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THIS PROJECT CONSISTS OF AN APPLICATION FOR A STRATEGIC HOUSING DEVELOPMENT BY WESTAR INVESTMENTS LIMITED (THE APPLICANT) FOR A NEW RESIDENTIAL DEVELOPMENT ON LANDS MEASURING APPROXIMATELY 10.36 HECTARES AT CAPDOO & ABBEYLANDS, CELBRIDGE ROAD, CLANE, CO. KILDARE. THE APPLICATION IS FOR A DEVELOPMENT THAT INCLUDES 333 DWELLINGS CONSISTING OF: 121 NO. 2, 3 & 4 BEDROOM HOUSING UNITS, 144 NO. 1, 2 & 3 BEDROOM APARTMENTS, 68 NO. 1, 2 & 3 BEDROOM DUPLEX & MAISONETTE TYPE UNITS, A CRÈCHE AND A PUBLIC PARK ADJACENT TO THE RIVER LIFFEY WITH 3 NO. VEHICULAR/PEDESTRIAN ACCESSES AND SITE, LANDSCAPING AND ASSOCIATED INFRASTRUCTURAL WORKS. THE SUBJECT SITE IS SITUATED ON THE EASTERN SIDE OF REGIONAL ROAD R403 IN THE EASTERN ENVIRONS OF CLANE TOWN, C. 650M FROM THE TOWN CENTRE'

INFRASTRUCTURE DESIGN REPORT

November 2020

Job Title:	***THIS PROJECT CONSISTS OF AN APPLICATION FOR A STRATEGIC HOUSING DEVELOPMENT BY WESTAR INVESTMENTS LIMITED (THE APPLICANT) FOR A NEW RESIDENTIAL DEVELOPMENT ON LANDS MEASURING APPROXIMATELY 10.36 HECTARES AT CAPDOO & ABBEYLANDS, CELBRIDGE ROAD, CLANE, CO. KILDARE. THE APPLICATION IS FOR A DEVELOPMENT THAT INCLUDES 333 DWELLINGS CONSISTING OF: 121 NO. 2, 3 & 4 BEDROOM HOUSING UNITS, 144 NO. 1, 2 & 3 BEDROOM APARTMENTS, 68 NO. 1, 2 & 3 BEDROOM DUPLEX & MAISONETTE TYPE UNITS, A CRÈCHE AND A PUBLIC PARK ADJACENT TO THE RIVER LIFFEY WITH 3 NO. VEHICULAR/PEDESTRIAN ACCESSES AND SITE, LANDSCAPING AND ASSOCIATED INFRASTRUCTURAL WORKS. THE SUBJECT SITE IS SITUATED ON THE EASTERN SIDE OF REGIONAL ROAD R403 IN THE EASTERN ENVIRONS OF CLANE TOWN, C. 650M FROM THE TOWN CENTRE'***
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Author:	**Brian Connolly**
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APPENDICES

1.0 INTRODUCTION

1.1 Background

This infrastructure design report is to accompany a planning submission for a residential development of 333 dwellings at Capdoo, Clane, Co. Kildare.

The lands are zoned "C1 : New Residential" in the Clane Loal Area Plan 2017-2023.

This application comprises 333 residential units and will provide infrastructure comprising a road layout, footpaths, cycle-track, foul, surface water and water supply services in accordance with the Clane Local Area Plan and the Kildare County Development Plan (2017-2023).

This report aims to consider the revised development's main infrastructure elements, including the following;

- Surface water strategy and servicing.
- Foul sewer strategy and servicing.
- Water supply and servicing.
- Preliminary flood risk assessment.
- Road Layout/Site access.

1.2 Location

The subject site, of some 10.3 hectares (25.44 acres), is located at the north eastern extent of the village of Clane. The site has the benefit of abutting the River Liffey. The site is bounded by existing residential developments to the south and west and access to the site is via Brooklands residential development and Alexandra Walk residential scheme, see Figure 1.1.

The development lands are identified as KDA 1 in the Clane Local Area Plan 2017-2023 and are zoned "C –New Residential/Infill".

The site is currently used for Agriculture. Existing boundaries within the site are predominantly hedgerows, walls and fencing.

Figure 1.1 Site Location.

1.3.1 Topography

The proposed development site rises from the river Liffey to the centre of the site and then drops back towards the existing Brooklands Residential development at an average gradient of approximately 1.4% as shown in Figure 1.2. A topographical survey of the Site is provided.

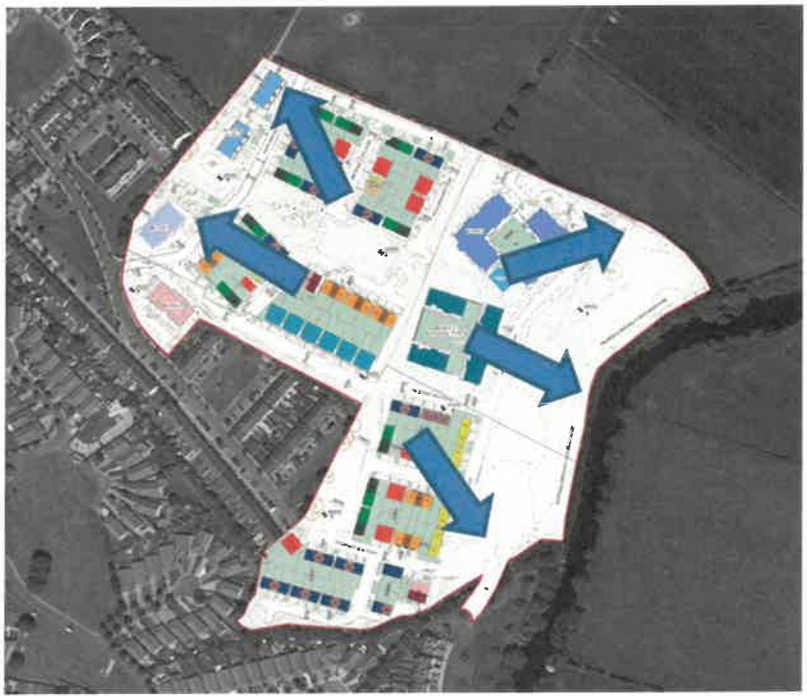


Figure 1.2 Site Topography.

1.4 Proposed Development

It is proposed to construct 333 residential units on the Site together with associated access roads, footpaths and infrastructure/services. A linear park is also proposed along the river Liffey.

1.5 Flood Risk

A separate Site Specific Flood Risk Assessment, FRA, has been prepared by Consult.IE as part of the application. The FRA recommends all finished floor levels should be constructed above 65.68m OD and all road levels constructed above 65.68m OD in agreement with the recommendation of Water Services Department of Kildare Co Council.

2.0 ACCESS AND ROADS

2.1 Overall Road and Access Layout

The proposed development will be accessed via Brooklands Residential Scheme from the R403. An Bord Pleanala granted permission to Ardstone Ltd, planning ref ABP 304632-19 to upgrade the existing R403/Brooklands/Capdoo Link road junction. Details of this upgrade are included in this application, Drawing 20017-306 1 & 2. Our client is willing to carry out these works if not completed by Ardstone Ltd. A secondary entrance is also provided via Alexandra Walk with access off the Clane relief road.

The development layout has been designed with speed reduction bends to provide traffic calming together with a combination of road vertical and horizontal geometry and forward sight visibility to reduce speeds. Design speed limits of 30km/hr are applied throughout the development as per Design Manual for Urban Roads and Streets (DMURS).

2.2 Road Layout Design

The proposed development's road layout and hierarchy is shown on site masterplan. The standard road cross-sections and construction details are also shown on this drawing and comprise the following;

- Main Access Road – 6.0m wide carriageway with a 1.0m planting strip/verge and 2m path and cycle-track on both sides.
- Development Local Streets – typically 5.5m wide carriageway with 2.0m footpaths.

Maximum road corner radii of between 3.5 and 5m are provided within the local streets and on the main access road as per DMURS.

An independent Road Safety Audit was carried out by Roadplan.ie and their recommendations were taking into account.

2.3 Pavement Design Standards

The main internal access roads are designed in accordance with the Design Manual for Urban Roads and Streets (DMURS) and Local Authority requirements.

2.4 Vehicle Tracking

The proposed development has been tracked to show the development's turning heads will accommodate large refuse vehicles and fire engines, Drawing 20017-305-1&2.

2.5 Driveway Access

All houses have access driveways set to accommodate a targeted maximum 1:20 driveway gradient. All driveways are permeable paving within private curtilage. Entrances to driveways in public footpaths comprise of drop kerbs with 150mm deep concrete pavement.

3.0 SURFACE WATER DRAINAGE

3.1 Existing Surface Water

The existing site is greenfield and the topography of the site generally slopes moderately from the south western boundary of the site to the North eastern boundary at an average gradient of approximately 1.4%, to an open drain and ultimately discharges to the River Liffey downstream. The drains will be retained throughout the site and similar to the the River Liffey, heavy planting is proposed to protect the residents and small children. Please refer to the Landscape Architect drawings.

3.2 General Design

The surface water drainage system will collect storm-water run-off generated from the proposed residential development using traditional pipe-work and manholes laid along the main access roads collecting run-off from impermeable road surfaces via gullies and adjoining areas. SUDS will also be incorporated to reduce run-off volumes and improve run-off water quality as described in Section 3.3 below.

The surface water drainage system for the residential development has been designed with two catchments as shown on drawing 20017-303. Surface water sections are showing on drawing 20017-303 - 2 & 4. The surface water will be attenuated in underground "stormtech" systems before discharging to the open drain at a controlled flow rate.

3.2.1 Compliance with Surface Water Policy

Surface water management for the proposed development is designed to comply with the Greater Dublin Strategic Drainage Study (GDSDS) policies and guidelines and the requirements of Kildare County Council. The guidelines require the following four main criteria to be provided by the development's surface water design;

- Criterion 1: River Water Quality Protection – satisfied by providing interception storage using permeable paving in driveways, treatment of run- off within the SUDS features e.g. permeable paving for driveways/parking bays, within the attenuation storage system and oil separators on the main surface water outfalls from the development.
- Criterion 2: River Regime Protection – satisfied by attenuating run-off with flow control devices prior to discharge to the outfall.
- Criterion 3: Level of Service (flooding) for the site – satisfied by the Site being outside the 1000 year coastal and fluvial flood zones, (See Flood Risk Assessment). Pluvial flood risk addressed by development designed to accommodate a 100 year storm as per GDSDS. Planned flood routing for storms greater than 100 year level, considered in design, the development has

been designed to provide an overland flood route from the development towards the surface water outfall.

- Criterion 4: River flood protection – attenuation and long term storage provided within the SUDS features e.g. permeable paving construction and attenuation facility.

3.2.2 Surface Water Design

In accordance with SUDS principals, permeable paving is provided for all driveways which will also collect run-off from adjacent private footpaths and run-off from house roofs. Permeable paving will provide "in curtilage" attenuation, storage and soakage for run- off.

