

SuDSmart Plus

Site address Former Texaco Petrol Station
Bury Old Road
Prestwich
M25 0EY

Site coordinates 382877, 402531

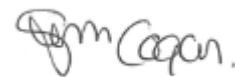
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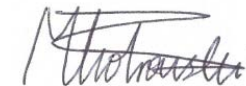
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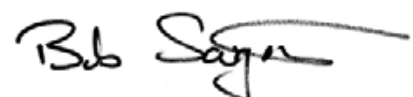
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1. Executive summary

This report assesses the feasibility of infiltration SuDS in support of the site development process. From April 6th 2015 SuDS are regulated by Local Planning Authorities and will be required under law for major developments in all cases unless demonstrated to be inappropriate. The Lead Local Flood Authority will require information as a statutory consultee on major planning applications with surface water drainage implications. The National Planning Policy Framework requires that new developments in areas at risk of flooding should give priority to the use of SuDS and demonstrate that the proposed development does not increase flood risk downstream to third parties.

High infiltration potential The site is likely to be suitable or contains areas that are likely to be suitable for infiltration SuDS. Guidance states infiltration SuDS are the preferred method for managing surface water run-off on site without increasing flood risk downstream.	
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*1 for the 6 hour, 1 in 100 year event excluding mitigation

Potential increase in run-off due to the development^{*1} Minimum attenuation assuming some off-site discharge.	Total run-off including climate change (+30%)^{*1} Maximum attenuation assuming no off-site discharge	Change in impermeable area on a previously developed / brownfield site (as a % of total area)
0 m ³	+128 m ³	0%

Suggested infiltration SuDS include: permeable pavements (primary recommendation), swales, infiltration trenches, soakaways and retention basins if feasible for the development site.

Potential issues

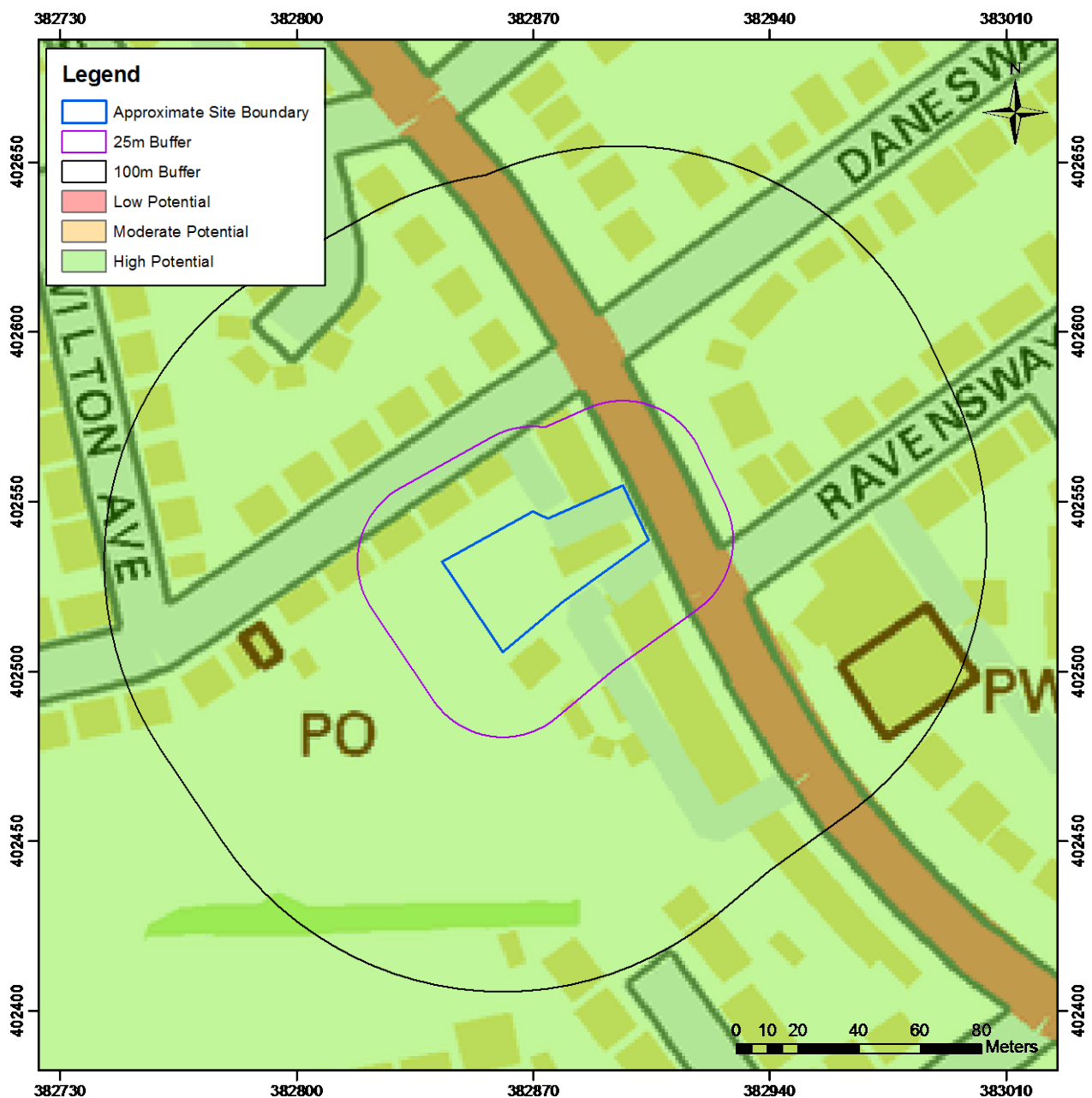
- The suitability for infiltration SuDS is high across the site, however proposals are to make the entire Site impermeable, which will reduce the range of infiltration SuDS which can be utilised on the Site. The runoff from a small area of the Site can likely be managed by infiltration via permeable paving.
- Shallow groundwater is unlikely to be an issue at the Site.
- The Site does not lie within a source protection zone and it's not at fluvial or groundwater flood risk but is at slight risk of surface water flooding to an area adjacent to the eastern boundary of the Site.
- The Sites current use as a petrol station may require additional SuDS for pre-treatment purposes which will affect potential SuDS recommendations.
- No SuDS features should be developed on the Site until remedial action has been undertaken regarding potential land contamination issues.

