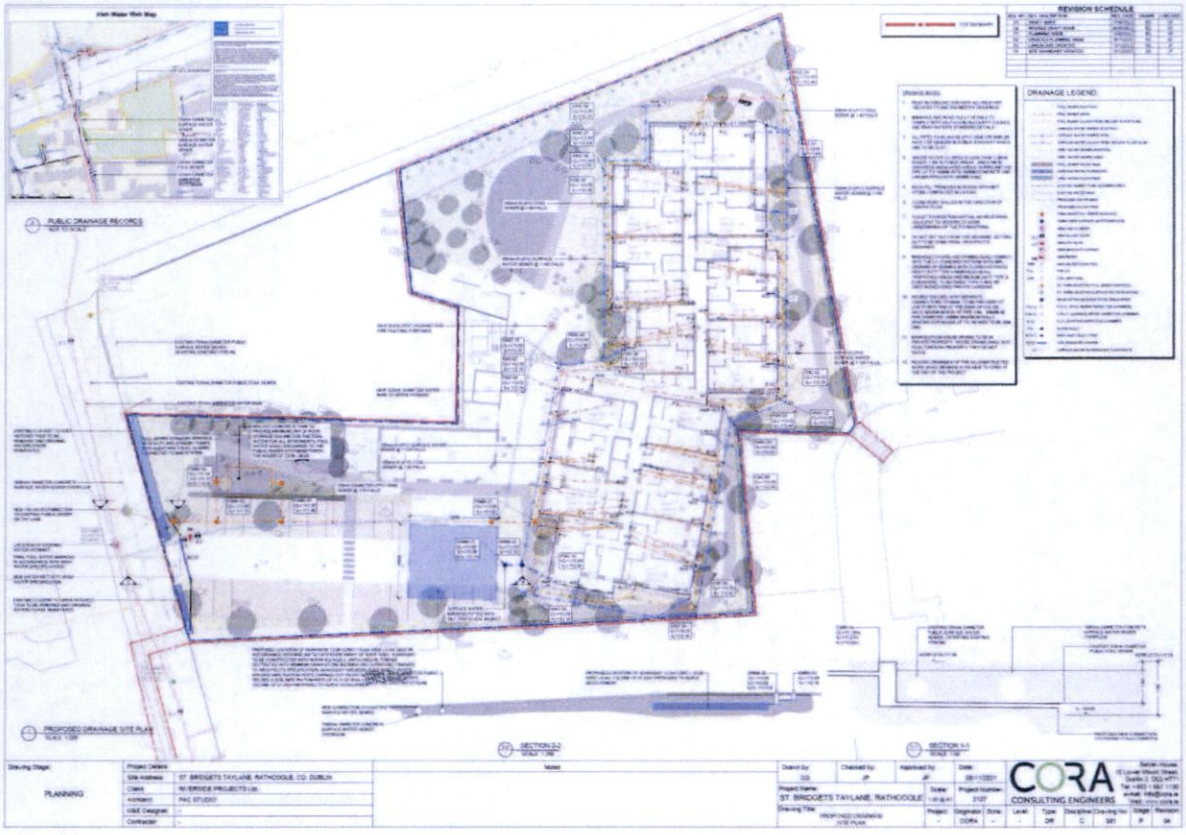
Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **91.20** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 10hr 35min 7s

