PINNACLE
CONSULTING ENGINEERS

DB081, Profile Park, Grange Castle, Lucan, Co. Dublin

Engineering Planning Report

June 2021

P210203

EQUINIX

STRUCTURAL · CIVIL · DUE DILIGENCE · ENGINEERING MASTERPLANNING

PINNACL
CONSULTING ENGINE

CONTACT DETAILS

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APPROVALS

	Name	Signature	Position	Date
Prepared by	S. O'Reilly		Associate	10/06/2021
Reviewed by	J. Mayer		Director	11/06/2021
Approved by	J. Mayer		Director	14/06/2021

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
1	S. O'Reilly	15/06/2021	Draft Planning Submission

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 of 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 storm water drainage sewers from car parking areas as required.

Storm water 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.

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 proposed attenuation pond / tanks and the existing stream.

Storm water attenuation measures will be incorporated into the scheme as mentioned previously. Hydrocarbon interceptors will be provided on storm water drainage sewers from service yard 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. Where this is not feasible, a terrain model has been produced, which will indicate the volumes of cut/fill material, based on the proposed levels and a levels balance will be struck across the site, thereby mitigating any import/export of material for site development.

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 is in keeping with other developments within Grange Castle Business Park. The pond area not only provides flood storage, but also provides ecological benefits as well.

6 Conclusion

In conclusion, the proposed development of the site by the applicant, for use as a Data Centre development, 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 development.

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, the Planning Authority is respectfully requested to recommend a grant of planning permission.

Appendix A

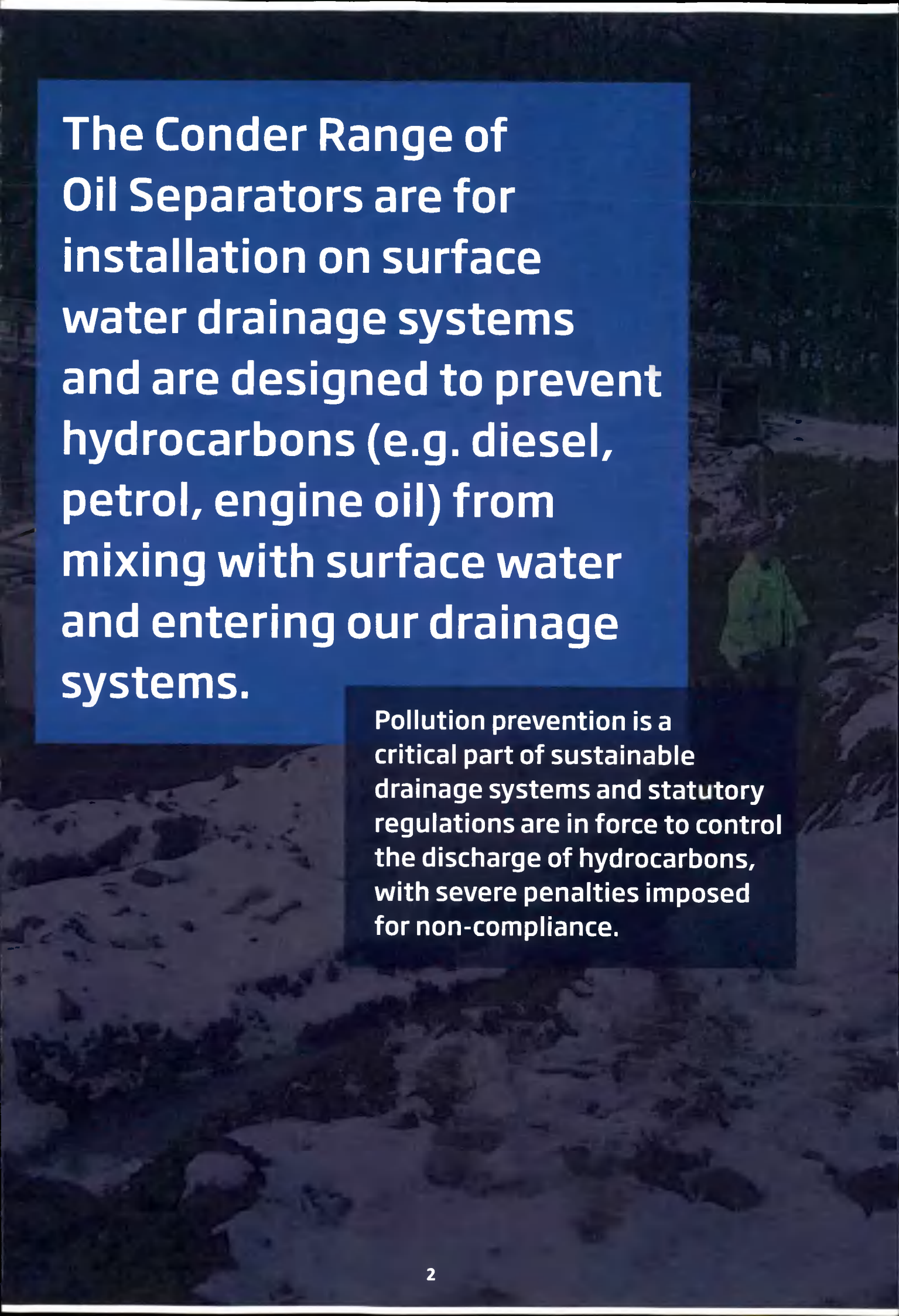
Conder Petrol Interceptor Details

Conder® OIL/WATER SEPARATORS

CONDER
AQUA SOLUTIONS
A PREMIER TECH AND EPS JOINT COMPANY

40 years OF PASSION

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

Surface Water Calculations

Qbar Calculation
Using IOH Report 124 for Sites < 25 km²

Catchment Name
DB8

$^{1}Q_{bar} = 0.00108 * (AREA)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$ — Estimation of QBAR from IOH Report 124 for catchments less than 25 km² using the 3 variable equation

SITE AREA =	2.65	Ha	Overall Redline Area
CATCHMENT AREA =	2.24	Ha (excl. Public Open Space)	Overall Catchment Area (Hectares) For catchments < 50 hectares in area, flow rates are linearly interpolated for smaller areas
AREA =	0.022	km^2	Area of the Catchment (km^2)
SAAR =	754	mm	Standard Annual Average Rainfall (mm)
SOIL =	0.30		
$M5_{60}$	16.8	mm	
$M5_{2DAY}$	61.9	mm	
$R=(M5_{60}/M5_{2d})$	0.27		

Soil Type Expressed as a Percentage	Soil 1	Soil 2	Soil 3	Soil 4	Soil 5
	0	100	0	0	0
SOIL Value	0.15	0.30	0.40	0.45	0.50

Soil index value (SPR) calculated from Flood Studies Report Vol V Fig I 4.18(1) - The Classification of Soils from Winter Rainfall Acceptance Rate .

