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21183

PROPOSED PAINT STORE AT GALCO, BALLYMOUNT HOUSE, BALLYMOUNT, DUBLIN 24

STORMWATER DRAINAGE & SuDS DESIGN REPORT

April 2022

Prepared For:
Water Services
South Dublin County Council
Tallaght
Dublin 24

Revision Register

Revision	Description	Prepared By	Checked By	Date
0	Issued as Additional Information (Planning Stage)	IC	LK	01.04.22

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EXECUTIVE SUMMARY

There follows a brief executive summary of this report which is a response in request to Section 1 of the additional information requested by South Dublin County Council under Planning Register Reference SD21A/0347.

An executive summary of the information contained within this report is included by way of response to each item below:

1. The applicant is requested to submit the following:
(i) a report showing the surface water attenuation calculations for the proposed development.
• Show what attenuation in m3 is required and what is provided in m3.
[DA Response] – As per our calculations included within appendix of this report, 30m cu of attenuation storage is required. As per our attached drawings, 32.32m cu of attenuation storage is proposed.
• Include the site area, the area of different surface types such as, green roofs, buildings, roads, permeable paving, green areas in m2 and their respective run off coefficients.
[DA Response] –
Total Area within redline site boundary = 6,198m sq

Area of existing building = 1,348m sq

Area of new building = 1,109m sq

Remaining area of hardstanding paving within red line boundary = 3,741m sq

Runoff coefficient of 1.0 has been adopted for the new roof.

This is an existing industrial site. The works comprise the development of a new portal frame built over existing impervious pavement. As such, there is no increase in runoff. However, our proposed SuDS approach represent a considerable improvement on the existing situation. No new paving or landscaped areas are proposed.

• Show the SAAR (Standard Annual Average Rainfall) value and site-specific Met Eireann rain fall
data.
[DA Response] –
Standard Average Annual Rainfall (SAAR) for Ballymount: 871mm

• Show what surface after attenuation is provided and what is required in m3 for proposed development.
[DA Response] – As per our calculations included within appendix of this report, 30m cu of attenuation storage is required. As per our attached drawings, 32.32m cu of attenuation storage is proposed.

(ii) All surface water should be attenuated by means of SuDs (Sustainable Drainage Systems) where possible. The applicant shall include SuDs as part of their development. Examples of such SuDs features are as follows but not limited to:

- Permeable Paving
- Grasscrete
- Green Roofs
- Swales
- Tree pits
- Planter boxes,
- Other such SuDs

If SuDs does not provide sufficient surface water attenuation, the applicant shall show in a drawing how surface water will be attenuated for the proposed development.

[DA Response] – Planter box raingardens beneath each downpipe ultimately collected within an underground attenuation tank ensure that the current runoff from the proposed building footprint is reduced from 15.41L/sec to 2.0L/sec. This is a considerable improvement on the existing situation.

INTRODUCTION

The following report provides a response in request to the additional information requested by South Dublin County Council under Planning Register Reference SD21A/0347.

It is proposed by our client, Galco, to develop a new single storey portal frame paint store. The site is a well established industrial site along Ballymount Road Lower as indicated in the aerial photo below.

The following report details the proposals for water services associated with the development and includes a flood risk appraisal.

Figure 1- Existing site layout

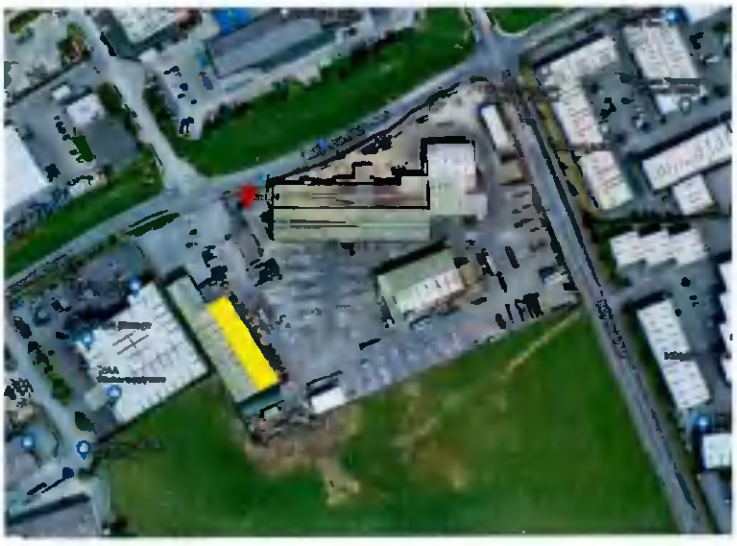


Figure 2- Proposed Paint Store highlighted yellow

EXISTING SERVICES

Foul Drainage

The site is served by an existing 225mm diameter private foul sewer. This is separate from the surface water sewer and ultimately connects to the existing public foul sewer along Ballymount Avenue.