Next steps

Site investigation is necessary to confirm the infiltration capacity and detailed design is required. See further information section at the end of this report.

2. SuDS Infiltration Suitability Map (SD50)

The GeoSmart SuDS Infiltration Suitability Map (SD50) screens the potential for infiltration drainage at the site and indicates where further assessment is recommended. The map combines information on the thickness and permeability of the underlying material and the depth to the high groundwater table. The report provides the attenuation volumes and run-off rates that will need to be considered. It supports conceptual site drainage assessment and the planning of further site investigation. The first part of the report addresses the constraints on the infiltration potential of the Site and the second part provides the attenuation and storage volume requirements.



Potential suitability for infiltration SuDS

(Based on the GeoSmart SuDS Infiltration Suitability Map (SD50))

Low infiltration potential There is a low potential for infiltration SuDS in parts of the Site. Comments: It is likely that the underlying geology at the Site, or in areas of the site, is relatively impermeable which would limit the effectiveness of a proposed infiltration SuDS scheme. Recommendations: Infiltration SuDS should be focused in more suitable parts of the site. If a site investigation confirms that infiltration SuDS are not possible at the Site then attenuation SuDS with a controlled discharge into a nearby surface water feature or existing surface water drainage is recommended.	
Moderate infiltration potential There is a moderate potential for infiltration SuDS in parts of the Site. Comments: It is likely that the permeability of the underlying material at the site would be suitable for infiltration drainage. However, there may be constraints on the use of infiltration SuDS as a result of any of the following: a high water table, the limited thickness of the receiving formation, the potential for a significant range in permeability in the underlying geology and confirmation of the infiltration capacity is recommended. Recommendations: A site investigation is recommended to investigate groundwater levels and formation thickness and to confirm that infiltration rates at the Site are sufficient to accommodate an infiltration SuDS feature. If a site investigation confirms that infiltration SuDS are possible at the Site then various options can be considered for infiltration SuDS and these include infiltration trenches, soakaways, swales, permeable pavements and infiltration basins without outlets.	
High infiltration potential There is a high potential for infiltration SuDS in parts of the Site. Comments: It is likely that the underlying geology at the Site is highly permeable and an infiltration SuDS scheme should be possible at the Site. Groundwater levels are expected to be sufficiently deep at the site. Recommendations: A site investigation is recommended to confirm the high infiltration capacity and the depth of the winter water table. Various options can be considered for infiltration SuDS and these include infiltration trenches, soakaways, swales, permeable pavements and infiltration basins without outlets.	

Underlying geology at the site

Geology present		Potentially permeable?
Superficial Geology	Glacial Sand And Gravel	✓
Bedrock Geology	Chester Pebble Beds Formation (Sandstone: Undifferentiated)	✓

3. Site analysis



Geology, permeability and thickness

A number of different formations underlie the Site and the permeability of both the underlying bedrock and the overlying superficial deposit material at the Site is high. Confirmation of the infiltration capacity is still recommended. The soil infiltration coefficient must be sufficient to accommodate the constraints on the dimensions of the soakaway and its emptying time. The underlying material is likely to have sufficient thickness to accept infiltration SuDS, subject to further investigation of permeability and thickness of the receiving formation.



Depth to groundwater

Due to the site's proximity away from the nearest watercourse, the presence of groundwater immediately beneath the Site is unlikely

The requirements for a Site investigation are based on the requirements for an infiltration system to be at least 1m above the expected seasonal high water table. Passage through unsaturated material is important for improving the quality of infiltrating water before it reaches the water table. The infiltration system should be designed to operate in periods of extreme groundwater levels, therefore the seasonal variance in local groundwater levels should be considered (if available) when finalising a drainage scheme.



Ground conditions

A site specific review of underlying ground conditions is recommended to ensure focused infiltration does not cause ground instability as a result of landslide or collapse associated with dissolution or shallow mining. Hazards that should be considered include soluble rocks, landslides, compressible ground, collapsible ground, shrink-swell clays, running sand and shallow mining.

Soakaways should be a minimum of 5m away from the foundations of a building. A detailed ground assessment is recommended: on steep slopes where infiltrating water would produce saturation and instability downslope; or within layered geology, where infiltrating water would produce springs down gradient.



Water quality

The Site does not lie within a source protection zone but is located over a bedrock Principle Aquifer and a superficial deposit Secondary (A) Aquifer. Previously developed sites may contain contaminated material which could limit the use of infiltration SuDS. A Phase 1 desk top study was undertaken for the Site in March 2013 by Synergie Holdings Ltd. It was concluded that the on-site risks were considered to be low to high with vapor and gas risk associated with the current land use. SuDS should not be developed on the Site until remedial action has been undertaken and confirmation that ground conditions are suitable so that SuDS can be used as per the recommendations within this report.

Infiltration systems should not be used where there is a risk of contaminating groundwater by infiltrating polluted runoff or where receiving groundwater is particularly sensitive. In this case, an assessment of the quality of infiltrating runoff and the possibilities for pre-treatment is likely to be required due to the sites use as a petrol station.



Flood risk

The Site is located within a Flood Zone 1, which has a low risk of fluvial flooding (EA, 2016). The Site is also at negligible risk of groundwater flooding (GeoSmart, 2016). However, the Site is mapped adjacent to an areas mapped to be at low to moderate risk of surface water flooding, located along Bury Old Road (EA, 2016).