Flood Return Event	^{5}Growth Factor	Permitted Flow (l/s)
1	0.85	3.8
QBAR	1	4.4
10	1.67	7.4
30	2.1	9.3
50	2.33	10.4
100	2.6	11.6
200	2.85	12.7
1000	3.5	15.6

^{4}QBar from Site with Factorial Error Allowance

r^2 =	0.847
n =	71
fse =	1.651

Q'_{bar} = 7.34 l/s
(With Allowance for the standard factorial error)

Pro-rata based on 50 Ha Site area to calculate Qbar

Q_{bar} =	0.00004	cumecs/Ha
Q_{bar} =	2.0	l/s/Ha
$Q_{bar[rural]}$ =	4.4	l/s

Catchment Characteristics

DB8	Area (m^2)	Runoff Coeff	Effective Area (m^2)
Roofs & Balconies - Type 1 (Draining to gullies)	-	1.00	0.0
Roofs - Type 2 (Draining to SUDS Soakaway features)	5,414	1.00	5414.0
Green Roofs	-	0.85	0.0
Roads and Footpaths - Type 1 (Draining to gullies)	-	0.80	0.0
Roads and Footpaths - Type 2 (Draining to Suds features)	5,560	0.80	4448.0
Paved Areas	-	0.80	0.0
Permeable Paving	5,989	0.60	3593.4
Grass over Basement	-	0.70	0.0
Parks (contributing)	5,214	0.30	1564.2
Public Open Space (non-contributing)	2,296	0.00	0.0

Include Public Open Space in Effective Catchment Area? no

Assumed open space area does not drain to surface water network

Effective Catchment Area 15019.6 m^2

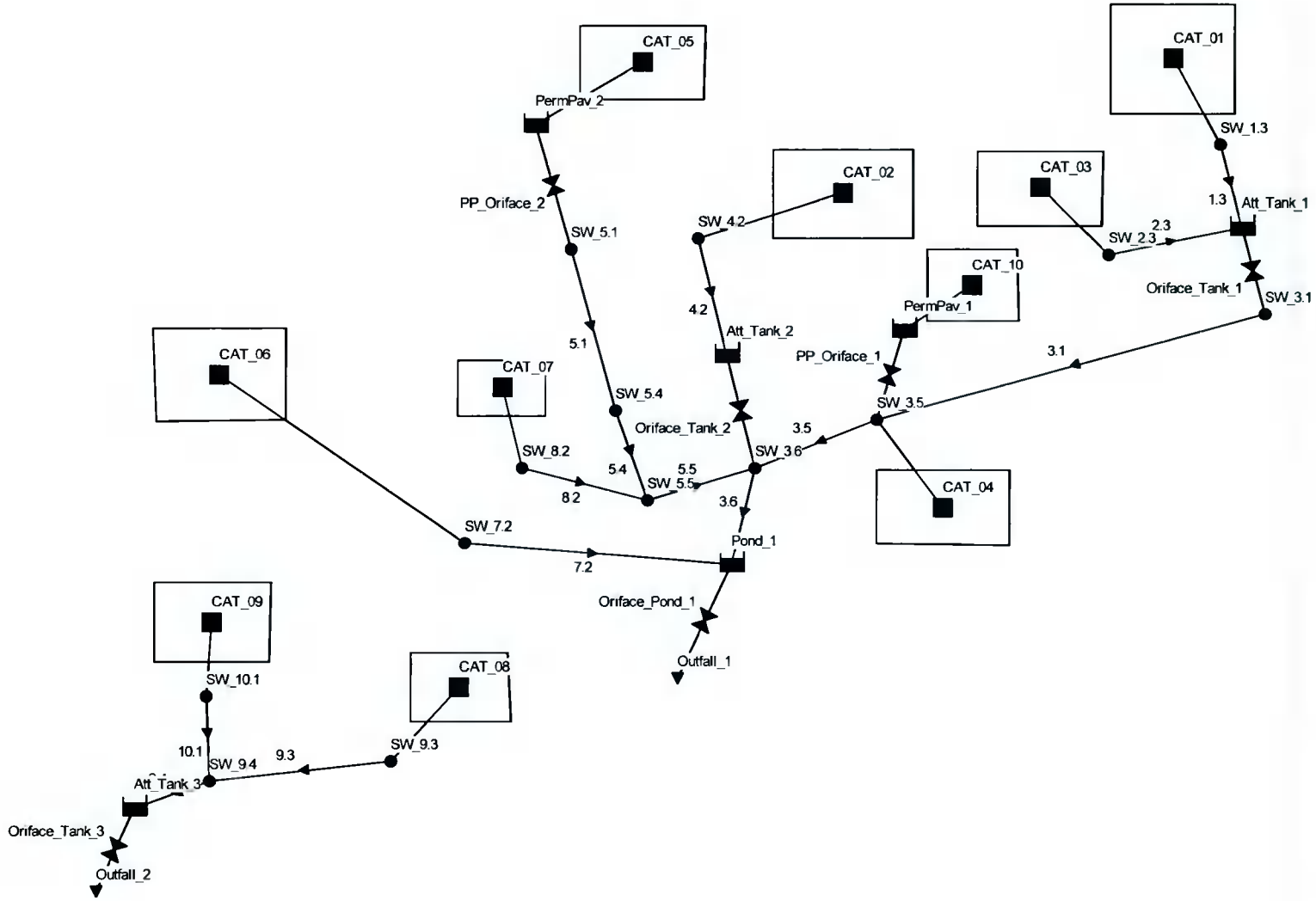
Effective Catchment Runoff Coefficient 0.67

DB8 - IRELAND (1:100 Post development)

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
CAT_01	121.53	0.00	0.00	2.52	116.30	0.08	3.32	0.957
CAT_02	121.53	0.00	0.00	1.26	118.52	0.24	10.88	0.975
CAT_03	121.53	0.00	0.00	1.26	118.51	0.14	6.26	0.975
CAT_04	121.53	0.00	0.00	3.16	115.12	0.25	9.72	0.947
CAT_05	121.53	0.00	0.00	12.62	94.09	0.76	13.66	0.774
CAT_06	121.53	0.00	0.00	1.26	117.81	0.28	12.84	0.969
CAT_07	121.53	0.00	0.00	3.16	114.86	0.23	7.63	0.945
CAT_08	121.53	0.00	0.00	5.05	112.79	0.11	4.85	0.928
CAT_09	121.53	0.00	0.00	5.05	112.64	0.09	3.54	0.927
CAT_10	121.53	0.00	0.00	12.62	99.97	0.20	4.64	0.823

DB8 - IRELAND (1:100 Post development)