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

Appendix B


REVISION SCHEDULE
DRAINAGE LEGEND
PUBLIC DRAINAGE RECORDS
PROPOSED DRAINAGE SITE PLAN
SECTION 2-2
SECTION 1-1
PLANNING
ST BRIGIDS TAYLANE, RATHCOOLE, CO. DUBLIN
RI-ERROS PROJECTS Ltd.
PAC STUDIO
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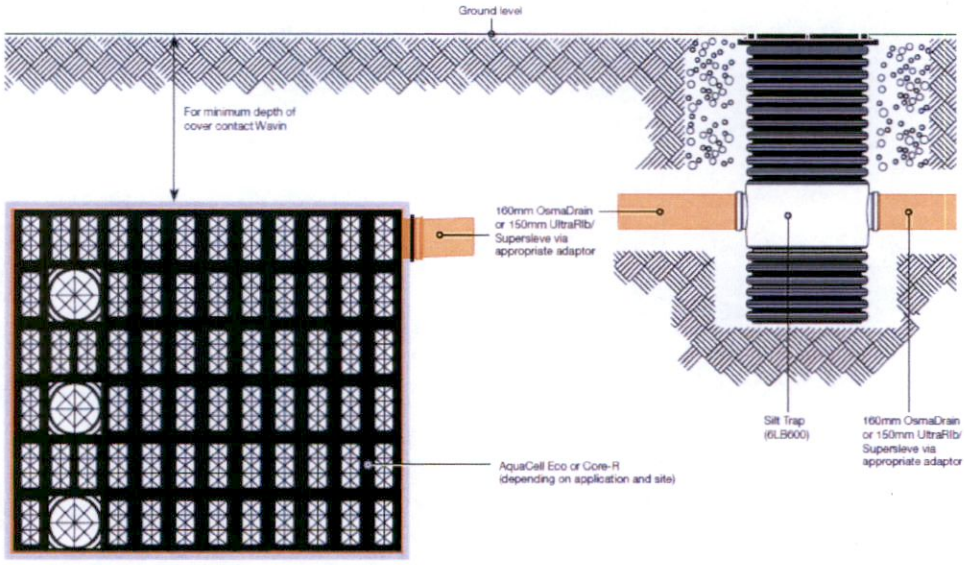
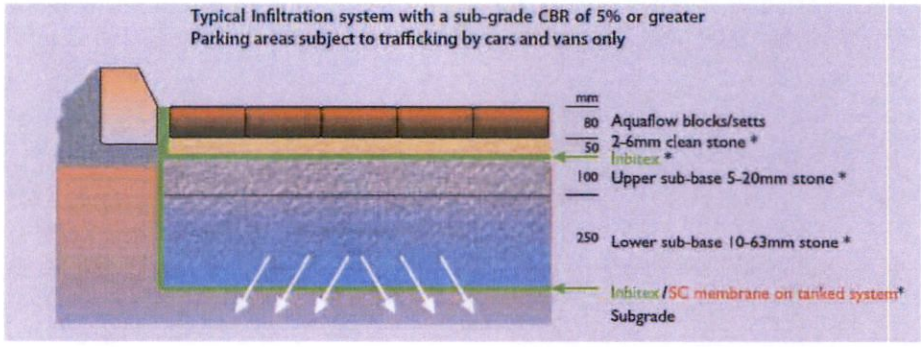
Appendix C

Soakaway – traffic loading

Soakaway



Permeable Paving Section



STONE SPECIFICATIONS

Lower sub-base layer 10-63mm clean crushed stone

Sieve sizes	% passing
80mm	90-100
63mm	90-100
40mm	60-80
20mm	15-30
10mm	0-5
Los Angeles Coefficient	LA - 25
Reference specification	I.S. EN 13242 + SR21 Annex B

Laying course 2-6mm clean crushed stone

Sieve sizes	% passing
10mm	98-100
6.3mm	80-100
2mm	0-100
1mm	0-5
Los Angeles Coefficient	LA - 25
Reference specification	I.S. EN 13242 + SR21 Annex B

Upper sub-base layer 5-20mm clean crushed stone

Sieve sizes	% passing
40mm	100
20mm	90-100
10mm	25-75
4mm	0-15
2mm	0-5
Los Angeles Coefficient	LA - 25
Reference specification	I.S. EN 13242 + SR21 Annex B
Material specification	Material supplied shall be referred to as 5-20mm clean crushed stone and conform to the above sieve analysis and aggregate testing.

Surface Dressing 2-4mm clean crushed stone

Sieve sizes	% passing
6.3mm	100
5mm	95-100
3.35mm	66-90
1.18mm	0-20
600 microns	0-8
600 microns	0-1.5
Los Angeles Coefficient	LA - 20
Reference specification	I.S. EN 1097-2 I.S. EN 1097-8 Annex A