The impact of infiltration on groundwater levels beneath adjacent properties and sensitive features such as basements and sewers should be considered. Subject to confirmation by site investigation there do not appear to be any sensitive features in the immediate vicinity of the proposed soakaways.

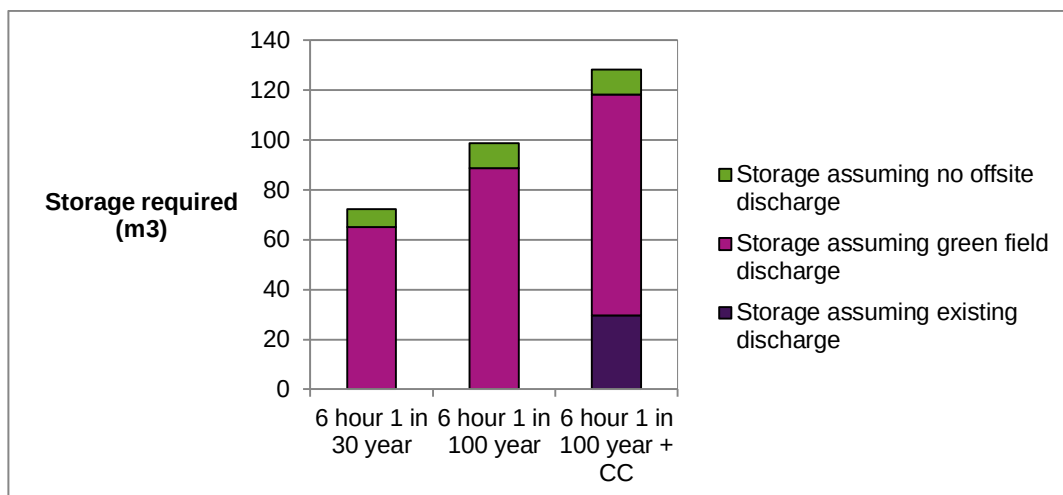
Guidance

'It is essential that the consideration of sustainable drainage takes place at the land acquisition due diligence stage'

LASOO (2015), Practice Guidance, Local Authority SUDS Officer Organisation.

4. Storage, volume and peak flow rate

Suggested minimum and aspirational storage requirements for an infiltration SuDS scheme for the development footprint are set out below with more detail provided in subsequent sections. Storage volumes may be reduced (but not below the minimum level) if the design incorporates off-site discharge.



Attenuation scenario	Attenuation requirement (m³)	Explanation
Minimum	30	Storage required so that the surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect (PPS 25)
Medium	118	Storage required assuming some off site drainage to greenfield run-off rates for the 6 hour 1 in 100 year event, including the maximum effects of climate change (DEFRA, 2015).
Maximum	128	Storage required assuming no off site drainage for the 6 hour 1 in 100 year event, including the maximum effects of climate change. <i>Note: discharge off site will reduce this, and the increase as a result of climate change is less for buildings with a limited design life.</i>

Surface water run-off

An increase in impermeable area on site will result in greater rainfall run-off. Reduction in run-off will help mitigate flood risk both on and off site. Further information on the surface water run-off calculations is provided in Section 6 'Background Information'.

The Non-Statutory Technical Guidance for SuDS (DEFRA, March 2015) states:

Guidance

"Where reasonably practicable, for Greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the Greenfield runoff volume for the same event. Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the Greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event."

Table 1: Change in impermeable area associated with the development

Total site area

1,366 m²

Impermeable area (and as a percentage of the total area of the proposed development footprint of 1,366 m ²)	
Pre-development	Post-development
1,366 m ² (100%)	1,366 m ² (100%)
Impermeable Land use: Petrol Station and courtyard Permeable Land use: N/A	New impermeable land use: Class D1 Synagogue and Class A1 retail unit with associated vehicular access, car parking

Due to the development nature of the Site, the most feasible infiltration feature available is likely to be permeable paving within the proposed car parking spaces. The overall area and depth of permeable paving should be considered in order to provide the necessary attenuation storage.

“The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event’ and ‘flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development”
(DEFRA, March 2015, non-statutory guidance).

Peak discharge rates

The table below presents peak discharge rates for a range of storm events used to assess the impact of the proposed development and select the maximum permitted discharge rate. Further information on the calculation and control of peak discharge rates is provided in Section 6 ‘Background Information’.

Table 2: Peak discharge rates associated with the development

¹ Assumes 100% run-off from impermeable surfaces. Assumes Greenfield run-off from permeable surfaces

Rainfall event	Greenfield run-off rates	Existing run-off rates ¹ (l/s)	Potential run-off rates without attenuation	Potential minus existing (l/s)
QBAR	0.0	N/A	N/A	N/A
6 hour 1 in 1 year	0.0	0.8	0.8	0.0
6 hour 1 in 10 year	0.0	2.5	2.5	0.0
6 hour 1 in 30 year	0.1	3.4	3.4	0.0
6 hour 1 in 100 year	0.1	4.6	4.6	0.0
6 hour 1 in 100 year + 20% CC	N/A	N/A	5.5	0.9
6 hour 1 in 100 year + 30% CC	N/A	N/A	5.9	1.4

calculated using the loH124 method.

Relevant local and regional plan policy should be consulted to determine restrictions on run-off from previously developed sites. In some cases green field rates may be requested. In practice it is difficult to restrict discharge rates at any one control point to less than 5 l/s.

Total discharge volumes

The table below presents discharge volumes for a range of storm events used to assess the impact of the proposed development and calculate the required storage volumes. Further information on the calculation of total discharge volumes is provided in Section 6 'Background Information'.

