Personal Injury Litigation as a Barrier to the Adoption of Sustainable Drainage Ponds – A Proposal for Legislative Reform

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LIST OF COMMON ACRONYMS USED IN THIS DOCUMENT

ARC - Auckland Regional Council (New Zealand)

BOD - Biological/Biochemical Oxygen Demand

BMP - Best Management Practice

CIRIA - Construction Industry Research and Information Association

CRoW - Countryside and Rights of Way Act (2000)

COD - Chemical Oxygen Demand

DEFRA - Department for Environment, Farming and Rural Affairs

DEX - Dunfermline Eastern Expansion

EA - Environment Agency

EHSNI – Environmental & Heritage Service for Northern Ireland

HMSO - Her Majesty's Stationary Office

HSE - Health and Safety Executive

IBMS - Institute for Biomedical Science

OLA - Occupiers Liability Act (1957 & 1984)

RoSPA - Royal Society for the Prevention of Accidents

SEPA - Scottish Environmental Protection Agency

SuDS - Sustainable Urban Drainage Systems / Sustainable Drainage Systems

UNCED - United Nations Conference on Environment and Development

Abstract

Anthropological interference with the hydrological cycle causes a number of detrimental problems to the environment as recognised at the 1992 Rio de Janeiro Earth summit. The principle of sustainable development under Agenda 21 attempts to redress this balance. Artificial and impermeable surfaces increase the amount of runoff generated during precipitation that causes flood problems and environmental pollution; sustainable drainage systems (SuDS) have been developed to deal with these problems and to dispose of storm water locally close to its source. SuDS have clear environmental benefits and are being actively promoted by the Environment Agency and CIRIA as having recreational benefits to local communities. However the widespread use of wet ponds to attenuate and store stormwater runoff in populated urban areas presents a number of safety problems through the risks of drowning, ice, blue green algae and water borne pathogens.

The recent heatwave in the UK highlighted the danger when water and people are in close proximity with a spate of tragic drownings. The owner or occupier of a SuDS pond has a duty of care to visitors, under the Occupiers' Liability Acts of 1957 and 1984, to ensure they are reasonably safe and the associated risk of litigation, following a drowning or injury at a SuDS pond is seen as a barrier to the adoption of SuDS by local authorities and water companies. There are three options by which the fear of litigation can be reduced. In the short term SuDS operators can implement a number of safety features in accordance with legal requirements but this does not remove liability as an adoption barrier. In the longer term, a legislative change seems to be required (as currently being examined by DEFRA in relation to SuDS). There may be some potential for exemption under the Countryside and Rights of Way Act 2000 by extending the provisions to encompass SuDS under the liability exemption clause. The most promising means of removing the litigation adoption barrier is where a SuDS pond conforms to the safety requirements under a new SuDS Code of Practice that would allow the site to be operated whilst exempt from the Occupiers' Liability Acts. This document focuses on the liability of the SuDS operator, it must be considered that designers and or builders could still be held liable for negligence.

Rationale

Sustainable urban drainage systems have clear advantages in respect of flood control (see section 2.1), reduction of environmental pollution (sections 2.3 & 3) and the creation of potentially biologically diverse habitat (section 3.5) in line with Agenda 21 (UNCED 1992) that promotes the idea of sustainable development. However in his paper '*Small Scale Wind and Solar Energy Systems: Access to Resources Under Irish and English Law*', Newman (2000) points out to us that 'often the law acts as a barrier either because of deliberate decisions (judicial or legislative) made some time in the past which no longer fit with modern conditions…or which, in trying to regulate one activity, inadvertently puts forward a barrier to another'. The same paper also states that 'the law is capable of being a force of either discouragement or encouragement of the adoption of the technology on a wider scale'. Newman *et al* (2002) and Chaplin (2002) have already discussed the way wildlife protection law can act as a barrier to the adoption of sustainable drainage systems; indeed, it was this previous research that led the author to investigate the problem of liability and suggest the proposals for reform contained in chapter 9. The concern regarding litigation following personal injury at sustainable balancing ponds is an equally, if not more serious problem, to the adoption of SuDS than wildlife law because of the substantial sums of money awarded in damages and the proliferation of personal injury lawyers advertising their services following the 'compensation culture' trend set in the United States.

Methodology

This document was complied in individual sections referring to sources from the University library, the Internet and opinion sought through personal correspondence. The content of the various chapters was planned and formulated at an early stage in the production process. The Internet (via general search engines, e.g. Google) provides the sources for much of this research, as can be seen by referring to the cited references and in selecting information great effort was made to source what may be considered 'definitive' references. Previous experience had showed that the Internet provides a fast and easily accessible source of information, particularly in the SuDS and safety issues themes,

something that the University library is predominantly lacking, and this was the basis for the heavy reliance of this particular resource. The University library was only consulted in the production of the chapter covering legal issues as the law library contains several authoritative and modern texts and the Internet only referred to in search of modern case law.

In order to validate the fear of litigation described, many SuDS authorities were contacted initially through electronic mail seeking experiences and opinions related to SuDS and personal injury. However, the number and nature of replies was particularly disappointing with disinterest from the Environment Agency and no reply from CIRIA; a problem, which possibly weakens the strength of argument contained within this document. Similar trouble was experienced when contacting water authorities and local councils when compiling the section on other open water but the information provided by the respondents was of high quality and useful in substantiating the theory and in formulating conclusions.

Statement of Objectives

The objectives of this research are threefold. Firstly an assessment is required of the of the dangers that would be encountered at a SuDS pond and the likelihood that members of the public would be in proximity to them; secondly there must be a detailed understanding of the relevant legal principles, including recent case law to highlight when and how a SuDS operator may face litigation including available defences to such an action. Thirdly an examination of safety recommendations made in SuDS design manuals from both home and abroad is required and also the safety principles used by owners of other open water features commonly found in the urban environment. The document will then conclude by suggesting how SuDS operators may reduce the risk of litigation and use the principles of water safety and the law to suggest how the litigation adoption barrier could be removed through legislative reform. The liability of those involved in the design or construction of SuDS is not considered. It is the hope of the author that this document will initially instigate discussion amongst the relevant authorities and subsequently provide the basis of legislative reform.

Contents

1. INTRODUCTION

During the recent spell of hot weather in the latter part of July and early August, where temperatures in the UK were confirmed by the Met Office to have reached a record breaking 38.1°C, recorded at Gravesend on 10th August (which also cost the bookmakers a reported £500,000), there were numerous warnings in the media from police, local authorities and safety campaigners warning of the dangers of swimming in lakes and pools, which were unfortunately unheeded by some, as these same stories also carried news of tragic drownings. The local *Leamington Spa Courier* on August 8th carried a police warning for people not to swim in the town's rivers, canals and lakes, as did *The Guardian* of July 31st. This same story in *The Guardian* also relates the drowning of a 15 year old who vanished 60 metres from the bank of Powell's Pool in Sutton Coldfield, West Midlands, while swimming with two friends, and that of a 33 year old man in Wayoh reservoir, Blackburn. *The Guardian* of August 7th details the drowning of two 17 year olds; Mark Attwood was found dead in a canal lock in Rotherham after he went for a swim with a group of seven boys, and Christopher Jones, a construction worker from Pontefract, died in a lake at Hurstbourne Priors near Whitchurch, Hampshire. *The Daily Mail* of August 7th reported that a 6 year old girl was seriously ill in Diana, Princess of Wales Hospital after being found floating face down in a lake at Market Bosworth Water Park, Leicestershire. The proximity of water and people clearly presents a dangerous combination; sustainable drainage systems (see section 3) increase the probability of this proximity occurring and thus potentially increase the danger. The fear of litigation, arising as a consequence of such tragic incidents has been highlighted as a barrier to the adoption of sustainable drainage systems.

1.1 The Ideals of Sustainable Development

Sustainable development has been a key environmental term since the 1987 World Commission of Environment and Development (WCED) when the issues of environmental protection and economic growth were linked. Gerke (2003) reports that 'sustainability' originated from forestry management with the basic principle that not more trees were felled than were able to re-grow.

The term ‘Sustainable Development’ is now more elaborated and established with growing global importance (Gerke 2003). The 1987 commission headed by Gro Harlem Brundtland produced the report ‘*Our Common Future’* (WCED 1987) and concluded that the planet is threatened by serious environmental problems caused in part by economic expansion with large-scale environmental destruction. Economic growth is of prime importance and as Eberstadt (2000) argues the world population is predicted to rise from six billion in 2000 to nine billion in 2040, a rate at which would nearly double the population in the next century. Butler & Davies (2001) point out to us that Brundtland defined sustainable development as ‘that which meets the needs and aspirations of the present generation without compromising the ability of future generations to meet their own needs’. It must satisfy environmental, economic and social criteria whilst reducing the developed world’s reliance on natural resources and improving basic living conditions (Gerke 2003). The 1992 United Nations Conference on Environment and Development took place in Rio de Janeiro and of five documents signed at the conference, the fifth, Agenda 21 provides a blueprint designed to promote sustainable development and combat environmental destruction.

