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Aungierstown 110Kv Sub-Station

Engineering Planning Report

Grange Castle South, Co. Dublin

December 2020

STRUCTURAL • CIVIL • DUE DILIGENCE • ENGINEERING MASTERPLANNING
FLOOD MANAGEMENT • INFRASTRUCTURE DESIGN
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	Name	Signature	Position	Date
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Reviewed by	J. Mayer		Director	28/08/2020
Approved by	J. Mayer		Director	28/08/2020

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
1	S. O'Reilly	14/12/2020	Planning Issue

SOURCES OF DATA

TOT Architects	Marston Planning Consultancy
Google	

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REPORT CONTENTS

Executive Summary

This report was prepared for An Bord Pleanála in connection with the planning application for a proposed 110Kv (GIS) Sub-Station and addresses the existing and proposed civil infrastructure, for the proposed development, located off Grange Castle Road South, Co. Dublin.

The proposed development primarily comprises the provision of two no. 110kV transmission lines and a 110kV Gas Insulated Switchgear (GIS) substation compound along with associated and ancillary works and is described as follows:

The proposed 110kV GIS Substation Compound is to be located on lands to the north-east of the two storey data centre facility and associated three storey office block that was permitted under SDCC Reg. Ref. SD18A/0134 / An Bord Pleanála Ref. ABP-302813-18, and within an overall landholding bound to the north by the Grange Castle South Business Park access road; to the west by the Baldonnel Road and to the south by 3 no. residential properties and the Baldonnel Road; and to the east by the Google data centre facility within Baldonnel, Dublin 22. The site of the proposed development has an area of c. 0.9163 hectares.

The proposed 110kV Gas Insulated Switchgear (GIS) Substation Compound includes the provision of a two storey GIS Substation building (with a gross floor area of 1,307.2sqm) (known as the Aungierstown Substation), two transformers, lighting and lightning masts, car parking, associated underground services and roads within a 2.6m high fenced compound and all associated construction and ancillary works.

Two proposed underground single circuit 110kV transmission lines will connect the proposed Aungierstown 110kV GIS Substation to the existing 220kV / 110kV Castlebaggot Substation to the immediate north-east. The proposed transmission lines cover a distance of approximately 120m and 140m within the townlands of Ballybane, and Aungierstown and Ballybane.

The development includes the connections to the two substations (existing and proposed), changes to landscaping permitted under SDCC Reg. Ref. SD18A/0134 / An Bord Pleanála Ref. ABP-302813-18 and all associated construction and ancillary works.

An Environmental Impact Assessment Report has been prepared in respect of this application.

The proposed development is bounded to the north by Grange Castle Road South, to the south & west by an access road serving the existing data centre development currently under construction and to the east by the existing Google Data Centre.

Proposed vehicular access would be off Grange Castle Road South to the north of the site.

The report should be read in conjunction with our Engineering Planning Drawings, and deals with existing foul, surface water and water mains present within the surrounding area, and the proposals for the site with regards to these services.

The report also discusses the ground conditions present on the site, the current proposals for achieving the development plateau and sustainability measures incorporated with the development.

1 Introduction

The applicant proposes to construct a 110Kv Sub-Station adjacent to and accessed off Grange Castle Road South to the north. The purpose of this report is to address the civil infrastructural aspects of the proposed development.

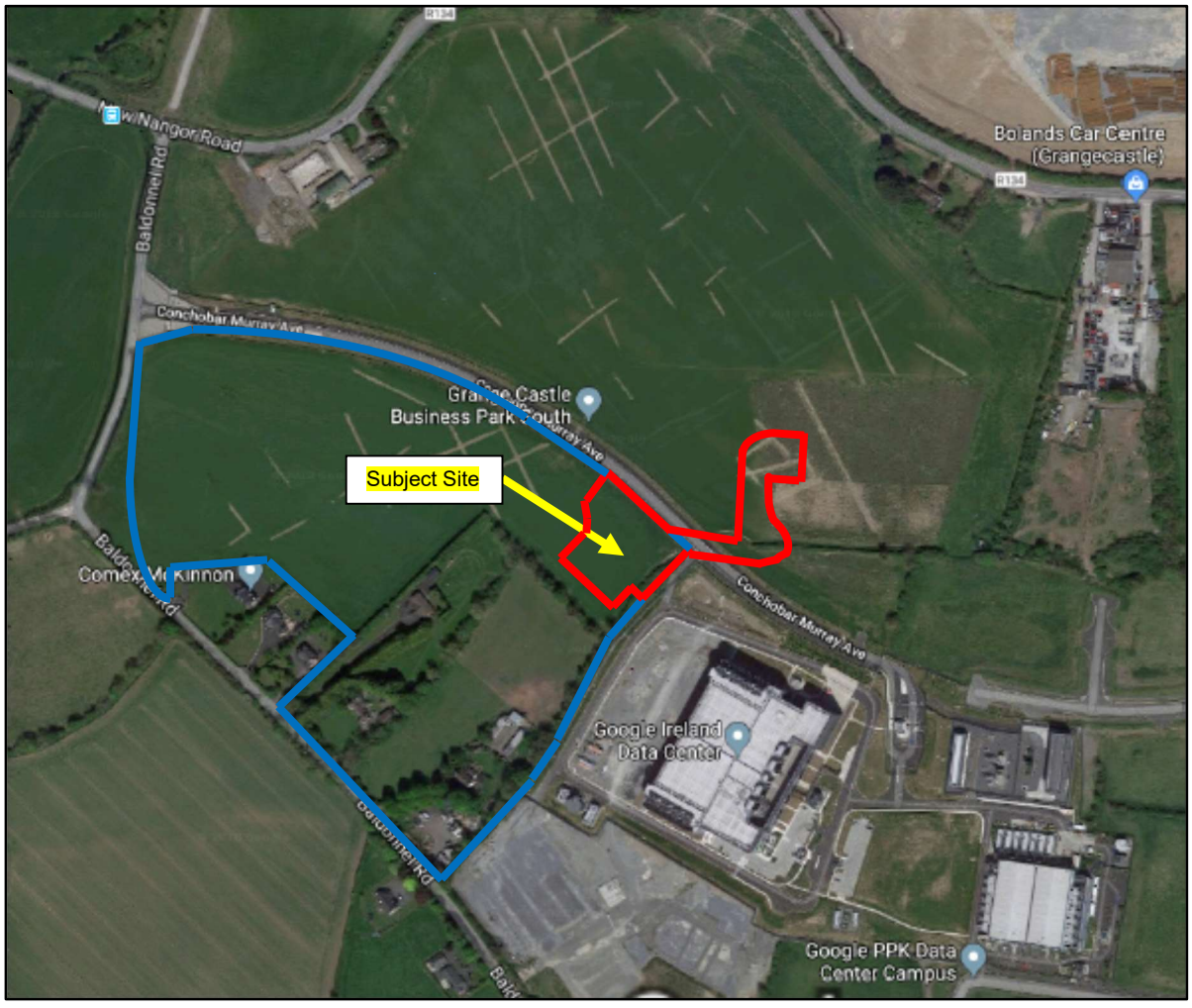
The subject site extends to circa 2.262 acres (0.916ha) and is currently a green field site.