Table 3: Total discharge volumes associated with the development

Rainfall event	Greenfield run-off volume (m ³)	Existing run-off volume ² (m ³)	Potential run-off volume without attenuation (m ³)	Potential minus existing (m ³)
QBAR	4	N/A	N/A	N/A
6 hour 1 in 1 year	2	18	18	0.0
6 hour 1 in 10 year	5	54	54	0.0
6 hour 1 in 30 year	7	72	72	0.0
6 hour 1 in 100 year	10	99	99	0.0
6 hour 1 in 100 year + 20% CC	N/A	N/A	118	20
6 hour 1 in 100 year + 30% CC	N/A	N/A	128	30

² Assumes 100% run-off from impermeable surfaces. Assumes Greenfield run-off from permeable surfaces calculated using the loH124 method.

Climate change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high-intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the National Planning Policy Framework (NPPF) recommends that the effects of climate change are incorporated into Flood Risk Assessments (NPPF technical guidance note, DCLG, 2012). To mitigate for climate change it is recommended that 30% should be added to the peak rainfall intensity for residential development, and 20% for commercial development.

Table 4: National precautionary sensitivity ranges relevant to site

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%

5. Further information and what to do next

The following table includes a list of products by GeoSmart:

Recommendations for next steps		
✓	Additional assessment: SuDSmart Report 	The SuDSmart Report range assesses which drainage options are available for a Site. They build on technical detail starting from simple infiltration screening, and work up to more complex SuDS Assessments detailing alternative options. Please contact info@geosmartinfo.co.uk for further information.
	Additional assessment: FloodSmart Report 	The FloodSmart Report range provides clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at a site. Our consultants assess available data to determine the level of risk based on professional judgement and years of experience. Please contact info@geosmartinfo.co.uk for further information.
✓	Additional assessment: GroundSmart Report 	Should you require any geotechnical advice to inform your site development please contact info@geosmartinfo.co.uk for further information.
✓	Additional assessment: EnviroSmart Report 	Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective. Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements. Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions. Please contact info@geosmartinfo.co.uk for further information.

Client checklist for limitations to infiltration SuDS

Guidance

Conditions set by Draft National Standards (Defra, 2011)	Do these conditions arise at the site?
Is the surface runoff greater than the rate at which water can infiltrate into the ground?	
Is there an unacceptable risk of ground instability?	
Is there an unacceptable risk of mobilising contaminants?	
Is there an unacceptable risk of pollution to groundwater?	
Is there an unacceptable risk of groundwater flooding?	
Is the infiltration system going to create a high risk of groundwater leakage to the combined sewer?	

According to guidance available in the Draft National Standards for SuDS (Defra, 2011) surface water runoff must not be discharged to the ground where the conditions listed above occur. Should this be the case then attenuation SuDS features are recommended. Please contact GeoSmart for more information.

Client checklist for SuDS design considerations

Confirm that potential flooding on site in excess of the design storm event and exceedance flow routes have been considered.	
Review options for the control of discharge rates (e.g. hydrobrake).	
Confirm the owners/adopters of the drainage system. Consider management options for multiple owners	
Is there an unacceptable risk of pollution to groundwater?	
Review access and way leave requirements.	
Review maintenance requirements.	

6. Background information

What are SuDS?

SuDS are defined as:

A sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS can also significantly improve the quality of water leaving the Site and can enhance the amenity and biodiversity that a site has to offer.

There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. When considering these options the destination of the run off should be assessed using the order of preference outlined in the Building Regulations Part H document (HM Government, 2010) and DEFRA's Draft National Standards for SuDS (2011):

1. Discharge to the ground
2. Discharge to a surface water body
3. Discharge to a surface water sewer
4. Discharge to a local highway drain
5. Discharge to a combined sewer

For general information on SuDS see www.susdrain.org

Infiltration SuDS

Guidance

Government policy for England is to introduce sustainable drainage systems (SuDS) via conditions in planning approvals. Guidance indicates that capturing rainfall run-off on site and infiltrating it into the ground (infiltration SuDS) is the preferred method for managing surface water without increasing flood risk downstream.

The greatest benefit to general flood risk is if all run-off is infiltrated on site, however, this may not be feasible due to physical and economic constraints in which case infiltration may be considered as a part of an integrated drainage solution. The final design capacity for an infiltration SuDS system depends on the site constraints and the requirements of the individual Planning Authority and the Lead Local Flood Authority.

The capacity of the ground to receive infiltration depends on the nature, thickness and permeability of the underlying material and the depth to the high groundwater table. The final proportion of the site drained by infiltration will depend on topography, outfall levels and a suitable drainage gradient. It is important to note that, even if the whole site cannot be drained by infiltration, the use of partial infiltration is encouraged, with the remainder of run-off discharged via other SuDS systems.

Types of infiltration SuDS

Infiltration components include infiltration trenches, soakaways, swales and infiltration basins without outlets, rain gardens and permeable pavements. These are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below.

An infiltration trench is usually filled with permeable granular material and is designed to promote infiltration of surface water to the ground. An infiltration basin is a dry basin or depression designed to promote infiltration of surface water runoff into the ground. Soakaways are the most common type of infiltration device in the UK where drainage is often connected to over-sized square or rectangular, rubble-filled voids sited beneath lawns.

According to the guidance in Building Research Establishment (BRE) Digest 365 (2007) a soakaway must be able to discharge 50% of the run-off generated during a 1 in 10 year storm event within 24 hours in readiness for subsequent storm flow. This is the basic threshold criteria for a soakaway design and the internal surface area of the proposed soakaway design options should be calculated on this basis by taking into account the soil infiltration rate for the Site.

Developers need to ensure their design takes account of the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any machinery access required.

How was surface water run-off estimated from the site?