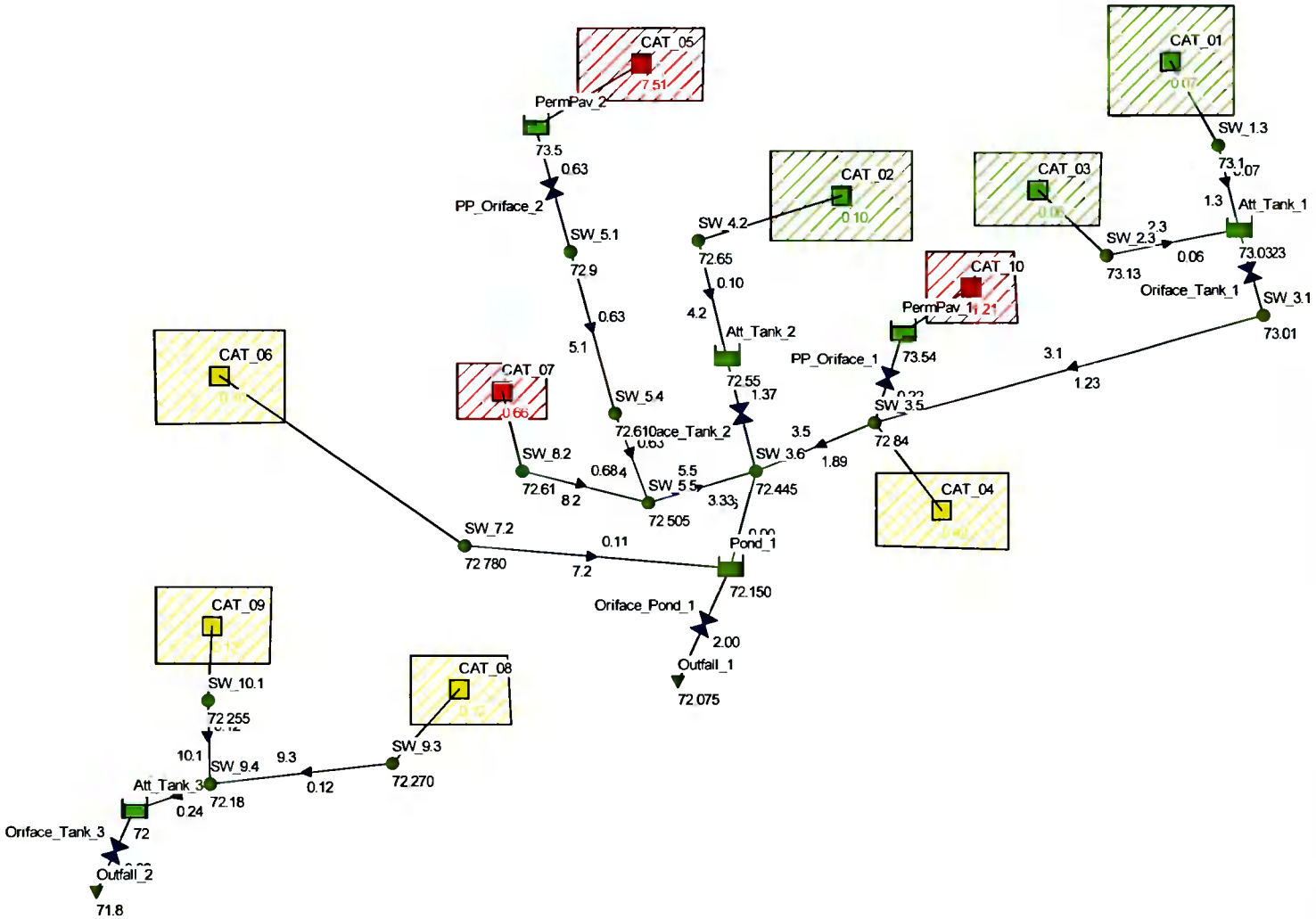
DB8 - IRELAND (1:100 Post development)

01/01/1999 09:58:00

Subcatch Runoff
0.01
0.05
0.10
0.50
LPS

Node Invert
25.00
50.00
75.00
100.00
m

Link Flow
10.00
20.00
30.00
40.00
LPS



DB8 - IRELAND (1:100 Post development)

Link Flow Summary

Link	Type	Maximum |Flow| LPS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| m/sec	Max / Full Flow	Max / Full Depth
1.3	CONDUIT	3.28	0	23:15	0.05	0.02	1.00
2.3	CONDUIT	6.22	0	23:15	0.09	0.03	1.00
3.1	CONDUIT	1.75	0	17:05	0.36	0.04	0.72
3.5	CONDUIT	18.28	0	19:15	1.03	0.10	1.00
3.6	CONDUIT	40.19	0	10:14	0.79	0.20	1.00
4.2	CONDUIT	10.87	0	23:15	0.15	0.13	1.00
5.1	CONDUIT	2.66	0	18:31	0.36	0.03	0.90
5.4	CONDUIT	2.99	0	18:21	0.15	0.03	1.00
5.5	CONDUIT	22.32	0	11:15	0.92	0.25	1.00
7.2	CONDUIT	12.83	0	23:15	0.29	0.07	1.00
8.2	CONDUIT	7.64	0	19:15	0.66	0.09	1.00
9.3	CONDUIT	4.84	0	23:15	0.12	0.11	1.00
9.4	CONDUIT	8.36	0	23:15	0.21	0.12	1.00
10.1	CONDUIT	3.53	0	23:15	0.09	0.08	1.00
Oriface_Tank_1	ORIFICE	1.69	0	21:20			
Oriface_Tank_2	ORIFICE	1.50	0	23:21			
Oriface_Tank_3	ORIFICE	1.28	0	23:29			
Oriface_Pond_1	ORIFICE	3.11	1	00:00			
PP_Oriface_2	ORIFICE	1.10	1	00:00			

DB8 - IRELAND (1:100 Post development)

Link	Type	Maximum |Flow| LPS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| m/sec	Max / Full Flow	Max / Full Depth
PP_Oriface_1	ORIFICE	0.36	1	00:00			

DB8 - IRELAND (1:100 Post development)

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Meters
SW_1.3	JUNCTION	0.39	0.88	73.98	0	23:25	0.88
SW_2.3	JUNCTION	0.38	0.85	73.98	0	23:25	0.85
SW_3.1	JUNCTION	0.03	0.13	73.14	1	00:00	0.13
SW_3.5	JUNCTION	0.06	0.30	73.14	1	00:00	0.30
SW_3.6	JUNCTION	0.24	0.70	73.14	1	00:00	0.70
SW_4.2	JUNCTION	0.50	1.18	73.83	0	23:25	1.18
SW_5.1	JUNCTION	0.04	0.24	73.14	1	00:00	0.24
SW_5.4	JUNCTION	0.15	0.53	73.14	1	00:00	0.53
SW_5.5	JUNCTION	0.21	0.64	73.14	1	00:00	0.64
SW_7.2	JUNCTION	0.08	0.36	73.14	1	00:00	0.36
SW_8.2	JUNCTION	0.15	0.53	73.14	0	23:59	0.53
SW_9.3	JUNCTION	0.38	0.96	73.23	0	23:29	0.96
SW_9.4	JUNCTION	0.44	1.05	73.23	0	23:29	1.05
SW_10.1	JUNCTION	0.39	0.98	73.23	0	23:29	0.98
Outfall_1	OUTFALL	0.00	0.00	72.08	0	00:00	0.00
Outfall_2	OUTFALL	0.00	0.00	71.80	0	00:00	0.00
Att_Tank_1	STORAGE	0.43	0.95	73.98	0	23:24	0.95
Att_Tank_2	STORAGE	0.56	1.28	73.83	0	23:25	1.28
Att_Tank_3	STORAGE	0.54	1.23	73.23	0	23:29	1.23

DB8 - IRELAND (1:100 Post development)

