SDS
Water Infrastructure Systems

INNOVATORS IN
WATER TECHNOLOGY

SDS GEOlight®

Stormwater Management System



SDS GEOlight® is an ultra lightweight honeycombed modular structure, made from recycled PVC, that provides an underground storage facility for the application of stormwater attenuation or infiltration.

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Stormwater Management

The Environment Agency is keen to promote the wider use of sustainable drainage systems, which reduce the impact of surface water runoff. There are two main ways of storing surface water for stormwater management:

- Stormwater attenuation tanks
- Soakaway infiltration systems

Stormwater Attenuation Systems

This consists of underground water storage facilities that hold excess water during periods of peak rainfall.

The stored water is gradually released in a controlled manner into the surface water drainage system or directly into watercourses, reducing the risk of upstream and downstream flooding.

Soakaway Infiltration Systems

Soakaways are designed to store surface water runoff until it can be gradually absorbed by the surrounding ground.

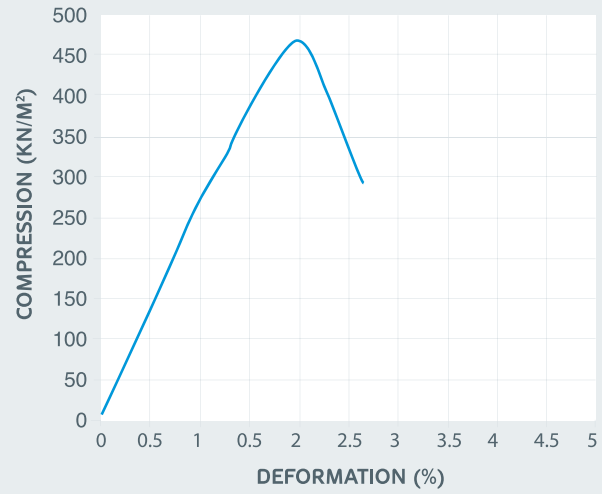
SDS GEOlight® – an efficient and economic solution for stormwater management.

SDS GEOlight® Attenuation

SDS GEOlight® has been specifically designed to form underground water storage reservoirs in stormwater management schemes. Its honeycombed structure gives it certain unique characteristics that make it ideal for this purpose:

- The high void rate (95%) of GEOlight® means that the maximum volume of water is stored in the minimum volume of storage unit.
- High compressive strength. GEOlight® is available in two strengths as standard: 200 and 400kN/m². Note: Higher compressive strengths available from 600 to 1000 kN/m². The graph on the right shows the results of a compression test, where samples of GEOlight® 400 were compressed at the rate of 1mm per minute. The deformation at 400kN/m² is about 1.6%.

RESULTS OF COMPRESSION TEST ON SDS GEOLIGHT® 400



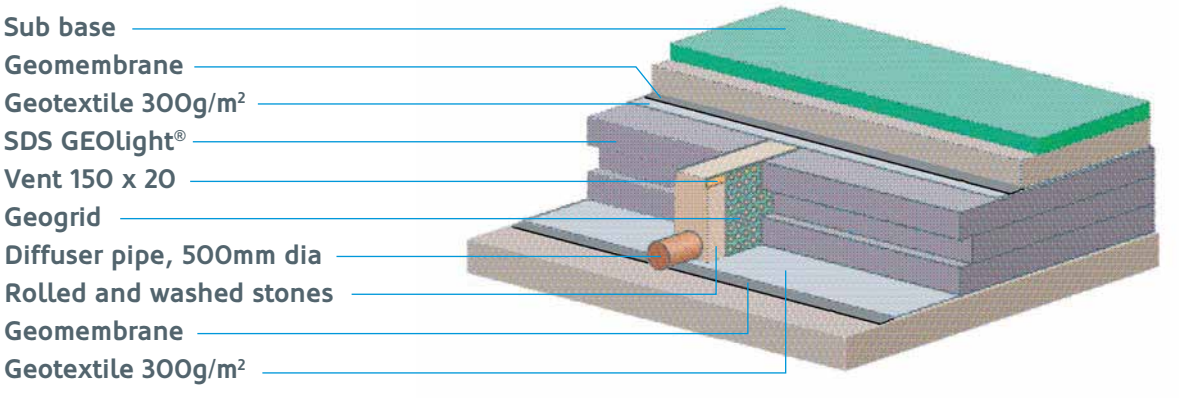
The GEOlight® Stormwater Attenuation System consists of two manholes (inspection chambers) connected by a length of perforated distribution pipe which feeds the stormwater storage reservoirs on either side formed from GEOlight®.