In accordance with The SuDS Manual (C753) (CIRIA, 2015), the Greenfield run-off from the Site has been calculated using the IoH124 method and is assumed representative of the run-off generated on the undeveloped surfaces that are affected by the proposed development. The method used for calculating the runoff complies with the NPPF (DGLC, 2014). For the impermeable surfaces, it has been assumed that 100% runoff will occur (calculations provided in Appendix A). Rainfall data is derived from the Flood Estimation Handbook (FEH) CD-ROM, developed by NERC (2009). Only areas affected by the proposed development are considered in the flow and volume calculations. Permeable areas that remain unchanged are not included in the calculations as it is assumed these will not be actively drained and attenuated.

What is the peak discharge rate?

An estimation of peak run-off flow rate and volume is required to calculate infiltration, storage and discharge requirements. The peak discharge rate is the maximum flow rate at which surface water runoff leaves the site during a particular storm event, without considering the impact of any mitigation such as storage, infiltration or flow control. Proposed discharge rates (with mitigation) should be no greater than existing rates for all corresponding storm events. If all drainage is to infiltration there will be no discharge off site. Discharging all flow from site at the existing 1 in 100 event would increase flood risk during smaller events. Flow restriction is generally required to limit the final discharge from site during all events as a basic minimum to the green field QBAR rate. A more complex flow restriction which varies the final discharge rate from the site depending on the storm event will reduce the volume of storage required on site. Drainage to infiltration SuDS is subtracted from the total discharge off site to achieve a beneficial net affect.

What is the total discharge volume?

The total discharge volume is calculated on the basis of the surface water runoff that has the potential to leave the site as a result of the assumed 6 hour duration design storm event. The run-off is related to the underlying soil conditions, impermeable cover, rainfall intensity and duration of the storm event. The total volume generated by the current site is compared to the potential total volume from the developed site (not taking into consideration any mitigation). The difference provides the minimum total volume that will need to be stored and infiltrated on site or released at a controlled rate. Guidance indicates that the total discharge volume should never exceed the runoff volume from the development site prior to redevelopment for that event and should be as close as is reasonably practicable to the Greenfield runoff volume.

GeoSmart SuDS Infiltration Suitability Map (SD50)

In response to the need for national-scale information to support sustainable drainage and land-use planning, GeoSmart have produced the GeoSmart SuDS Infiltration Suitability Map (SD50) for preliminary assessment.

In producing the SuDS Infiltration Suitability Map (SD50), GeoSmart used data from the British Geological Survey on groundwater levels, geology and permeability to screen for areas where infiltration SuDS may be suitable. The map classifies areas into 3 categories of High, Medium and Low suitability for infiltration SuDS which is then informed by additional data on site constraints to give recommendations for SuDS design and further investigation.

The primary constraint on infiltration potential is the minimum permeability of the underlying material and in some cases the range in permeability may be considerable, ranging down to low. The map classifies these areas as moderate infiltration suitability requiring further investigation. In cases where the thickness of the receiving permeable horizon is less than 1.5 meters then additional site investigation is recommended. If the site is at risk of groundwater flooding for up to the 1% annual occurrence the map classifies these areas as moderate infiltration suitability requiring further investigation.

The GeoSmart SuDS Infiltration Suitability Map (SD50) is a national screening tool for infiltration SuDS techniques but a site specific assessment should be used before final detailed design is undertaken.

Further details:

- The GeoSmart SuDS Infiltration Suitability Map (SD50) model takes advantage of all the available data and provides a preliminary indication of infiltration SuDS suitability on a 50m grid covering England and Wales. Our approach is consistent with latest best practice for such assessments and based on authoritative science and quality assured methods.
- The map is a general purpose indicative screening tool, and is intended to provide a useful initial view for a wide variety of applications. However, it does not provide an alternative to a proper site-specific assessment.
- Further information on the SuDS Infiltration Suitability Map (SD50) is available at geosmartinfo.co.uk

Data limitations

Guidance

The data and information which GeoSmart interprets in Reports is obtained by GeoSmart from third parties including the British Geological Survey. The data, information and related records supplied can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. Geological observations are made according to the prevailing understanding of the subject at the time. The quality of such observations may be affected by subsequent advances in knowledge or improved methods of interpretation.

7. References and glossary

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Glossary³

Attenuation	Reduction of peak flow and increased duration of a flow event.
Combined sewer	A sewer designed to carry foul sewage and surface water in the same pipe.
Detention basin	A vegetated depression, normally is dry except after storm events, constructed to store water temporarily to attenuate flows. May allow infiltration of water to the ground.
Evapotranspiration	The process by which the Earth's surface or soil loses moisture by evaporation of water and by uptake and then transpiration from plants.
FEH	Flood Estimation Handbook, produced by Centre for Ecology and Hydrology, Wallingford (formerly the Institute of Hydrology).
Filter drain or trench	A linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water, but may also be designed to permit infiltration.
First flush	The initial runoff from a site or catchment following the start of a rainfall event. As runoff travels over a catchment it will collect or dissolve pollutants, and the "first flush" portion of the flow may be the most contaminated as a result. This is especially the case for intense storms and in small or more uniform catchments. In larger or more complex catchments pollution.
Flood plain	Land adjacent to a watercourse that would be subject to repeated flooding under natural conditions (see Environment Agency's Policy and practice for the protection of flood plains for a fuller definition).
Greenfield runoff	This is the surface water runoff regime from a site before development, or the existing site conditions for brownfield redevelopment sites.
Impermeable surface	An artificial non-porous surface that generates a surface water runoff after rainfall.
Permeability	A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium, for example grain size, porosity and pore shape.
Runoff	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.
Sewerage undertaker	This is a collective term relating to the statutory undertaking of water companies that are responsible for sewerage and sewage disposal including surface water from roofs and yards of premises.
Soakaway	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
Treatment	Improving the quality of water by physical, chemical and/or biological means.