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Meters
Pond_1	STORAGE	0.42	0.99	73.14	1	00:00	0.99
PermPav_2	STORAGE	0.07	0.18	73.68	1	00:00	0.18
PermPav_1	STORAGE	0.04	0.10	73.64	1	00:00	0.10

DB8 - IRELAND (1:100 Post development)

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow LPS	Max. Flow LPS	Total Volume 10^6 ltr
Outfall_1	58.36	2.62	3.11	0.178
Outfall_2	58.36	1.10	1.28	0.077

DB8 - IRELAND (1:100 Post development)

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Average Percent Full	Evap Percent Loss	Exfil Percent Loss	Maximum Volume 1000 m3	Maximum Percent Full	Day of Maximum Volume	Hour of Maximum Volume	Maximum Outflow LPS
Att_Tank_1	0.048	36	0	0	0.105	80	0	23:24	1.69
Att_Tank_2	0.056	35	0	0	0.128	80	0	23:25	1.50
Att_Tank_3	0.054	23	0	0	0.123	52	0	23:29	1.28
Pond_1	0.350	26	0	0	0.848	64	1	00:00	3.11
PermPav_2	0.277	18	0	0	0.709	45	1	00:00	1.10
PermPav_1	0.074	10	0	0	0.183	24	1	00:00	0.36

Appendix C

DB080-PIN-00-ZZ-DR-C-PLAN-1210-P02

External Works Plan

SOURCES OF DATA

RKD Architects Ltd.	Land Survey Services Ltd.
Google	Brock McClure

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Executive Summary

This report was prepared for South Dublin County Council in connection with the planning application for a data centre development and addresses the existing and proposed civil infrastructure, for the proposed development, located in Profile Park, Grange Castle Business Park, Lucan, Co. Dublin.

Equinix (Ireland) Ltd. intend to apply for permission for development at this site of c.2.65ha on lands known as Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (the site is bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue). The development will consist of the following:

- Construction of a 3 storey (part 4 storey) data centre known as "DB8" to include data halls, electrical/plant rooms, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level. The total gross floor area excluding hot air plenums and external staircase is c.9,601sqm. The overall height of the data centre ranges from c.16m to c.20m to roof level and c.20m to c.24m including roof top plant, flues and lift overrun;
- Provision of 5 no. external generators , 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a sprinkler pump room (c.23sqm), 2 no. sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm). Total floor area of ancillary structures and plant (c.303sqm);
- Provision of a delivery yard and loading bays, 64 no. car parking spaces, 5 no. motorcycle spaces, bicycle shelter serving 14 no. spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of existing vehicular entrances from Falcon Avenue;
- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;
- The area to the south west of the site is reserved for a future data centre, subject of a separate application to South Dublin County Council;
- This application is accompanied by a Natura Impact Statement.

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.

The following engineering drawings have been prepared for the proposed development:-

DB080-PIN-00-ZZ-DR-C-PLAN-1202-P02	Proposed Site Levels & Contours
DB080-PIN-00-ZZ-DR-C-PLAN-1205-P02	Site Drainage
DB080-PIN-00-ZZ-DR-C-PLAN-1210-P02	External Works Plan
DB080-PIN-00-ZZ-DR-C-ZZZZ-3207-P02	Proposed Drainage Long Section (Foul) Sh 1/3
DB080-PIN-00-ZZ-DR-C-ZZZZ-3208-P02	Proposed Drainage Long Section (Foul) Sh 2/3
DB080-PIN-00-ZZ-DR-C-ZZZZ-3209-P02	Proposed Drainage Long Section (Foul) Sh 3/3
DB080-PIN-00-ZZ-DR-C-ZZZZ-3210-P02	Proposed Drainage Long Section (Surface) Sh 1/2
DB080-PIN-00-ZZ-DR-C-ZZZZ-3211-P02	Proposed Drainage Long Section (Surface) Sh 2/2

1 Introduction

The applicant proposes to construct 3 storey (part 4 storey) data centre and associated office areas, which will be accessed off Falcon Avenue to the west.. The purpose of this report is to address the civil infrastructural aspects of the proposed data centre development, located in Profile Park, Grange Castle Business Park, Lucan, Co. Dublin.

The total subject site area extends to circa 6.55 acres (2.65 ha) and is currently a greenfield site. The site is bounded to the north by the New Nangor Road, to the west by Falcon Avenue and to the east and south by Grange Castle Golf Club.

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 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

South Dublin County Council record drawings have identified 3 No. 150mm / 225mm Ø spur connections, located adjacent to the western boundary of the property & Profile Park. These spur connections were left out to facilitate development of these lands. These spur connections are joined into the reticulation netwrok for Profile Park.

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.

2.2 Existing Surface Water Drainage Networks

The topographical survey as carried out has identified a dry open ditch which forms the southern boundary of the site adjacent to Grange Castle Golf Club. This ditch network runs in an westerly direction. This ditch network is then drained via a tributary into the Camac River.

The aforementioned open ditch network has been identified as having capacity to accommodate the proposed discharge from the subject site.

2.3 Existing Water Main Network

South Dublin County Council record drawings have identified an existing 6" (160mm) Ø main located along the western boundary of the property, within Falcon Avenue adjacent to the subject site. 2No. 160mm Ø capped connections with sluice valves, have been left off the aforementioned water main, in order to facilitate development of these lands.

There is also an existing 700mm Ø trunk water main running parallel to the New Nangor Road adjacent to the northern boundary of the subject site.

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 Ø gravity foul sewer outfall, laid from a discharge manhole at the end of a 100mm Ø pumped main and discharge into the existing 225mm Ø spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue.

The office building contains 6 No. WC's, with a predicted maximum number of daily staff being in the region of circa 65 people, over a 24hr period. Based on Irish Water's Code of Practice of 150ltr/hd/day, the peak wastewater flow will not be in excess of circa 0.66l/s.

The proposed network connects into the EX MH FW11, with an invert level of 71.82m, prior to the ultimate outfall discharging into the Profile Park reticulation network, - refer Drawing No. DB080-PIN-00-ZZ-DR-C-PLAN-1205-P02.

All on-site foul sewers have been designed to be a minimum 225mm Ø 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.

It should be noted that the subject site currently comprises a greenfield site and 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 areas of the proposed building units, will be directed via rain water pipes into an on-site reticulation system. The outflow from this system will be connected into the surface water drainage network collecting run-off from the road areas and will be ultimately discharged into a stormwater storage pond / below ground Stormtech tanks (or similar approved) - refer Drawing No. DB080-PIN-00-ZZ-DR-C-PLAN-1205-P02.

Based on the contributing area for this current application, i.e. circa 22,400m^2 (2.24Ha), the total attenuation volume required has been calculated as being circa 1,204m^3, which will be provided for as mentioned above, in a storage pond and below ground storage tanks (3No.) - Refer Appendix B for Surface Water Calculations.

The following volumes have been provided for within the storage elements:-

- Tank 1 provides a storage volume of 105m^3
- Tank 2 provides a storage volume of 128m^3
- Tank 3 provides a storage volume of 123m^3
- The attenuation pond comprises a storage volume of circa 848^3

It should be noted that both Tanks 1 & 2 discharge into the attenuation pond which has an outfall into the open ditch network. Tank 3 discharges independently into the ditch, thus providing a total of 2 No. outfalls into the ditch network.