Surface water discharge rates from the surface water network will be controlled by a Hydro-brake flow control device at each attenuation storage area.

A green roof is proposed to the undercroft car-parking structures. Typical construction details are shown on Drawing 20017-314. The location of rainwater butts for dwellings and Rainwater Harvesting tanks for the Apartment and Creche Blocks are shown on Drawing 20017-303

Surface water attenuation storage for the development will be provided within stormtech attenuation tanks in accordance with the GDSDS. The tanks will provide storage for the 100 year storm for the catchment. The layout of the attenuation tank is shown on Drawing 20017-303 with typical details on 20017-314.

Surface water discharge rates from the surface water network will be controlled by a Hydro-brake flow control device at each attenuation storage area.

3.2.3 Ground Investigation

Preliminary site investigation was undertaken by IGSL on the Subject Site which included trial pits and infiltration tests. Infiltration tests in accordance with BRE Digest 365 were carried out at different locations throughout the site The infiltration tests carried out resulted in a soakage rate of f = 3.8662E-05 m/sec to f =1.05119E-06 m/sec. The lowest rate was used in the design of the permeable paving. The benefit of infiltration results of pit 6 and 7 were used in the design of the attenuation tanks. The results of Pit 6 & Pit 7 conclude the stormtech chambers must be wrapped in Bentonite. The Site Investigation report is attached in Appendix F.

3.3 SUDS

In accordance with the GDSDS it is proposed to use Sustainable Urban Drainage systems (SUDS) for managing storm-water for the proposed development. The aim of the SUDS strategy for the site will be to;

- Attenuate storm-water runoff.
- Reduce storm-water runoff.

- Reduce pollution impact.
- Replicate the natural characteristics of rainfall runoff for the site.
- Recharge the groundwater profile

The proposed layout of the drainage and SuDS is detailed on drawings 20017-303 and 20017-314.

An assessment of the potential SuDS that could be incorporated within the site was conducted using the site investigation data, www.uksuds.com/irish_suds/index.htm website and the SuDS Manual. A SuDS evaluation report is provided in Appendix A. Since the proposed development drainage will be constructed to a taking in charge standard, the range of SuDS features available are restricted but include the following;

1. Extents of impermeable areas reduced where allowable.
2. Permeable, self-draining areas incorporated in landscaped areas.
3. All driveways to be permeable paving. Run-off from these permeable paving areas is allowed to infiltrate to the sub-soil and provide attenuation, storage and soakage for run-off generated by adjacent impermeable surfaces.
4. Down pipes from roof surfaces to rain water butts with overflows to permeable paved areas to dwellings.
5. Attenuation storage system.
6. Green roofs provided to undercroft car-parking structure
7. Rainwater harvesting tanks to Apartment and Creche blocks
8. A petrol interceptor to be provided before both attenuation tanks.

3.4 Attenuation Calculations

Run-off from the proposed development will be limited/attenuated using vortex flow control devices (Hydro-brake or equivalent) limiting discharge to greenfield run-off rates (Q_{bar}) in accordance with the GDSDS for the total area of the site within the catchment of the new drainage networks (Total area 10.3Ha).

The calculated allowable discharge for the development catchment is calculated as 9.3l/s and 20.21 l/s for tanks 1 and 2 respectively as per www.uksuds.com/irish_suds/index.htm website and the SUDS Manual.

Attenuation volumes have been designed using Microdrainage Windes analysis software taking account of design invert levels, ground levels and depth and type of system. In total 1,682m^3 of storm-water storage is provided within the attenuation facilities.

Discharge rates from the Site are in-line with the GDSDS recommendations; refer to design run-off calculations in Appendix B.

Surface water storage volumes to accommodate a 100 year storm include for climate change, refer to Appendix B for Windes attenuation calculations. Typical details and cross-sections of the proposed surface water attenuation facilities are provided on drawings 20017-303-2 and 314. Details of the "in curtilage" SuDS proposed includes the permeable driveways as shown on drawing 20017-314.

3.5 Interception Volume

To prevent pollutants or sediments discharging into water courses the GDSDS requires "interception storage" to be incorporated into the development. This interception storage is designed to receive the run-off for rainfall depths of 5mm up to 10mm if possible. The SUDS features including permeable driveways and attenuation facilities will provide the necessary interception volume required by the GDSDS. Petrol Interceptors are also provided at the entrance to both of the attenuation tanks. Typical details are shown on drawing 20017-314.

3.6 Design Standards

Drainage is designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works. Surface water pipe-work was sized using the following parameters:

• Return period for pipe work	2 years, check 30 year 15 minute, no flooding. check 100 year 15 minute, flooding in designated areas.
• Time of entry	4 minutes
• Discharge Limit	29.5 l/s @ 100 years
• Pipe Friction (Ks)	0.6 mm
• Minimum Velocity	0.7 m/s
• Standard Average Annual Rainfall	821mm (UK SuDS.com)
• M5-60	16.1mm (Met Eireann)
• Ratio r (M5-60/M5-2D)	0.28 (Met Eireann)
• Attenuation Tank Storm Return Event	GDSDS Volume 2, p61, Criterion 3 30 year no flooding on site. 100 year check no internal property flooding. Flood routing plan. FFL freeboard above 100 year flood level. No flooding to adjacent areas.

- Climate Change Allowance 20%
- Factor of Safety for infiltration 2.0
- Runoff from Roads and Footpaths 100%
- Runoff from Roofs (draining via permeable pavement) 60%
- Runoff from Driveways (draining via SuDS feature) 60%

Surface water sewers have been designed in accordance with IS EN 752 and the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS).

Standard drainage details, as outlined on drawings 20017-303 and 303-14, are in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

The minimum pipe diameter for public surface water sewers is 225mm. Private drains within the proposed development will be 100mm as outlined on individual house drawings.

Refer to drawings 20017-303 for the proposed surface water layout.

Surface water sewer calculations for the main drainage networks is included in Appendix B and C.

3.7 Climate Change

Surface water calculations for the development made use of rainfall values for Clane, provided by UK SuDS.com. Rainfall intensities were increased by a factor of 10% (flows factored by 20%) to take account of climate change, as required by the GDSDS for attenuation storage design.

3.8 Pluvial Flooding Provision

The surface water network, attenuation storage and site levels are designed to accommodate a 100 year storm event and includes climate change provision. Floor levels of houses are set above the 100 year flood levels by a minimum of 0.5m for protection. For storms in excess of 100 years, the development has been designed to provide overland flood routes along the various development roads towards the surface water drainage outfall. Refer to Consult.ie Site Specific Flood Risk Assessment for further details.

3.9 Surface Water Quality Impact

Run-off rates from the site are controlled by vortex flow control devices. Surface water management proposals for the development also incorporate the following to reduce its impact;

- Designed in accordance with GDSDS requirements;

- Incorporates SuDS features e.g. permeable paving in high risk parking areas at the front of houses;
- On-line attenuation/infiltration facilities with an oil separator prior to discharge to a public surface water sewer.
- The attenuation system will be maintained by the contractor in accordance with the manufacturers' recommendation until the scheme is taking in charge. "Stormtech" has a maintenance program which can be agreed with the planning authority prior to commencement.

4.0 FOUL DRAINAGE

4.1 Existing Foul Drainage

The subject site is green-field and therefore has no foul loading at present. It is proposed to divide the foul sewer into two catchments, Catchment 1, Western part of site to Abbey Park pumping station via Brooklands and Catchment 2, Eastern part of site also through Brooklands to the Abbey Park pumping station. The Abbey Park pumping station is in the control of the applicant. A 225mm diameter foul sewer runs to the pumping station.

We note the contents of the pre-connection reply from Irish Water, dated 3 July, 2020 for 80 units initially and by deduction, the remaining units on completion of the Upper Liffey Valley Sewerage Scheme Contract 2B. We understand the Upper Liffey Valley Sewerage Scheme Contract 2B will be completed by quarter 3 of 2021 as per Irish Water letter dated 03 July, 2020. Phase B and Phase C will consist of 75 units, with the balance of 103 units in Phase D. A phasing drawing, ref PE20057-CWO-ZZ-ZZ DRA-0008 was prepared by Architects' CWOB showing the phasing of the development.

In response to the issues raised by Irish Water in their report to An Bord pleanala, we confirm the applicants are in charge of the adjoining third party lands of Brooklands and Abbeylands, see Drawing 20017-304. Letters of consent to discharge the effluent through these lands are included with this application. The capacity of the Abbeylands pumping station are included in Appendix D. The pumping station at Abbeylands was constructed circa 1990 and will require some upgrading to comply with current Irish Water Standards and Codes of Practice. As per the pre-connection feasibility reply to our clients' by Irish Water dated 03 July, 2020, our client is prepared to demonstrate and upgrade if necessary the Third Party infrastructure so it is in compliance with the requirements of Irish Water Code of Practice and Standard Details to satisfy the current and the additional demand.

4.2 Future Foul Drainage

The foul sewer network has been continued to the lands to the North of the subject site for future developments.

4.3 Design Strategy

The proposed foul drainage system for the entire site has been designed as two separate catchments (refer to drawing 20017-303 & 304), based on the topography of the site. 130 units and the crèche, predominantly to the West of the site, will discharge to the Abbeylands pumping station,(capacity calculation included in Appendix D) via Brooklands residential scheme with the remaining 203 units discharging also to the Abbeylands pumping station, (capacity calculations included in Appendix D).

Individual houses will connect to the 225mm and 150mm diameter foul drains via

individual 100mm diameter house connections, as per Irish Water Code of Practice for Wastewater Infrastructure.

No. of Residential Units	No. of Persons @ 3 per unit & 60 Creche	Dry Weather Flow (Litres/person /day)	Peak Flow - 6 x DWF (l/s)	Daily Demand (m^3)
333 + Creche	1,059	333 (Dwelling) 60 (Creche)	14.00	201

4.4 Design Calculations

Foul sewers have been designed in accordance with the Building Regulations and specifically in accordance with the principles and methods set out in the Irish Water Code of Practice, IS EN752 (2008), IS EN12056: Part 2 (2000) and the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS).

The following criteria have been applied:

Demand	600l/dwelling/day (based on 3 persons per house and a per capita wastewater flow of 200 litres per head per day.)
Discharge units	14 units per house (as BS8301)
Pipe Friction (Ks)	1.5 mm
Minimum Velocity	0.75 m/s (self-cleansing velocity)
Maximum Velocity	3.0 m/s
Frequency Factor	0.5 for domestic use
Manhole Depths	< 5.0m

Foul sewer design calculations are provided in Appendix D.

All foul sewers and manholes will be constructed in accordance with the Irish Water Standard Details and the Irish Water Code of Practice for Wastewater.

4.5 Compliance with Irish Water Standards

The proposed foul sewer design and layout is in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water Wastewater Infrastructure Standard Details. Connections to the existing infrastructure will be carried out in

accordance in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water, Wastewater Infrastructure Standard Details.