There are no known public sewer drainage pipes or watermains, presently located on the subject site.

This report has been prepared to outline the existing and proposed drainage, pollution control measures and water main infrastructure, in order to support the proposed development application.

The location of the site is indicated indicatively on the map extract below - Figure 1.

FIGURE 1 - Site Location (Source Google Maps)



2 Existing Drainage & Watermain Services

2.1 Existing Foul Drainage Networks

Carroll & Browne Consultants record drawings have indicated a 225mm Ø sewer, located along the Grange Castle South Access Road adjacent to the northern boundary of the property. This gravity sewer connection was laid to facilitate development of these lands and for other lands within Grange Castle South Business Park. This sewer then connects into a 375mm Ø pipe on Baldonnel Road and ultimately drains via gravity, into the Grange Castle Business Park pumping station, circa 1.9km to the north. The effluent from this pumping station is then pumped via 3 No. rising mains, i.e. 100mm Ø, 200mm Ø & 450mm Ø, into the local infrastructural network.

The existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the subject site and there are no known issues noted with the sewer reticulation network. 3 No. 225mm Ø spur connections have been provided off the main sewer for future connection of these lands.

2.2 Existing Surface Water Drainage Networks

Carroll & Browne Consultants record drawings have identified a 450mm Ø sewer, located along the Grange Castle South Access Road adjacent to the northern boundary of the property. This gravity sewer then runs in a northerly direction, via a 450mm Ø pipe, along a new section of road, prior to connecting into the Griffeen River, via an outlet headwall, circa 280m to the north, just to the south of the new junction on the Nangor Road. There is also a 450mm Ø culvert located in the north-eastern corner of the site.

The aforementioned sewer, has been identified as having capacity to accommodate the proposed discharge from the subject site. 3 No. 300mm Ø spur connections have been provided off the main sewer for future connection of these lands.

2.3 Existing Water Main Network

Carroll & Browne Consultants record drawings have identified an existing 500mm Ø main located along the Grange Castle South Access Road, adjacent to the northern boundary of the property. There are 2 No. spur connections off this main, both being 200mm Ø, in order to facilitate the subject site.

The aforementioned existing watermain connects into existing infrastructure, i.e. a 450mm Ø main, located just north of the junction access into Grange Castle South Business Park, on Baldonnel Road. This main then connects into the 700mm Ø D.I. trunk main located along the New Nangor Road, circa 130m to the north.

From discussions with the South Dublin County Council, it is understood that there is adequate capacity within the existing watermain network to supply the proposed development.

3 Proposed Site Drainage & Water Supply

3.1 Proposed Foul Water Drainage

It is proposed to discharge foul water from the proposed development, via a 225mm gravity foul sewer network and connect into the aforementioned existing 225mm Ø foul sewer spur to the north of the site. There is an existing manhole, EX FMH, located at the property boundary near the site access to the north, with a Cover Level of circa 74.13m & an Invert Level of circa 72.83m - refer Drawing No. P200401– 200 Rev. D.

Design guidelines from Irish Water have been used to estimate the peak foul water loading rates for the proposed development, as outlined below:-

Estimated Foul Discharge Rate

Dry Weather Flow (DWF)	=	2 PE x 150 litres/person/day
	=	0.003 litres/sec (DWF)
Design Peak Flow	=	0.018 litres/sec (6xDWF)

All on-site foul sewers have been designed to be a minimum 225mm diameter pipes, with gradients designed to achieve self-cleansing velocities.

3.2 Proposed Surface Water Drainage

Storm water from the proposed development has been designed in accordance with the GDSDS and ensures that Best Management Practice has been incorporated into the design.

The proposed surface water measures are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge, etc.

Storm water from the roof area of the 110Kv sub-station, will be directed via rain water pipes into an on-site reticulation system. The outflow from this system will be discharged directly into a Stormtech, or similar, attenuation system, located in the north-west of the site, near the access road off Grange Castle South Access Road - refer Drawing No. P200401– 200 Rev. D & Appendix B for Attenuation Details.

Storm water from all other hardstanding areas, except for the roof and surrounds of the MV switch (client control) building & transformer yard, will be drained into the aforementioned attenuation tank. Prior to discharge into the mains network, the run-off will be directed through appropriately sized Conder Separator(s) CNSB3s/21 (or similar approved) petrol interceptors - refer Appendix A for Interceptor Details.

Run-off from the MV switch (client control) building, transformer yard and surrounds was permitted under Reg. Ref. SD18A/0134 / An Bord Pleanála Ref. ABP-302813-18. This development commenced construction in the summer of 2019. This included for the construction of the Client Control building of the substation that was permitted under the original permission.

Further to extensive site investigations, it would appear that the existing sub-soil would provide inadequate soil infiltration rates and thus it is not practical to install a soakaway system.

The storm water drainage within the development has been designed to accommodate a 1:2 year storm frequency. The attenuation system has been designed to accommodate a 1:100 year storm event + 20% climate change, based on a total hardstanding area of 0.253Ha, which is the total fenced off area of the 110Kv Sub-Station. This area constitutes a surface water storage volume of 208m3. It is also proposed to restrict the outflow from the subject site by installing a Hydrobrake / orifice plate, limiting the ultimate discharge to 0.5l/s.- refer Appendix C for surface water calculations.

It is proposed to ultimately discharge surface water from the proposed development, post attenuation and outflow restrictions, via a 300mm Ø gravity sewer network and connect into existing manhole, EX SWMH, with a Cover Level of circa 74.02m and an Invert Level of circa 72.07m located adjacent to the ESB sub-station, to the north of the subject site - refer Drawing No. P200401– 200 Rev. D.