Storm water from all car park areas and access roads / delivery areas will be drained as follows:-

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers
- Porous asphalt

Prior to discharging into the proposed pond, the storm water from the car park and access roads, which is drained via the methods as described above, will be directed through an appropriately sized Conder Separator (or similar approved) petrol interceptor - refer Appendix A for Interceptor Details.

Site investigations have been carried out and the results have shown 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 entire development has been designed to accommodate a 1:2 year storm frequency. The pond, attenuation tanks and porous asphalt areas have been designed to accommodate a 1:100 year storm event + 20% climate change.

The outflow from the proposed development, will be restricted by way of a Hydrobrake facility, which will limit the total discharge to 4.4l/s, which is the calculated QBAR greenfield run-off rate - refer Appendix B for Surface Water Calculations.

The surface water discharge for this application will incorporate the road areas, parking, service yard area and the roof water from the proposed data halls, which then ultimately feeds into the existing network as previously mentioned. Refer Appendix C, Dwg. No. DB080-PIN-00-ZZ-DR-C-PLAN-1210-P02, for a drawing indicating the various surface areas of this application; all areas are hardstanding of various types, with the respective coefficients detailed below:-

- Access Road – Tarmac (2,504m^2) / c = 0.80
- Data Hall Roof Area (5,414m^2) / c = 1.00
- Yard Slab Area – Concrete (2,032m^2) / c = 0.80
- Open Space / Landscaping (5,214m^2) / c = 0.30
- Porous Asphalt & Parking Areas (5,989m^2) / c = 0.60

- Concrete Footpath (1,953m^2) / c = 0.8
- Standard Road Tarmac (1,103m^2) / c = 0.8
- Gravel (2,291m^2) / c = 0.5

3.3 Proposed Water Mains

It is intended to serve the proposed development via connection off the 150mm Ø network, as located in Falcon Avenue - Refer Drawing No. DB080-PIN-00-ZZ-DR-C-PLAN-1202-P02.

Hydrants will be installed in accordance with the Requirements of the Building Regulations and in accordance with the recommendations contained in the Technical Guidance Documents, Section B – Fire Safety, dated 2006, and these are detailed on our engineering drawings.

Water demand for the development has been based on Irish Water's criteria, i.e. 150 litres/hd/day = 9,750 litres/hd/day (based on 65 PE) = 0.113 litres/second.

Avg. Demand = 0.113 l/s x 1.25 = 0.141 litres/second

Peak Demand = 0.141 l/s x 5 = 0.705 litres/second

Water meters, sluice valves and hydrants, in line with Irish Water requirements and specifications, will be installed at the connections onto the aforementioned existing water mains, as required. A Pre-Connection Enquiry application has been submitted to Irish Water in respect of the water supply and we are still awaiting a response to same.

3.4 Standard Drainage Details

All standard drainage details including manhole details, pipe bedding, channels, hydrants etc. have been included within the planning pack. 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.

Concrete bed and surround to the pipe runs will be used where the cover to the pipes is less than 900mm, where the pipes are sufficiently close to the building, or where the pipe runs are below the ground floor slab.

All works are to be carried out in accordance with Irish Water's Code of Practice for Water Infrastructure, dated July 2020 : Document IW-CDS-5020-03 and any subsequent revisions thereof.

Appendix D

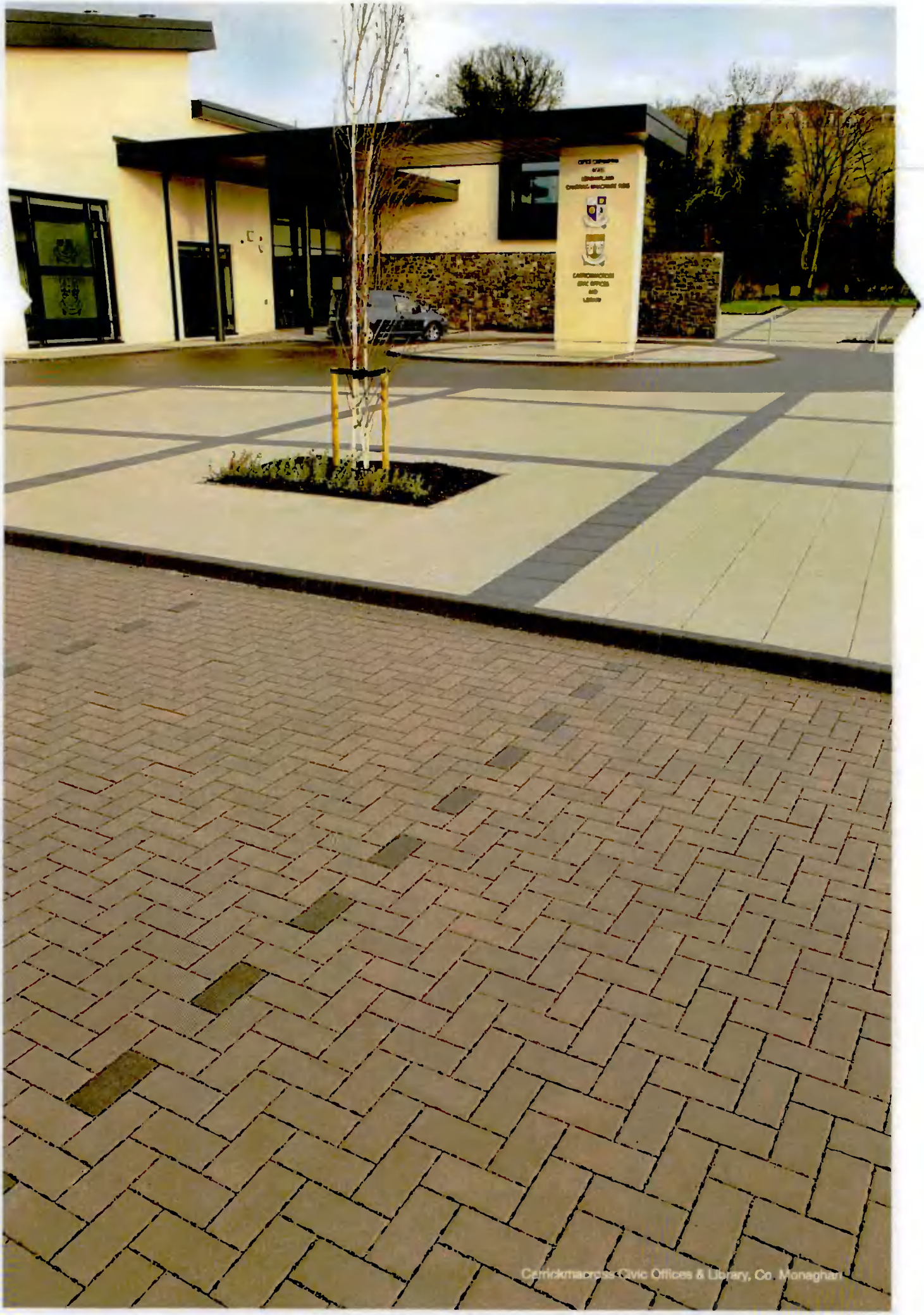
Permeable Paving

Clima-Pave™

Permeable Paving Solutions

Kilsaran

ideas taking shape



Carrickmacross Civic Offices & Library, Co. Monaghan

Clima-Pave™

The rapid development of previously green-field sites and the associated creation of impermeable areas such as roofs, car parks and footpaths will mean that at project conception stage there will be potentially large volumes of surface water to be dealt with. Traditionally this has been done by piping the surface water into storage tanks or discharging it into nearby streams or surface water drainage. This method of drainage is not currently favoured by planners and designers, as it simply moves the surface water downstream where it still has to be dealt with. This is especially important where large volumes of water need to be dealt with during heavy rainfall events. Piping large volumes of water into streams and rivers increases the risk of flooding and also allows for the potential pollution of local water courses and drinking water supplies.