4.6 Proposals for protection or diversion of Irish Water Assets

The proposed foul sewer design does not envisage the removal or diversion of existing foul sewers. Connections to the existing infrastructure will be carried out in accordance in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water, Wastewater Infrastructure Standard Details.

4.7 Foul Environmental Impacts

This application comprises 333 residential units. The development will discharge by gravity to a Pumping Station located in the adjoining Abbey Park (in control of applicant).

An Irish Water Pre-Connection Enquiry form has been submitted to Irish Water and an Irish Water Feedback form has been received outlining that a Wastewater connection is possible for the proposed development. Refer to Appendix E for a copy of each form.

The proposed foul water design and layout was submitted to Irish Water and a letter of Design Acceptance was issued by Irish Water. This is included in Appendix H.

5.0 WATER SUPPLY AND DISTRIBUTION

5.1 Existing Water supply

An existing 150mm diameter public uPVC water-mains passes the subject site on the Brooklands entrance. Please refer to Irish Water Map in Appendix G. Adequate supply of water is available to meet fire-fighting demands.

5.2 Development Water Main Layout

The development's water-main distribution system is indicated on drawings 20017-304 1&2 and 20017-315. A connection will be made to the existing 150 diam water-mains at the south-west boundary entrance off Brooklands Housing Scheme, (in control of the applicant) to service the development. A 150mm diameter spine water main will be provided along the main access road through the Subject Site with a number of 100mm diameters looped water-mains provided along the Local Streets. A connection is made back to the existing 150mm water-mains at Brooklands residential scheme at the bottom south-west corner of the site.

The connection to the public water main will include a metered connection with sluice valve arrangement in accordance with the requirements of Irish Water.

The selected pipe material options for the development will be PE-100.

Individual houses will have their own connections to the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Irish Water and to facilitate domestic meter installation.

Hydrants are provided for fire-fighting at locations to ensure that each dwelling is within the required Building Regulations distance of 46.0m to a hydrant.

5.3 Compliance with Irish Water Standards

The proposed water-mains design and layout is in accordance with the Irish Water Code of Practice for Water Infrastructure and The Irish Water, Water Infrastructure Standard Details. The proposed water design and layout was submitted to Irish Water and a letter of Design Acceptance was issued by Irish Water. This is included in Appendix H.

5.4 Proposals for protection or diversion of Irish Water Assets

The proposed water design does not envisage the removal or diversion of water-mains. Connections to the existing infrastructure will be carried out in accordance in accordance with the Irish Water Code of Practice for Water Infrastructure and The Irish Water, Water Infrastructure Standard Details.

5.5 Water Demand & Conservation

The average daily domestic demand (ADDD) for the proposed development is approximately 136.1m³ and an average day / peak week demand of 170.1 m³ has been calculated as outlined in the Irish Water Code of Practice for Water Infrastructure.

The average water demand is estimated to be 1.97 l/s. The peak demand for sizing of the pipe network (5 times the average day, peak week demand) is calculated as 9.9l/s.

Each house will provide 24 hours of cold water storage in the header tank and houses will utilise water saving features for the fittings to reduce water demand.

Adequate provision is provided for fire fighting purposes.

An Irish Water Pre-Connection Enquiry form, including calculations has been submitted to Irish Water and an Irish Water Feedback form has been received outlining that a Watermain connection is possible for the proposed development.

A letter of Design Acceptance is included in Appendix H.

Appendix A

IRISH SUDS REPORT

Site Drainage Evaluation

Site name: Capdoo Commons
Site location: Clane, Co. Kildare

Report Reference: 1544347714187

1. INTRODUCTION

This is a bespoke report providing initial guidance on potential implementation of SuDS for the development site in line with current best practice.

The use of this tool should be supplemented by more detailed guidance on SuDS best practice provided in a number of sources, principally the CIRIA SUDS Manual (2007), other CIRIA documents; the Use of SUDS in High Density Developments, HR Wallingford, (2005) and other HR Wallingford documents.

The objective is to provide some early guidance on the numbers and types of components that might be suitable for consideration within the site design. This may facilitate pre-application discussions with planners and other relevant authorities.

This guidance has been provided prior to the completion of the SUDS standards and the supporting guidance. However the principles of this tool are unlikely to be very different to the aims of the SUDS standards. HR Wallingford is not liable for the use of any output from the use of this tool and the performance of the drainage system. It is recommended that detailed design using appropriately experienced engineers professionals and tools is undertaken before finalising any drainage scheme arrangement for a site.

THE CONTENT OF THE REPORT

This report is split into 8 sections as follows:

2. Generic SuDS Best Practice Principles
3. Runoff Destination
4. Hydraulic Design Criteria
5. Water Quality Design Criteria
6. Site-Specific Drainage Design Considerations
7. SuDS Construction
8. SuDS Components Performance
9. Guidance on The Use of Individual Components

2. GENERIC SuDS BEST PRACTICE PRINCIPLES

To comply with current best practice, the drainage system should:

(i) manage runoff at or close to its source;
(ii) manage runoff at the surface;
(iii) be integrated with public open space areas and contribute towards meeting the objectives of the urban plan;
(iv) be cost-effective to operate and maintain.

The drainage system should endeavour to ensure that, for any particular site:

(i) natural hydrological processes are protected through maintaining Interception of an initial depth of rainfall and prioritising infiltration, where appropriate;
(ii) flood risk is managed through the control of runoff peak flow rates and volumes discharged from the site;
(iii) stormwater runoff is treated to prevent detrimental impacts to the receiving water body as a result of urban contaminants.

In addition, it is desirable to maximise the amenity and ecological benefits associated with the drainage system where there are appropriate opportunities. SuDS are green infrastructure components and can provide health benefits, and reduce the vulnerability of developments to the impacts of climate change.

3. RUNOFF DESTINATION

Introduction

Infiltration should be prioritised as the method of controlling surface water runoff from the development site, unless it can be demonstrated that the use of infiltration would have a detrimental environmental impact.

Groundwater (via Infiltration)
Infiltration may not be appropriate for managing runoff from this site. Robust studies are reqired to confirm the significance of the following constraints to infiltration:

(1) The subsurface geology is primarily impermeable and the use of infiltration is unlikely to be suitable. Where infiltration rates are confirmed via testing to be < 1 x 10-7 m/s, infiltration will be very limited. Where infiltration rates are between 1 x 10-7 and 1 x 10-5 m/s, then soils can still provide Interception and partial infiltration. If rates are confirmed to be > 1 x 10-5 m/s, full infiltration can be considered in the design.

The groundwater beneath the site is designated as , and this designation will define the treatment requirement for any infiltrated water (See Water Quality Design Criteria).

Surface water body
All runoff that cannot be discharged to groundwater will be managed on site and discharged to a surface water body.

The receiving surface water body for runoff from the site is: the *Liffey*. The riparian owner is: .

4. HYDRAULIC DESIGN CRITERIA

Introduction
Best practice criteria for hydraulic control require Interception, runoff and volume control.

Interception
To fulfill the requirements for Interception, there should normally be no runoff from the site for an initial depth of rainfall - usually 5mm. This is achieved through the use of infiltration, evapotranspiration, or rainwater harvesting.

Flow and Volume Control
Local guidance states that there are no additional requirements for peak flow or volume control for this site. Therefore, once Interception requirements have been fulfilled, residual surface runoff can be conveyed directly to the watercourse for this site.

The site is a greenfield development, therefore runoff from the site needs to be constrained to the equivalent greenfield rates and volumes.

Attenuation and hydraulic controls will be used to manage flow rates.

Rainwater harvesting, or the use of Long Term Storage can be used to achieve greenfield runoff volume control. Where volume control is not practicable, flows discharged from the site will be constrained to Qbar or 2 l/s/ha (whichever is the greater).

5. WATER QUALITY DESIGN CRITERIA

Introduction
Current best practice takes a risk-based approach to managing discharges of surface runoff to the receiving environment. The following text provides guidance on the extent of water quality management likely to be appropriate for the site.

Hazard Classification
Runoff from clean roof surfaces (ie not metal roofs, roofs close to polluted atmospheric discharges, or roofs close to populations of flocking birds) is classified as Low in terms of hazard status.

Runoff from roads, parking and other areas of residential, commercial and industrial sites (that are not contaminated with waste, high levels of hydrocarbons, or other chemicals) is classified as Medium in terms of hazard status.

Treatment requirements for disposal to surface water systems
The level of urbanisation of the catchment at the point of the discharge from the site is < 20%, therefore it may be classified as a sensitive receptor.

Roof runoff will require 1 treatment stage prior to discharge.

Runoff from other parts of this site such as roads, parking and other areas will require 3 treatment stages prior to discharge.

6. SITE-SPECIFIC DRAINAGE DESIGN CONSIDERATIONS

The design of SuDS with access to temporary or permanent water should consider public health and safety as well as issues associated with construction and operational management of the structures. Health and safety issues and risk mitigation features are presented in the CIRIA SuDS Manual.

Individual SuDS components should not be treated in isolation, but should be seen together as providing a suite of drainage features which are appropriate in different combinations for varying scales. It is always desirable to have a mix of SuDS components across the site as different components have different capacities for treatment of individual pollutants.

7. SuDS CONSTRUCTION

SuDS are a combination of civil engineering structures and landscaping practice. Due to the limited experience of building SuDS in the water industry, there are a number of key issues which need to be particularly considered as their construction requires a change in approach to some standard construction practices.

- SuDS components should be constructed in line with either the manufacturer's guidelines or best practice methods.
- The construction of SuDS usually only requires the use of fairly standard civil engineering construction and landscaping operations, such as excavation, filling, grading, top-soiling, seeding, planting etc. These operations are specified in various standard construction documents, such as the Civil Engineering Specification for the Water Industry (CESWI).
- Construction of soakaways is regulated by the Buildings Regulations part H (Drainage and waste disposal) which sets out the requirements for drainage of rainwater from the roofs of buildings.
- During construction, any surfaces which are intended to enable infiltration must be protected from compaction. This includes protecting from heavy traffic or storage of materials.
- Water contaminated with silt must not be allowed to enter a watercourse or drain as it can cause pollution. All parts of the drainage system must be protected from construction runoff to prevent silt clogging the system and causing pollution downstream. Measures to prevent this include soil stabilisation, early construction of sediment management basins, channelling run-off away from watercourses and surface water drains, and erosion prevention measures.
- After the end of the construction period and prior to handover to the site owner/operator:
  - Subsoil that has been compacted during construction activities should be broken up prior to the re-application of topsoil to garden areas and other areas of public open space to reinstate the natural infiltration performance of the ground;
  - Any areas of the SuDs that have been compacted during construction but are intended to permit infiltration must be completely refurbished;
  - Checks must be made for blockages or partial blockages of orifices or pipe systems;
  - Any silt deposited during the construction must be completely removed;
  - Soils must be stabilised and protected from erosion whilst planting becomes established.