Freshwater is an essential component of the environment, characterised by the hydrological cycle, that in some regions manifests itself as extreme drought and dramatic flooding (United Nations Conference on Environment and Development 1992 Agenda 21 Chapter 18(1)). The general objective of Agenda 21 in relation to water is to ensure adequate water supplies whilst reducing the impact that climate change and atmospheric pollution has on the hydrological cycle and as stated in Chapter 18(2) ‘while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities…and combating vectors of water-related diseases’. Chapter 18.12 (UNCED 1992) suggests a range of possible solutions in an attempt to redress the problem: ‘Integration of measures for the protection and conservation of potential sources of freshwater supply… and other relevant development and conservation activities, flood and drought management, and integration of water (including surface and underground water resources) quantity and quality management’.

2. HUMAN INTERFERENCE WITH THE HYDROLOGICAL CYCLE

As socio economic development can conflict with the protection of the environment the UK Government, following the 1992 UN summit committed itself to sustainable development under *Local Agenda 21,* as stated by the Construction Industry Research and Information Association (CIRIA, 2000), where local authorities have their own strategies of sustainable development.

Drainage systems are required due to anthropological interference of the hydrological cycle. This takes two forms; firstly, water abstraction for general domestic and industrial use that produces polluted wastewater. The second form is the covering of land with impermeable surfaces during economic development and associated urbanisation (Everard 2001) with the effect of diverting rainwater from natural drainage systems. This water, termed runoff, is defined by Kolsky (1998) as 'the portion of rainfall that runs off the surface of a drainage area and ends up in streets, drains and natural water courses'. Stormwater, as stated by Butler & Davis (2000), if not dealt with in the correct manner can cause serious damage to property, cost millions of pounds in flood damages, and poses a grave risk of pollution through the concentration of pollutants from rainfall and land surfaces.

2.1 The Effect of Urbanisation on Storm Water Drainage

When a natural surface is covered with artificial and impermeable surfaces the amount of runoff produced increases in relation to a natural surface where a higher proportion of the storm water is able to infiltrate the surface of the ground to become groundwater. In an early study in Denver, Urbonas (1993) showed that an acre of paved land produced the same amount of runoff as several square miles of natural 'rangeland' and that during a thunderstorm, the runoff generated by one acre of paved area could equal that from forty to one hundred acres of 'rangeland'. In the UK the Environment Agency (EA) estimate that over 125,000 properties are at risk from flooding, affecting about 5% per cent of the population. Loughran (2001) reports that the anticipated growth in household numbers to 2016 is over 20,500 each year and will place flood-risk areas under even greater development pressure.

The floods in England in 2000 resulted in 11,000 people evacuated from their homes or businesses with some 10,000 properties flooded (National Audit Office 2001). The floods in Easter 1998 caused £400 million worth of damage and claimed five lives with some 1500 people evacuated from their homes as reported by McDonald (2002).

The amount of runoff from a natural surface varies but runoff on an impermeable surface travels at a greater velocity and volume than from a natural surface. This increases the danger of 'flash' flooding, exacerbates the transportation of pollutants and indeed by diverting rainfall to piped systems, the amount of water infiltrating the ground is reduced, depleting ground water and reducing flows in watercourses in dry weather (Environment Agency 2003).

2.2 Urban Drainage and Stormwater Pollution.

The traditional means of removing storm water from urban areas is to drain it rapidly and in large quantities by swale, gutter and underground storm sewers connected to the nearest watercourse to order to prevent localised flooding (Everard 2001) detailed in design manuals produced by CIRIA and HR Wallingford. More recently, environmental awareness has increased and Urbonas & Stahre (1993) report that concerns have arisen over both water quality and the impact on the receiving waters by rapid downstream conveyance of storm water.

Wanielsta & Yousef (1993) define precipitation as 'the material deposited by wet (rainfall) and dry (dust fall) processes on land surfaces'. Wet precipitation absorbs and dissolves atmospheric pollutants and dry fallout is a continuous process by which pollutants are deposited on land surfaces as dry particulates and then washed into the watercourse by subsequent precipitation. Vehicular pollutants include aromatic hydrocarbons, lead, and hydrocarbons from fuel and hydraulic systems; zinc from body corrosion and copper and nickel from brakes and clutch. Traffic erodes road surfaces releasing bitumen, emulsifiers, aromatic hydrocarbons, metals and sediment (Herefordshire Wildlife Trust

2001). Glenn *et al* (2001) consider snow to have greater capacity to accumulate traffic pollutants compared to runoff due to the porous nature of snow concluding that snow is a significant sink for both heavy metals and traffic generated particulates. Studies have shown that substantial proportions of heavy metals in road runoff are biologically available, as much as 50-60% of lead and 30-37% of copper are in a potentially exchangeable form (Ellis 1989). Heavy metals may accumulate in sediment, phytoplankton, benthic organisms and fish affecting biodiversity and abundance. Gay *et al* (1987) studied the sources of storm water contamination at airports. In the UK glycol (see Heathrow Airport constructed wetland section 3.4) is used as a de-icer and Gay found that in a three-month period at Stanstead airport 160,000 litres were used. Aircraft washing produces copious quantities of wastewater (4,500 litres per aircraft) whilst fuel spillages and maintenance work produces significant quantities of hydrocarbons.

Building erosion by weathering produces a significant constituent of sediment in storm water. Excess sediment produces turbid water that reduces clarity and therefore plant growth and clogs up fish gills whilst spatial location of the sediments can remove spawning areas and adsorption of nutrients to sediment particles have a direct effect on plant growth (Wanielista & Yousef 1993). Urine and/or faecal deposits from animals are a source of coliform pollution and the specific pathogens *Shigella, Salmonella* and *Clostridium. Clostridium* has been linked to duck kills in lakes and can potentially affect humans and *Salmonella* is a source of gastrointestinal disorders in humans (Mason 2002). The organic matter in these deposits is also a source of high BOD. Pathogens are considered in more detail in section 4. Other pollutant sources include phenols and cresols from wood preservative, pesticides and herbicides, and road gritting causes chloride loads in storm water during or after cold weather to be 50-500 times higher than occurs naturally (Stotz 1987). Colwill *et al* (1984) suggest that rock salt contains impurities and an insoluble portion that contributed 25% of solids in a study. Salt also accelerates the corrosion of vehicle bodywork and accentuates the levels of toxic metals as discussed previously.

3. SUSTAINABLE (URBAN) DRAINAGE SYSTEMS

Conventional drainage systems, that remove large quantities of storm water rapidly, do not control or remedy polluted water and Williams (1982) reports that they may actually exacerbate the problem by increasing flooding and eroding streams and rivers. In response to *Local Agenda 21 – A Framework for Local Sustainability,* and to numerous other pressures, for example flooding (see section 2.1), sustainable drainage systems (SuDS) have been developed under a variety of names (e.g. in the USA 'Best Management Practices' or BMP's) to deal with storm water locally, disposing of it close to its source.

As Everard (2001) points out, SuDS is an umbrella term for a number of approaches to urban drainage that focuses on more sustainable methods for storm water management in urban areas. The clear advantages of SuDS as cited by CIRIA (2000) include the recharge of groundwater, the management of runoff flow rates and flood reduction, the protection and enhancement of water quality, integration into local surroundings and the capability to permit new development where existing sewerage systems are at their maximum capacity. Conversely, a disadvantage to the use of SuDS, as both CIRIA (2001a) and the National SuDS Working Group (2003) point out, is that much relevant legislation was drawn up prior to widespread use of sustainable drainage, therefore a number of legal issues may effectively act as a barrier to the adoption of SuDS, one of which is public safety.

There are four general structures in a SuDS system, of which any or all may be used holistically according to the setting, local land uses, the needs of local people, associated safety risks and future land management. These structures include:

- Filter strips and swales
- Filter drains and permeable surfaces
- Infiltration devices
- Basins and ponds.

These devices attenuate the runoff so as to prevent flooding and urban stream erosion and provide some treatment of the pollutants mentioned previously by sedimentation, filtration, adsorption, degradation and biological uptake (CIRIA 2000) and each have their own individual safety issues.

3.1 Filter Strips and Swales

Filter strips and swales are vegetated surface features designed to transport, treat and store runoff from impermeable surfaces. Swales are shallow grass lined channels with low water velocity and high infiltration capacity that mimic natural drainage patterns (Urbonas & Stahre 1993). Filter strips are sloping areas of ground and similar to swales in the disposal of storm water but are designed to allow the runoff to flow as a sheet across the strip (Butler & Davies 2000). In two early studies, Whallen & Callum (1988) reported swales removed up to 80% of common storm water pollutants whilst Ellis (1992) found that 60-70% of solids and 30-40% of metals, hydrocarbons and bacteria were retained by a swale of 30-60 metres long. More recently, Bäckström (2001) concluded that sedimentation rather than filtration accounted for the removal of 70-98% of solids, with the higher percentages observed in swales with well-developed turf and high infiltration. With gently sloping sides and extremely shallow, slow moving water, the safety risks of such devices must be considered minimal but possibly pose some danger during flood conditions with deeper, faster flowing water.