The distribution pipe is normally from 225mm up to 500mm diameter, generally covered in a trench that is filled with draining material such as 15/25 clean graded stone, free from fines.

The reservoirs and distribution pipe are wrapped in a waterproof membrane, such as butyl, to prevent seepage of water into the surrounding ground. The top of each GEOlight® reservoir has a vent which is connected back to the upstream manhole.

A geotextile or 10mm mesh geogrid is laid between the distribution pipe and GEOlight® to prevent the GEOlight® units being clogged by the draining materials.

SDS GEOlight® Attenuation



How does it work?

→ 1. In normal conditions, water enters a back drop manhole. This is the upstream manhole and any silt or sediment will collect in the bottom of the chamber. The water then flows along the distribution pipe into the downstream manhole. The upstream pipework is sized to cope with normal flow conditions. The distribution pipe and attenuation tank are sized to cope with storm conditions. The outflow pipe is sized to cope with the permissible discharge.

→ 2. In storm conditions the flow restrictor (vortex flow control or orifice plate) in the downstream manhole limits the amount of water flowing out of the manhole. This causes the water level in the distribution pipe to rise and water to spill into the GEOlight® reservoirs on either side. As the water level rises in the reservoirs, air is forced out of the high level vents into the upstream manhole.

→ 3. Once the storm has passed, the water level in the GEOlight®reservoirs gradually falls as water passes through the flow restrictor in the downstream manhole. The vents now allow air to return into the GEOlight® reservoirs. Gradually the reservoirs empty. The flow restrictor prevents excess surges of flood water to pass downstream and uses the storage reservoirs to store the water for the period of the storm.

Calculating the storage capacity

The storage capacity of the GEOlight® reservoirs is determined by the maximum outflow permitted, (set by the water company or Environment Agency), the impermeable area of the site and the rainfall return period – normally 1 in 30 years, but again can be dictated by the water company. A full design service, including calculations, can be supplied via a third party consultant.
Please contact SDS for details.

Other uses

The water storage ability of SDS GEOlight® lends itself to a number of other uses:

→ Water recycling combines with irrigation systems – this is increasingly popular: GEOlight® is used to retain stormwater which is then pumped as required to a network of standpipes for irrigation.

→ Drainage channels – the natural permeability of GEOlight® lends itself for use as an underground drainage channel that collects and drains away groundwater.

→ Pollution control – improved water runoff quality. When used in combination with oil / petrol separators, GEOlight® can replenish groundwater without the risk of contamination from oil, chemicals or suspended solids.

→ To form lightweight embankments (slope stabilisation) - GEOlight® can be used to quickly form the base of embankments that only weigh a fraction of earth embankments.