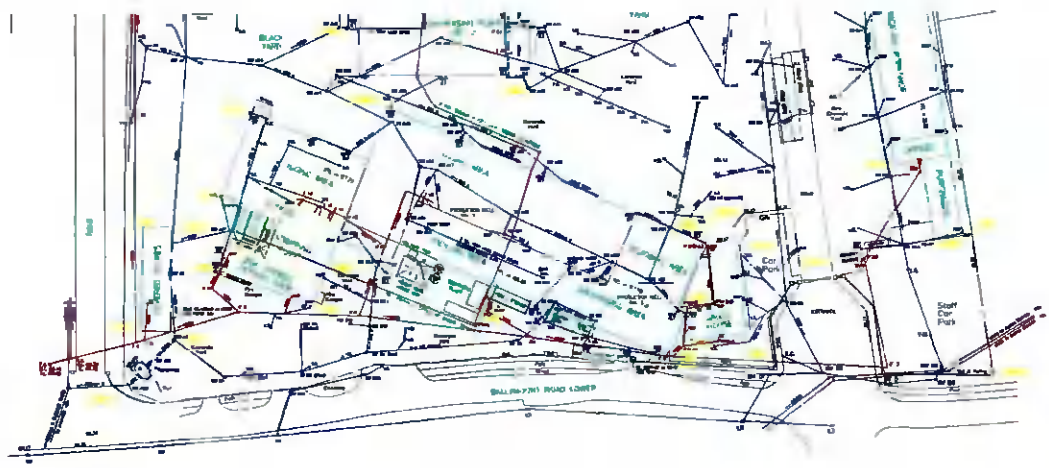


Figure 3- Existing drainage layout

Surface Water

The site is served by an existing underground private stormwater sewer drainage network which ultimately connects to the existing 450mm diameter public stormwater sewer along Ballymount Road Lower.

PROPOSED SERVICES

FOUL DRAINAGE

The project comprises the development of a paint store only. The development will not increase the existing quantity or rate of effluent leaving the site. No new connections will be made to the public system.

SURFACE WATER DRAINAGE

The permanent surface water drainage solution is indicated on enclosed Downes Associates drawings.

Collection and Treatment

Surface water will be collected from the building roofs by gutters, downpipes and pass through planterbox raingardens prior to being collected within the underground surface water pipes prior to passing through a new stormwater attenuation unit, the design of which is discussed in detail later on in this report.

The proposed building is to be developed over an existing hardstanding area. As such, the total runoff from the site will not be increased over and above the existing situation. However as new planterbox raingardens and a new attenuation tank are to be provided, along with an associated flow control device, the existing situation is set to be significantly improved.

Refer to a later sub-section for details of SUDS measures adopted. The collection system is shown on the enclosed drawings.

Stormwater Modelling of the the new drainage system and attenuation has been undertaken using Causeway Flow + Software. A schedule of areas is included below:

Total Area within redline site boundary = 6,198m sq

Area of existing building = 1,348m sq

Area of new building = 1,109m sq

Remaining area of hardstanding paving within red line boundary = 3,741m sq

Runoff Rate Calculation

The runoff rate for greenfield sites, Q_{bar}, is estimated using the HR Wallingford estimation tool that refers to the Institute of Hydrology Report No. 124 – Flood Estimation for Small Catchments. The input used in the estimation is as follows:

Red Line Site Area: 0.6198Ha

SOIL Type: 4 (on the basis of site investigation)

SPR is a parameter which is used by 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: 0.47

Standard Average Annual Rainfall (SAAR) for Ballymount: 871mm

M5-60 Rainfall Depth (mm), the rainfall depth for the 60 minutes 5 years return period event. M5-60 value is a parameter used in deriving rainfall depths for other return periods and durations.

M5-60 for Ballymount: 17mm

'r' Ratio M5-60/M5-2 day represents the ratio of the rainfall depth of the 60 minute to the 2 day, 5 year rainfall event.

'r': 0.3

Qbar is calculated using the calculator available on www.uksuds.com and verified on Causeway Flow + Software. The Qbar value for this particular redline site boundary equates to 3.86L/sec. However, as the proposal is to attenuate only runoff associated with the new building within this long established industrial site, it is proposed to restrict the hydrobrake to its lower practical limit of 2.0L/sec. This is well within the Qbar value and is considered to be a practical approach.

Pipe Design

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

$Q = 2.78C_vC_rA$ (where Q is in l/s, i is in mm/hr and A is in Ha)

$A = 1,109m^2 = 0.1109Ha$ – Roof contributing area

$C_v = 0.75$ and $C_r = 1.3$

$Q = 2.78iA$

Qmax = 15.41 l/s

A roughness coefficient, k_s of 0.6mm is used for surface water drains. Pipe size and gradient for each run are determined using the Wallingford hydraulic design tables.

Using a 225mm diameter sewer at a gradient of approximately 1:200

Hydriatic performance with ks = 0.6

Full bore condition:

Discharge capacity = 36.5 l/s (>15.41 l/s)

Velocity = 0.9 m/s

Sustainable Surface Water Drainage Measures

The proposed surface water drainage system has been designed in accordance with the policy requirements of the Greater Dublin Strategic Drainage Study (GDSDS), incorporating surface water source control measures and Sustainable Drainage Systems (SuDS).

The proposed use of SuDS is based on detailed consideration of the following criteria:

- Technical Guidance Documents for the "Greater Dublin Strategic Drainage Study Regional Drainage Policies" (GDSDS);
- Engineering guidelines contained in CIRIA Document CIRIA C753 – The SuDS Manual
- Restrictions of the development site in terms of location, context, size, ground conditions and topography;
- Management issues relating to the adoption and operation of SuDS;

In general terms, SuDs measures shall comply with the following principles:

- Achieve adequate water quality treatment.
- Minimise runoff volumes and rates.
- Treat appropriately the stormwater effluent prior to discharge to receiving environment.
- Protect groundwater.
- Maximise amenity potential and ecological benefits where possible.

A detailed SuDS evaluation of the site was carried out including use of the design tools available on the website www.irishsuds.com.