3.2 Filter Drains and Permeable Surfaces.

Filter drains and permeable surfaces are devices with a volume of porous media below ground for the temporary storage of water. The permeable material traps sediment and it has been shown that metals, hydrocarbons and COD may be removed at 60-80% efficiency (Colwill *et al* 1984). There are three basic types of permeable surface; porous asphalt and porous concrete are largely similar, containing very little fine aggregate (i.e. sand) and therefore voids in the media remain open with a minimum 12% void space by volume often specified (Ferguson 1994). These materials are placed upon a base layer that promotes infiltration (Urbonas & Stahre 1993). The third type of porous paving is

constructed of modular interlocking concrete blocks with open cells and safety concerns are focused on the public tripping in these cells.

3.3 Infiltration Devices

Infiltration devices include soakaways and trenches and can be used at the source of the runoff, or the runoff be conveyed by pipe or swale to the infiltration device (CIRIA 2000). A soakaway is an underground structure that is stone filled, dry wall lined or constructed with pre-cast concrete rings and an infiltration trench is a linear structure backfilled with rock and possibly covered in grass. Infiltration basins and swales store water temporarily on the surface in periods of heavy rain but otherwise remain dry. Although involving greater expense than surface basins, the safety risks, such as drowning, that are frequently associated with wet ponds in urban areas, (discussed in section 4) are greatly reduced and in addition eliminate the mosquito problem (see section 3.4 discussing detention basins), and due to global warming this may be of interest to the UK in the near future.

3.4 Basins and Ponds

Basins and ponds differ in the period of time that water is stored in them and the National SuDS Working Group (2003), in the document *'Framework for Sustainable Drainage Systems in England and Wales',* state that is anticipated that many sustainable drainage systems will incorporate a basin or pond into the design; therefore any safety issues are of paramount importance.

Detention Basins

Basins are designed for short-term storage of runoff during wet weather and are dry during periods of fine weather (National SuDS Working Group 2003). Most commonly known as detention basins or dry ponds, they consist of excavated areas, either rectangular or elongated triangular in shape that are lined with grass with even depth so as to prevent uneven water distribution and thus pools of stagnant water that provide a breeding ground for mosquitoes (Wanielista & Yousef 1993).

During a storm event surface runoff is routed through a detention basin with the outlet closed so that the basin fills with runoff. Water is then released at a fixed rate as the peak flow subsides. Whilst the water is detained in the basin, suspended solids settle out and since many pollutants are attached to such solids, the basin will remove a proportion of them although the exact amount depends upon depth, volume, shape and inlet/outlet configuration as reported by Urbonas and Stahre (1993). Increased detention time also improves treatment efficiency; 'extended' detention basins may contain a small area of permanent pond (with the associated drowning risk) within the larger dry area. It is preferable for water to undergo some form of pre-treatment before entering the structure (i.e. swale, filter strip) to remove sediment loads. CIRIA (2000) report that a depth of greater than three metres may damage the vegetation on the sides and bottom of the basin.

A detention basin, if designed correctly, can become an integral part of the community, gently sloping sides and vegetated surfaces are ideal sites for recreational activities and as sports fields (CIRIA 2000). Such simple and inexpensive considerations in the design of these structures can transform an unattractive and relatively useless hole in the ground into a useful and attractive community amenity (Urbonas & Stahre 1993). However the Auckland Regional Council (2002) does not consider detention basins to be well suited as a storm water management option, with over 70% of detention basins functioning incorrectly and with less aesthetic appeal to the local community. A correctly constructed detention basin with grass lined, gently sloping sides (CIRIA 2000 recommend <4:1 slope) and an even bottom is unlikely to pose a safety or drowning risk to the local community but there may be some issues with polluted sediments and pathogens (see section 4).

Retention Ponds

Retention ponds provide long-term storage of storm water with residence times averaging weeks or even months. Permanently wet ponds provide a greater degree of pollution remediation than detention ponds and along with wetland type structures (see below) with areas of aquatic vegetation, provide greater attenuation and filtration. However, ponds that permanently hold water present a much

greater safety risk through drowning, ice hazards, blue green algae and water borne pathogens (discussed more fully in section 4), especially where such features are sited near to housing. Retention ponds and wetlands require regular inflow to prevent them drying out, but major flood events are routed around these structures to avoid excessive depth fluctuation and damage to plant life. Currents need to be reduced to maximise the settlement of suspended solids by using length to width ratios of at least 3:1, and also by windbreaks and baffles – either islands, shoals or promontories Wet ponds offer excellent habitat to wildlife and integrate easily into open spaces.

The planting of a variety of aquatic plant species around the fringes, shallow marginal shelves and in the deeper water of a retention pond allows biological treatment of pollution, in addition to greater removal of suspended solids and finer sediments due to the longer residence times compared to that in a detention basin. Aquatic vegetation attenuates flows and currents in the pond providing the conditions required for particle settlement. The vegetation may also take up some contaminants biologically and help to prevent algal blooms, thus enhancing the aesthetic and wildlife value of the pool. Retention ponds are designed to allow water retention of two to three weeks, have a maximum depth of three metres, with a minimum twenty-five percent as shallow marginal areas not more than fifty centimetres deep (CIRIA 2000). Clearly, where ponds have a depth of up to three metres, there is the significant risk of drowning and subsequent litigation, and this may be sufficient to deter local authorities and other agencies from adopting SUDS due to the financial risk. CIRIA (2000) state that when established, a retention pond should be aesthetically pleasing, well-maintained and permanent features of the locality, including the Thorpe Park and DEX examples discussed below in section 3.5. Such a pond has the potential to provide a range of amenities (see section 3.5) from fishing and bird watching to sailing and water sports on larger pools.

Constructed Wetlands

The Environment and Heritage Service for Northern Ireland (1999) consider constructed wetlands

to be a further enhancement of retention ponds that incorporate shallow areas planted with emergent vegetation to provide a much greater degree of biological filtration. There has been much interest in constructed wetlands for several years for sewage treatment, as discussed by Mason (2002). In such systems, effluent is passed through beds of aquatic macrophytes that may be submerged (e.g. Canadian pondweed *Elodea Canadensis*), floating (e.g. water hyacinth *Eichhornia crassipes*) or emergent (e.g. reed *Phragmites australis*). A prominent recent wetland costing some £20 million was constructed at Heathrow Airport, primarily to treat water contaminated with glycol de-icer with average glycol removal efficiencies of 54.2% and 78.3%, following shock dosing inputs as described by Revitt *et al* (2001). The treatment system also incorporates aeration, storage and, combined with reed bed technology, has been designed to reduce a mixed inlet BOD concentration of 240 mg/l to less than 40 mg/l for water temperatures varying between 6°C and 20°C. Mason (2002) further discusses the construction of such a wetland but with depths of less than 0.6m deep and prolific vegetation, safety issues would appear to be relatively minor, as experienced by the Bourne Stream wetlands discussed in section 7.1.

3.5 Amenity and Recreational Benefits of SuDS

The Scottish Environmental Protection Agency (2000) in their document *Ponds, Pools and Lochans; Guidance on Good Practice in the Management and Creation of Small Waterbodies in Scotland* state that people find water in the landscape intrinsically attractive and pleasing. They also consider that water creates a natural focal point in any landscape; it reflects the sky, buildings or night-lights. The additional benefits of wildlife such as ducks and swans are also highly regarded and the Environment Agency (2003) consider that one of the main benefits of sustainable drainage is to enhance the nature conservation, landscape and amenity value of the site and its surroundings with a ‘permanent water body’ making the greatest contribution to aesthetic and amenity value.

Furthermore the Department for Environment, Food & Rural Affairs (DEFRA) *Code of Practice on*

Conservation, Access and Recreation: Guidance for the Environment Agency and Water and Sewerage Undertakers (Environment Act 1995, Water Industry Act 1991) Section 4.2 requires that land and water that is owned or controlled by the relevant authorities offers a 'unique resource for a wide range of recreation activities'. Under Section 4.2 of the Code of Practice the authorities should normally permit a freedom of access to all land and water of natural beauty and crucially for SuDS of amenity or recreational value. The owners of SuDS may therefore be required to permit access for the widest possible range of activities and wherever possible provide access by means of marked paths for walkers and for other users, including equestrians and cyclists. In considering access a SuDS operator must, as set out in Section 4.8, have regard to the disabled (under the Disability Discrimination Act 1995) and provide suitable access arrangements without obstacles or barriers to the amenity. Section 4.3 of the Code of Practice provides a clause that access should be permitted unless there is a significant threat to public health and safety as discussed in section 4, or to wildlife, however this is unlikely to apply to a well-designed SUDS pool.

Storey (2003) on the Environment Agency's website highlights the staggering loss of ponds in post-war Britain. He states that ponds (defined as a water body exceeding $25m^2$) in the UK have declined from about 470,000 in 1945 to 243,000 in 1998. However there is evidence that the losses may have temporarily at least, been halted. Between 1990 and 1998 an approximate 24,000 lowland ponds were lost and 37,000 new ponds were created, giving a net increase of 13,000 ponds. Whether this reversal will continue is unclear because as Storey (2003) again points out, in Britain in 1996, a large number of countryside ponds were still being actively or accidentally filled in. In addition, 12% of sites had been built over as part of urban housing or road development. SuDS ponds clearly have a potentially significant role in reversing this worrying trend whereby the local (SuDS) pond can once again become a central feature of everyday community life. This apparent promotion of SuDS retention pools as community recreational facilities can be clearly illustrated by the case studies described below which also includes a brief discussion vis-à-vis safety issues.