3.3 Proposed Water Mains

It is intended to serve the proposed 110Kv Sub-station off the existing (8”) 200mm Ø water main spur located adjacent to Grange Castle South Access Road, circa 85m to the west from the site access into the application site.

Hydrants will be installed in accordance with Part B of the building regulations, and these are detailed on our engineering drawings - refer Drawing No. P200401-200 Rev. D.

Water demand for the development has been based on design loadings as indicated by Irish Water, i.e. 150 ltr/person/day, which based on 2 PE, generates an estimated average water demand of 3000 litres/day (0.003ltr/sec x 1.25) or 0.004 litres/second. The peak water demand is calculated as being 0.004 litres/second (x 5), which equates to circa 0.02 litres/second.

Water meters in line with South Dublin County Council & Irish Water requirements and specifications, will be installed at the connections onto the aforementioned existing water mains as required.

3.4 Standard Drainage Details

All standard drainage details including manhole details, pipe bedding, channels, hydrants etc. are shown on Drawing No. P200401-204 & 205. Details of the types and construction methods will be agreed with the local authority prior to construction.

Drains generally will consist of PVC (to IS 123) or concrete spigot and socket pipes to (IS 6).

Drains shall be laid to comply with the Requirements of the Building Regulations 1997 and in accordance with the recommendations contained in the Technical Guidance Documents, Section H.

Strict separation of surface water and foul sewerage will be imposed on the development. Drains will be laid out to minimise the risk of inadvertent connections of sinks, dishwashers etc. to the surface water system.

In order to minimise the risk of floating contamination of the surface water system, road gullies will be precast trapped gullies to BS5911:Part2:1982.

4 Surface & Groundwater Impacts

4.1 Construction Phase

Water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association provides guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors – C532 CIRIA Report (Masters-Williams *et al*, 2001), which provides information on these issues.

Pollutants can commonly include suspended solids, oil, chemicals, cement, cleaning materials and paints. These can enter controlled waters in various ways:

- directly into a watercourse
- via drains or public sewers
- via otherwise dry ditches
- in old field drains
- by seepage into groundwater systems
- through excavations into underlying aquifers
- by disturbance of an already contaminated site

The proximity of the site to streams, aquifers and water abstractions; potential sources, pathways and impacts of pollution; and the historical uses of the site and nearby areas should be examined early in project planning and design, to ensure that suitable redesign and mitigation measures are undertaken as necessary.

During construction, careful management and planning will help minimise water pollution. This may include adequate bunding for all oil tanks, wheel washers and dust suppression on haul roads, particular care to be taken near watercourses, and regular plant maintenance.

A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident.

The CIRIA document (2001), recommends that a contingency plan for pollution emergencies should address the following:

- containment measures
- emergency discharge routes
- list of appropriate equipment and clean-up materials
- maintenance schedule for equipment
- details of trained staff, location, and provision for 24-hour cover
- details of staff responsibilities
- notification procedures to inform the relevant environmental protection authority

- audit and review schedule
- telephone numbers of statutory water undertakers and local water company
- list of specialist pollution clean-up companies and their telephone numbers

4.2 Operational Phase

The sources of pollution that could potentially have an effect on surface or groundwater during the operational phase of the development will be oil and fuel leaks from parked cars, service vehicles, HGV delivery's etc. Hydrocarbon interceptors will be provided on stormwater drainage sewers from car parking areas as required.

Stormwater attenuation measures will be incorporated into the scheme as mentioned previously.

It is not anticipated that flooding of the site will occur, due to the fact that there is no historical data, which refers to any past flooding on this site – refer to the stand alone Flood Risk Assessment which accompanies this planning application..

4.3 Mitigation Measures

The construction management of the building project will incorporate protection measures to minimise as far as possible the risk of spillage that could lead to surface and groundwater contamination.

All appropriate methods will be utilised to ensure that surface water arising during the course of construction activities will contain minimum sediment, prior to the ultimate discharge to the existing 300mm Ø surface water pipe network.

Stormwater attenuation measures will be incorporated into the scheme as mentioned previously. Hydrocarbon interceptors will be provided on stormwater drainage sewers from car parking areas as necessary. Grease traps will be installed on foul sewers where necessary.

Best practice in design and construction will be employed for the installation of surface water and sanitary drainage.

5 Sustainability

5.1 Site Development

In order to minimize material export and import to the site and the impact of this on the surrounding road network, we are proposing to maintain existing on-site levels as far as is practical.

5.2 Site Drainage

Storm water drainage proposals for the site have been designed in accordance with the GDSDS and incorporate on site storm water attenuation in order to limit discharge of storm water from the developed site to the equivalent Q-bar run-off rates.

The attenuation system proposed in comparison with other subsurface systems offers lower overall installation costs, superior design flexibility and enhanced long-term performance, resulting in an efficient storm water storage system. It is also an extremely light weight system, which requires the application of washed angular stone. The stone serves as a structural component whilst allowing the conveyance and storage of stormwater.

6 Conclusion

In conclusion, the proposed development of the site by the applicant, for use as a 110Kv Sub-station, is considered a suitable use of the site. Local infrastructure has the capacity to serve the proposed development.

The site will be developed in a sustainable manner, in order to minimise the impact of the development during construction and throughout the lifespan of the proposed Sub-station.

Accordingly, there are no reasons in relation to the drainage elements, as to why this scheme should not be granted planning permission, and with this in mind, An Bord Pleanála is respectfully requested to recommend a grant of planning permission.

Appendix A

Conder Petrol Interceptor Details

Conder® OIL/WATER SEPARATORS

40 years OF PASSION

CONDER AQUA SOLUTIONS
A PREMIER TECH AND EPS JOINT COMPANY

THE PARTNER OF CHOICE

The Conder Range of Oil Separators are for installation on surface water drainage systems and are designed to prevent hydrocarbons (e.g. diesel, petrol, engine oil) from mixing with surface water and entering our drainage systems.

Pollution prevention is a critical part of sustainable drainage systems and statutory regulations are in force to control the discharge of hydrocarbons, with severe penalties imposed for non-compliance.