Based on the constraints of the site, the SuDs components considered implementable in this instance are as follows:

- Planter box Raingardens
- Stormwater Attenuation
- Flow Control Device

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 considered appropriate within galvanising plant site. Not suited to roof structure	No
A.2	Permeable paving	N/A	No new paving proposed	No
A.3	Grass	N/A	Works include new storage unit only	No
A.4	Reinforced grass	No	Not suitable in industrial site	No
A.5	Gravelled areas	No	Not suitable in industrial site	No
A.6	Rainwater harvesting	No	Of no use to paint store. However infrastructure will be constructed allowing the adoption of such measures for (non-potable) purposes only	No
A.7	RainTrap	No	No use for this within industrial site	No
A.8	Water Butt	Yes	Infrastructure will be constructed allowing the future adoption of such measures by owners.	No

Swales and conveyance channels

Ref	Measure	Suitable	Comment	Adopted
B.1	Swales	No	Not suited to long established galvanising plant site	No

Ref	Measure	Suitable	Comment	Adopted
B.2	Canals and rills	No	Not suited to long established galvanising plant site	No

Filtration

Ref	Measure	Suitable	Comment	Adopted
C.1	Filter trench	No	Development comprises paint store building only. High rock levels (300mm below ground level in many areas) prevents filtration.	No
C.2	Bioretention areas	Yes	The raingarden will provide some bioretention function.	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	High rock levels (300mm below ground level in many areas) prevents filtration.	No
D.2	Infiltration basin	No	Not considered suitable for a development of this size.	No
D.3	Rain garden	Yes	Planterbox raingardens provided at downpipes	Yes

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 this site	No
E.2	Retention ponds	No	Not considered suitable for this site	No

Ref	Measure	Suitable	Comment	Adopted
E.3	Geocellular systems	Yes	New stormwater attenuation arch system and flow control device to be provided	Yes

Wetlands

Densely vegetated water bodies that use sedimentation and filtration to provide treatment of surface water runoff.

Ref	Measure	Suitable	Comment	Adopted
F.1	Wetlands	No	Not considered suitable for this particular site	No

Proposed Solution

The new stormwater system and associated attenuation has been hydraulically modelled using Causeway Flow + Software and the associated pipe sizes and attenuation volumes have been verified on this basis. Refer to the calculations provided within Appendix B of this report.

As noted above, the proposed building is to be located above an existing hardstanding area. The building measures 1109m sq and stormwater runoff from this area is calculated as follows:

$Q = 2.78C_vC_fiA$ (where Q is in l/s, i is in mm/hr and A is in Ha)

$A = 1,109m^2 = 0.1109Ha$ – Roof contributing area

$C_v = 0.75$ and $C_f = 1.3$

$Q = 2.78iA$

$Qmax = 15.41$ l/s

It is proposed to provide a new stormwater attenuation system along with a flow control device restricted to 2.0L/sec which is the lower practical limit for a hydrobrake.

For this area of the site, runoff is reduced from its current rate of 15.41L/sec to 2.0L/sec which is a considerable improvement. The attenuation tank will be accompanied by planter box raingardens to provide a means of filtration and encourage biodiversity which again is a considerable improvement to the site. The raingarden system will detain runoff from each rain event and treat this runoff in the catchment, with the growing/filter medium and stone base area acting as an infiltration and part detention device. It is however proposed to provide a high-level overflow provision to the raingarden to permit discharge of runoff to the underground surface water sewer prior

to ultimately being passing through the attenuation tank and restricting the flow to 2.0L/sec. This is to accommodate any exceedance events for the raingarden. T The retention time promotes pollutant removal through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations. The planting will be drought and flood tolerant types. The landscape and biodiversity design will be carried out by a landscape designer for the Client. Typically, the following types of planting are suitable:

Stipia arundinacea

Carex 'evergold'

Miscanthus Yakushima Dwarf

Festuca blue fox

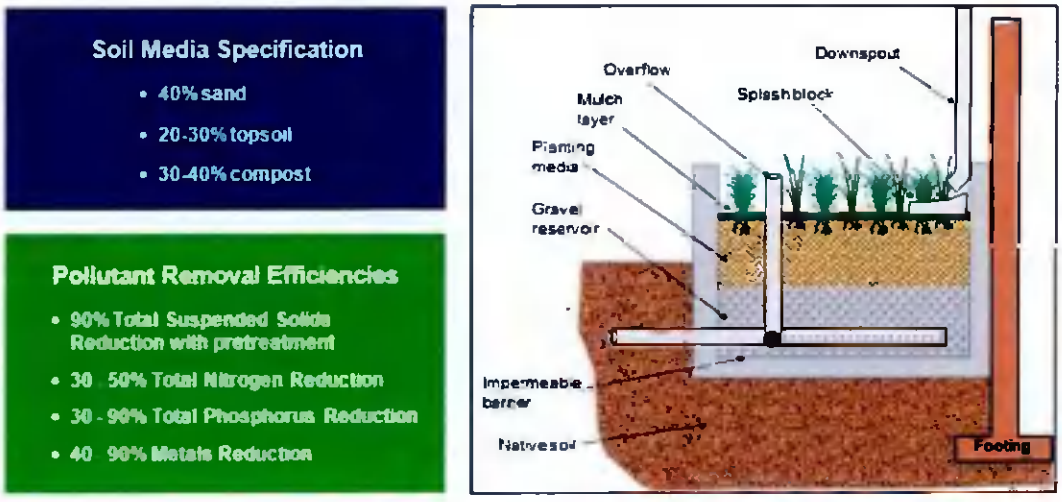


Figure 4- Planter box raingarden collecting from Downpipe

FLOOD RISK MANAGEMENT

Flood Risk Assessment

Primary and Secondary sources of flooding information were gathered and assessed individually in the following chapter as defined in Appendix A of the Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009 report.