Stormwater Attenuation System

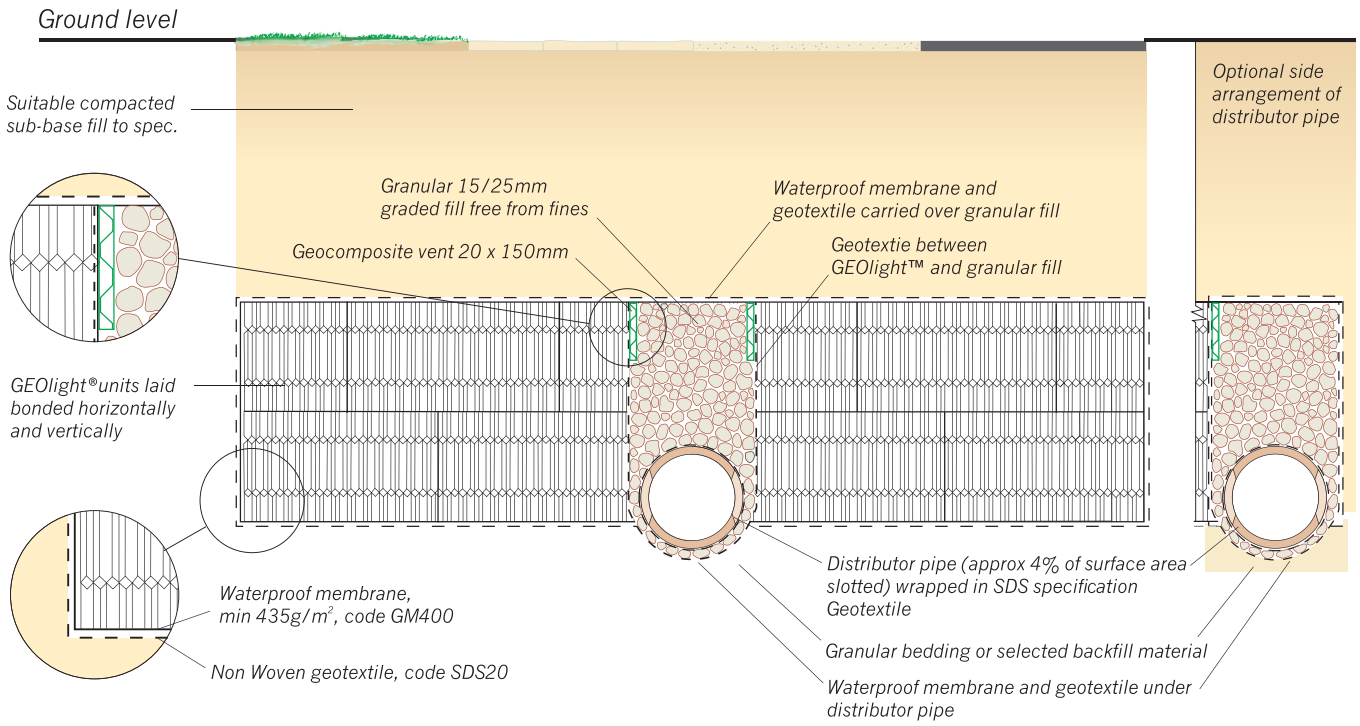
Design Details

The details on these two pages illustrate the construction of a typical SDS GEOlight® Stormwater Attenuation System. The length and height of the GEOlight® reservoirs is determined by the quantity of water to be stored.

The layout of each scheme is specifically designed to suit the characteristics and limitation of the site. Typically the distributor pipe would be arranged in the centre of the reservoir, but can alternatively be placed at the side where topographical constraints dictate.

The high performance waterproof membrane should be sealed continuously to encapsulate the GEOlight® reservoirs, distributor pipe and granular fill. It is protected by a heavyweight needle punched, non woven geotextile. To help with maintenance a high flow geotextile is placed between the granular fill and GEOlight® attenuation units to prevent silt and particles being washed into the reservoir. GEOlight® can be used under a range of surfaces e.g. grass, porous paving, standard paving block, tarmac and concrete.