Case Study: Thorpe Park Regional Business Park

The site comprises 270 acres with up to 1.8 million square feet of office space and a new motorway connection developed by Leeds City Council and monitored by the University of Bradford SuDS Research Group. The Research Group state that the area lies in green belt land, and so the low-density business park has been landscaped in harmony with the existing scenery, including 115 acres of parkland dedicated to recreational use. As part of the development, a number of retention ponds are to be built upon the site and have been designed to be of recreational value. This recreational aspect at Thorpe Park is thought to be one of its key features and marketing angles. The University of Bradford SuDS Group report that the ponds, designed to be amenity features, have footpaths around their edges to encourage their use as a leisure area. The balancing pond is not fenced from the public, although the planting regime and marshy areas should keep the public away from the water's edge. Lifebelts and warning signs are located along the banks at regular intervals.

Case Study: Dunfermline East Expansion (DEX) Area

The site covers some 290 hectares and was predominantly green field and is to be developed over the next 20 years as a mixture of industrial, commercial, residential and recreational areas (CIRIA 2001a). The site drains naturally to 4 watercourses that flow to the south and west that pass through developed areas downstream of the DEX site, all of which are subject to flooding as outlined by the Scottish Executive (2000) website. Stormwater treatment and attenuation is achieved through a series of ponds and wetlands as the underlying clay soils precluded the use of infiltration devices. CIRIA (2001a) report that these ponds are a large-scale initiative and designed to cope with the runoff from 90% of storms and the 1 in 100 years storm events. The Scottish Executive states that the ponds are now a significant amenity feature. Safety fears voiced by councillors at the planning stage were overcome by a 4-stage plan:

- Pond design – The ponds themselves are designed with a shallow slide slope (maximum 1 in 4) both above and below the water level for a distance of at least 5 metres into the pond.

- Barrier planting – Marginal planting of reeds extends into the pond for a depth of 4 to 6 metres. The tall reeds (used for pollutant removal) are also effective in deterring entry to the water. Inhospitable shrub planting on the pond side slopes is designed to deter access.
- Fencing – Beyond the barrier planting is a 1 metre high metal fence (seen in fig 1) designed in such a way that it will only be effective in keeping out the very youngest of children living near to the ponds. The fence will not be a barrier to adults, should access be required in the case of emergency.
- Pond location – The ponds are situated so that there is a degree of natural surveillance by those using the surrounding land through the provision of roads and footpaths or housing directly adjacent to, and overlooking the ponds (fig 1).

The 1 metre high fencing appears to be an excellent and unique safety initiative; in general where fencing is discussed there are fears over the fence acting as a challenge to be overcome, and the visual intrusion/barrier aspects that are discussed in more detail in the subsequent chapter. Furthermore, many SuDS design manuals, and indeed RoSPA seemingly advocate the use of high fences as a deterrent. The 1 metre fence acts as neither a challenge, a visual barrier nor a dangerous impediment in the case of emergency.

Fig 1. Retention pool on DEX development (Source: Scottish Executive)

In addition to the amenity value described above SuDS retention ponds also have additional benefits to biodiversity and the economy that may further enhance the amenity value:

Biodiversity

Jones & Fermor (2001) cite statistics provided by the Warwickshire Wildlife Trust, that of the 225,132 hectares of land in Warwickshire, open water constitutes just 1.02% of the total and wetland 0.18%. Therefore, there is obvious potential for SuDS schemes as valuable habitat for wildlife in general and for rare and endangered species. Powell *et al* (2001), Jones & Fermor (2001) and SEPA (2000) make extensive recommendations to SuDS designers to maximise the wildlife habitat potential of sustainable drainage systems. SuDS clearly have the potential to attract a variety of wildlife including rare and protected species that would only serve to enhance the amenity and recreational value of a scheme.

Economic Benefits

That water is highly regarded for its aesthetic appeal is undeniable. A study in 1993 in America by the National Association of Home Builders (NAHB) found that a proximity to water raises the value of a house by up to 28%. In the UK the '*Move Channel'* website reports that in London, properties with views of the River Thames are extremely desirable and cost an average 20% more than a similar property without the view. *The Guardian Unlimited* website cites a report from The Observer newspaper that states that properties in Fowey, Cornwall with a view of the river or harbour can command double the asking price of one without the view whilst house prices in the vicinity of the Yacht club have risen by 60% between 2000 and 2002.

Conclusions

From the available literature it is clear that a number of prominent SuDS authorities, i.e. CIRIA, the Environment Agency, SEPA etc are actively promoting the amenity value of sustainable urban

drainage systems under the requirements of the DEFRA Code of Practice. It is clear that water has a strong attraction and aesthetically pleasing quality to humans and given the loss of ponds highlighted by Storey (2003) SuDS potentially have enormous recreational and amenity value to both the local and wider community. The benefit to biodiversity especially, enhances the recreational value. However where there are significant numbers of visitors there is an increased risk of a visitor suffering an injury due to a particular danger of the pond (explored in section 4 below) and subsequently seeking damages through civil litigation against the owner or operator of a SuDS pond (see section 5).

4. HAZARDS AND RISK

In order to appreciate how and where members of the public are likely to be injured, careful consideration must be given to each individual hazard likely to be encountered at an open water SuDS pond, and the risk assessed accordingly.

4.1 Water

As the Wildlife Trusts Water Policy Team (2003) point out, wetlands are wonderful places for people to explore and enjoy. Nonetheless, deep water has an element of risk. According to statistics available on the Royal Society for the Prevention of Accidents (RoSPA 2001) website 568 people drowned in 1998, of which 341 were at inland water sites such as canals, lakes and reservoirs. In 1999, the number of people drowning remained constant at 571, but the number of these occurring at inland water sites increased to 375. In their '*Water Safety Factsheet 2002*' RoSPA also state that there were 199 people drowned at inland sites in 2000 with 11% of these occurring at lakes and reservoirs. To prevent accidents occurring RoSPA state it is necessary to break the links in what they refer to as 'the drowning chain'. Theses links are:

- Ignorance, disregard or misjudgement of danger
- Unrestricted access to the hazard
- Absence of supervision
- Inability to save oneself

RoSPA recommend public education, and crucially to the SuDS question, warning of the danger or physically preventing access to the hazards by fencing. This organisation's 1999 publication *'Safety at Inland Water Sites – Operational Guidelines'* is the definitive publication regarding safety and used by water undertakers in the UK as discussed in section 7. As RoSPA (1999) warn us, uninformed or unrestricted access to water can easily prove fatal, thus strategic water safety

management, which incorporates risk assessment and hazard identification, is vital.

4.1.1 Risk Assessment

The definitive publication regarding risk assessment is British Standard BS8800: 1996 *Guide to Occupational Health and Safety Management Systems* on which this brief description is based. Risk assessment involves three basic steps a) identify hazards; b) estimate the risk from each hazard — the likelihood and severity of harm and c) decide if the risk is tolerable. Hazard and risk are defined by BS8800; a hazard is a source of potential harm or damage or a situation with potential for harm or damage, and a risk is the combination of the likelihood and the consequences of a specified hazardous event. Risk assessment should provide an inventory for action and decide what safety control measures are required, where improvements can be made and a priority order for such measures. Three questions enable hazard identification, is there a source of harm, who (or what) could be harmed and how could harm occur? The risk from the hazard should be determined by estimating the potential severity of harm and the likelihood that harm will occur. BS8800 recommends risk estimation and risk control are displayed in the form of a matrix. The examples below have been modified from BS8800: 1996 specifically for SuDS:

	SEVERITY OF ACCIDENT		
PROBABILITY OF ACCIDENT	*SLIGHTLY HARMFUL (LOW)*	*HARMFUL (MEDIUM)*	*EXTREMELY HARMFUL (HIGH)*
HIGHLY UNLIKELY (LOW)	**Trivial**	**Tolerable**	**Moderate**
UNLIKELY (MEDIUM)	**Tolerable**	**Moderate**	**Substantial**
LIKELY (HIGH)	**Moderate**	**Substantial**	**Intolerable**

Fig 2. Risk Level Estimator (Source: BS8800:1996)

RISK LEVEL	ACTION AND TIMESCALE
Trivial	No action is required.
Tolerable	No immediate action required, more effective solution may be considered. Monitoring is required to ensure controls are maintained.
Moderate	Effort should be made to reduce risks in defined timescale. Where risk is associated with harmful consequences further assessment is required to determine the type of improvements.
Substantial	No amenity activities until risk has been reduced through much improved safety features. Urgent action should be taken to remedy problem.
Intolerable	No public access until risk has been reduced. May require considerable expense and on-site security to deter trespassers. If it is not possible to reduce risk public access must remain prohibited.

Fig 3. Risk Based Control Plan (Modified from BS8800:1996)

An example of a risk assessment for a hypothetical SuDS pond can be found in Appendix B of this document.