Detailed guidance on the construction related issues for SuDS is available in the SuDS Manual and the associated Construction Site handbook (CIRIA, 2007).

8. SuDS COMPONENTS PERFORMANCE

	Interception	Peak flow control: Low	Peak flow control: High	Volume reduction	Volume control	Gross sediments	Fine sediments	Hydrocarbons/ PAHs	Metals	Nutrients
Rainwater Harvesting	Y	Y	S	Y	N	N	N	N	N	N
Pervious Pavement	Y	Y	Y	Y	Y	Y	Y	Y	Y	Var
Filter Strips	Y	N	N	N	N	Y	N	Y	Y	Var
Swales	Y	Y	S	Y(*)	N	Y	Y(+)	Y	Y	Y(-)
Trenches	Y	Y	S	Y(*)	N	N	N	Y	Y	Y(-)
Detention Basins	Y	Y	Y	N	Y	Y	Y(+)	Y	Y	Var
Ponds	N	Y	Y	N	Y	N(~)	Y	Limited	Y	Var
Wetlands	N	Y	S	N	Y	N(~)	Y	Limited	Y	Y
Green Roofs	Y	Y	N	N	N	N	N	Y	N	N
Bioretention Systems	Y	Y	S	Y(*)	N	N(~)	Y	Y	Y	Y
Proprietary Treatment Systems	N	N	N	N	N	Y	Y	Y(!)	Y(!)	Y(!)
Subsurface Storage	N	Y	Y	N	Y	N(~)	N	N	N	N
Subsurface Conveyance Pipes	N	N	N	N	Y	N(~)	N	N	N	N

Notes:

S: Not normally with standard designs, but possible where space is available and designs mitigate impact of high flow rates.
Y(*): Where infiltration is facilitated by the design.
N(~): Gross sediment retention is possible, but not recommended due to negative maintenance and performance implications.
Y(+): Where designs minimise the risk of fine sediment mobilisation during larger events.
Y(!): Where designs specifically promote the trapping and breakdown of oils and PAH based constitutents.
Y("): Where subsurface soil structure facilitates the trapping and breakdown of oils and PAH based constituents.
Var: The nutrient removal performance is variable, and can be negative in some situations.
Y(-): Good nutrient removal performance where subsurface biofiltration systems with a permanently saturated zone included within the design.

9. GUIDANCE ON THE USE OF INDIVIDUAL COMPONENTS

Rainwater Harvesting

• *Roofs*
Rainwater harvesting systems can be used to effectively drain roofs and provide both water supply and stormwater management benefits.

Pervious Pavement

• *Roofs*
Roof water can be drained into pervious pavement areas using diffusers to dissipate the point inflows. Detailed design of the pavement will need to take account of the additional impermeable roof area.

• *Roads*
Some types of pervious pavement can be used for relatively highly trafficked roads and pavement manufacturers should be consulted on the appropriate specification.

• *Car parks/other impermable surfaces*
Pervious pavements provide effective drainage, storage and treatment of car park surfacing,

Filter Strips

• *Roads*
Filter strips can provide treatment for road runoff, upstream of swales or trench components. They can reduce the need for kerbing and runoff collection systems.

• *Car parks/other impermable surfaces*
Filter strips can provide treatment for runoff from impermeable surfaces, upstream of swales or trench components. They can reduce the need for kerbing and runoff collection systems.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Swales

• *Roofs*
Swales can be used to convey roof water to other parts of the site.

• *Roads*
Swales provide treatment and conveyance of road runoff. There are a range of swale types - standard grass channels, underdrained swales, and wetland swales - depending on drainage requirements.

• *Car parks/other impermable surfaces*
Swales provide treatment and conveyance of runoff from impermeable areas. There are a range of swale types - standard grass channels, underdrained swales, and wetland swales - depending on drainage requirements.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Trenches

• *Roofs*
Trenches can be used to convey roof water to other parts of the site.

• *Roads*
Trenches can provide treatment and conveyance of road runoff. They require effective pretreatment to minimise the risk of blockage.

• *Car parks/other impermable surfaces*
Trenches can provide treatment and conveyance of runoff for impermeable areas.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Detention Basins

• *Roofs*
Detention basins can be used to attenuate and treat runoff.

• *Roads*
Detention basins can be used to attenuate and treat runoff.

• *Car parks/other impermable surfaces*
Detention basins can be used to attenuate and treat runoff.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria. A risk assessment should be used to determine the maximum appropriate depth of stored water in the basin.

Ponds

• *Roofs*
Ponds can be used to attenuate and treat roof runoff.

• *Roads*
Ponds can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in ponds for extended periods, nutrient concentrations can rise - particularly in the summer months, and the pond can become unattractive with poor amenity and biodiversity potential.

• *Car parks/other impermable surfaces*
Ponds can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in ponds for extended periods, nutrient concentrations can rise - particularly in the summer months, and the pond can become unattractive with poor amenity and biodiversity potential.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

• *Other*
Ponds built in permeable soils will require lining to maintain the water level of the permanent pool. The lining may be finished 100 or 200 mm lower than the outlet invert to encourage some infiltration to take place to contribute to interception.

Wetlands

• *Roofs*
Wetlands can be used to attenuate and treat roof runoff.

• *Roads*
Wetlands can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in wetlands for extended periods, nutrient concentrations can rise - particularly in the summer months, and the wetland can become unattractive with poor amenity and biodiversity potential.

• *Car parks/other impermable surfaces*

Wetlands can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in wetlands for extended periods, nutrient concentrations can rise - particularly in the summer months, and the wetland can become unattractive with poor amenity and biodiversity potential.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Green Roofs

• *Roofs*
Green roofs can be designed to provide interception, management and treatment of rainfall up to specified rainfall depths.

Bioretention Systems

• *Roofs*
Bioretention systems can be used to attenuate and treat roof runoff.

• *Roads*
Linear bioretention systems (ie biofiltration swales) can be used to attenuate and treat road runoff.

• *Car parks/other impermable surfaces*
Bioretention systems canbe used for car park drainage.

• *Site size > 50 ha*
Bioretention systems will tend to be suitable for managing small areas only.The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Proprietary Treatment Systems

• *Roads*
Proprietary treatment systems can be used where surface vegetated systems are impracticable. However, regular monitoring needs to be ensured so that they are maintained so that they continue to function effectively.

• *Car parks/other impermable surfaces*
Proprietary treatment systems could be used where surface vegetated systems are impracticable. However, regular monitoring needs to be ensured so that they are maintained so that they continue to function effectively.

• *Site size > 50 ha*
Proprietary treatment systems will tend to be suitable for managing small areas only. The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Subsurface Storage

• *Roofs*
Subsurface storage can be used to attenuate roof runoff.

• *Roads*
Subsurface storage can be used to attenuate road runoff.

• *Car parks/other impermable surfaces*
Subsurface storage can be used to attenuate car park runoff.

Subsurface Conveyance Pipes

TANK 1

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Brian Connolly
Site name:	Capdoo Commons
Site location:	Clane, Co. Kildare

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments" W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude: 53.29476° N

Longitude: 6.67473° W

Reference: 6504607

Methodology	IH124

Site characteristics

Total site area (ha) 4.3

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	812	812
Hydrological region	12	12
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.13	2.13
Growth curve factor: 100 year	2.61	2.61

Notes:

(1) Is Q_{BAR} < 2.0 l/s/ha?

(2) Are flow rates < 5.0 l/s?

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	9.32	9.32
1 in 1 year (l/s)	7.92	7.92
1 in 30 years (l/s)	19.86	19.86
1 in 100 years (l/s)	24.33	24.33

TANK 2

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name: Capdoo Commons

Site location: Clane

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance 'Preliminary rainfall runoff management for developments' W5-074/A/TR1/1 rev. E (2012), and the SuDS Manual C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude: 53.29476° N

Longitude: 6.67267° W

Reference:

Methodology	IH124

Site characteristics

Total site area (ha): 9.2

Methodology

Qbar estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	821	821
Hydrological region	12	12
Growth curve factor 1 year	0.85	0.85
Growth curve factor 30 year	2.13	2.13
Growth curve factor 100 year	2.61	2.61

Notes:

(1) Is Q_{BAR} < 2.0 l/s/ha?

(2) Are flow rates < 5.0 l/s?

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	20.21	20.21
1 in 1 year (l/s)	17.17	17.17
1 in 30 years (l/s)	43.04	43.04
1 in 100 years (l/s)	52.74	52.74

Appendix B

SURFACE WATER DISCHARGE AND ATTENUATION

Microstrain Ltd	
Unit B3 Metropoint Business Park Swords Co. Dublin	CAPDOO, CLANE, TANK 1 100YRP+20% 9.3 l/s
Date 24APR19 File	Designed by STORMTECH MC3500 Checked by LP
XP Solutions	Source Control 2015.1

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 733 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Winter	0.500	0.500	0.0	9.3	9.3	268.4	O K
30 min Winter	0.696	0.696	0.0	9.3	9.3	373.3	O K
60 min Winter	0.901	0.901	0.0	9.3	9.3	483.4	O K
120 min Winter	1.112	1.112	0.0	9.3	9.3	596.5	O K
180 min Winter	1.233	1.233	0.0	9.3	9.3	661.3	O K
240 min Winter	1.314	1.314	0.0	9.3	9.3	704.9	O K
360 min Winter	1.414	1.414	0.0	9.3	9.3	758.6	O K
480 min Winter	1.468	1.468	0.0	9.3	9.3	787.6	O K
600 min Winter	1.496	1.496	0.0	9.3	9.3	802.6	O K
[illegible]							
960 min Winter	1.499	1.499	0.0	9.3	9.3	804.0	O K
1440 min Winter	1.461	1.461	0.0	9.3	9.3	783.9	O K
2160 min Winter	1.366	1.366	0.0	9.3	9.3	732.8	O K
2880 min Winter	1.247	1.247	0.0	9.3	9.3	668.7	O K
4320 min Winter	0.988	0.988	0.0	9.3	9.3	530.2	O K
5760 min Winter	0.741	0.741	0.0	9.3	9.3	397.3	O K
7200 min Winter	0.521	0.521	0.0	9.3	9.3	279.6	O K
8640 min Winter	0.339	0.339	0.0	9.3	9.3	182.0	O K
10080 min Winter	0.202	0.202	0.0	9.3	9.3	108.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Winter	80.247	0.0	272.7	26
30 min Winter	56.084	0.0	382.3	40
60 min Winter	36.915	0.0	509.3	68
120 min Winter	23.512	0.0	649.2	126
180 min Winter	17.903	0.0	741.6	184
240 min Winter	14.722	0.0	813.1	242
360 min Winter	11.142	0.0	923.0	356
480 min Winter	9.130	0.0	1008.2	470
600 min Winter	7.819	0.0	1078.9	580
[illegible]				
960 min Winter	5.633	0.0	1241.5	884
1440 min Winter	4.243	0.0	1393.1	1106
2160 min Winter	3.194	0.0	1593.5	1568
2880 min Winter	2.609	0.0	1734.9	2020
4320 min Winter	1.958	0.0	1952.4	2860
5760 min Winter	1.596	0.0	2126.3	3640
7200 min Winter	1.362	0.0	2267.2	4392
8640 min Winter	1.196	0.0	2388.5	5016
10080 min Winter	1.072	0.0	2495.1	5560