Sustainable Urban Drainage Systems (SUDS) and Water Source Control

Planners are encouraging the use of Sustainable Urban Drainage Systems (SUDS) in all new developments, in particular the use of appropriate source control techniques is important as this allows for the containment of the surface water collected on the site and for this surface water to be dealt with on-site as opposed to traditionally draining it off-site. SUDS, as a sustainable development approach to Surface Water Design Techniques, has the aim of balancing the following:

1. **To manage water run-off from developed areas to similar quantities prior to development (Source Control)**
2. **Reduce and avoid incidences of downstream flooding**
3. **To protect or enhance water quality of the run-off**
4. **To improve or enhance the amenity where possible**

Advantages of Permeable Paving

- Permeable Paving is a 'source control' method. Water is managed and dealt with on-site without piping off to storage tanks or surface water treatment systems
- The Water Framework Directive (Directive 2000/60/EC) requires that surface water discharges are managed to ensure that risk of contamination or pollution are mitigated. Permeable paving systems filter contaminants by microbial action. There is no requirement for additional filtering/polishing with Permeable Paving in normal use
- Separate attenuation tank systems are not required
- No need for gullies or channels or conventional drainage
- Recharges ground water
- Roofs, roads and other non-permeable areas can be discharged into permeable paving (No gullies required)
- No ponding or surface water
- Collected water can potentially be re-used for non-potable purposes
- Improves water quality

Clima-Pave™, the permeable paving solution from Kilsaran, offers an advantage over traditional SUDS techniques, such as storm water attenuation tanks. This is because the stone based sub-base, which needs to be installed for any type of surfacing material, is adapted to an open graded material in permeable paving systems. This allows the water collected from the site to be stored in the pavement and either infiltrated back into the ground or discharged at a controlled rate into the surface water drainage system.

The Clima-Pave™ system is constructed using our specially engineered permeable paving block, which has enlarged joints on all sides, typically 4-8mm in width. When the blocks have been laid, a corresponding slot is formed between the paving blocks which are then filled with a clean 3mm aggregate. This allows water to rapidly drain from the surface down into the pavement.

Traditional block paving is laid on a sand bedding layer and a Type 1/CL. 804 sub-base. To allow for storage and infiltration of the surface water percolating through the block, permeable block paving is laid on a grit laying course instead of sand and an open-graded stone sub-base instead of Type 1/CL. 804.

Clima-Pave™
Permeable Paving Solutions

Advantages of Clima-Pave™ for your project

Clima-Pave™ from Kilsaran offers the widest range of permeable paving products for use in commercial, retail and civic projects.

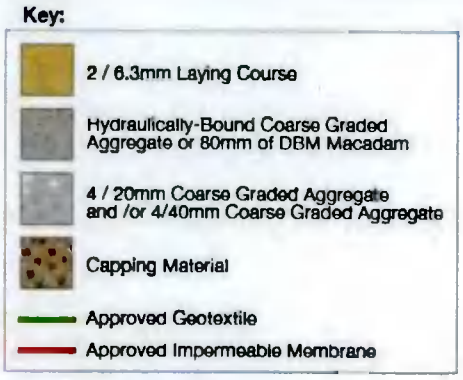
Kilsaran can also offer a full site-specific permeable paving design for your project, taking into account the site ground conditions, drainage requirements and structural and traffic loading requirements for the site. This is a chargeable service and Kilsaran will provide an indemnified design provided by our nominated Consulting Engineer who will visit the site if required to appraise the installation.

Clima-Pave™
Technical Information

- Design Guidance
- Permeable Paving Aggregates
- Materials for HGV Trafficked Pavements
- Typical Design Diagrams
- Construction & Maintenance Guidelines

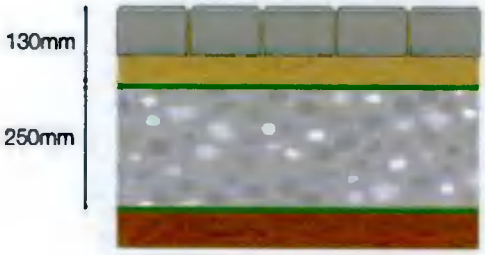
Typical Design Diagrams

Below are typical build-up details for permeable pavement systems based on BS 7533-13:2009. These diagrams are based on ideal site conditions for drainage and CBR values of 5% or greater. The diagrams are for project appraisal purposes only and in all cases a site specific design in accordance with BS 7533-13:2009 will be required.



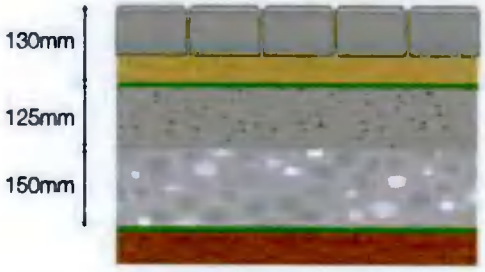
System A & B (Infiltrating & Partial Infiltration Systems)

LOAD CATEGORY 1



LOAD CATEGORY 2

LOAD CATEGORY 3



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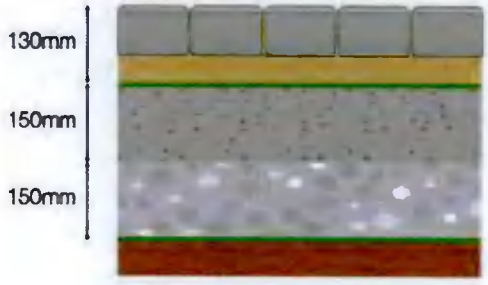

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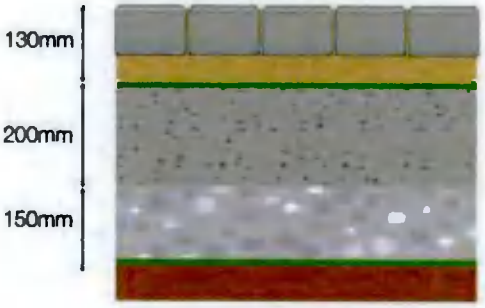
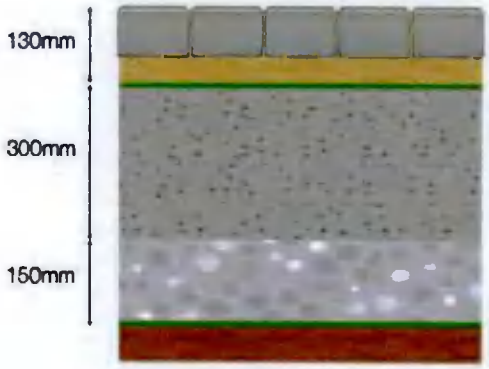


LOAD CATEGORY 6



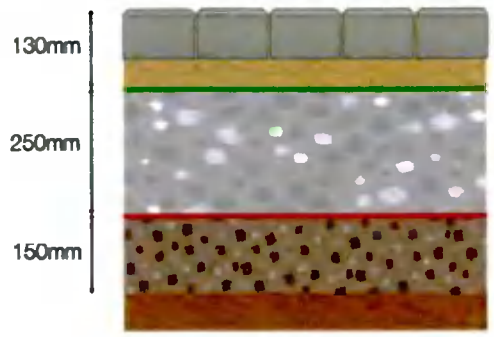
Alternative build up / materials may be used depending on project specific details.