4.1.2 Hazard Identification and Mitigation

Hazard identification should, according to RoSPA (1999), account for the nature of the water, the proximity of deep water, the waters edge, accessibility to the water and hinterland activity. The nature of the water includes depth and clarity; very deep water is the most hazardous of all whilst poor clarity (likely to be encountered in a SuDS pond) obstructs submerged hazards. The propinquity of deep water and people can be modified by design. Careful thought should be given to the nature of the banks and the risks of slipping, and accessibility to the water. Accessibility would seem to be the most crucial safety feature of all. RoSPA (1999) recommends gentle gradients above and below the water line so that even non-swimmers can regain their stance after slipping or falling into water.

Given that the majority of pollution remediation occurs in the shallow, vegetated margins of SuDS

ponds, such design should already be the norm. Vegetative planting and or mud can act as a deterrent to swimming and may be coupled with clear, well-defined footpaths to create vegetative barriers between footpath and water. Footpaths are well suited to the key question of safety and amenity, they may lead visitors away from hazardous areas of the site, they help to maintain the leisure and amenity value and improve the visual surveillance aspect of a site as used in the DEX discussed above in section 3.5.

The use of fencing is a somewhat controversial and contradictory subject as regards SuDS. RoSPA (1999) strongly advocates the use of fences where a site is associated with very deep water, steep sides and high edges or where there are additional situation hazards such as nearby schools. A number of SuDS authorities, (see section 8) feel that fences simply act as a challenge to be overcome, especially by children and also reduce safety by acting as a visual barrier, obstructing the view of the pool from nearby roads and houses. Even RoSPA (1999) concede that even the most substantial fence is still scaleable, therefore to acquiesce with good design practice and situation would seem to be preferable to fencing. Indeed, careful consideration to the positioning of a SuDS pond appears to be as important as good design.

The *'Safety at Inland Water Sites – Operational Guidelines'* document provides comprehensive advice as to suitable signs. Briefly, signs should conform to The Health and Safety (Safety Signs and Signals) Regulations 1996 and provide clear and concise information regarding safety risks (see section 5.2.2 regarding appropriate language). An information board at a main access point can outline the main safety information in addition to a site map and in the case of SuDS provide a brief outline of the purpose of the pool. Additional signs at hazard spots i.e. waters edge coupled with 'nag' signs repeating basic information are sufficient. Section 7.3 details the operational use of such signs.

Signs, such as the one shown below in figure 4 could prove to be a very effective deterrent against swimming:

Fig 4. Possible Warning Sign for SuDS Ponds (Source: www.jaxshells.org/0816k.htm)

RoSPA (1999) also strongly promotes the role of community education and awareness. Familiarity with the dangers of a SuDS pond can lower the overall risk as well as educate and encourage community participation in stormwater programmes, as seen in the US and Australia. Education is certainly favoured by a number of SuDS authorities as stated in personal correspondence and a basic knowledge of the likely water quality within a SuDS pond (see section 2.2) should deter even the most ardent swimmer.

As discussed above there do not appear to be any cases of injuries at SuDS ponds in the UK. However, in the US, Ferguson (1998) reports that where people have been injured in ponded water, such sites are frequently characterised by steep, slippery sides, deep water and nothing to hold onto.

Ferguson (1998) concludes that to make a pond safe it must be designed to make it unlikely that persons will fall in and if they do so, will be able to easily escape. The safety design recommendations are largely in accordance with RoSPA's; the pond should be visible, open and accessible, gentle gradients on side slopes with shallow vegetated margins and the possible incorporation of islands or boulders in the water, a point of view queried by RoSPA (1999) who feel that islands may act as an allurement (see section 5) and encourage children to enter the water.

4.2 Ice

RoSPA again provide excellent ice safety information in their 'Water Safety Information' publication *Ice Safety* (June 2000). This includes four basic measures to help prevent accidents:

- Publicity and Education – e.g. leaflets warning of the risks of the water.
- Information – Warning signs i.e. 'Danger Thin Ice' to British Standard colour and format placed at main access points or areas where access to the ice is particularly easy. Signs should be removed when the cold weather ends to avoid complacency.
- Supervision - increase levels of supervision such as park rangers during cold periods.
- Do not break the ice – Sometimes attempted to deter visitors from walking on it but the broken area makes the rest of the ice less stable, so if people do venture onto it they are at greater risk of falling in.

4.3 Blue Green Algae

As Sawyer (2003) states a number of freshwater algae can cause unpleasant 'scum' and discolouration of the water. However, 60-70% of so called 'algal' blooms can produce toxic chemicals that pose a threat to wild and domestic animals, fish, and humans (Health and Safety Executive 2002). The formation of a cyanobacterial bloom depends upon the conditions of the pond but generally occur where there are high levels of nutrients together with warm, sunny and calm conditions (Sawyer 2003).

Cyanobacterial toxins can cause illnesses such as dermatitis, gastro-enteritis, atypical pneumonia and hepatoenteritis in humans (Sawyer 2003). In recent years in the UK, blue-green algae have been responsible for the deaths of birds, fish and animals, although no human deaths have been directly attributable to these toxins (Health and Safety Executive 2002). However, as HSE state many cases of ill health have been reported both here and abroad, with symptoms including skin rashes, eye irritation, asthma, vomiting, diarrhoea and fever and pains in muscles and joints in persons that swallow or swim through the algal blooms. Such blooms present a more subtle danger to members of the public than obvious risks such as deep water or ice but under the general duty of care, the landowner must still protect the public from the hazards associated with cyanobacteria described above.

Urbonas & Stahre (1993) state that although almost impossible to prevent, cyanobacterial blooms can to some extent be controlled by deeper water, vegetative growth and regular pond cleaning. According to these authors, aeration and chemicals may be considered, although chemicals present another potential health hazard to the public.

4.4 Pathogens

Possibly the most serious pathogen likely to be encountered in the SuDS pond is *Leptospirosis bacterium*, that causes the bacterial disease leptospirosis, which affects both humans and animals and commonly referred to as Weil's disease. The primary hosts of the bacteria as Mason (2002) states are rodents, which carry the organism in their kidneys and then contaminate the water with their infected urine. The legal issues are discussed in section 5 and it is clear that Weil's disease presents not only a threat to human health, there is also a significant risk of civil litigation.

The Institute of Biomedical Science (IBMS, 2000) reports that in the United States, there are 100-200 cases of leptospirosis annually and a similar proportion of cases are thought to occur in the UK.

The IBMS state that although the incidence of the disease is relatively low, it is considered by many to be the most widespread zoonotic disease in the world and is recreational hazard for campers and those who participate in water sports. Leptospirosis presents a number of symptoms including fever, muscle aches, headache and vomiting and then progressing to liver or kidney failure and meningitis but as IBMS (2000) point out, only occasionally causes death. *Leptospirosis bacterium* enters the body via skin abrasions or the mouth or nose and Gaten (2000) considers the only effective way of preventing Weil's disease is to avoid contact with infected water.

Weil's disease may well prove to be an increased risk at SuDS pools in urban areas where there are already substantial numbers of rats in existing sewers and drains, due to litter and waste foodstuffs dropped or thrown in the pond via passers by or deposited in the pond by runoff. The provision of litter bins, site litter picks and litter awareness would seem to be of the utmost importance.

5. LEGAL ASPECTS – NEGLIGENCE AND OCCUPIERS' LIABILITY

The purpose of this chapter is primarily to explore where SuDS operators may face civil action, were a person to drown or be injured at a SuDS pond and to investigate how the risk of litigation can be reduced/mitigated or removed. The second function must be to give the reader a thorough understanding of the relevant legal principles under UK law, including recent cases, something that is distinctly lacking in SuDS design manuals.

CIRIA (2001b) state that drainage in England and Wales can engage a number of different bodies, including private landowners, local authorities, sewerage undertakers and the Environment Agency. Local authorities that act as local planning authorities also have responsibility for local roads, public landscaping and local land drainage. The Highways Agency controls trunk road drainage, whilst sewerage undertakers (water service provider) have responsibility for sewers conveying surface water from impervious areas such as roofs and drives and CIRIA (2001b) report there is no clear guidance on who is responsible for the operation and maintenance of such facilities. Therefore, the term 'SuDS operator' can currently extend to a number of authorities that may be liable for persons drowning, illness and personal injury resulting from activity at a SuDS pool. However future legislation is likely to rectify this problem and if this follows the principle of the adoption of sewers and drains it is probable that either the relevant water service provider or more likely the local authority will have responsibility for a sustainable drainage system in line with the responsibilities set out in *Local Agenda 21*.

Tort is the branch of civil law that relates to obligations on all natural and artificial persons and as Brazier & Murphy (1999) state, what the law of torts does, is to define the obligations imposed on one person to his or her fellows so as to provide compensation for any damage caused by the breach of such obligations. Markesinis & Deakin (1999) cite the Pearson Committee Report of 1978 that stated that the number of people that obtained compensation through the tort system was just over

two hundred thousand per year, thus tort liability is a major source of compensation for the victims of accidents. Far more people suffer damage from careless acts of others than from deliberate or intentional acts (Brazier & Murphy 1999) and English law has long since recognised that, in certain circumstances a person that is guilty of careless or reckless conduct is liable to pay their victim damages (Slapper & Kelly 2000). Historically many actions of nuisance and trespass were based upon negligent conduct but it was not until the early nineteenth century, according to Brazier and Murphy (1999) that there was any emergence of negligence as a separate tort and subsequent to this, action in negligence became increasingly common as the Industrial Revolution imposed a more mechanical environment upon society.