Microstrain Ltd	
Unit B3 Metropoint Business Park Swords Co. Dublin	CAPDOO, CLANE, TANK 1 100YRP+20% 9.3 l/s
Date 24APR19 File	Designed by STORMTECH MC3500 Checked by LP
XP Solutions	Source Control 2015.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	15.600	Shortest Storm (mins)	15
Ratio R	0.264	Longest Storm (mins)	10080
Summer Storms	No	Climate Change %	+20

Time Area Diagram

Total Area (ha) 1.652

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.551	4	8	0.551	8	12	0.551

Model Details

Storage is Online Cover Level (m) 2.000

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.60
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	894.0	894.0	1.600	0.0	1073.4
1.500	894.0	1073.4			

Hydroslide Outflow Control

Design Head (m)	1.510	Invert Level (m)	0.000
Design Flow (l/s)	9.3	Maximum Head (m)	2.025
Range	VS	Minimum Pipe Diameter (mm)	150
Application	Stormwater	Minimum Manhole Diameter (mm)	1800
Model	DR 200/150 VS		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.6	1.200	9.3	3.000	9.8	7.000	14.9
0.200	9.3	1.400	9.3	3.500	10.6	7.500	15.5
0.300	9.3	1.600	9.3	4.000	11.3	8.000	16.0
0.400	9.3	1.800	9.3	4.500	12.0	8.500	16.5
0.500	9.3	2.000	9.3	5.000	12.6	9.000	16.9
0.600	9.3	2.200	8.4	5.500	13.2	9.500	17.4
0.800	9.3	2.400	8.7	6.000	13.8		
1.000	9.3	2.600	9.1	6.500	14.4		

User Inputs

Chamber Model	MC-3500
Outlet Control Structure	No Outlet
Project Name	Capdoo, Clane SHD
Project Location	Capdoo, Clane (TANK 1)
Project Date	10/24/2020
Engineer	Brian Connolly Associates
Measurement Type	Metric
Required Storage Volume	808 cubic meters
Stone Porosity	40%
Stone Above Chambers	305 mm.
Stone Foundation Depth	229 mm.
Average Cover Over Chambers	610 mm.
Design Constraint	Width
Design Constraint Dimension	15 meters

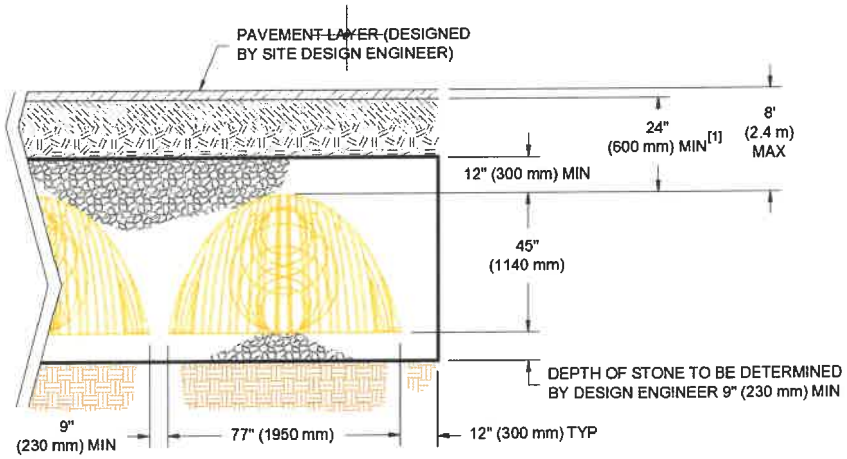
Results

System Volume and Bed Size

Installed Storage Volume	809 cubic meters
Storage Volume Per Chamber	5.0 cubic meters
Storage Volume Per End Cap	1.3 cubic meters
Number Of Chambers Required	151 each
Number Of End Caps Required	12 each
Rows/Chambers	1 row(s) of 26 chamber(s)
Leftover Rows/Chambers	5 row(s) of 25 chamber(s)
Maximum Length	59.63 meters
Maximum Width	13.49 meters
Approx. Bed Size Required	780 square meters

System Components

Amount Of Stone Required	833 cubic meters
Volume Of Excavation (Not Including Fill)	1309 cubic meters
Non-woven Filter Fabric Required	1808 square meters
Length Of Isolator Row	57.92 meters
Woven Isolator Row Fabric	303 square meters



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

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST by StormTech
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

Capdoo, Clane SHD

Capdoo, Clane (TANK 1)

STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500 OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MADE FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 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 SUBGRADE.
   - 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 - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm) MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING..
10. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

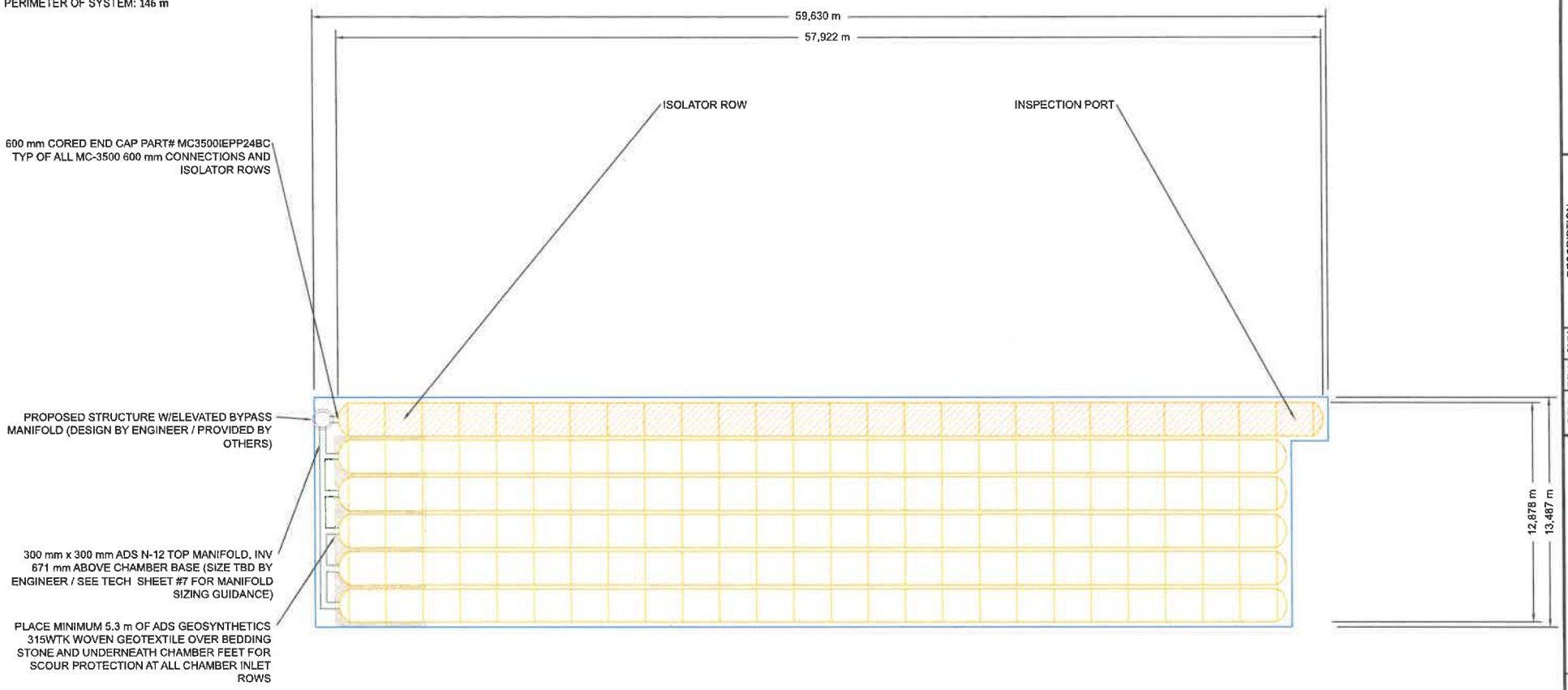
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

CONCEPTUAL LAYOUT

(151) STORMTECH MC-3500 CHAMBERS
(12) STORMTECH MC-3500 END CAPS
INSTALLED WITH 305 mm COVER STONE, 229 mm BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 809 m³
AREA OF SYSTEM: 780 **m²**
PERIMETER OF SYSTEM: 146 **m**

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



Capdoo, Clane SHD
Capdoo, Clane (TANK 1)

REV	DRW	CHK	DESCRIPTION

DATE: 10/24/2020 DRAWN: BC
PROJECT #: Tool CHECKED: ---

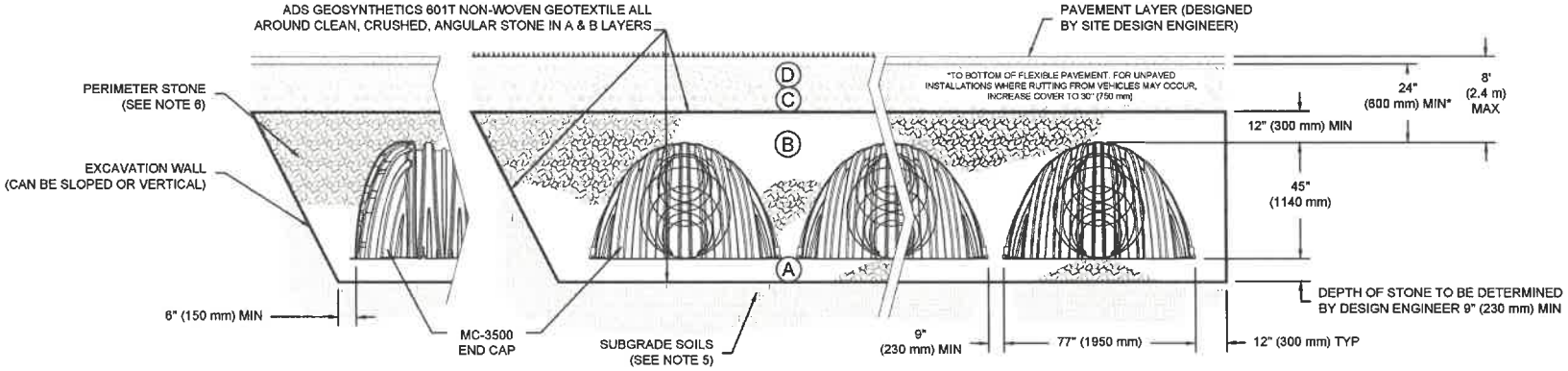
StormTech
Detention · Retention · Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

NOT TO SCALE

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 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 SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE 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 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 4	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 9" (230 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.