Compliance

The Conder Range of Oil Separators fully conform to both the Environment Agency's latest PPG guidelines and European standard BSEN-858-1-2 and are proven to effectively separate oil and water. Under test, the Conder Bypass performed to less than 1 mg/l and in doing so guarantees minimal environmental impact and ensures public safety.

Classes of Separator

There are two classes of separator which are defined by performance.

Class 1

Class 1 Separators are designed to achieve a concentration of less than 5mg/l of oil under standard test conditions. These conditions are required for discharges to surface water drains and the water environment.

Class 2*

Class 2 Separators are designed to achieve a concentration of less than 100mg/l oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies such as discharges to the foul sewer.

*Class 2 available in forecourt separators only.

Selecting the Right Separator

Conder offers a full range of Separators for varying use and application:

- Bypass Separator
- Full Retention Separator
- Forecourt Separator
- Wash Down and Silt Separators

If you're unsure of what type of Conder Oil Separator you require please use the below chart to help you identify the most suitable product for your project.

The guidance given is for the use of separators in surface water drainage systems that discharge to rivers and soakways.

Is there a risk of oil contaminating the drainage from the site?

YES	YES	YES	YES	NO
Risk of infrequent light contamination and potential for small spills only e.g. car park.	Risk of regular contamination of surface water run off with oil and/ or risk of larger spills e.g. vehicle maintenance area, goods vehicle parking or vehicle manoeuvring.	Risk of regular Drainage will also contain dissolved oils, detergents or degreasers such as vehicle wash water and trade effluents e.g. industrial sites.	Fuel oils are delivered to and dispensed on site e.g. retail fuel forecourts.	Very low risk of oil contamination e.g. roofwater.
YES				YES
Source control SUDS must be considered and incorporated where suitable.				Separator not required.
IF NOT SUITABLE	YES	YES	YES	
By-pass separator with alarm required. Class 1 if discharge to surface water. Class 2 if discharge to foul sewer.	Full retention separator with alarm required. Class 1 if discharge to surface water. Class 2 if discharge to foul sewer.	Trade effluents must be directed to the foul sewer. It may need to pass through a separator before discharge to sewer to remove.	Full retention 'forecourt' separator with alarm required. Class 1 if discharge to surface water. Class 2 if discharge to foul sewer.	Clean water should not be passed through the separator unless the size of the unit increased accordingly.

The use of SUDS should be considered at all sites and they should be incorporated where suitable. SUDS can be used to polish the effluent from these separators before it enters the environment.

Source control SUDS should be considered where possible.

Separator Alarms

All oil separators are required by legislation to be fitted with an oil level alarm system with recommendations that the alarm is installed, tested, commissioned and regularly serviced by a qualified technician.

The alarm indicates when the separator is in need of immediate maintenance in order for it to continue to work effectively. Conder Aqua Solutions can offer a full technical and service package for a variety of alarm options.

The Conder Range of Bypass Separators

The Conder Range of Bypass Separators are used to fully treat all flows generated by rainfall rates of up to 6.5mm/hr. Bypass Separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where only small spillages occur and the risk of spillage is small.

Typical Application

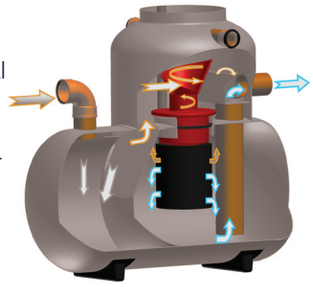
- Car parks
- Roadways and major trunk roads
- Light industrial and goods yards

Features and Benefits

- Innovative design
- Compact and easy to handle/install
- Fully compliant to the Environment Agency's PPG3 guidelines
- Low product and install costs
- Full BSI certification
- Exceeds industry standards
- Easy to service
- Fully tested and verified with a range from CNSB 3 to CNSB 1000 (Class 1)

Performance

Conder Bypass Separators have been designed to treat all flow up to the designed nominal size. Any flow in excess of the nominal size is allowed to bypass the separation chamber thereby keeping the separated and trapped oil safe.



How it Works

Step 1

During the early part of a rain storm, which is a time of high oil contamination, all of the contaminated water flow passes through the sediment collection chamber and enters the separation chamber through a patented oil skimming and filter device.

Step 2

All of the oil then proceeds to the separation chamber where it is separated to the Class 1 standard of 5 mg/l and safely trapped.

Step 3

As the rainstorm builds up to its maximum and the level of oil contamination reduces significantly, the nominal size flow continues to pass through the separation chamber and any excess flow of virtually clean water is allowed to bypass directly to the outlet.

Specification Larger models up to CNSB 1000 are available.

Area Drained (m^2)	Tank Code including Silt	Length including Silt (mm)	Silt Capacity (L)	Oil Storage Capacity (L)	Diameter (mm)	Height (mm)	Base to inlet Invert (mm)	Base to outlet Invert (mm)	Access (mm)
1667	CNSB3s/21	1400	300	45	1026	2200	1730	1680	750
2500	CNSB4.5s/21	1785	450	67.5	1026	1875	1270	1220	600
3333	CNSB6s/21	1975	600	90	1026	1875	1270	1220	600
4444	CNSB8s/21	2165	800	120	1026	1875	1270	1220	600
5555	CNSB10s/21	2485	1000	150	1026	1875	1270	1220	600
8333	CNSB15s/21	2670	1500	225	1210	2150	1450	1400	600
11111	CNSB20s/21	3115	2000	300	1210	2150	1450	1400	600
13889	CNSB25s/21	3555	2500	375	1210	2150	1450	1400	600
16667	CNSB30s/21	3470	3000	450	1510	2690	1770	1720	750
22222	CNSB40s/21	4040	4000	600	1510	2690	1770	1720	750
27778	CNSB50s/21	4655	5000	750	1510	2690	1770	1720	750
33333	CNSB60s/21	4415	6000	900	1880	3300	2025	1975	2 x 600
44444	CNSB80s/21	5225	8000	1200	1880	3300	2025	1975	2 x 600
55556	CNSB100s/21	6010	10,000	1500	1880	3300	2025	1975	2 x 600

Note: It is a requirement of PPG3 that you have a silt capacity either in your tank or in an upstream catch pit.

The Conder Range of Full Retention Separators

The Conder Range of Full Retention Separators are designed to treat the full flow that can be delivered by a drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr. Full Retention Separators are used where there is a risk of regular contamination with oil and a foreseeable risk of significant spillages.