Howarth (1996) states that there has been a striking increase in the amount of personal injury litigation since the mid-1970's. This is clarified by Nugent (2002), who reports that over the last three years, the amount spent on compensation claims has nearly doubled, with around three million people annually pursuing personal injury claims and approximately £12 billion paid each year in compensation and legal fees. Although as Markesinis & Deakin (1999) point out, personal injury claims have not yet reached the apparent 'compensation culture' epidemic of the US there has been a growing number of awards and settlements in personal injury cases involving substantial amounts of money, well over the one million pounds mark. Clearly any such action against a SuDS operator subsequent to a drowning, illness or injury would be of serious consequence, threatening the continued operation and maintenance of existing SuDS schemes and restricting the motivational and fiscal ability to implement any new urban drainage systems in the future, to the detriment of the environment. The fear of possible litigation may also act as a barrier to the adoption of SuDS by water companies and local authorities. Newman *et al* (2002) and Chaplin (2002) have already discussed how domestic and European wildlife law is deterring investment in SuDS in the UK despite the overwhelming environmental benefits SuDS schemes can offer as discussed in section 3 above. Therefore, the clear objective of this section is to provide understanding of the legal basis on

which a SUDS operator may face personal injury litigation from a member of the public and to investigate how such litigation can be prevented from arising.

5.1 The Tort of Negligence

As Slapper and Kelly (2000) point out to us, negligence is the most important of all the torts, not only because an understanding is vital to comprehending other torts (i.e. occupiers liability that is discussed below) but also because it is one of the most 'dynamic' and rapidly developing areas of liability at modern civil law.

The prime objective of negligence is to provide compensation for the injured person, however as Brazier & Murphy (1999) state that it is not the law that any person who suffers harm as a result of another's careless actions can sue, rather as was set out in *Lochgelly Iron & Coal Co. v McMullan* [1934] AC 1 the tort of negligence requires more than 'heedless or careless conduct'. The plaintiff, to succeed in a negligence claim must establish that the defendant owed a duty of care to protect him (Brazier and Murphy 1999), secondly that the defendant has breached this duty and that there has been foreseeable damage to the claimant resulting from the breach (Bell & McGillivray 2000). The test for establishing whether a duty of care exists was laid down in *Donoghue v Stevenson* [1932] AC 562 but prior to this as Markesinis & Deakin (1999) point out, legal liability was only established in a number of separate, specific scenarios with no unifying principles. In *Donoghue v Stevenson,* Lord Atkin established the 'neighbour principle':

> 'You must take reasonable care to avoid acts or omissions which you could reasonably forsee would be likely to injure your neighbour. Who then in law is my neighbour? The answer seems to be persons who are so closely and directly affected by my act that I ought reasonably to have them in contemplation as being so affected when I am directing my mind to the acts or omissions that are called into question'.

Brazier & Murphy (1999) argue that whether a duty exists is straightforward and illustrates this using the examples of the duty a doctor owes his patients, a teacher to his pupils and the duty a landowner (i.e. a SuDS operator) owes to their visitors under occupiers liability.

5.2 Occupiers' Liability

As Markesinis and Deakin (1999) state, occupiers' liability is today, essentially the law of negligence in statutory form. This was the first area of the common law to be comprehensively reformed by statute ands this area of law governs to what extent landowners are responsible for the health and safety of visitors to their premises (Howarth 1996). The governing statutes are the Occupiers' Liability Acts of 1957 and 1984. The OLA 1957 operates with respect to visitors to the defendant's premises and the 1984 Act defines liability to non-visitors, i.e. trespassers (Brazier & Murphy 1999).

5.2.1 Occupiers' Liability Act 1957

Previous to the OLA 1957, as Howarth (1996) reminds us, occupiers were held to a higher standard of care to people that entered their premises whilst fulfilling a contractual obligation than to people who entered the premises under non-contractual matters. This first class of visitors were termed contractors and liability was based on an implied warranty that the premises of the defendant were fit for the purposes necessary for the fulfilment of the contractual obligation (Markesinis & Deakin 1999). The standard for persons entering on non-contractual matters but in the pursuance of matters of mutual interest (termed invitees) was that the occupier was required to use reasonable care to prevent damage from unusual danger. The third group, licensees, received lower protection still. This group, persons on the premises who had been given permission to enter (including implied permission) but in pursuance of their own interests were only required to be warned of any concealed dangers. To trespassers no duty of care was owed.

Howarth (1996) states that the 1957 Act abolished the distinction between these groups. Section 1 of

the OLA 1957 states that the rules enacted by Sections 2 and 3 ‘have effect in place of the rules of the common law, to regulate the duty which an occupier of premises owes to his visitors in respect of dangers due to the state of the premises, or to things done or omitted to be done on them’.

Occupier

The first precondition under the OLA 1957 is that the defendant is the occupier of the premises in question. As both Howarth (1996) and Brazier & Murphy (1999) remind us the 1957 Act does not define ‘occupier’. A person need not necessarily be in occupation of premises to be the occupier; what is decisive is control of the premises as was laid out in *Wheat v E Lacon & Co Ltd* [1966] AC 552 where Lord Denning stated ‘if a person has any degree of control over the premises it is enough’. A water company or local authority maintaining a SuDS pond would therefore have sufficient control to be the occupier. Markesinis & Deakin (1999) summarise the law by stating that the decision as to who the occupier of the premises is, depends largely on the facts of the case, the nature and extent of the occupation by the occupier and the control exercised by the defendants over the premises.

Visitor

Under sections 1(2) and 1(3)(b) of the OLA 1957 the common duty of care is owed to lawful visitors; this means someone who would previously have counted as either a contractor, licensee or invitee or someone entering as of right by legal authorisation (Lunney and Oliphant 2000). As Rogers (2002) states, in each case it is a question of fact of whether permission to enter can be implied, however where SuDS features operate as a public amenity such an explicit invitation would put the matter beyond doubt, although as Rogers (2002) reports, visitors who exceed their permission to enter can be counted as trespassers. As Scrutton LJ stated in *The Carlgarth* [1927] P83 110 ‘when you invite a person into your house to use the stairs you do not invite them to slide down the bannister’. In the SuDS context therefore, if a retention pond was so designed that lawful visitors were excluded from entering any dangerous areas of the site, for example deep water or steep slopes by the use of

footpaths, dense vegetation or warning signs, any person straying beyond the permitted areas receives only the duty of care owed under the OLA 1984, as discussed in section 5.2.3.

Common Duty of Care

Section 2(2) of the OLA 1957 states 'the common duty of care is a duty to take such care as in all the circumstances of the case is reasonable to see that the visitor will be reasonably safe in using the premises for the purposes for which he is invited or permitted by the occupier to be there'. The question as to whether the duty of care has been fulfilled is a matter of fact and as Rogers (2002) states all circumstances must be taken into account. Under section 2(3)(a) the occupier must be prepared for children to be less careful than adults but may also expect parents to exercise some control over their children and responsibility for their safety.

5.2.2 Defences

Warnings

Under the common law, as Brazier & Murphy (1999) state an occupier discharged his duty of care to a visitor by a warning sufficient to fully convey to the visitor the nature and extent of the danger. However the provision in S 2(4)(a) changed this approach and provides that 'where damage is caused to a visitor by a danger of which he had been warned by the occupier, the warning is not to be treated without more as absolving the occupier from liability unless in all the circumstances it was enough to enable the visitor to be reasonably safe'.

Such warning may in appropriate circumstances discharge the occupiers' duty of care. As Howarth (1996) states the test under the Act is to whether the warning was adequate and had the effect of enabling the visitor to be reasonably safe. In *London Graving Dock Co. v Horton* [1951] AC 737 the House of Lords, as Markesinis and Deakin (1999) report, gave the impression that if a visitor recognised the significance of a warning the occupier would automatically be absolved.

However, under S 2(4)(a) a warning should not be treated as automatically absolving the occupier from liability. Howarth (1996) makes the distinction between a warning and a notice that attempts to exclude liability. He notes that a warning is an attempt to fulfil the duty of care by supplementing the safety of the premises with useful information to the visitor, implying that warning notices should be used in conjunction with other safety features, whereas an exclusion notice simply tries to discharge liability without being helpful or informative. Case law has dictated that a warning in an unusual language, in an unsuitable place or one that is not given in an appropriately serious manner will not be sufficient for the purposes of discharging the duty of care.