NOTES:

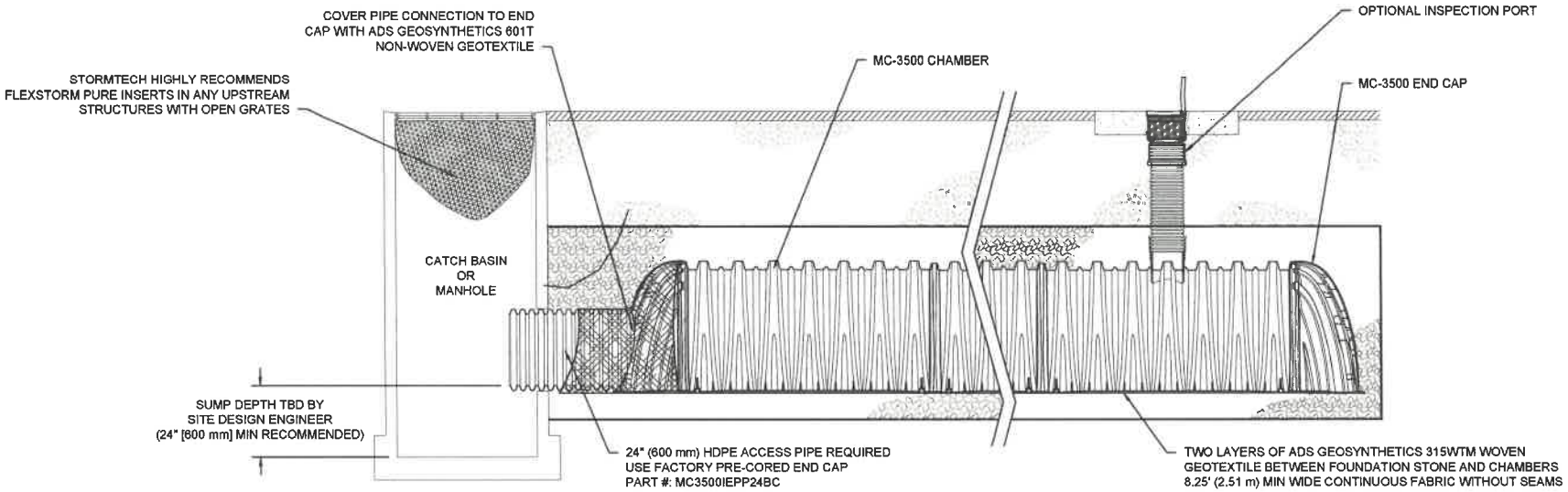
1. MC-3500 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

Capdoo, Clane SHD
Capdoo, Clane (TANK 1)

DATE: 10/24/2020 | DRAWN: BC | PROJECT #: Tool | CHECKED: ---

REV | DRW | CHK | DESCRIPTION

StormTech
Chamber-Retention-Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM



MC-3500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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.

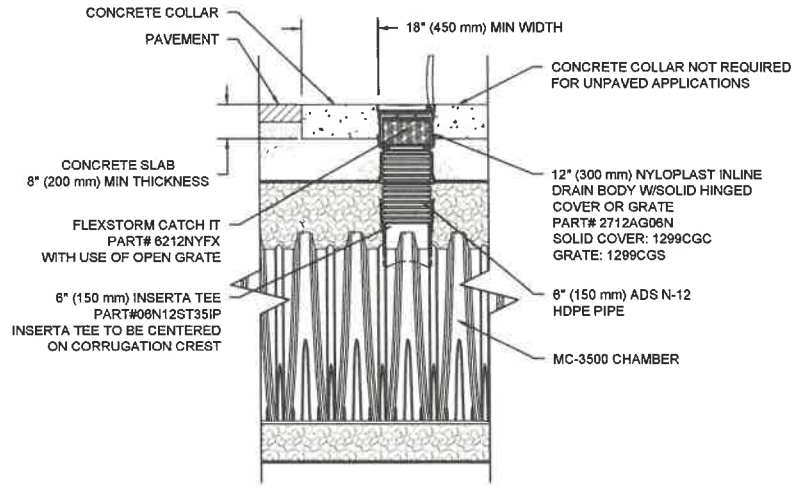
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

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.



MC-3500 6" INSPECTION PORT DETAIL
NTS

Capdoo, Clane SHD
Capdoo, Clane (TANK 1)

DATE: 10/24/2020 DRAWN: BC
PROJECT #: Tool CHECKED: ---

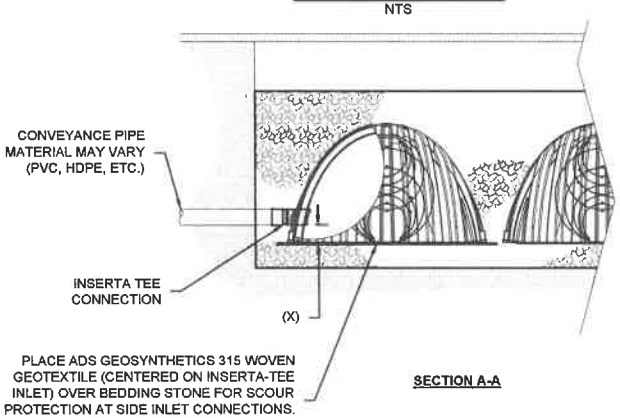
REV	DRW	CHK	DESCRIPTION

StormTech
Chamber Technology Made Easier
70 INWOOD ROAD, SUITE 3 | ROCKY HILL, CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

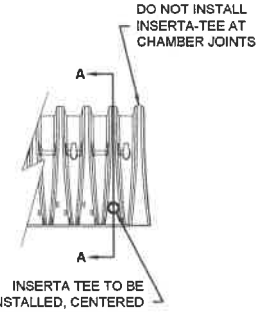
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE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

INSERTA TEE DETAIL

NTS



SECTION A-A



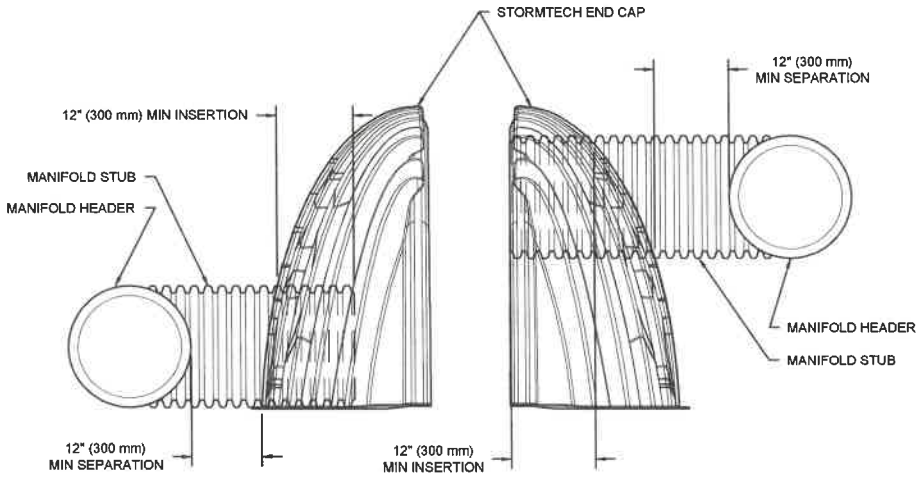
SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

MC-SERIES END CAP INSERTION DETAIL

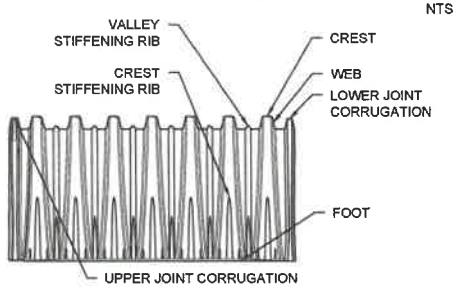
NTS

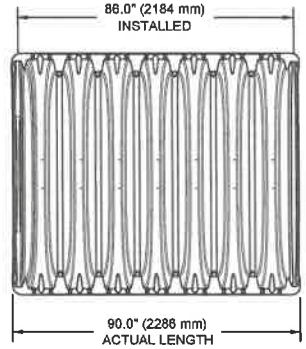


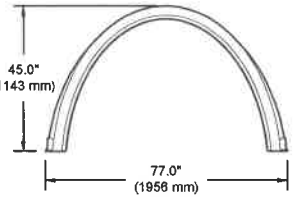
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

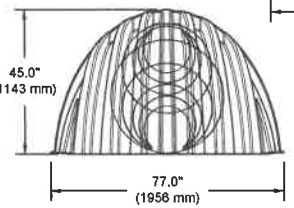
MC-3500 TECHNICAL SPECIFICATION

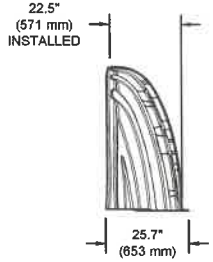
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	178.9 CUBIC FEET	(5.06 m³)
WEIGHT	135.0 lbs.	(61.2 kg)

NOMINAL END CAP SPECIFICATIONS

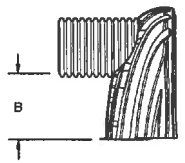
SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 22.5"	(1956 mm X 1143 mm X 571 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	46.0 CUBIC FEET	(1.30 m³)
WEIGHT	50.0 lbs.	(22.7 kg)

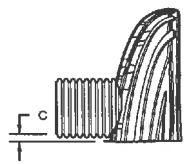
*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP30BC	30" (750 mm)	---	

NOTE: ALL DIMENSIONS ARE NOMINAL





CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS.
CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm)
THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHTEST POSSIBLE FOR THE PIPE SIZE.