Typical Application

- Sites with hi-risk of oil contamination
- Fuel storage depots
- Refuelling facilities
- Petrol forecourts
- Vehicle maintenance areas/workshops
- Where discharge is to a sensitive environment

Features and Benefits

- All surface water is treated
- Automatic closure device (ACD) fitted as standard

Performance

All Conder Full Retention Separators have an automatic closure device (ACD) fitted as standard. This is compulsory for all PPG3 compliant Full Retention Separators and prevents accumulated pollutants flowing through the unit when maximum storage level is reached.

How it Works

Step 1

Contaminated water enters the separator where the liquid is retained for a sufficient period to ensure that the lighter than water pollutants (such as oil, petrol) separate and rise to the surface of the water.

Step 2

The decontaminated water then passes through the coalescing filter before it is safely discharged from the separator, with the remaining pollutants being retained in the separator.

Step 3

Retained pollutants must be emptied from the separator once the level of oil is reached, or the oil level alarm is activated. This waste should be removed from the separator under the terms of The Waste Management Code of Practice.

Specification Larger models available upon request.

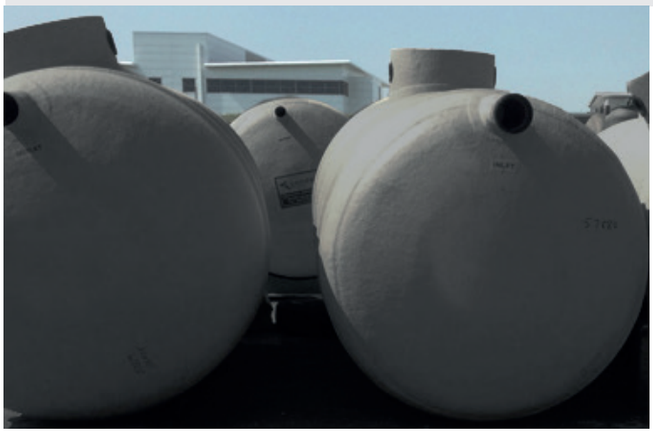
Area Drained (m^2)	Tank code Incl. Silt	Length including Silt (mm)	Slit Capacity (L)	Oil Storage Capacity	Diameter (mm)	Height (mm)	Base to inlet Invert (mm)	Base to outlet Invert (mm)
222	CNS4s/11	2319	400	40	1026	1655	1295	1245
333	CNS6s/11	3414	600	60	1026	1655	1295	1245
444	CNS8s/11	3197	800	80	1210	1855	1480	1430
556	CNS10s/11	3957	1000	100	1210	1855	1480	1430
833	CNS15s/11	3870	1500	150	1510	2180	1780	1730
1111	CNS20s/11	5060	2000	200	1510	2180	1780	1730
1667	CNS30s/11	5369	3000	300	1880	2560	2030	1980
2222	CNS40s/11	7059	4000	400	1880	2560	2030	1980
2778	CNS50s/11	4080	5000	500	2600	3315	2730	2680
3333	CNS60s/11	4805	6000	600	2600	3315	2730	2680
3889	CNS70s/11	5529	7000	700	2600	3315	2730	2680
4444	CNS80s/11	6254	8000	800	2600	3315	2730	2680
5556	CNS100s/11	6751	10,000	1,000	2600	3315	2730	2680

Note: It is a requirement of PPG3 that you have a silt capacity either in your tank or in an upstream catch pit.

Conder Range of Forecourt Separators

Conder Forecourt Separators have been designed for specific use in petrol filling stations and other similar applications. The size of this separator has been specifically increased in order to retain the possible loss of the contents from one compartment of a road tanker, which could be up to 7,600 litres.

Forecourt separators are an essential infrastructure requirement for all forecourts so as to ensure compliance with both health and safety and environmental legislation.



Application Areas

- Petrol forecourts
- Refuelling facilities
- Fuel storage depot

Features and Benefits

- All surface water is treated
- Available in Class 1 and Class 2
- Automatic Closure Device (ACD) fitted as standard
- Includes 2000L silt capacity

Performance

All Conder Forecourt Separators have an automatic closure device (ACD) fitted as standard. This is compulsory for all PPG3 compliant Full Retention Separators and prevents accumulated pollutants flowing through the unit when maximum storage level is reached.

How it Works

Step 1

Contaminated water enters the separator where the liquid is retained for a sufficient period to ensure that the lighter than water pollutants (such as oil, petrol) separate and rise to the surface of the water.

Step 2

The decontaminated water then passes through the coalescing filter before it is safely discharged from the separator, with the remaining pollutants being retained in the separator.

Step 3

Retained pollutants must be emptied from the separator once the level of oil is reached, or the oil level alarm is activated. This waste should be removed from the separator under the terms of The Waste Management Code of Practice.

Specification

Tank Code	Volume (L)	Length (mm)	Diameter (mm)	Height (mm)	Base to inlet (mm)	Base to outlet (mm)	Access (mm)
ANO/11*	10000	4250	1800	2100	1600	1550	750
ANT/12**	10000	4250	1800	2100	1600	1550	750
LNO/11***	10000	4250	1800	2100	1600	1550	750

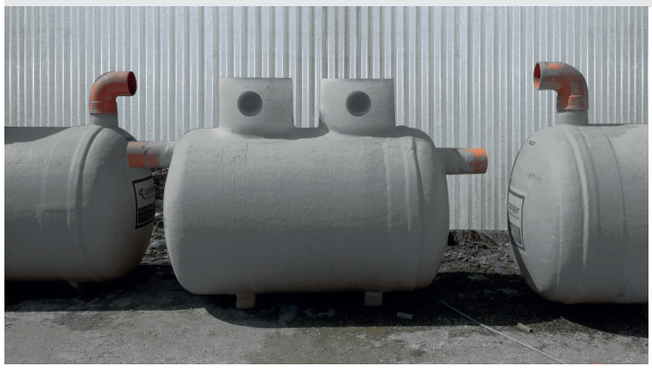
*Class 1 Forecourt Separator suitable for discharging to surface water drains

**Class 2 Forecourt Separator suitable for discharging to foul drains only

*** Class 1 Forecourt Separator suitable for installation in granular materials

Conder Range of Washdown and Silt Separators

Conder Washdown and Silt Separators are for use in areas such as car washes, pressure wash facilities or other cleaning facilities and must be discharged to the foul water drainage system in accordance with PPG13.