Exclusion of Liability

The defence of exclusion of liability is covered under s 2(1) of OLA 1957 that states 'an occupier of premises owes the same common duty of care to all his visitors except in so far as he is free to extend, restrict, modify or exclude his duty to any visitor or visitors by agreement or otherwise'. This defence by notice arises where the defendant has expressed in a notice that people enter the premises on the condition that they accept that they do so at their own risk and will not be able to recover damages for any injury suffered whilst on the land (Rogers 2002, Brazier & Murphy 1999). The occupier can modify the common duty of care to visitors as Lunney & Oliphant (2000) report. Where the visitor enters in fulfilment of a contractual obligation an express term within the contract can modify the duty of care. Secondly and of most relevance to the SuDS question that this document seeks to answer, is that in respect of non-contractual visitors a notice that is positioned either at the entrance to the land or included in a programme or ticket giving access to the land is sufficient to discharge liability. However the minimum standard of care owed to trespassers cannot be modified as Rogers (2002) states.

Both Howarth (1996) and Brazier & Murphy (1999) conclude that the purpose of this provision appears to be to protect farmers and landowners who freely open their land to the public (also see

chapter 6) but at the same time wish to exclude or restrict their liability by notice. By the same concept, a SuDS operator who wishes to allow public access to an open water feature, where there are clear health and safety issues (see section 4) would seem to be able to exclude or restrict their liability provided that a 'clear and unequivocal notice' (Brazier & Murphy 1999) is displayed at the point of entry. Therefore some boundary would seem to be required, possibly hedgerow or fencing to limit and provide definite points of entry to the land.

5.2.3 Occupiers' Liability Act 1984

Liability to trespassers is regulated under S.1 of the OLA 1984. Markesinis & Deakin (1999) define a trespasser as a person who has no permission, express or implied to be where he is. A duty to uninvited entrants arises only where three conditions are met. Under Section 1 (3)(a) the occupier must be aware of the danger or have reason to believe it exists on their premises; under S 1 (3)(b) he must have known or had reasonable grounds to assume that an uninvited entrant had, or might come into the vicinity of the danger and under (3)(c) that the risk of injury resulting from the danger was one in which bearing in mind the facts of the case where the occupier might reasonably have been expected to afford the trespasser some protection. Clearly, where a SuDS scheme is designed and constructed with safety in mind and protection is offered to trespassers the requirement under s 1(3)(c) is not met.

The OLA 1984 would seem to be of greater relevance where the SuDS operator seeks to exclude members of the public from the land and where the feature does not operate as a community facility (as with Highways Agency operated SuDS, see section 7.2), or where the feature operates but with restricted opening hours. In defence s 1(5) provides that any duty under the OLA 1984 can 'in an appropriate case be discharged by taking such steps as are reasonable in all the circumstances of the case to give warning of the danger concerned or to discharge a person from incurring the risk'. Howarth (1996) considers this duty much easier to fulfil than the warning defence under OLA 1957.

Crucially it is the defendant's attempts to discourage trespassers rather than the effectiveness of such attempts, which is critical.

Rogers (2002) reports that it is the facts of the trespass that matter; in the case of young trespassing children, the same precautions as under the OLA 1957 may be required. An adult trespasser however, who continues to intrude after passing a 'prominent' warning sign has only themselves to blame for any injury suffered and even where there are no warning signs an adult who takes an obvious risk (such as swimming in a SuDS retention pond) has no grounds to recover damages from the occupier.

5.3 Recent Case Law

During this research it has, fortunately, not been possible to uncover a single instance of a person being injured or drowned at a SuDS pond in the UK. Ferguson (1998) discusses injuries at drainage facilities in America and concludes that more than half of such cases occurred at places associated with concentrated quantities of fast flowing water. Ferguson (1998) also cites two examples of case law in the US associated with drainage facilities. In *Cope v Doe* [1984] in Illinois, the developer of an apartment complex was found not to be liable for the drowning of a seven-year old boy in a partially frozen detention pond. The pond was located only 100 metres from the apartments and clearly visible and the area included other recreational facilities including a children's play area. The design of the pond included no measures to deter children other than the managers warning to parents. The court held that the pool was an 'open and obvious danger', that children had not been invited to swim in the pool or use it for recreation and that a seven-year old could reasonably have been expected to be aware of and appreciate the dangers of a partly frozen pond.

The second case, *Guillot v Fisherman's Paradise Inc* [1983] found the developer liable for the death of a 2 year old in an oxidation pond. The pond, just 100 yards from the place of residence was completely unmarked, with no closed off border and an incomplete, decorative wooden fence. The

sides of the pond were steep with no marginal area and the surface of the pool covered in algae, making the presence of water less apparent to a child. Were UK courts to follow these principles, it is clear that the location of SuDS pools is important (as has been discussed previously); they should be open and visible and clearly marked whilst educating children as to the presence and dangers of water through school or community programmes would seem prudent.

There are also two recent cases from the UK of note concerning occupiers' liability and SuDS. The case of *Darby v National Trust* [2001] EWCA Civ 189 is particularly important. In this case the victim's widow complained that the defendants had failed to warn visitors of Weil's disease if they swam in a pond when her husband had in fact drowned. The court held that 'the risk of Weil's disease required a notice' and that the cost of the sign would have been small and may have given sufficient warning against the danger of drowning. As Cooper (2002) reports the legal principle used was laid down in *Staples v West Dorset District Council* [1995] PIQR 439, the court stating 'if the danger is obvious, the visitor is able to appreciate it, he is not under any kind of pressure and he is free to do what is necessary for his own safety, then no warning is required'. However under section 2(3)(a) the occupier must be prepared for children to be less careful than adults but may also expect parents to exercise some control over their children and responsibility for their safety. Consequently children would appear to present the greatest threat of litigation against a SuDS operator.

Darby is doubly important to SuDS; the court made it clear that the public have a responsibility for their own safety and must accept the consequences of their own actions and although the plaintiff failed on the grounds that her husband drowning was not due to the defendants failure to erect Weil's disease warning signs, the fact that the court considered such warning signs necessary should be noted by all SuDS operators.

Nevertheless, some caution must be taken from *John Tomlinson v Congleton BC* where a dangerous

quarry was used by members of the public for swimming and diving over a period of time despite warning signs erected by the local authority. The House of Lords held that a swimmer who broke his neck whilst diving into the quarry was able to recover damages, as the local council must have been aware that the signs were not working, that water is an attractive destination for the public and because the local authority had failed to take further measures to prevent people from swimming in view of the failure of the signs (Exchange Chambers 2002). Clearly then historical context is important in determining liability. Where warning signs at a retention pond but are patently ineffective, the operator must take further steps to rectify the problem if wishing to avoid litigation.

To simplify the points of law outlined above, to enhance the reader's understanding of the issues discussed above, and to relate the law to the practical management of sustainable drainage retention ponds, liability issues are discussed in two hypothetical SuDS scenarios in Appendix C.

6. EXEMPTION FROM OCCUPIERS' LIABILITY

Section 5 discussed the defences to OLA but the rationale of this section is to investigate how and where SuDS may be exempted from occupiers' liability, so prudent proposals can be made to effectively remove the litigation adoption barrier.

6.1 The UK Perspective – Countryside and Rights of Way Act 2000

Right to roam proposals have now been enacted as Part I of the Countryside and Rights of Way Act (CRoW) 2000. This is intended to give greater freedom for people to explore open countryside. It contains provisions for a statutory right of access for open-air recreation to mountain, moor, heath, down and registered common land.

Under S.16 of the Act, landowners can 'dedicate the land for the purposes of this Part of the CRoW Act, so that it is treated as access land for the purposes of the general right of access' and it is this aspect that may be of interest to larger SuDS schemes in both urban and rural settings. Of greatest significance in respect of potential litigation is that Section 13 amends OLA 1957 to reduce the liability of owners of land dedicated under S.16 (see above). The duty owed to those exercising the right of access is restricted to the same level as owed to trespassers. Section 13 further provides (by amending the OLA 1984) that, 'at any time when the right is exercisable, occupiers of access land will owe no liability to those exercising the right of access, nor to trespassers, in respect of risks arising from natural features of the landscape; any river, stream, ditch or pond; and the passage of any person across a wall, fence or gate (except by proper use of a gate or stile).' The question that must surely be asked here is could SuDS be categorised as a 'natural feature', or might 'natural feature' be redefined to include SuDS? This point is considered in relation to legislative reform in section 9.3. Under S.13 natural features are defined as any plant, shrub or tree. However liability is not excluded in any of these circumstances if the risk arises from anything done intentionally or recklessly by the occupier (HMSO 2001).

The dedication of such land is irrevocable. Section 2 gives people a right of entry onto access land for the purposes of 'open-air recreation' and schedule 2 restricts activities and behaviour whilst accessing the land, for example the use of any vehicle (including bicycles) or craft (on water), and horse-riding and also includes specific restrictions for the control of dogs. Under Section 2(4), people who break any of these restrictions will lose their right of access to land in the same ownership as that on which the breach occurred, for a period of 72 hours, and may be treated as trespassers by the owner of the land.