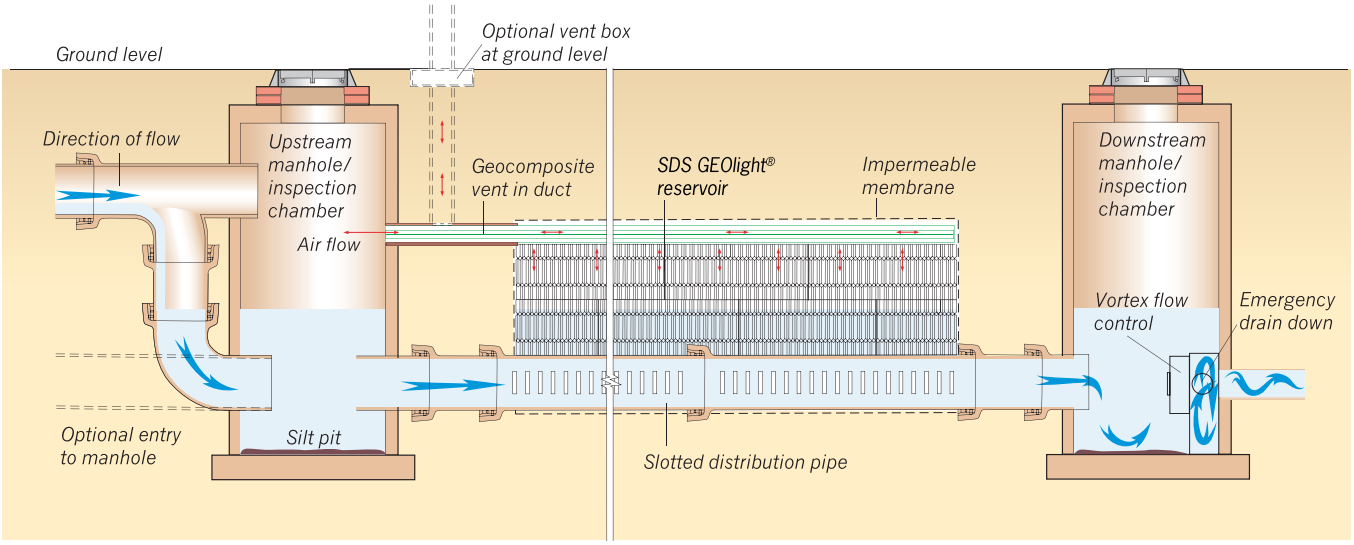
Cross Section



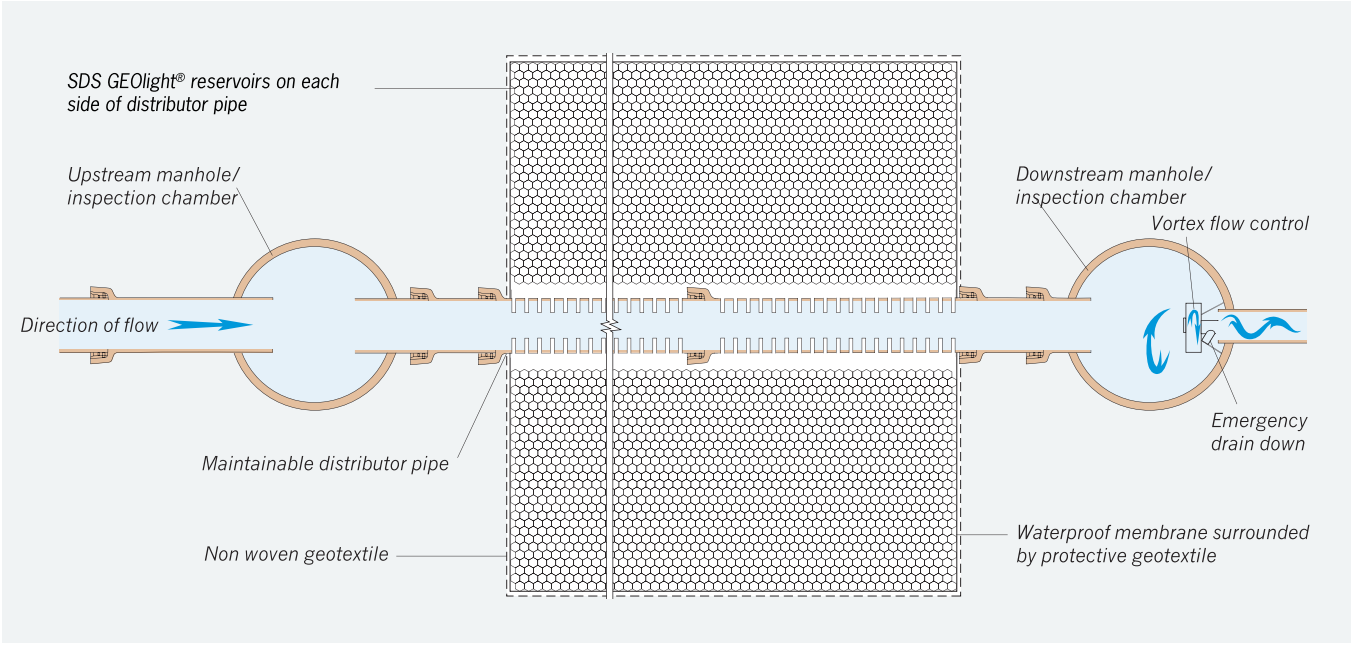
Stormwater Attenuation System

Design Details

Long Section



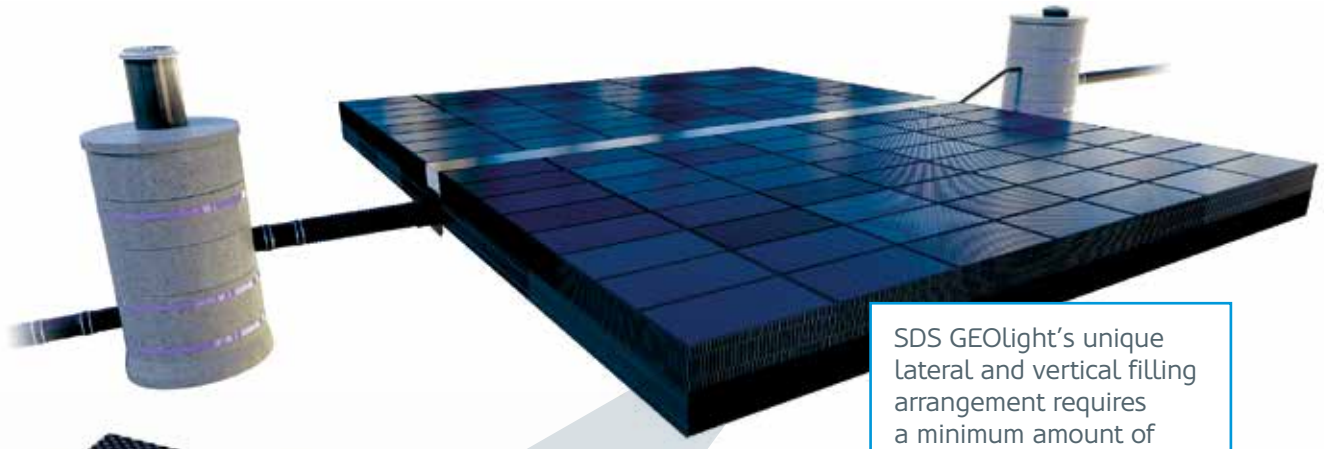
Plan



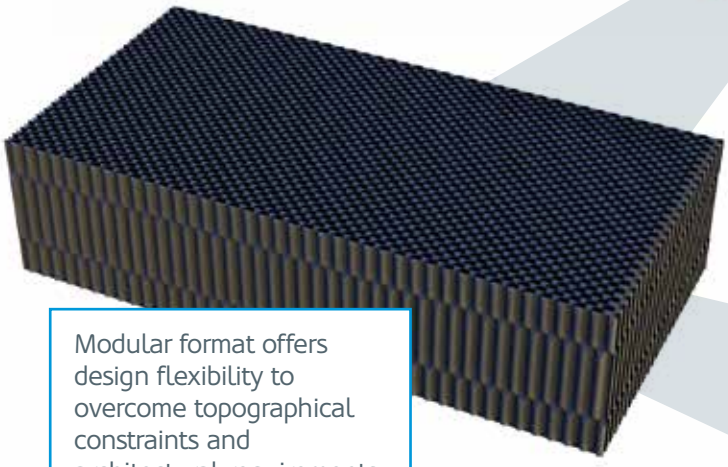
Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m^3 reservoir, completed in one week.
- Light and easy to handle.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist petrol / oil separators.
- Design service available, including calculations.

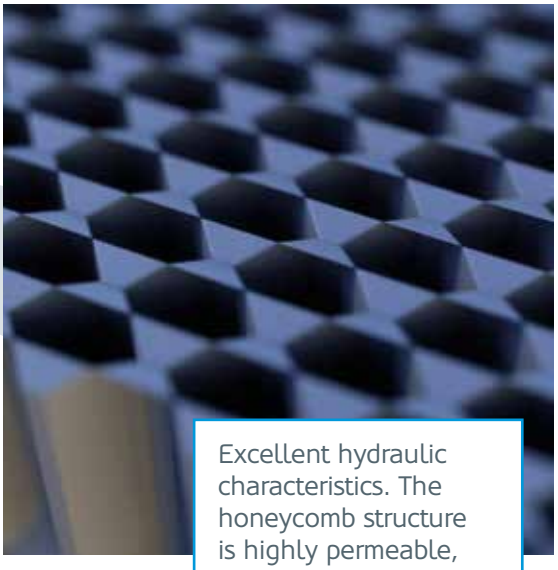
GEOlight® block



SDS GEOlight's unique lateral and vertical filling arrangement requires a minimum amount of pipework and stone.