Primary Sources for Flood Risk Information

Examination of the Eastern CFRAM Maps available on www.floodinfo.ie reveals the predictive extent of flooding in the vicinity of the site (refer to Figure 3 below). Anticipated flood extents along the River Camac are far removed from the site as indicated below. The site is therefore considered not susceptible to flooding from exceedance in any direction.

Figure 5 - Extract from CFRAM Maps

Secondary Sources for Flood Risk Information

OPW Flood Record;

An extract from the OPW records found on Floodmaps.ie shown below indicates no recorded flood events in the vicinity of the site. Refer to Figure 6 below.

Figure 6 Extract from OPW Floodmaps.ie

Conclusions from Flood Risk Assessment

A flood risk to the site has been identified using available Preliminary Flood Risk Assessments. It is noted that the site is not at risk from Flood Zone A or Flood Zone B events. The proposed dwelling can be considered as being within **Flood Zone C.**

Sequential Approach to Planning

In accordance with "The Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009" a sequential approach has been undertaken during the layout and design stage of the proposed development to ensure that the flooding risks to the proposed development are managed. The diagram below sets out the broad philosophy of the sequential approach which has been adopted within the design and layout of the proposed development.

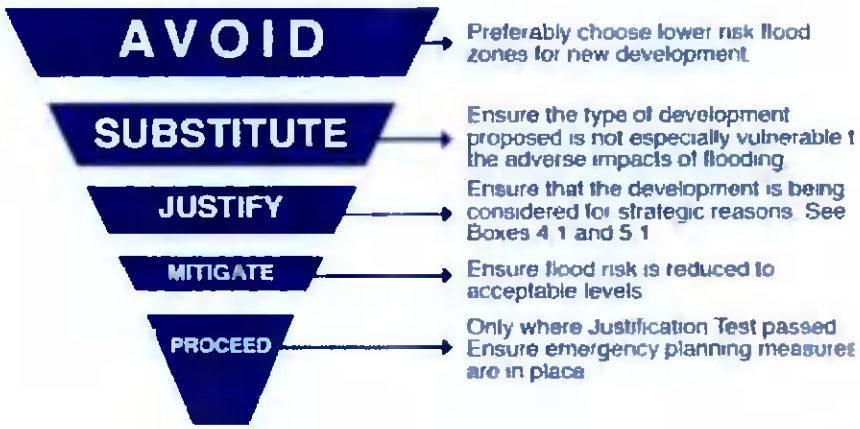


Figure 8 - Sequential Approach

Vulnerability Class of Proposed Development

The vulnerability class of the development is dependent on the land use and type of development proposed. The "Planning Systems and Flood Risk Management: Guidelines for Planning Authorities" presents a matrix of vulnerability versus flood zone to illustrate appropriate development and the requirement of justification tests. The proposed residential development is classified as a highly vulnerable development. Highly vulnerable developments, such as the proposed development, at risk of Zone A and Zone B flooding require a Justification Test. Therefore, a Justification test is not required for the proposed development as based on the evidence outlined above, the development is considered to be located in Zone C, i.e. an area subject to a low probability of flooding.

SCHEDULE OF DRAWINGS

The following drawings should be read in conjunction with this report:

- 21183-GALC-DOW-00-XX-DR-CE-5001-S4-P01- Proposed Site Layout & Water Services
- 21183-GALC-DOW-00-XX-DR-CE-5002-S4-P01- Proposed Site Layout & Water Services
- 21183-GALC-DOW-00-XX-DR-CE-5016-S4-P01-Paving Details
- 21183-GALC-DOW-00-XX-DR-CE-5015-S4-P01-Gully Details
- 21183-GALC-DOW-00-XX-DR-CE-5014-S4-P01-Attenuation Details
- 21183-GALC-DOW-00-XX-DR-CE-5013-S4-P01-Watermain Details
- 21183-GALC-DOW-00-XX-DR-CE-5012-S4-P01-Pipe Bedding Details
- 21183-GALC-DOW-00-XX-DR-CE-5011-S4-P01-Manhole Details Sheet 2 of 2
- 21183-GALC-DOW-00-XX-DR-CE-5010-S4-P01-Manhole Details Sheet 1 of 2
- 21183-GALC-DOW-00-XX-DR-CE-5017-S4-P01-Road Surface Details
- 21183-GALC-DOW-00-XX-DR-CE-5000-S4-P01- Existing Site Survey & Dainage layout

APPENDIX A

STORMWATER MODELLING CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.000
Ratio-R	0.300	Preferred Cover Depth (m)	0.000
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1		5.00	59.556	1200	709715.989	730523.720	1.056
S2	0.059	5.00	59.322	1200	709699.083	730548.700	0.973
S3			59.101	1200	709681.397	730574.707	0.909
S7		5.00	59.569	1200	709700.181	730515.171	0.994
S8	0.052	5.00	59.548	1200	709678.445	730547.343	1.167
S9			59.423	1200	709666.885	730565.292	1.149
S10			59.184	1200	709672.500	730571.931	1.039
S11			59.039		709664.386	730580.467	0.964
S13			59.103	1200	709658.247	730582.593	1.060
S12			59.088	1200	709654.519	730583.925	1.065