Application Areas

- Car wash facilities
- Tool hire depots
- Pressure washer facilities

Features and Benefits

- Available in 1,2 and 3 stage options
- Efficient silt and hydrocarbon removal

Performance

The Environment Agency's PPG13 requires that discharge from pressure washers must discharge to a foul drainage system. Where there is no foul drainage available, the effluent must be contained within a sealed drainage system or catchpit for disposal by a licenced waste contractor.

Silt build-up is the primary concern with washdown facilities and so the Conder range of washdown and silt separators are used to remove the silt and will allow some separation of hydrocarbons.

Detergents that are used in wash down areas will break down and disperse hydrocarbons (hindering the separation process). Therefore it is important to remember the main function of wash down separators is to remove silt.

How it Works

Step 1

Contaminated wash down water enters the unit where the heavier solids, silts, settle to the bottom of the tank.

Step 2

The lighter liquids, hydrocarbons, will rise to the surface and be retained within the tank.

Step 3

Treated water will exit the separator via the dipped outlet.

Specification

Although it is recognised that single stage separators give the most efficient separation, 2 and 3 chamber Conder Washdown and Silt Separators are available on request.

Tank Code	Capacity (L)	Silt Storage	Diameter (mm)	Length (mm)	Access Diameter (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm)
CWS2/12	2000	1000	1000	2713	600	1290	1240
CWS3/12	3000	1500	1200	2853	600	1475	1425
CWS4/12	4000	2000	1200	3737	600	1475	1425
CWS6/12	6000	3000	1500	3636	600	1775	1725
CWS8/12	8000	4000	1800	3443	600	2030	1980
CWS10/12	10000	5000	1800	4250	600	2030	1980

FST Silt Trap

Large quantities of silt can be associated with washdown areas. The Conder FST silt trap is ideal for easy removal of silt either manually or by a waste disposal contractor.

The FST range of silt traps are available with varying grades of covers from B125 up to E600 to allow installation in all types of vehicle or plant washdown facilities.

Conder Range of Alarm Systems

All separators must be fitted with an alarm in order to provide visual and audible warning when the level of oil reaches 90% of its storage volume, as required by The Environment Agency's PPG3.

The alarm system will then be triggered to indicate that the separator is in need of immediate emptying, in order to continue effective operation.

Features and Benefits

- Option for installation at a remote supervisory point
- Audible and visual
- Eliminates unnecessary waste management visits
- Easy installation
- Audible, visual and text message alert alarm systems available

Mains Powered System

Mains powered alarm systems are best suited to new build situations or sites where installation of the necessary cabling and ducting is straight forward and economical. The probe located in the separator will, when surrounded by floating hydrocarbons, activate an alarm condition on the remote panel to advise that the unit requires emptying.

Solar Powered System (Flashing Beacon)

This option requires no mains power supply or any significant cabling and ducting, making it extremely economical for large sites and retro fitting alarms to existing oil separators. A High Intensity Beacon will flash when a problem is detected.

Solar GSM Alarm

The Solar GSM alarm sends a status report on your separator to a mobile phone number of your choice. The status of the GSM alarm can also be tested at any time by simply sending a pre-recorded text message, via your directed mobile phone, for added peace of mind.

Peripherals

Coalescing Filters

The Conder Coalescing Filter is designed to separate residual oil in already separated oil/water and ensures a discharge quality of less than 5mg/litre of oil in water.

Features and Benefits

- Handle for easy removal and cleaning
- Flashing beacons (with option of siren kit)
- Kiosks
- Probe brackets
- Bas 1000 intrinsically safe junction box
- High level probe
- Silt level probe
- Oil level probe

Servicing

The Environmental Agency's PPG3 guidelines stipulate that every 6 months, and in accordance with manufacturer's instructions, experienced personnel should carry out maintenance to both the separator and alarm.

Conder and our service partners can offer a full technical and service package including separator and alarm installation, commissioning, oil and silt removal and route service contracts.

CONDER AQUA SOLUTIONS
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Appendix B

Stormtech Attenuation Details

Product Catalog

Underground Stormwater Chambers

Save Valuable Land and Protect Water Resources[SM]

StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management[SM]

StormTech® Subsurface Stormwater Management

The advanced design of StormTech's chambers allows stormwater professionals to create more profitable, environmentally sound installations. Compared with other subsurface systems, StormTech's innovative chambers offer lower overall installed costs, superior design flexibility and enhanced long-term performance.

Superior Design Flexibility for Optimal Land Use

StormTech chambers are ideal for commercial, municipal and residential applications. One of the key advantages of the StormTech chamber system is design flexibility. StormTech chambers can be configured into beds or trenches, in centralized or decentralized layouts to fit on nearly any site.

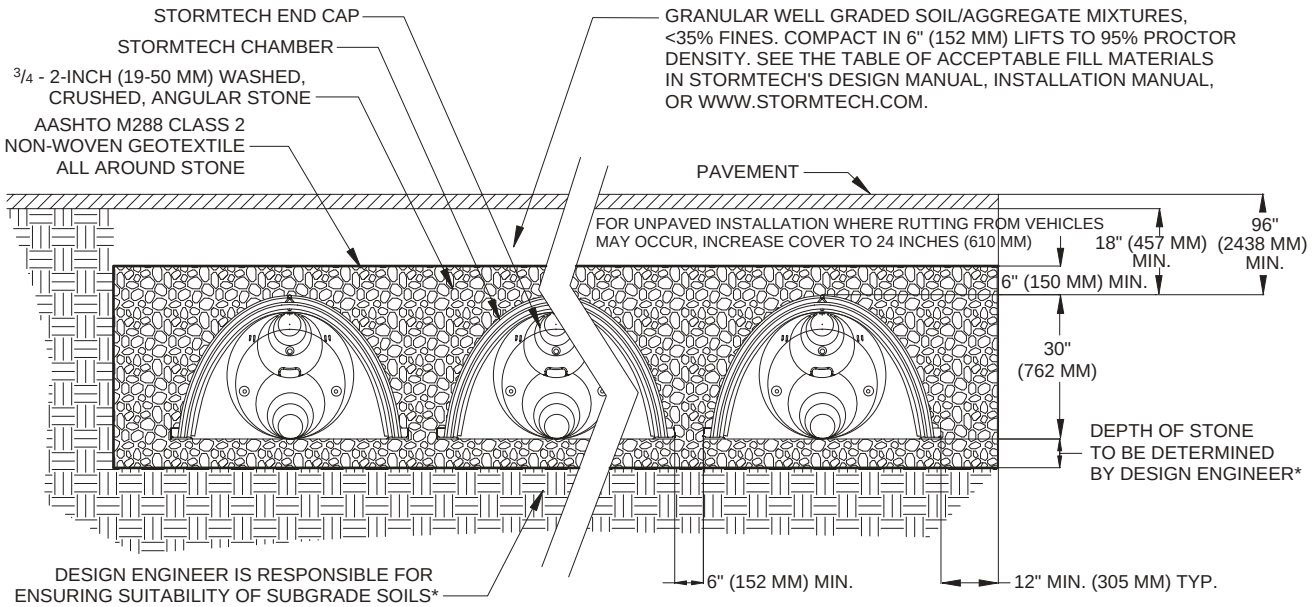
L to R: SC-310 chamber and SC-740 chamber