Modular format offers design flexibility to overcome topographical constraints and architectural requirements.



Excellent hydraulic characteristics. The honeycomb structure is highly permeable, offering low resistance to water flow.

COSHH and Handling Information

1. COMPOSITION/INFORMATION ON INGREDIENTS:

Hazardous ingredients:
None as finished goods or products.

Types of materials:
Polyvinyl chloride (PVC)
MEK

2. HAZARDS IDENTIFICATION

Nature of hazard:
There are no health risks from the products during normal use. The products may contain various pigment colours and stabilisers that may be toxic. The chemicals are, however, bound within the product material and not easily extracted.

3. FIRST-AID MEASURES

Eye contact:
Plastic materials may cause physical irritation in the eyes. Wash out with large amounts of water. If irritation persists, seek medical advice.

Skin contact:
Not applicable.

Inhalation:
Not applicable.

Ingestion:
Not expected to have any toxic effects.

4. FIRE-FIGHTING MEASURES

Extinguishing media:
On small fires use any hand-held extinguisher type.
On large fires use water.

Fire and explosion hazards:
Melting plastics may flow and spread in a large fire.
Products of fire will be thick black toxic smoke.

Material characteristics:
PVC products will burn in the presence of a flame but are classed as self- extinguishing.

Protective equipment:
Wear self-contained breathing apparatus and protective clothing.

5. HANDLING AND STORAGE

Handling:
There are no hazards associated with the finished products. However, when cutting SDS GEOlight®, we recommend that the correct tools are used e.g. Handsaw or Alligator saw. When cutting, dust may be created; avoid inhaling these dusts. Take care of heat build-up within materials during cutting etc. The pallets of SDS GEOlight® units should be placed on level ground and should not be stacked on site. The maximum weight of the pallet of SDS GEOlight® units as delivered to site is 650kg (700kg on one copy), including packaging. Machines used to lift the pallet should be able to lift this weight safely. Loose individual units should not be stored more than three units high. SDS GEOlight® units are lightweight ranging from 23kg to 55kg and can be easily handled – one or two person lift.

Storage:
SDS GEOlight® units will resist the effects of UV light for up to six months; however, prolonged storage in direct sunlight should be avoided. SDS GEOlight® units should not be stored near to any fuel storage areas or any other solvents. SDS GEOlight® units are very robust and resistant to damage during normal handling; however, they should be secured in areas where impacts from vehicles or construction plant will be avoided.

Material characteristics:
PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:
Wear self-contained breathing apparatus and protective clothing.

6. EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection:
Not required under normal conditions of use. Where cutting etc. creates dust, wear a disposable half-mask to the standard FFP2S.

Hand protection:
Wear impervious strong gloves to prevent cuts to the hands while handling, cutting etc.

Eye protection:
Wear safety glasses when cutting etc.

Skin protection:
Wear overalls.

7. SITE HAZARDS

Other hazards for consideration:
Working in excavations and trenches – SDS GEOlight® may be designed with a shallow invert for infiltration (soakaway) or attenuation (storage) system. This negates the need for deep excavations or trenches, excavation near services e.g. gas, electricity or contaminated soil areas. N.B. All risk assessments should be undertaken by the main contractor for forklift, access to and working in excavations and trench support.

8. STABILITY AND REACTIVITY

Decomposition products:
Major thermal decomposition products are oxides of carbon.
Relevant differences are (in addition): PVC may produce amounts of Hydrogen Chloride.

Stability:
These materials are stable at temperatures up to normal operating limits (moulding parameters).

9. ECOLOGICAL INFORMATION

Biodegradability:
Plastic products are not readily biodegradable but are not detrimental to terrestrial wildlife.

Aquatic toxicity:
Non-toxic to marine life.

10. DISPOSAL CONSIDERATIONS

Method:
The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

11. OTHER INFORMATION

As the handling, storage, use and disposal of the product are beyond our control SDS disclaims all liability for loss, damage, injury or expense in any way connected with such activities and further makes no warranties, expressed or implied, as to the suitability of the product for any particular use.

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