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	30.163	0.600	58.500	58.349	0.151	199.8	225	5.55	38.7
1.001	S2	S3	31.451	0.600	58.349	58.192	0.157	200.3	225	6.12	37.2
1.002	S3	S10	9.320	0.600	58.192	58.145	0.047	198.3	225	6.28	36.7
2.000	S7	S8	38.826	0.600	58.575	58.381	0.194	200.1	225	5.70	38.3
2.001	S8	S9	21.350	0.600	58.381	58.274	0.107	199.5	225	6.09	37.2
2.002	S9	S10	8.695	0.600	58.274	58.231	0.043	202.2	225	6.25	36.8
1.003	S10	S11	11.777	0.600	58.145	58.075	0.070	168.2	225	6.48	36.3
1.004	S11	S13	6.497	0.600	58.075	58.043	0.032	203.0	225	6.60	36.0
1.005	S13	S12	3.959	0.600	58.043	58.023	0.020	198.0	225	6.67	35.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.921	36.6	0.0	0.831	0.748	0.000	0.0	0	0.000
1.001	0.920	36.6	5.9	0.748	0.684	0.059	0.0	61	0.680
1.002	0.925	36.8	5.9	0.684	0.814	0.059	0.0	60	0.678
2.000	0.920	36.6	0.0	0.769	0.942	0.000	0.0	0	0.000
2.001	0.922	36.7	5.2	0.942	0.924	0.052	0.0	58	0.659
2.002	0.916	36.4	5.2	0.924	0.728	0.052	0.0	58	0.654
1.003	1.005	40.0	10.9	0.814	0.739	0.111	0.0	80	0.860
1.004	0.914	36.3	10.8	0.739	0.835	0.111	0.0	84	0.799
1.005	0.925	36.8	10.8	0.835	0.840	0.111	0.0	83	0.805

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	30.163	199.8	225	Circular	59.556	58.500	0.831	59.322	58.349	0.748
1.001	31.451	200.3	225	Circular	59.322	58.349	0.748	59.101	58.192	0.684
1.002	9.320	198.3	225	Circular	59.101	58.192	0.684	59.184	58.145	0.814
2.000	38.826	200.1	225	Circular	59.569	58.575	0.769	59.548	58.381	0.942
2.001	21.350	199.5	225	Circular	59.548	58.381	0.942	59.423	58.274	0.924
2.002	8.695	202.2	225	Circular	59.423	58.274	0.924	59.184	58.231	0.728
1.003	11.777	168.2	225	Circular	59.184	58.145	0.814	59.039	58.075	0.739
1.004	6.497	203.0	225	Circular	59.039	58.075	0.739	59.103	58.043	0.835
1.005	3.959	198.0	225	Circular	59.103	58.043	0.835	59.088	58.023	0.840

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
2.000	S7	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable
2.001	S8	1200	Manhole	Adoptable	S9	1200	Manhole	Adoptable
2.002	S9	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.003	S10	1200	Manhole	Adoptable	S11		Junction	
1.004	S11		Junction		S13	1200	Manhole	Adoptable
1.005	S13	1200	Manhole	Adoptable	S12	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	709715.989	730523.720	59.556	1.056	1200	0	1.000	58.500	225
S2	709699.083	730548.700	59.322	0.973	1200	1	1.000	58.349	225
						0	1.001	58.349	225
S3	709681.397	730574.707	59.101	0.909	1200	1	1.001	58.192	225
						0	1.002	58.192	225
S7	709700.181	730515.171	59.569	0.994	1200	0	2.000	58.575	225
S8	709678.445	730547.343	59.548	1.167	1200	1	2.000	58.381	225
						0	2.001	58.381	225
S9	709666.885	730565.292	59.423	1.149	1200	1	2.001	58.274	225
						0	2.002	58.274	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10	709672.500	730571.931	59.184	1.039	1200		1	2.002	58.231	225
							2	1.002	58.145	225
							0	1.003	58.145	225
S11	709664.386	730580.467	59.039	0.964			1	1.003	58.075	225
							0	1.004	58.075	225
S13	709658.247	730582.593	59.103	1.060	1200		1	1.004	58.043	225
							0	1.005	58.043	225
S12	709654.519	730583.925	59.088	1.065	1200		1	1.005	58.023	225

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	17.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

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 %)
100	20	0	0

Node S13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.005	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0067-2000-1000-2000
Invert Level (m)	58.043	Min Outlet Diameter (m)	0.100
Design Depth (m)	1.000	Min Node Diameter (mm)	1200
Design Flow (l/s)	2.0		

Node S11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	58.075
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	188

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	0.0	0.600	50.0	0.0	0.601	0.0	0.0

Results for 100 year +20% CC 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
240 minute summer	S1	192	58.599	0.099	0.3	0.1115	0.0000	OK
240 minute summer	S2	192	58.598	0.249	7.6	0.5846	0.0000	SURCHARGED
240 minute summer	S3	192	58.598	0.406	7.5	0.4595	0.0000	SURCHARGED
240 minute summer	S7	192	58.598	0.023	0.1	0.0264	0.0000	OK
240 minute summer	S8	192	58.598	0.217	6.7	0.4395	0.0000	OK
240 minute summer	S9	192	58.598	0.324	6.6	0.3668	0.0000	SURCHARGED
240 minute summer	S10	192	58.598	0.453	12.3	0.5126	0.0000	SURCHARGED
240 minute summer	S11	192	58.598	0.523	11.9	26.1551	0.0000	SURCHARGED
240 minute summer	S13	192	58.598	0.555	2.2	0.6277	0.0000	SURCHARGED
30 minute summer	S12	22	58.058	0.035	2.0	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)
240 minute summer	S1	1.000	S2	-0.3	-0.019	-0.008	0.8518	
240 minute summer	S2	1.001	S3	7.5	0.615	0.206	1.2508	
240 minute summer	S3	1.002	S10	6.6	0.457	0.180	0.3707	
240 minute summer	S7	2.000	S8	0.1	0.003	0.002	0.8054	
240 minute summer	S8	2.001	S9	6.6	0.627	0.181	0.8444	
240 minute summer	S9	2.002	S10	5.7	0.606	0.157	0.3458	
240 minute summer	S10	1.003	S11	11.9	0.898	0.298	0.4684	
240 minute summer	S11	1.004	S13	2.2	0.242	0.060	0.2584	
240 minute summer	S13	1.005	S12	2.0	0.477	0.053	0.0162	47.7