Product Features and Benefits

The advanced features and innovative technology of StormTech chambers streamline installations while lowering overall installed costs. StormTech chambers offer these unique advantages:

- Lightweight, two people can install chambers quickly and easily, saving time and money
- Extensive product research & development and rigorous testing ensure long term reliability and performance
- Versatile product design accommodates a wide range of site constraints with cost-effective system designs
- The chamber length can be cut in 6.5" (165 mm) increments – reducing waste and optimizing the use of available space
- Injection molded polypropylene ensures precise control of wall thickness and product consistency
- Isolator Row – a patent pending technique to inexpensively enhance total suspended solids (TSS) removal and provide easy access for inspection and maintenance
- Corrugated Arch Design – a proven geometry for structural integrity under H-20 live loads and deep burial loads, also provides high storage capacity

Typical Cross Section Detail (not to scale)



Detention-Retention-Recharge

The StormTech SC-740 chamber optimizes storage volumes in relatively small footprints by providing 2.2 ft^3/ft^2 (0.67 m^3/m^2) (minimum) of storage. This can decrease excavation, backfill and associated costs. The StormTech SC-310 chamber is ideal for systems requiring low-rise and wide-span solutions. The chamber allows the storage of large volumes, 1.3 ft^3/ft^2 (0.4 m^3/m^2) (minimum), at minimum depths.

StormTech SC-740 Chamber
(not to scale)

Nominal Chamber Specifications

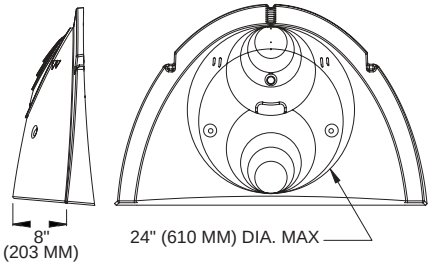
Size (L x W x H)
85.4" x 51.0" x 30.0"
(2169 x 1295 x 762 mm)

Chamber Storage
45.9 ft^3 (1.30 m^3)

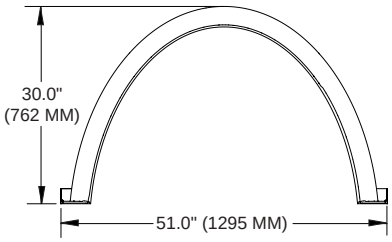
Minimum Installed Storage*
74.9 ft^3 (2.12 m^3)

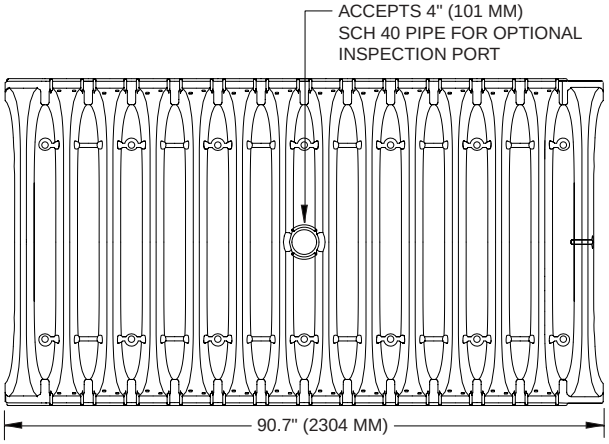
Weight
74.0 lbs (33.6 kg)

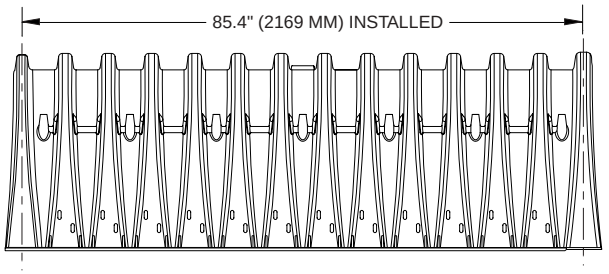
Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck



SC-740 end cap







SC-740 chamber

StormTech SC-310 Chamber
(not to scale)

Nominal Chamber Specifications

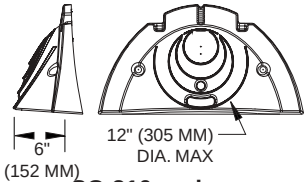
Size (L x W x H)
85.4" x 34.0" x 16.0"
(2169 x 864 x 406 mm)

Chamber Storage
14.7 ft^3 (0.42 m^3)

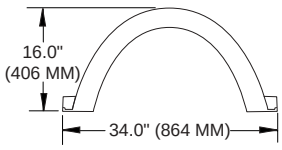
Minimum Installed Storage*
31.0 ft^3 (0.88 m^3)

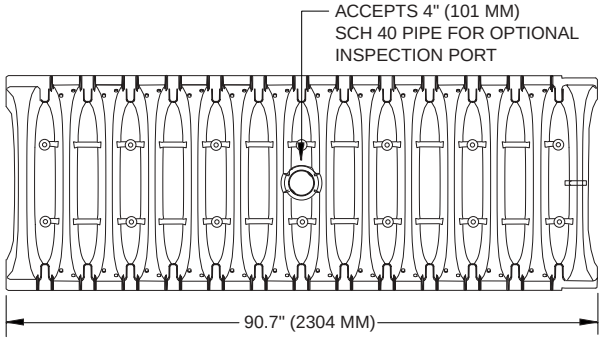
Weight
37.0 lbs (16.8 kg)

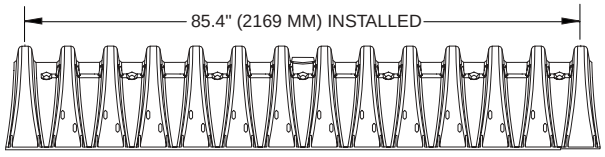
Shipping
41 chambers/pallet
108 end caps/pallet
18 pallets/truck



SC-310 end cap







SC-310 chamber

*This assumes a minimum of 6 inches (152 mm) of stone below, above and between chamber rows.