Capdoo, Clane SHD
Capdoo, Clane (TANK 1)

DATE: 10/24/2020 | DRAWN: BC | CHECKED: --- | PROJECT #: Tool

REV | DRW | CHK | DESCRIPTION

StormTech
Distinction Reference Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860.529.8188 | 888-892-2694 | WWW.STORMTECH.COM

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 428 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Winter	0.630	0.630	0.0	13.0	13.0	328.9	O K
30 min Winter	0.873	0.873	0.0	14.6	14.6	455.8	O K
60 min Winter	1.123	1.123	0.0	16.4	16.4	586.2	O K
120 min Winter	1.366	1.366	0.0	18.0	18.0	713.0	O K
180 min Winter	1.492	1.492	0.0	18.8	18.8	779.0	O K
240 min Winter	1.567	1.567	0.0	19.3	19.3	818.1	O K
360 min Winter	1.639	1.639	0.0	19.7	19.7	855.6	O K
480 min Winter	1.662	1.662	0.0	19.9	19.9	867.7	O K
600 min Winter	1.677	1.677	0.0	20.0	20.0	875.4	O K
720 min Winter	1.678	1.678	0.0	20.0	20.0	876.0	O K
960 min Winter	1.656	1.656	0.0	19.8	19.8	864.2	O K
1440 min Winter	1.567	1.567	0.0	19.3	19.3	818.0	O K
2160 min Winter	1.409	1.409	0.0	18.3	18.3	735.5	O K
2880 min Winter	1.255	1.255	0.0	17.3	17.3	655.0	O K
4320 min Winter	0.985	0.985	0.0	15.4	15.4	513.9	O K
5760 min Winter	0.755	0.755	0.0	13.8	13.8	394.1	O K
7200 min Winter	0.536	0.536	0.0	12.9	12.9	279.9	O K
8640 min Winter	0.343	0.343	0.0	12.9	12.9	178.8	O K
10080 min Winter	0.255	0.255	0.0	12.3	12.3	133.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Winter	80.247	0.0	339.1	26
30 min Winter	56.084	0.0	474.4	40
60 min Winter	36.915	0.0	628.6	68
120 min Winter	23.512	0.0	801.0	124
180 min Winter	17.903	0.0	914.9	180
240 min Winter	14.722	0.0	1003.1	236
360 min Winter	11.142	0.0	1138.8	344
480 min Winter	9.130	0.0	1244.2	398
600 min Winter	7.819	0.0	1331.8	470
720 min Winter	6.886	0.0	1407.4	538
960 min Winter	5.633	0.0	1534.7	704
1440 min Winter	4.243	0.0	1732.4	1004
2160 min Winter	3.194	0.0	1961.1	1436
2880 min Winter	2.609	0.0	2135.5	1856
4320 min Winter	1.958	0.0	2403.8	2680
5760 min Winter	1.596	0.0	2614.4	3464
7200 min Winter	1.362	0.0	2788.0	4248
8640 min Winter	1.196	0.0	2937.9	4760
10080 min Winter	1.072	0.0	3070.2	5344

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	15.600	Shortest Storm (mins)	15
Ratio R	0.264	Longest Storm (mins)	10080
Summer Storms	No	Climate Change %	+20

Time Area Diagram

Total Area (ha) 2.031

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.677	4	8	0.677	8	12	0.677

Model Details

Storage is Online Cover Level (m) 2.500

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.60
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	870.0	870.0	1.800	0.0	1070.6
1.700	870.0	1070.6			

Hydro-Brake® Outflow Control

Design Head (m) 1.700 Hydro-Brake® Type Md5 SW Only Invert Level (m) 0.000
Design Flow (l/s) 20.2 Diameter (mm) 160

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.5	1.200	16.9	3.000	26.7	7.000	40.8
0.200	11.1	1.400	18.2	3.500	28.8	7.500	42.2
0.300	12.8	1.600	19.5	4.000	30.8	8.000	43.6
0.400	12.8	1.800	20.7	4.500	32.7	8.500	44.9
0.500	12.7	2.000	21.8	5.000	34.5	9.000	46.2
0.600	12.9	2.200	22.9	5.500	36.1	9.500	47.5
0.800	14.1	2.400	23.9	6.000	37.7		
1.000	15.5	2.600	24.8	6.500	39.3		

User Inputs

Chamber Model	MC-3500
Outlet Control Structure	No Outlet
Project Name	Capdoo, Clane SHD
Project Location	Capdoo, Clane (TANK 2)
Project Date	10/24/2020
Engineer	Brian Connolly Associates
Measurement Type	Metric
Required Storage Volume	876 cubic meters
Stone Porosity	40%
Stone Above Chambers	305 mm.
Stone Foundation Depth	229 mm.
Average Cover Over Chambers	610 mm.
Design Constraint	Width
Design Constraint Dimension	18 meters

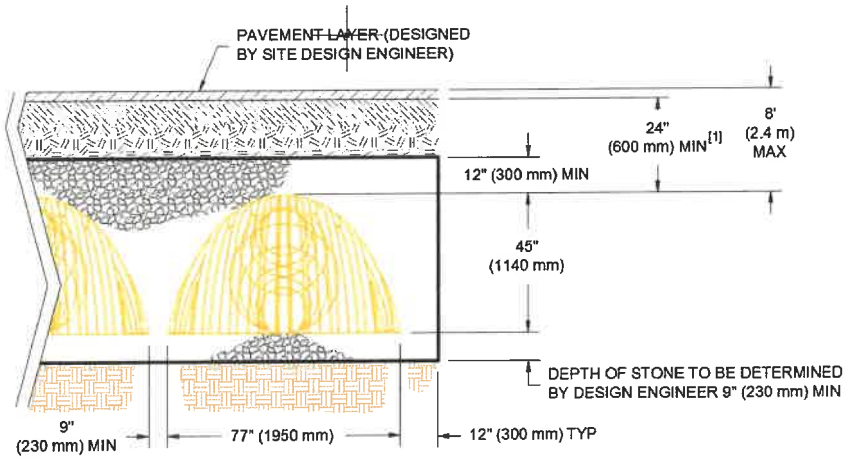
Results

System Volume and Bed Size

Installed Storage Volume	881 cubic meters
Storage Volume Per Chamber	5.0 cubic meters
Storage Volume Per End Cap	1.3 cubic meters
Number Of Chambers Required	164 each
Number Of End Caps Required	16 each
Rows/Chambers	4 row(s) of 21 chamber(s)
Leftover Rows/Chambers	4 row(s) of 20 chamber(s)
Maximum Length	48.71 meters
Maximum Width	17.86 meters
Approx. Bed Size Required	851 square meters

System Components

Amount Of Stone Required	909 cubic meters
Volume Of Excavation (Not Including Fill)	1427 cubic meters
Non-woven Filter Fabric Required	1927 square meters
Length Of Isolator Row	47.00 meters
Woven Isolator Row Fabric	248 square meters



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

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST by StormTech
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Capdoo, Clane SHD

Capdoo, Clane (TANK 2)

STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500 OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MADE FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 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 SUBGRADE.
   - 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 - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm) MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING..
10. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

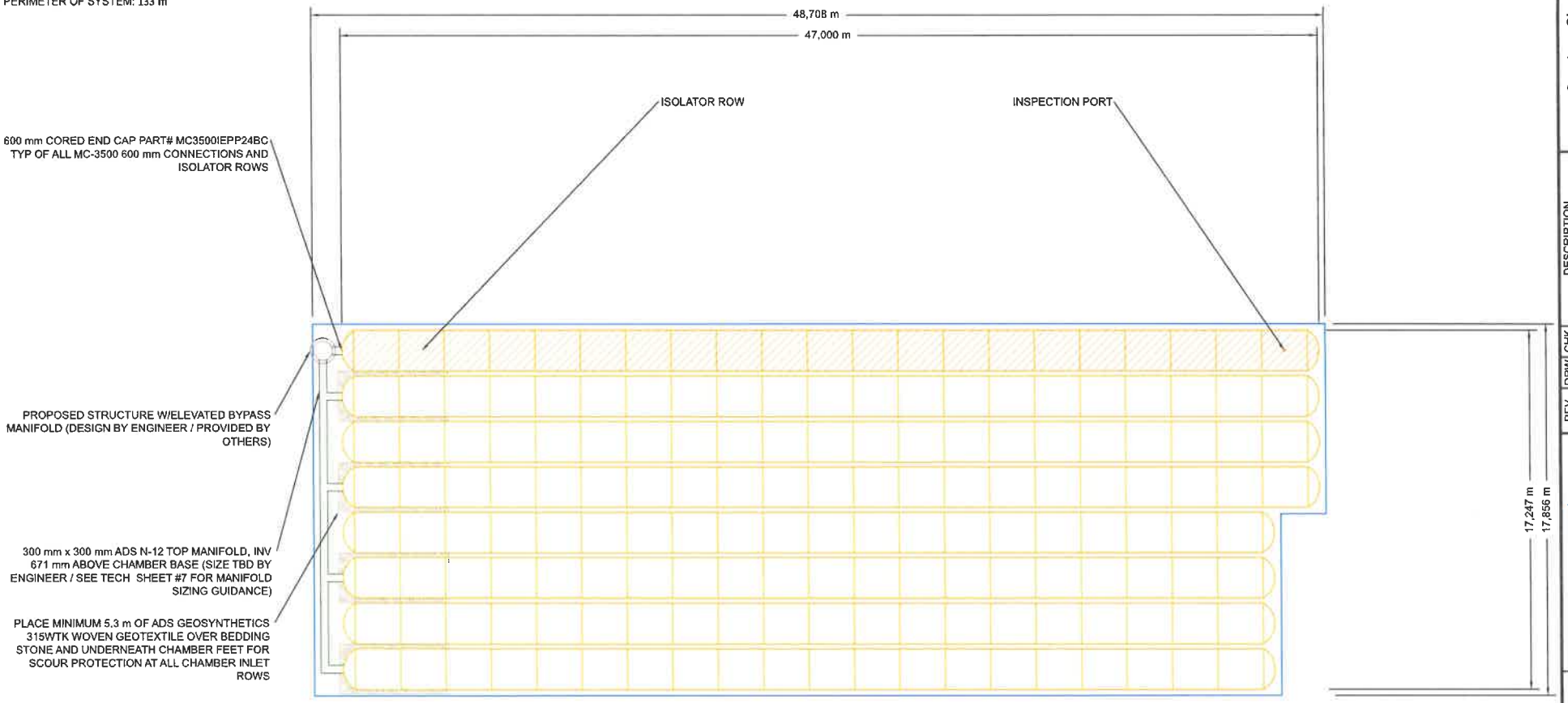
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

CONCEPTUAL LAYOUT

(164) STORMTECH MC-3500 CHAMBERS
(16) STORMTECH MC-3500 END CAPS
INSTALLED WITH 305 mm COVER STONE, 229 mm BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 881 m³
AREA OF SYSTEM: 851 m²
PERIMETER OF SYSTEM: 133 m

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



Capdoo, Clane SHD
Capdoo, Clane (TANK 2)

REV	DRW	CHK	DESCRIPTION

DATE: 10/24/2020 DRAWN: BC
PROJECT #: Tool CHECKED: ---

NOT TO SCALE

SHEET
2 OF 5

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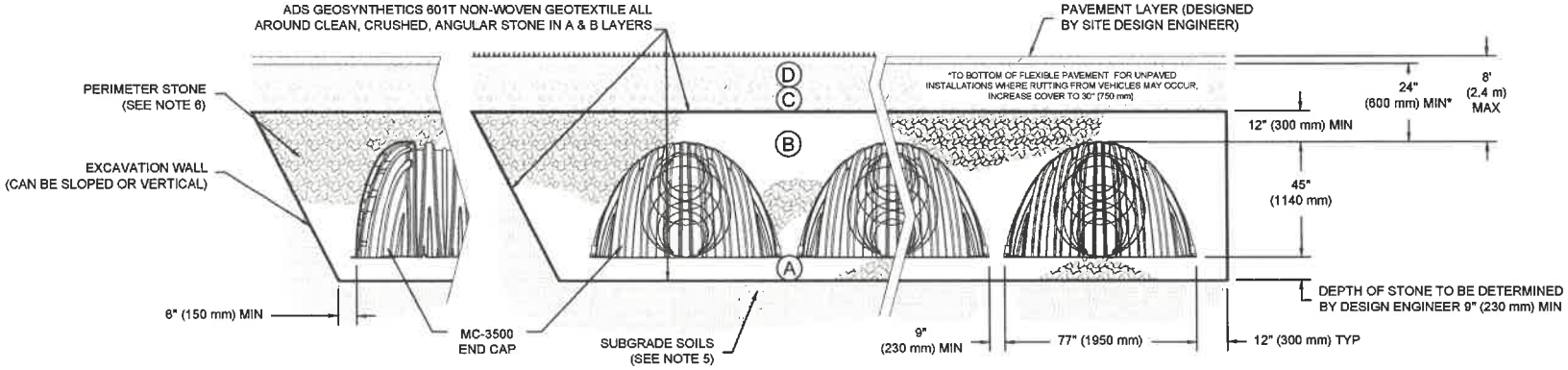
ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

	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 SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE 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 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 4	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 9" (230 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.