APPENDIX B

ATTENUATION SYSTEM DETAILS

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc

ADS SiteAssist
FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

GALCO
DUBLIN, IRELAND

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE, WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS, AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT, AND MULTIPLE VEHICLE PRESENCES
6. CHAMBERS SHALL BE DESIGNED, TESTED, AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER, 2) MAXIMUM PERMANENT (75-YR) COVER LOAD, AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, A) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/IN/IN. B) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLOURS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS.
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787, AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUB-GRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE
6. MAINTAIN MINIMUM 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUB-SURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE"
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE"
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE"
3. FULL 36" (900 mm) OF STABILISED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

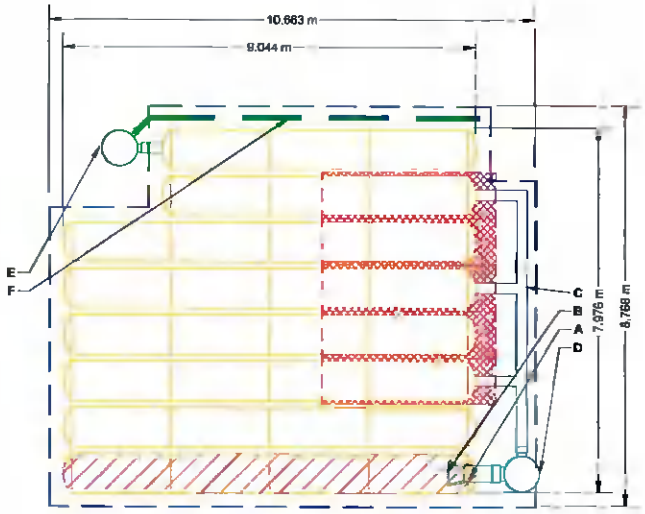
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

ISOLATOR ROW PLUS COMPONENTS SHOWN ON THIS DESIGN MAY NOT BE AVAILABLE IN THE SPECIFIED PROJECT REGION. PLEASE CONTACT YOUR LOCAL ADS REPRESENTATIVE OR E-MAIL ADSINTERNATIONAL@ADS-PIPE.COM FOR FURTHER INFORMATION

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
30	STORMTECH SC-310 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)	2.997
16	STORMTECH SC-310 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)	1.168
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)	1.016
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT)	1.016
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)	1.016
32.3	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE	0.711
		TOP OF SC-310 CHAMBER	0.559
		200 mm x 200 mm TOP MANIFOLD INVERT	0.241
		300 mm ISOLATOR ROW PLUS INVERT	0.175
87.1	SYSTEM AREA (m²)	200 mm BOTTOM CONNECTION INVERT	0.168
389	SYSTEM PERIMETER (m)	BOTTOM OF SC-310 CHAMBER	0.152
		UNDERDRAIN INVERT	0.000
		BOTTOM OF STONE	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	300 mm BOTTOM PREFABRICATED EZ END CAP, PART# SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
FLAMP	B	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART# SC310I2RAMP		
MANIFOLD	C	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
NYLOPLAST INLET W/ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN
NYLOPLAST (OUTLET)	E	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
UNDERDRAIN	F	100 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #8.32 FOR MANIFOLD SIZING GUIDANCE
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

GALCO
DUBLIN, IRELAND

DATE | DRAWN: IC
PROJECT #: | CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

StormTech®
Chamber System
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ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

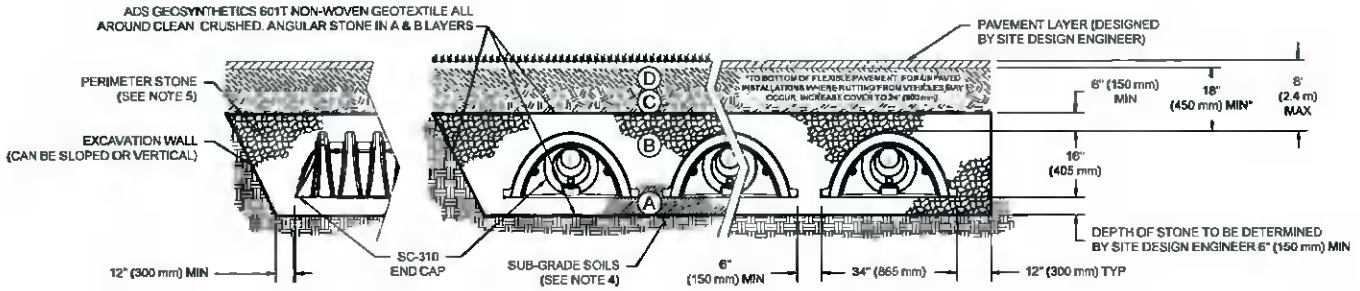
SCALE = 1 : 100

SHEET
2 OF 6

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUB-BASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUB-GRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUB-BASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE MOST PAVEMENT SUB-BASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[4] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs. (89 kN)
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUB-GRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE: A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE"
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUB-BASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE). "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUB-GRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION: A) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/IN/IN, B) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23°), AND C) CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLOURS.