Advanced Structural Performance for Greater Long-Term Reliability

StormTech developed a state of the art chamber design through:

- Collaboration with world-renowned experts of buried drainage structures to develop and evaluate the structural testing program and product design
- Designing chambers to exceed AASHTO LRFD design specifications for HS-20 live loads and deep burial earth loads
- Subjecting the chambers to rigorous full scale testing, under severe loading conditions to verify the AASHTO safety factors for live load and deep burial applications

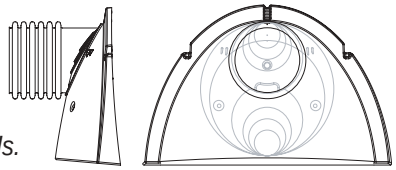
StormTech continues to conduct research and consult with outside experts to meet customer needs for alternative backfill materials, designs for special loadings and other technical solutions.

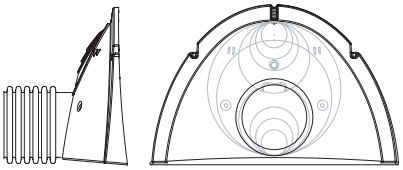
Technical Assistance

StormTech's technical support staff is available to provide assistance to engineers, contractors and developers. Please contact one of our engineers or product managers to discuss your particular application. A wide variety of technical support material is available in print, electronic media or from our website at www.stormtech.com. For any questions, please call StormTech at 888-892-2694.

Fabricated End Caps

Contact StormTech for details.





StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management℠

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Appendix C

Surface Water Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.253	Urban	0.750
SAAR (mm)	754	Region Number	Ireland Greater Dublin

Results l/s

QBAR Rural	0.5
QBAR Urban	1.6
Q100 years	3.0
Q1 year	1.3
Q30 years	2.8
Q100 years	3.0

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	72.538	0.308	0.2	41.6	O K
30 min Summer	72.656	0.426	0.3	57.5	O K
60 min Summer	72.793	0.563	0.3	76.0	O K
120 min Summer	72.947	0.717	0.3	96.8	O K
180 min Summer	73.043	0.813	0.4	109.8	O K
240 min Summer	73.111	0.881	0.4	118.9	O K
360 min Summer	73.203	0.973	0.4	131.3	O K
480 min Summer	73.271	1.041	0.4	140.5	O K
600 min Summer	73.323	1.093	0.4	147.6	O K
720 min Summer	73.365	1.135	0.4	153.2	O K
960 min Summer	73.428	1.198	0.5	161.7	O K
1440 min Summer	73.505	1.275	0.5	172.1	O K
2160 min Summer	73.557	1.327	0.5	179.1	O K
2880 min Summer	73.572	1.342	0.5	181.2	O K
4320 min Summer	73.578	1.348	0.5	182.0	O K
5760 min Summer	73.570	1.340	0.5	180.9	O K
7200 min Summer	73.555	1.325	0.5	178.9	O K
8640 min Summer	73.536	1.306	0.5	176.3	O K
10080 min Summer	73.512	1.282	0.5	173.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	88.252	27
30 min Summer	61.077	42
60 min Summer	40.475	72
120 min Summer	25.985	132
180 min Summer	19.768	190
240 min Summer	16.164	250
360 min Summer	12.046	370
480 min Summer	9.781	488
600 min Summer	8.314	608
720 min Summer	7.275	728
960 min Summer	5.887	966
1440 min Summer	4.358	1444
2160 min Summer	3.217	2160
2880 min Summer	2.589	2736
4320 min Summer	1.903	3416
5760 min Summer	1.526	4152
7200 min Summer	1.288	4976
8640 min Summer	1.121	5800
10080 min Summer	0.998	6656

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	72.576	0.346	0.2	46.6	O K
30 min Winter	72.707	0.477	0.3	64.5	O K
60 min Winter	72.861	0.631	0.3	85.1	O K
120 min Winter	73.035	0.805	0.4	108.6	O K
180 min Winter	73.143	0.913	0.4	123.2	O K
240 min Winter	73.219	0.989	0.4	133.5	O K
360 min Winter	73.323	1.093	0.4	147.6	O K
480 min Winter	73.401	1.171	0.4	158.0	O K
600 min Winter	73.461	1.231	0.5	166.1	O K
720 min Winter	73.509	1.279	0.5	172.7	O K
960 min Winter	73.582	1.352	0.5	182.5	O K
1440 min Winter	73.674	1.444	0.5	195.0	O K
2160 min Winter	73.743	1.513	0.5	204.2	O K
2880 min Winter	73.769	1.539	0.5	207.8	O K
4320 min Winter	73.767	1.537	0.5	207.5	O K
5760 min Winter	73.755	1.525	0.5	205.9	O K
7200 min Winter	73.732	1.502	0.5	202.8	O K
8640 min Winter	73.702	1.472	0.5	198.8	O K
10080 min Winter	73.668	1.438	0.5	194.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	88.252	27
30 min Winter	61.077	41
60 min Winter	40.475	70
120 min Winter	25.985	130
180 min Winter	19.768	188
240 min Winter	16.164	246
360 min Winter	12.046	364
480 min Winter	9.781	482
600 min Winter	8.314	600
720 min Winter	7.275	716
960 min Winter	5.887	950
1440 min Winter	4.358	1414
2160 min Winter	3.217	2096
2880 min Winter	2.589	2744
4320 min Winter	1.903	3548
5760 min Winter	1.526	4432
7200 min Winter	1.288	5336
8640 min Winter	1.121	6240
10080 min Winter	0.998	7168

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	16.800	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+20

Time / Area Diagram

Total Area (ha) 0.253

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.084	4-8	0.084	8-12	0.084

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