3 The terms included in this glossary have been taken from CIRIA guidance.

Appendices

Disclaimer

This report has been prepared by GeoSmart in its professional capacity as soil and groundwater specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client, and is provided by GeoSmart solely for the internal use of its client.

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Further information

Information on confidence level and ways to improve this report can be provided for any location on written request to info@geosmart.co.uk or via our website. Updates to our model are ongoing and additional information is being collated from several sources to improve the database and allow increased confidence in the findings. Further information on groundwater levels and flooding are being incorporated in the model to enable improved accuracy to be achieved in future versions of the map. Please contact us if you would like to join our User Group and help with feedback on infiltration SuDS and mapping suggestions.

Important consumer protection information

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- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
- By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs contact details:

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk.

Please ask your search provider if you would like a copy of the search code

Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly.

If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision.

Complaints should be sent to:

Lisa Davies
Operations Manager

GeoSmart Information Limited
New Zealand House
160 Abbey Foregate
Shrewsbury
SY2 6FD

Tel: 01743 276150
lisdavies@geosmartinfo.co.uk

Terms and conditions

GEOSMART INFORMATION LIMITED

Conditions of contract for environmental reports

March 2016, Version 1.1

Definitions:

The following words shall have the following meaning:

- a) "Client" means the person for whom the Report has been procured either directly or through an Intermediary;
- b) "Conditions" means these terms and conditions of sale, the User Guide and the Order;
- c) "GEOSMART" means GeoSmart Information Ltd of New Zealand House, 160, Abbey Foregate, Shrewsbury, Shropshire, SY2 6FD, registered in England and Wales with company registration number 05475394.
- d) "Information" means environmental data, including other third party sources of information;
- e) "Intermediary" means the party that places the Order acting on behalf of the Beneficiary, who might be a lawyer, consultant or other party;
- f) "Order" means the order for Services sent by a Client or an Intermediary to GEOSMART;
- g) "Report" or "Reports" means a report which relates to environmental information (as distinct from opinion) and which is prepared by GEOSMART in respect of a Site;
- h) "Services" means the preparation and provision of Report(s) by GEOSMART from the Information;
- i) "Site" shall mean the site specified in the Order;
- j) "User Guide" means the document (if any) which may be produced from time to time by GEOSMART entitled 'GeoSmart User Guide', which may be requested with the Report by writing to GEOSMART at the above address and will be provided if applicable.

1. Conditions

1.1 Subject to receipt of a valid Order, GEOSMART agrees to supply to the Client or the Intermediary (if the Client has appointed one) the Services subject to these Conditions and the Client or the Intermediary agrees that by placing an Order for the Services it accepts these Conditions. The User Guide applicable to each Report should be read in conjunction with the Report and is incorporated into these Conditions as if it were repeated herein. A Report is sold subject to all information contained in such User Guide

1.2 GEOSMART acknowledges that in the provision of the Report and Services it owes a duty of care to the Intermediary and to the Client.

1.3 In providing search reports and services GEOSMART will comply with Search Code and will take into account the requirements of the Alternative Dispute Resolution for Consumer Disputes (Amendment) Regulations 2015. Further details are provided in the PCCB Bulletin which accompanies GEOSMART Reports.

2. Report

GEOSMART shall use reasonable care, skill and diligence in carrying out the Services and providing the Report to the Intermediary (and the Client). However the Report is provided to the Intermediary (and the Client) on the express basis that the Intermediary (and the Client) acknowledge and agree to the following:

2.1 information and data supplied in Report(s) is derived from the Information and GEOSMART does not warrant the accuracy or completeness of such Information;

2.2 the sources of information and data supplied in Report(s) are specifically cited in the Report and the User Guide; however GEOSMART does not claim that these sources represent an exhaustive or comprehensive list of all sources that could or might be consulted; and

2.3 GEOSMART does not guarantee that all environmental risks that are or might be associated with the Site will be identified in the Report; and

2.4 Reports and other services provided by GEOSMART are generally professional business to business services and intended as such for use or interpretation by professional persons skilled in the use of environmental information; and

2.5 GEOSMART shall not be responsible for any error or corruption in a Report resulting from inaccuracy or omission of third party information and data provided by the Intermediary or the Client (as applicable), inaccurate processing of information and data by third parties, computer malfunction or corruption of data whilst in the course of conversion, coding, processing by computer or electronic means, or in the course of transmission by telephone or other communication link.

3. Liability

3.1 As some of the data and information which GEOSMART interprets in Reports is obtained by GEOSMART from third parties, GEOSMART cannot control the accuracy or completeness of such data and information, nor is it within the scope of the Services to verify the data or information by a physical inspection of the Site. Save as provided in Conditions 3.5 and 3.11 GEOSMART will only be liable to the Client or to the Intermediary in respect of the Services:

3.1.1 for loss or damage caused by breach by GEOSMART of these Conditions accordingly save as provided in Condition 3.5 GEOSMART shall not be liable in any other circumstances for any errors, inaccuracies, faults or omissions in the Services;

3.1.2 for any obvious errors or obvious inaccuracies in any information obtained by it where GEOSMART should reasonably have been alerted to such error or inaccuracy;

3.2 GEOSMART has no liability whatsoever for, under or in respect of any insurance policy purchased by the Client or the Intermediary where

insurance is made available to the Client or Intermediary following the provision of a Report by GEOSMART issued in accordance with these Conditions. Where such a policy has been purchased, all liability arising from or relating to the Site shall remain exclusively with the insurers. Moreover, GEOSMART is not endorsing any policy recommended by insurers and the Client or the Intermediary is entirely responsible for ensuring the insurance policy offered is suitable for its needs and should seek independent advice.