GALCO
DUBLIN, IRELAND
DRAWN: IC
DATE:
CHECKED: N/A
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

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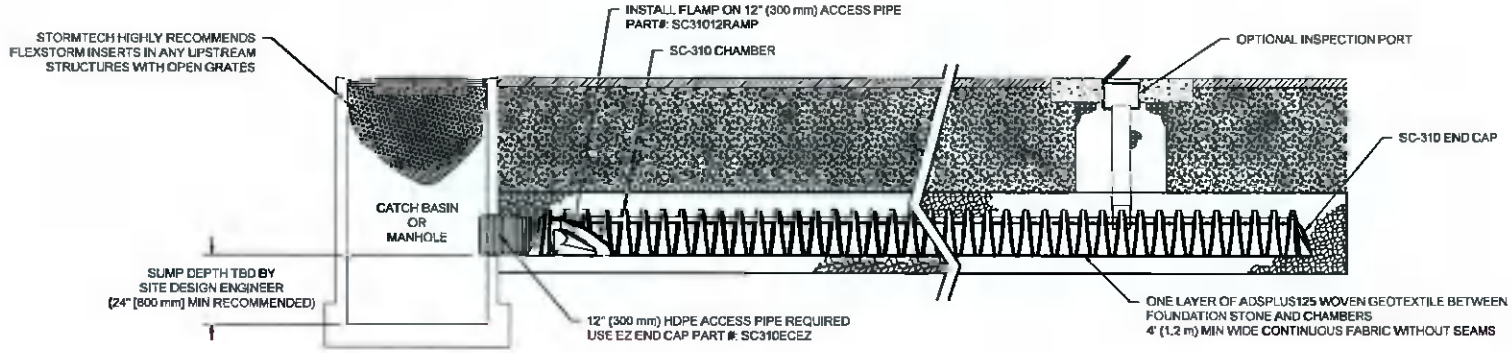
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE [illegible] DESIGN ENGINEER. IT IS THE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PROJECT DESIGNED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LOCAL REGULATIONS AND PROJECT REQUIREMENTS.

SHEET
3 OF 6



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

ISOLATOR ROW PLUS COMPONENTS SHOWN ON THIS DESIGN MAY NOT BE AVAILABLE IN THE SPECIFIED PROJECT REGION. PLEASE CONTACT YOUR LOCAL ADS REPRESENTATIVE OR E-MAIL ADSINTERNATIONAL@ADS-PIPE.COM FOR FURTHER INFORMATION

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - I) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - II) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH-WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

GALCO
DUBLIN, IRELAND
DATE:
DRAWN: IC
PROJECT #:
CHECKED: N/A

DESCRIPTION	CHK	DRW	DATE

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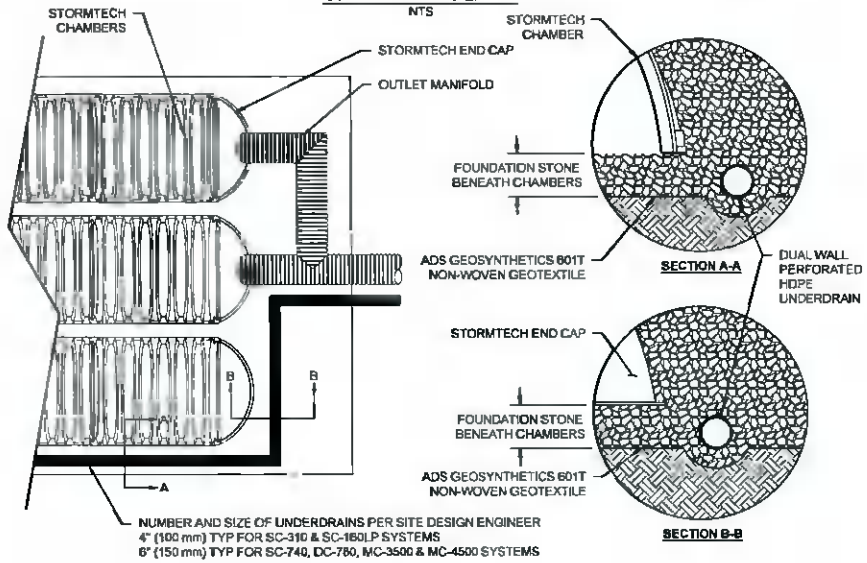
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