NOTES:

1. MC-3500 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

Capdoo, Clane SHD
Capdoo, Clane (TANK 2)
DATE: 10/24/2020 | DRAWN: BC
PROJECT #: Tool | CHECKED: ---

REV	DRW	CHK	DESCRIPTION

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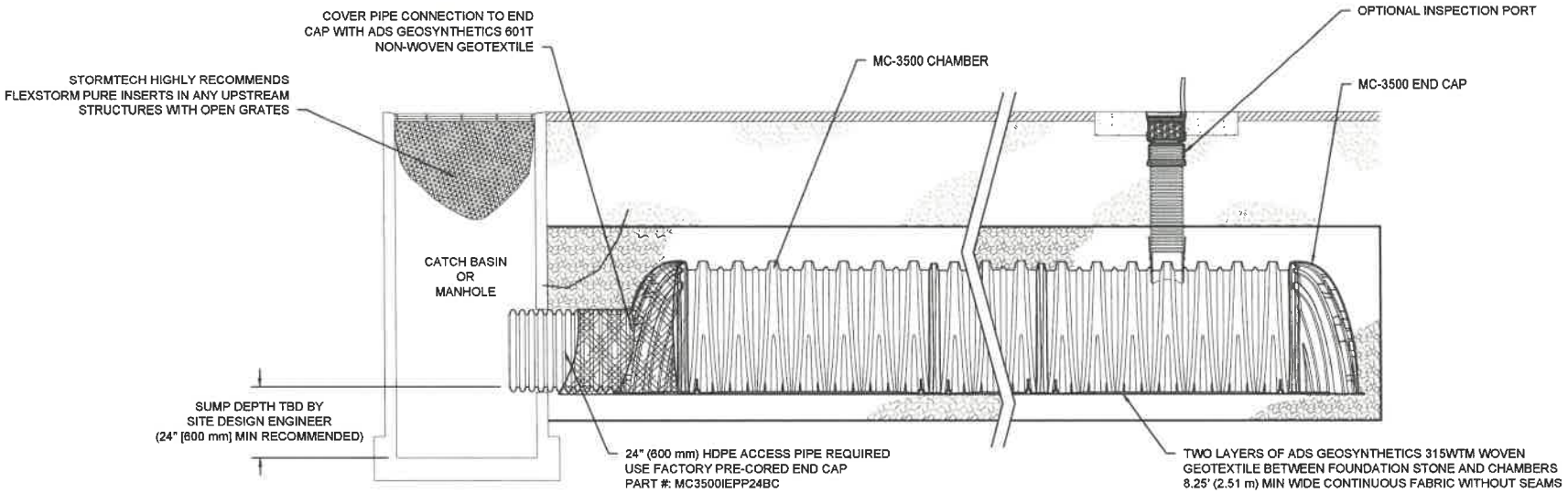


MC-3500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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.

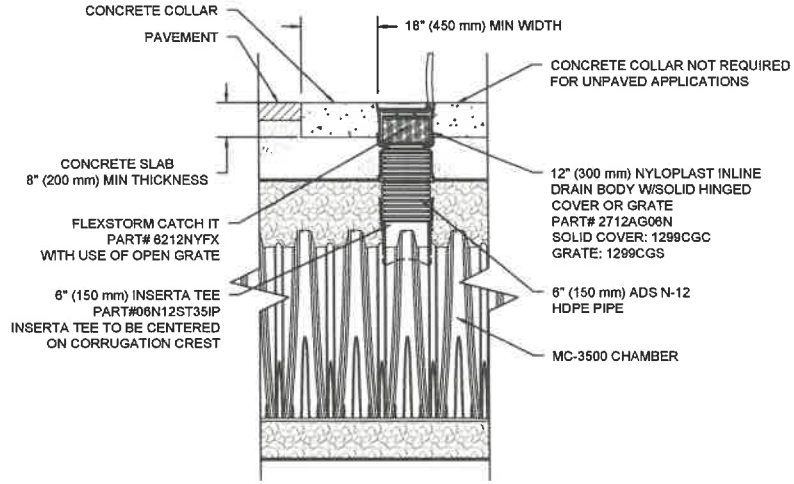
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

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.



MC-3500 6" INSPECTION PORT DETAIL
NTS

Capdoo, Clane SHD
Capdoo, Clane (TANK 2)

DATE: 10/24/2020 | DRAWN: BC | PROJECT #: Tool | CHECKED: ---

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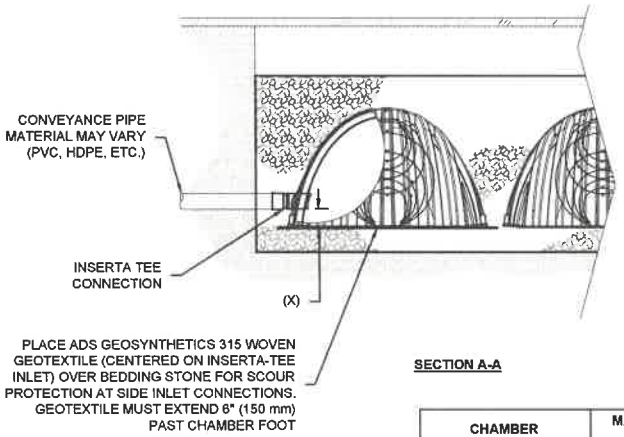
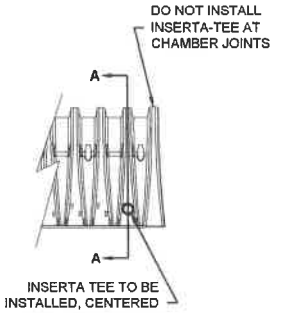
INSERTA TEE DETAIL

NTS



SECTION A-A



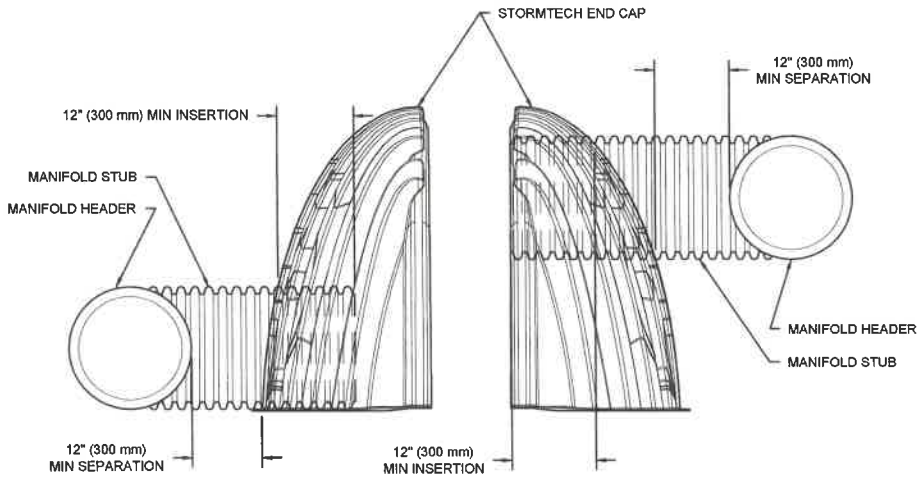
SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

MC-SERIES END CAP INSERTION DETAIL

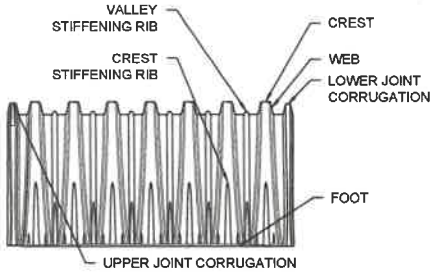
NTS

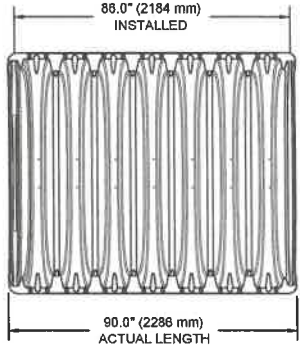


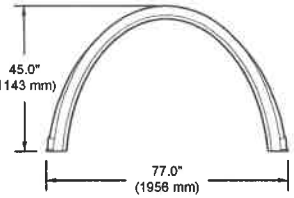
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

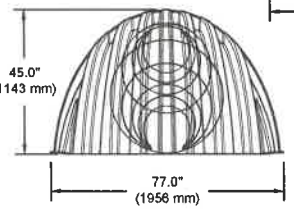
MC-3500 TECHNICAL SPECIFICATION

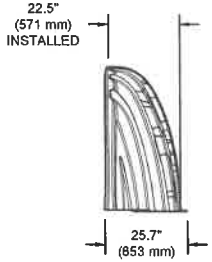
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	178.9 CUBIC FEET	(5.06 m³)
WEIGHT	135.0 lbs.	(61.2 kg)

NOMINAL END CAP SPECIFICATIONS

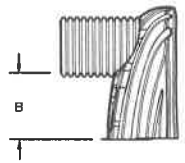
SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 22.5"	(1956 mm X 1143 mm X 571 mm)
END CAP STORAGE	14.8 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	46.0 CUBIC FEET	(1.30 m³)
WEIGHT	50.0 lbs.	(22.7 kg)

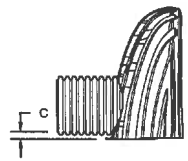
*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP30BC	30" (750 mm)	---	

NOTE: ALL DIMENSIONS ARE NOMINAL





CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS.
CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm)
THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHTEST POSSIBLE FOR THE PIPE SIZE.

Capdoo, Clane SHD
Capdoo, Clane (TANK 2)

DATE: 10/24/2020 | DRAWN: BC | CHECKED: --- | PROJECT #: Tool

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