3.3 GEOSMART does not guarantee that an insurance policy will be available for the environmental risks that may be associated with the Site specified in the Report and the provision of a Report does not constitute any indication by GEOSMART that insurance will be available for the Site.

3.4 GEOSMART has undertaken the Services for use by the Client or the Intermediary and those persons referred to at condition 5.1 and 5.2 and for no other purpose whatsoever and the Services should not be relied upon by any other third party. GEOSMART cannot accept responsibility and will not be liable to any other party for any loss caused as a result of reliance upon the Services. Any other party relying on the Services does so entirely at its own risk, including without limitation, any insurers. Recipients of the Services are to rely on their own skill and judgment in determining the suitability of the Services for their own purpose and use.

3.5 Nothing in these Conditions shall exclude or restrict GEOSMART's liability for death or personal injury resulting from the negligence of GEOSMART or their employees while acting in the course of their employment or arising from a breach of its statutory duty or fraud.

3.6 GEOSMART shall not be liable to any recipient of the Service for loss of profits, loss of contracts, (or other indirect or consequential loss or damage) resulting from any event or default by GEOSMART in the provision of the Services to the fullest extent permitted by law.

3.7 GEOSMART shall make reasonable endeavors to supply the Report on the date agreed with the Intermediary or the Client (as applicable). This date will be taken as a guideline for time planning purposes only. Time shall not be of the essence with respect to the provision of the Services except where it has agreed in writing to a deadline with the Client or Intermediary in which it is stated that time is of the essence.

3.8 GEOSMART shall not be liable for any delay, interruption or failure in performance of its obligations hereunder which is caused by war, flood, riot, Act of God, strike or other labour dispute (including those affecting Government officials), suspension or delay of service at public registries, lack of power, telecommunications failure or overload, or computer malfunction caused by any event beyond the reasonable control of GEOSMART.

3.9 The Client or the Intermediary (as appropriate) shall on receipt of the Services make a reasonable inspection of the Site to satisfy itself that there are no apparent defects or failures with respect to the description of the Site.

3.10 GEOSMART's liability under the Conditions shall cease upon the expiry of six (6) years from the date when the Client, Intermediary or any person making use of the Report in accordance with Condition 5.2 became aware that it may have a claim in respect of a particular Report provided always that there shall be no liability at the expiration of six (6) years from the date of the Report. For the avoidance of doubt, any claims in respect of which proceedings are notified to GEOSMART prior to the expiry of the time periods referred to in this Condition shall survive the expiry of those time periods.

3.11 Subject as otherwise provided in these Conditions, GEOSMART's aggregate liability arising out of the provision or use of the Services, in contract, negligence or in any other way, for damages or loss sustained or incurred by the Intermediary shall be limited to an aggregate amount not exceeding £2,000,000 pounds. For the avoidance of doubt, if multiple parties make use of the Report, the limit referred to above applies to all users of that Report in aggregate.

3.12 GEOSMART undertakes for the duration of the six (6) year period of liability provided for by Condition 3.11 to maintain and renew annually Professional Indemnity Insurance in respect of the Services with a liability limit of not less than £2,000,000 provided that such insurance is available at commercially reasonable rates (and in such case then at the next highest limit which is available in the market at commercially reasonable rates). Details of Professional Indemnity Insurance shall be made available to the Client or Intermediary (as applicable) on request.

3.13 Where GEOSMART procures for the Intermediary, otherwise than as part of a Report, any third party service, including but not limited to,

environmental reports, risk models, risk assessments, professional opinions, or any other service, GEOSMART accepts no liability whatsoever for the information contained therein.

3.14 The Client and the Intermediary warrant that they shall: (i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010; (ii) comply with such of GEOSMART'S anti-bribery and anti-corruption policies as are notified to them from time to time; and (iii) promptly report to GEOSMART any request or demand for any undue financial or other advantage of any kind received by the or on their behalf in connection with these Conditions. Breach of this clause shall be deemed a material breach of these Conditions.

4. Copyright

4.1 The Intermediary, the Client and any recipient of the Report pursuant to the provisions of condition 5.2 acknowledge that the proprietary rights subsisting in copyright, design rights and any other intellectual property rights in respect of the data and information in the Report are and shall remain the property of GEOSMART and these Conditions do not purport to grant, assign, or transfer any such rights in respect thereof.

4.2 Reports may be stored on the Intermediary's server and used on up to ten (10) units (where a "Unit" means a single client personal computer or workstation) on the Intermediary's network and any network of a recipient of the Report pursuant to the provisions of Condition 5.2. Data in Reports is deemed to be in use when it is loaded into the temporary memory (i.e. RAM) or installed onto the permanent memory (i.e. memory chip, hard disc, CDROM) of that computer.

4.3 The Intermediary, the Client and all recipients of the Report pursuant to the provisions of Condition 5.2 are all entitled to make up to five printed copies only of any Report. Copies of the Report may be provided for information purposes for proper and lawful use only to a person who is considering whether to acquire or hold an interest in the Site or to provide funding in relation to the Site. Further copies may not be made in whole or in part without the written permission of GEOSMART who shall be entitled to make a charge for each additional copy.

4.4 The Intermediary and the Client (as applicable) shall (and shall procure that all recipients of the

Report pursuant to the provisions of Condition 5.2 shall);

4.4.1 not remove, suppress or modify any trademark, copyright or other proprietary marking belonging to GEOSMART from the Services;

4.4.2 not create any product which is derived directly or indirectly from the data contained in the Services; save for products documents and advice provided by those acting in a professional or commercial capacity in accordance with 5.2.3;

4.4.3 not combine the Services with or incorporate such Services into any other information data or service;

4.4.4 not re-format or otherwise change (whether by modification, addition or enhancement) data contained in the Services save for those modifications made by those acting in a professional or commercial capacity in accordance with 5.2.3;

4.5 The mapping (if any) contained in any Services is protected by Crown Copyright and must not be used for any purpose outside the context of the Services.