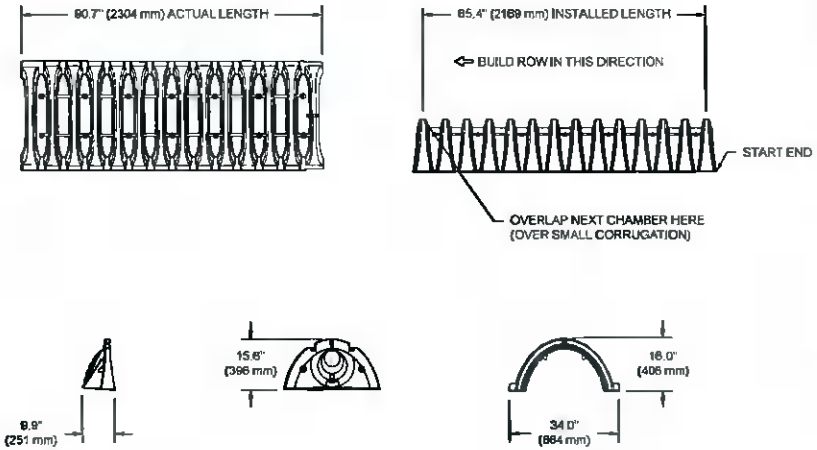
UNDERDRAIN DETAIL

NTS



SC-310 TECHNICAL SPECIFICATION

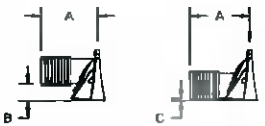
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.6" (147 mm)	—
SC310EPE06B / SC310EPE06BPC			—	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	—
SC310EPE08B / SC310EPE08BPC			—	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	—
SC310EPE10B / SC310EPE10BPC			—	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	—	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

GALCO
DUBLIN, IRELAND
DATE: DRAWN: IC
PROJECT #: CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

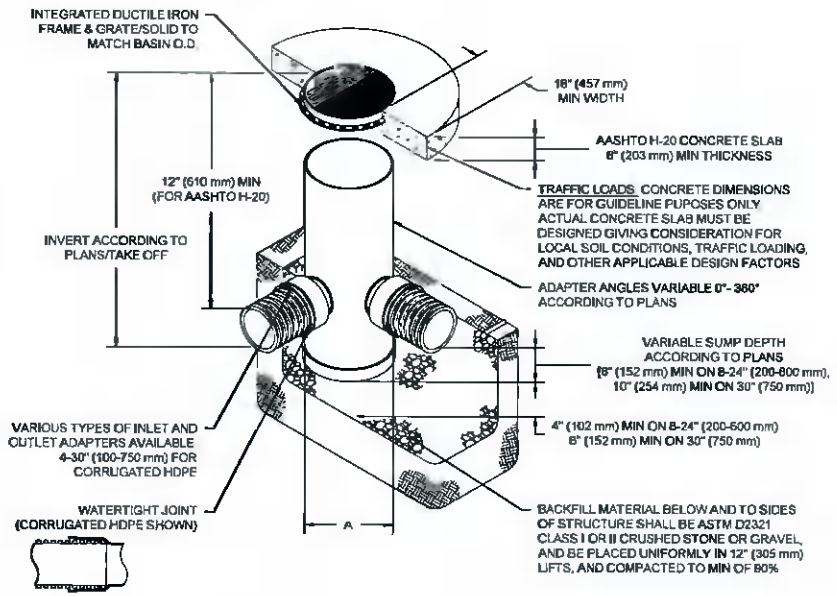
IT'S THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER THAT THE PROJECT IS DESIGNED AND ALL APPLICABLE STATE REGULATIONS AND PROJECT REQUIREMENTS

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION. **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

GALCO
DUBLIN, IRELAND

DESCRIPTION	DRW	CHK	DATE

DATE:
DRAWN: IC
PROJECT #:
CHECKED: N/A

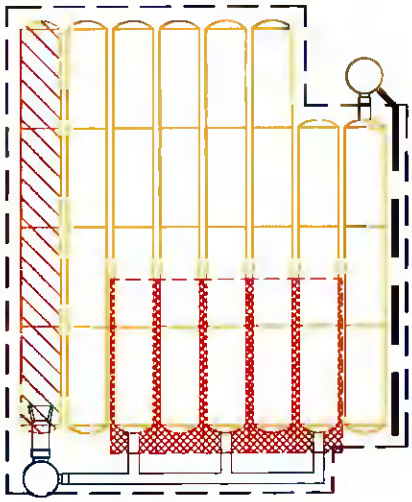
ADS
4640 TRUEMAN BLVD
HILLIARD OH 43026
1-800-733-7473

Nyloplast®

770-932-2443 | WWW.NYLOPLAST-US.COM

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS

SHEET
6 OF 6



APPENDIX C

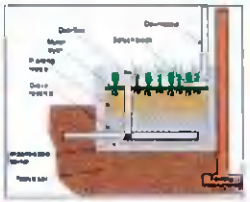
DRAWINGS

Soil Media Specification

- 40% sand
- 20-30% topsoil
- 30-40% compost

Pollutant Removal Efficiencies

- 50% total suspended solids reduction and sedimentation
- 30-70% total nitrogen reduction
- 30-90% total phosphorus reduction
- 40-80% metals reduction



PLANTER BOX RAINGARDEN DETAIL

SCHEDULE OF AREAS

NEW ROOF AREA = 1,100M SQ
(THIS IS CONSTRUCTED OVER EXISTING HARDSTANDING PAVEMENT)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH BUILDING ARCHITECTS AND ENGINEERS DRAWINGS.
2. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE WORKS COMMENCE. ANY DISCREPANCIES TO BE REPORTED BEFORE ANY WORK PROCEEDS.
3. REFER TO DRAWING [illegible] FOR PROJECT SPECIFICATION

LEGEND

PROJECT
PROPOSED PAINT STORE AT GALCO, BALLYMOUNT

CLIENT
GALCO

DRAWING TITLE
PROPOSED SITE LAYOUT & WATER SERVICES

GALC - DOW - 00 - XX - DR - CE

Project	Originator	Volume	Level	Type	Role
21183	5001				P-02

S4 FOR STAGE APPROVAL

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E admin@downesassociates.ie
www.downesassociates.ie

Downes associates