For load categories 3-6 the hydraulically-bound coarse graded aggregate (porous no fines concrete) layer may be replaced with 80mm depth of DBM Macadam to act as a stiffening layer. The macadam layer should be punctured at 750mm centres on grid. Further details on the DBM macadam layer are given on page 19.

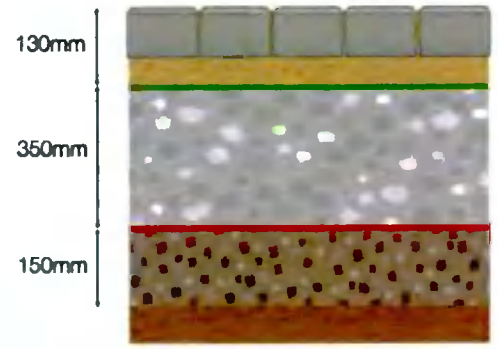
Where the depth of aggregate sub-base is in excess of 350mm for the given loading category, it may be possible to reduce the depth of aggregate required and provide a more cost effective design with the use of an appropriate and approved geo-grid. This can be appraised at design stage.

System C (Fully Tanked/Bunded)

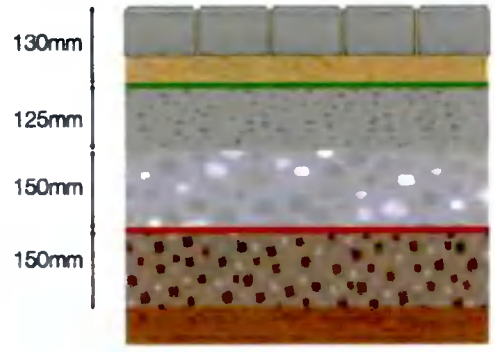
LOAD CATEGORY 1



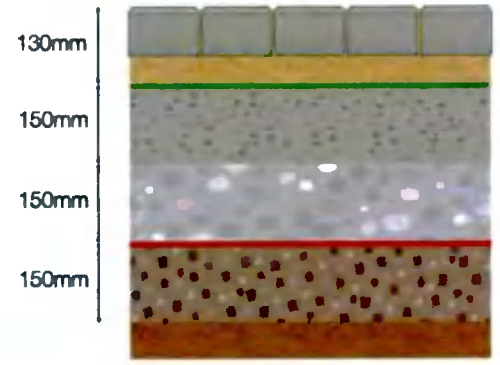
LOAD CATEGORY 2



LOAD CATEGORY 3



LOAD CATEGORY 4



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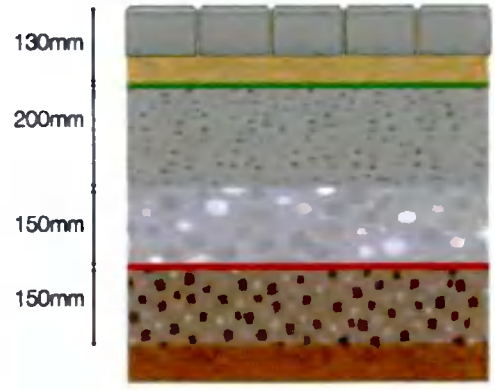

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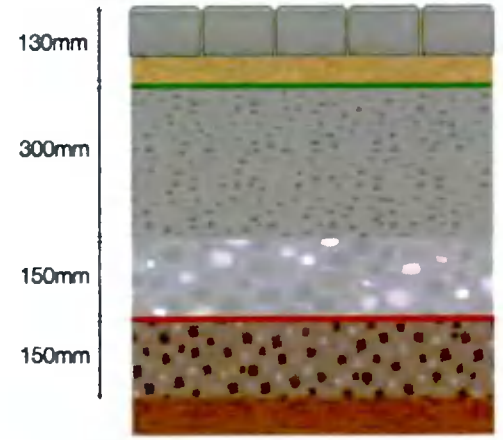
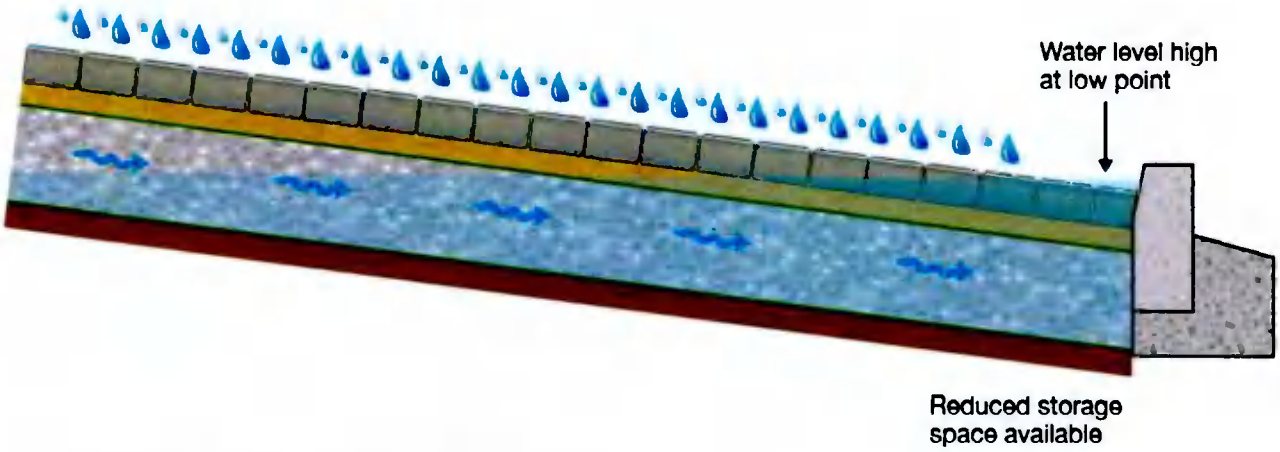


In the case of System C (fully tanked permeable pavements) there is always a requirement for 150mm depth of capping to be used beneath the impermeable membrane as shown above. The capping material should be approved by the Engineer and should comply with either the NRA Specification for Roadworks Series 600 or the Specification for Highway Works Series 600. The material should be tested before and during supply for full compliance, and should be compacted in accordance with the series 600 requirements. The capping layer should be blinded immediately before laying the impermeable membrane to prevent puncturing the membrane.