5. Confidentiality and reliance

5.1 Subject to (i) full payment of all relevant Fees and (ii) compliance with this Contract, the Client or the Intermediary is entitled to rely on the report and information provided.

5.2 Subject to Condition 5.3, the Client or the Intermediary (as applicable) may without further charge make the Report available to:

5.2.1 Up to a maximum of three (3) persons who acquire or hold an interest in the Site or an interest in the Client or the entity which holds or acquires an interest in the Site save that nothing shall hereby entitle any such person to recover twice (whether directly or indirectly) in respect of the same loss nor seek recovery in respect of any loss relating to any period after such entity ceases to hold its interest or to have potential liability for the Site (whichever is the later) (unless otherwise agreed by the parties);

5.2.2 Up to a maximum of three (3) persons who provide funding to the Client or to a person at condition 5.2.3;

5.2.3 Up to a maximum of three (3) persons acting in a professional or commercial capacity for the Client in relation to the Site.

5.3 GEOSMART shall have the same duties and obligations to those persons referred to in Conditions 5.2.1, 5.2.2, 5.2.3 in respect of the Services as it has to the Client and the Intermediary, and such persons shall be entitled to rely on the relevant Report as if it was addressed to them and any such person shall be entitled to enforce each of these Conditions as if they were named as joint Client in the Order, provided always that the person to whom the Report is made available accepts these Conditions by writing accordingly to GEOSMART citing the Report and the Site.

5.3 The Report is to be used solely for the benefit of such persons as are set out in Condition 5.1 and 5.2, and GEOSMART exclude all liability to all other persons unless GEOSMART has expressly agreed in writing to a third party taking the benefit of the Report and has been paid reasonable fees for so doing.

5.4 Any information provided by the Intermediary or the Client to GEOSMART in contemplation of the Services to be provided together with the Report will be treated as confidential information.

5.5 GEOSMART agrees not to disclose or publish any statement relating to such confidential information (in whole or in part) to any third party without the prior written consent of the Intermediary save for its provision to GEOSMART's employees who require access to the confidential information in order to perform their duties to GEOSMART.

5.6 GEOSMART will procure that its employees will maintain the confidential information in strict confidence.

6. GEOSMART's charges

6.1 The Client or the Intermediary (as applicable) shall pay GEOSMART's charges for the Services at the rate set out in the Order.

6.2. Unless otherwise stated all prices are exclusive of Value Added Tax which shall, where applicable, be payable in addition to any sum payable for the Services at the relevant rate in force from time to time, against delivery of an appropriate tax invoice.

6.3 The Client or the Intermediary (as applicable) shall pay the price referred to in Condition 6.1 above for the Services:

6.3.1 without any set off, deduction or counterclaim;

6.3.2 GEOSMART requests upfront payment by debit or credit card (No surcharges for credit cards) or by bank transfer. A credit agreement can be set up for repeat clients with terms based on 14 days from the date of GEOSMART's invoice.

6.4 GEOSMART shall not be obliged to invoice any party other than the Client or the Intermediary (as applicable) for the provision of Services, but where GEOSMART does so invoice any third party at the written request of the Client Intermediary, and such invoice is not accepted or remains unpaid, GEOSMART shall have the right at any time to cancel such invoice and invoice the Client or the Intermediary (as applicable) direct for such Services. Where the Intermediary's order comprises a number of Services or separate elements within any one or more Services, any failure by GEOSMART to provide an element or elements of the Services shall not prejudice GEOSMART's ability to require payment in respect of the other Services delivered to the Intermediary or the Client (as applicable).

6.5 If the Intermediary or the Client (as applicable) fails to make any payment on the due date GEOSMART shall be entitled to cancel or suspend any further orders or delivery. In addition, GEOSMART may charge the Intermediary or the Client (as applicable) interest on overdue amounts at 4% over the NatWest plc base rate (as varied from time to time) from the due date until payment in full is made (whether before or after judgment).

7. General

7.1 These Conditions constitute the entire agreement between the parties and no statement given orally or in writing should be deemed

incorporated herein unless executed in writing by a director of GEOSMART and countersigned by the Intermediary or the Client (as applicable). Each of the Conditions and Sub-conditions of these Conditions is distinct and severable. If any provision of these Conditions shall be determined to be invalid, illegal or unenforceable, the remainder of these Conditions shall continue to be valid, legal and enforceable to the fullest extent of the law.

7.2 Any time or indulgence granted by GEOSMART or the Client or the Intermediary or delay in exercising any of its rights under these Conditions shall not prejudice or affect GEOSMART's or the Client's or the Intermediary's rights or operate as a waiver of the same.

7.3 GEOSMART, the Client and the Intermediary shall not be entitled to assign their respective rights or obligations pursuant to these Conditions without the prior written approval of the other parties.

7.4 GEOSMART may suspend or terminate the provision of the Services if the Client or the Intermediary (as applicable) is bankrupt or insolvent or makes any voluntary arrangements with its creditors or become subject to an administration order or has an administrative receiver appointed over any of its assets or GEOSMART has reason to believe that any of foregoing circumstances may come into existence or any amount owing to GEOSMART that is overdue or where the Client or Intermediary (as applicable) has exceeded any credit limit.

7.5 These Conditions shall at all times be governed construed and enforced in accordance with English Law which shall be the proper law of these Conditions, and both parties thereby submit to the exclusive jurisdiction of the English courts.

7.6 Except as otherwise provided in these Conditions a person who is not a party to any contract made pursuant to these Conditions shall have no right under the Contracts (Rights of Third Parties) Act 1999 to enforce any terms of such contract and GEOSMART shall not be liable to any such third party in respect of the Products.