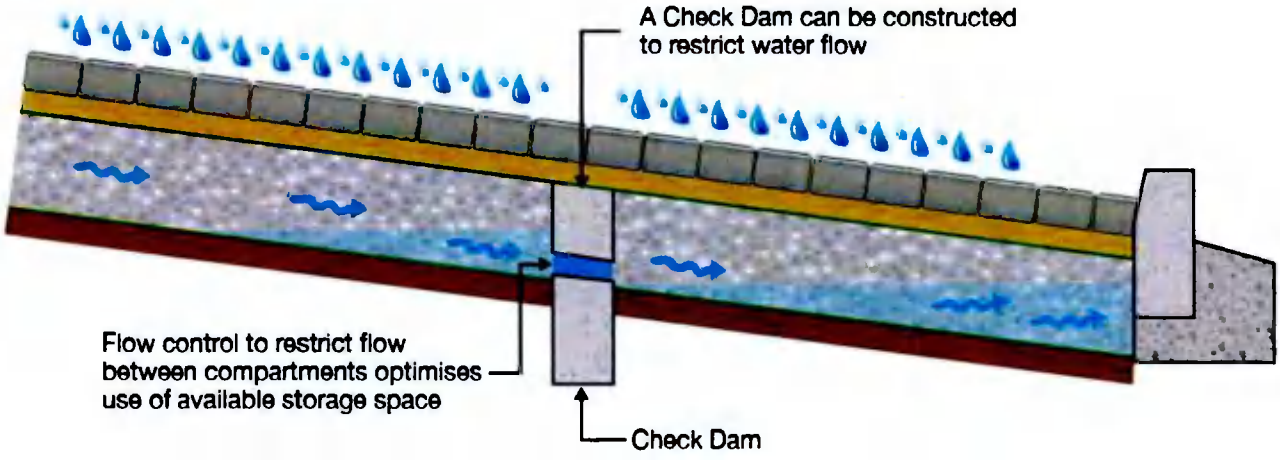
The requirement for using capping material may be eliminated by carrying out a design using an appropriate geo-grid which would negate the requirement for both the capping material and may also reduce the total depth of sub-base stone required.

Sloping Sites

On sloping sites water will naturally collect at the lowest point of the pavement. If sharp falls are allowed on site this will reduce the effective water storage capacity of the sub-base aggregate. In order to minimise this effect, gradients should be at a maximum 1 in 20 and preferably 1 in 30 or better.



Where sloping sites are unavoidable due to site layout, it will be necessary to reduce any sharp falls to maintain the water attenuation capacity of the system. This can be achieved by creating 'dams' in the sub-base of the pavement which will 'step' the pavement sub-base and reduce the overall falls. On extreme slopes, the pavement can be terraced with a step down and a dam between the two levels to restrict water flow.



Construction & Maintenance Guidelines

Construction

To ensure correct performance and durability of a permeable pavement, a fully detailed design should be carried out in accordance with BS 7533-13:2009 taking into account all site specific requirements for the project. Construction should be carried out strictly in accordance with BS 7533-13:2009 and BS 7533-3. All materials to be used shall be tested for full compliance to the above standard both before supply and during construction. It is also advised not to use any of the layers of permeable pavement construction for site traffic unless the build-up has been specifically designed to accommodate this. Additionally site equipment such as tele-handlers and forklifts should not be used on the paving surface after construction has been completed unless the pavement has been designed to accommodate this.

Maintenance

Permeable pavements should not be contaminated with soft landscaping materials, soil, detritus or general dirt as this may wash into the pavement. Also the pavement should not be trafficked by construction traffic or unsuitably heavy vehicles above that for which the pavement was designed.

To keep any growths or weeds to a minimum it is advised that the installed permeable paving be sealed with an appropriate sealer. Where the paved area is beneath overhanging trees or in a very damp area, an annual treatment of an environmentally friendly weed killer can be applied. Note the weed killer should be applied as directed by the supplier and only in very dry weather where rain is not expected, active weed killer could be washed into the sub-system otherwise. The manufacturer's instructions for all treatment products should be followed in detail.

The pavement should be inspected on a routine basis and carefully swept as required using a mechanical sweeper or by hand for smaller areas. The sweeping action may remove some of the jointing grit from the surface, the joints must be topped up after sweeping if required.

Should silting or blocking of the joints occur after a period of years, the use of a suitable jet wash and suction sweeper should be used to remove the defective material. It is likely that the jetting of the pavement will remove some grit. This grit should be replaced as required.

As with conventional block pavements, depressions, rutting and cracked or broken blocks which may be a structural concern or a hazard to users should be remedied as soon as possible. All joints must be maintained full at all times.

Permeable pavements will drain relatively quickly compared with other types of surfacing, and are not as liable to freezing over of standing water, hoar frosts may occur which can cause surface slip on any material. The use of de-icing salts on permeable pavements, as with any other concrete surface, should be kept to a minimum as the chlorides in the salt will penetrate the concrete and excessive use will damage the surface. Any de-icing material applied should not cause blockage or clogging of the permeable pavement joints (if blockage occurs in localised areas this will need to be removed by suction sweeper and joints topped up with appropriate jointing grit). It should also be considered that any de-icing material used will drain into either the sub-grade or the drainage system through the permeable pavement. Care should be taken to ensure no contamination of water courses or drainage systems. De-icing materials should be applied to the paving surface before ice or snow covers the surface to prevent damage.

get in touch

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Client:

EQUINIX

HAZARD IDENTIFICATION LEGEND:

HAZARD IDENTIFICATION (if none state 'none relevant')	CONTROL AN MITIGATIC MEASURI

NOTE:
Hazards listed above are only those considered significant risks and

a) not likely to be obvious to a competent contractor or other designers;
b) unusual; or
c) likely to be difficult to manage effectively

KEY

- SITE ACCESS ROAD (A=2504.70m²/c=0.8)
- GRAVEL (A=2,291.80m²/c=0.5)
- PERMEABLE ASPHALT/PAVING (A=5,989.43m²/c=0.6)
- BUILDING FLOOR SLABS/ROOF (A=5,414.30m²/C=1)
- LANDSCAPED AREAS (REF LANDSCAPE ARCHITECTS PLANS) (A=5,214.30m²)
- CONCRETE SERVICE YARD (A=2,032.22m²/C=0.8)
- CONCRETE FOOTPATH (A=1,953.05m²/C=0.8)
- STANDARD ROAD TARMAC (A=1,103.63m²/C=0.8)
- 150mm CONC UPSTAND

REV	DATE	DESCRIPTION	DWN CHK APP
P02	15.09.21	PLANNING ISSUE	AB/JM
P01	17.06.21	STAGE 3 ISSUE	AB/JM

Key:

Project:
Equinix DB081

Drawing Title:
EXTERNAL WORKS PLAN

Drawing Number:
DB080-PIN-00-ZZ-DR-C-PLAN-1210

Scale:	Paper Size:	Purpose:	Revisic
1:200	A1	S4	P02

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