Under S.6 there is a provision for landowners to exclude or restrict access for any reason for up to 28 days a year when maintenance work could be carried out (note maintenance requirements for SuDS ponds). Crucially under Sections 17, 18 and 19 local authorities may make byelaws to preserve order and prevent damage, appoint wardens to advise landowners and visitors and secure compliance with byelaws and to erect notices to provide important information to visitors. Obviously only large retention ponds that are incorporated into the wider landscape would be suitable for such freedom of access, essentially excluding SuDS from the designation. There has however, as discussed below in chapter 6.2 been a growing tendency for the restriction or removal of occupiers' liability for land used for recreational purposes in other common law countries. Such is the importance of sustainable drainage systems to enhancing the environment that the restriction of occupiers' liability would seem to be a particularly relevant way in which to encourage continued investment in SuDS and has found support among several leading SuDS authorities (see conclusions section 9).

6.2 Other Common Law Countries

The provision under the CRoW Act 2000 that owners of dedicated land can be exempt from liability is not unique; indeed other countries that retain the common law system have gone as far as amending occupiers' liability so that the owner of any land used for recreational purposes owes no liability to persons injured upon it.

Canada

The Legislative Assembly of Alberta Occupiers' Liability (recreational users) Amendment Act, 2003 (Bill 208) recently amended occupiers' liability with regards to recreational land. Section 6.1 provides that the 'liability of an occupier to a person who uses the premises or a portion of them for a recreational purpose shall be determined as if the person was a trespasser unless the occupier receives payment for the entry or activity of the person (SS.1) or is providing the person with living accommodation on the premises (SS.2)'. The amendment applies to rural premises and lists land used for agricultural purposes, vacant or undeveloped premises, forest or wilderness, golf courses when not open for playing, utility rights-of-way and recreational trails. Similarly the Occupiers' Liability Act 1996 in British Columbia provides that an occupier has no duty of care to a person in respect of risks willingly assumed by that person other than a duty not to create a danger with intent to do harm to the person or damage to the person's property, or act with reckless disregard to the safety of the person or the integrity of the person's property (S 3(3)). Under Section 3 (3.2) a person who enters the premises either by trespassing, or for the purpose of a recreational activity (where the occupier receives no payment or other 'consideration' and the occupier is not providing the person with living accommodation on those premises) is deemed to have willingly assumed all risks and the occupier of those premises is subject only to the duty of care set out in subsection 3.

United States

The Florida Greenways and Trails System is a scheme similar to the CRoW Act 2000 and encourages private land to be adopted for recreational use. The Office of Greenways and Trails *Resource Guide* (2000) states that there is no liability on the part of the landowner to persons using the land unless injury was caused by a 'wilful, deliberate or malicious act' and the landowner will not be presumed to extend any assurances that the designated land is safe for any purpose, will not incur any duty or care toward those who enter the land and will not be responsible for any injuries to persons or property caused by a person on the designated land. These protections apply regardless of whether the person using the land is an invited guest or a trespasser.

7. CURRENT EXPERIENCE

In investigating liability issues, it is important to discuss relevant practical experiences of operating SuDS and to also examine the experience of those who own or operate other open water features that are accessible to the public, and discuss how they ensure public safety at their sites.

7.1. Bourne Stream

The Bourne Stream runs some 8km through a shallow valley from Poole through Bournemouth's public gardens and on to the popular Bournemouth Pier bathing beach. It comprises two main tributaries and has a drainage catchment of 12km^2, about 70% of which lies within the borough of Poole. The stream discharges close to the bathing beach and due to concerns over the water quality on the bathing beach the stream was identified as ideal for SuDS research. The Project Officer Sarah Austin (Personal Correspondence 2003) confirms that health and safety has never been an issue although the existing wetlands are particularly shallow, less than 0.5m. However the Bourne Stream Partnership are anticipating building another SuDS development in a particularly heavily used recreational garden where health and safety may be more of a problem but again this issue has not been discussed. Austin feels that local people's familiarity with the marine environment and visitors expectations of a coastal town actually helps people increase their own safety highlighting the importance of public awareness/education about SuDS. As with the US Department of Transportation's Federal Highway Administration (see section 8) the Bourne Stream Partnership is aware of the problems of retro-fitting SuDS into the urban environment where site specifics i.e. available area, can be problematic. Therefore Austin (Personal Correspondence 2003) states that any new safety design code (see section 9.2) for SuDS may be too restrictive for the experimental work which they undertake; consequently there is surely the potential on a national level for such a code of practice to discourage SuDS investment and building more so than the threat of civil litigation!

7.2 Highways Agency

The view of the Highways Agency (HA) is that SuDS are in general being over promoted in view of the current lack of technical knowledge and real-time experience. Whitehead (Personal Correspondence 2003) also states that the claim that SuDS are sustainable is also spurious since treatment systems will collect polluted sediment (see section 5.5) over time that will need to be disposed of as contaminated waste. For this reason the Highways Agency do not feel SuDS are suitable for recreational use.

The Highways Agency do of course use SuDS for the detention of runoff from roads and as such have a greater degree of control as regards access as such SuDS features are generally built within the highway boundary. Whitehead (2003) states that where systems are designed to contain standing water public access will not normally be permitted and boundary designs are planned accordingly. Where access is allowed for recreational or amenity uses water levels are designed to be shallow and gently graded. If deep water is unavoidable then it is Highways Agency policy to exclude the public or in exceptional circumstances erect suitable fencing to prevent members of the public falling in. The position of the HA in excluding the public is unfortunate and seems a missed opportunity as far as recreation, such as bird watching is concerned; the statement that SuDS are unsustainable is also incorrect and the vigorous anti recreation stance of the HA could, in the author's opinion, be interpreted as a response to the fear of litigation.

7.3 Other Open Water

The briefest of Internet searches or a speedy examination of newspapers is adequate for the dangers of open water to be appreciated. On May 28th 2003, a 17 year-old male drowned at the Rodings Valley Meadows in the Epping Forest in 3 metres of water (the same depth advocated by many design manuals for SuDS ponds) and the lake had no warning signs as to the dangers of deep cold water (Phantis & Armstrong 2003). In Brighton more than £100,000 has been spent on safety

measures, significantly on warning signs and marginal vegetative planting, following the death of a two-year old in Mewsbrook Park lake (Newsquest Media Group 2002). These tragedies are in addition to those highlighted in the introduction to this document. Although the fear of litigation is seen as an adoption barrier to SuDS the death of a (young) person by drowning is of course far more serious and those authorities who own or operate park lakes and reservoirs which are readily accessible to the public have a number of safety strategies. Both Anglian Water and Welsh Water follow the general guidance provided by the RoSPA publication *'Safety at Inland Water Sites'* described in section 4. Moore (2003) states that Anglian Water has never been sued for negligence despite a small number of fatalities. Steve Morgan (2003) for Welsh Water reports that safety measures in place range from signage, educational initiatives with local schools, security fencing and ranger patrols. The problems that Welsh Water are currently facing are in line with the safety issues of SuDS ponds and are deliberating what controls are best to firstly avoid any injuries to public and secondly mitigate any litigation or enforcement action. The company are also experiencing trespass problems particularly in the recent hot weather (see section 1), with children attempting to swim in the reservoirs and a security presence has been initiated given the frequency of trespass.

Yorkshire Water have some form of public access at 108 of their 135 reservoirs and public safety is set out in the *'Public Safety at Reservoirs'* section of their Code of Practice. This company consider that the easiest way to provide a defence to liability is to enforce the prohibition of bathing by sample prosecution under Section 157 of the Water Industries Act 1991. The Company feel that this is a particularly useful strategy where there is a history of such incidents at a site (see discussion of *Tomlinson* case, section 5.3). The Code of Practice also details the use of signs, the standard '*deep water – no swimming*' type of sign is to be positioned at main access points (also points of trespass) and where access is permitted at the waters edge. In addition, a '*danger cold water kills'* sign is required at particularly popular sites or where there is a history of swimming. Public information signs are used to guide visitors away from hazardous areas but interestingly Yorkshire Water does not

advocate positioning blue green algae notices (this would seem to conflict with the principle regarding Weil's disease set out in *Darby* see section 5.3) preferring instead to notify relevant leaseholders of the problem. The position regarding life saving equipment is much the same as CIRIA (discussed in section 8) with vandalism a frequent problem therefore reducing its reliability in emergencies. Periodical audits must be completed under company policy to ensure that safety issues are addressed; these inspections must examine the general safety of the site.

Such a Code of Practice, as used by Yorkshire Water, with detailed safety requirements could well offer the greatest potential in seeking legislative reform to remove the litigation adoption difficulty. By conforming with the requirements a SuDS pond could operate without being subject to occupiers' liability.

Northamptonshire County Council use a similar risk assessment and best practice approach to safety at their water based sites (Haines 2003, Personal Correspondence) The Council document *Standards for the Safety of the Public in Country Parks* states that parks are to be 'designed, constructed and managed in a manner which will ensure, so far as is reasonably practical, that all persons who use the parks will not be exposed to risk to their health and safety.' The Council also produce water plans specifically for Barnwell and Sywell Country Parks that are broadly similar to those examples discussed previously. Rangers enforce a no swimming ban, with an increase in patrols in very hot weather whilst signs and vegetative barriers deter entry to the water. Additional signs are provided for blue green algae and leptospirosis but fences are only used where there is a drop of 1 metre of more to the water. The Rangers also provide emergency telephone and rescue craft facilities at these sites.

8. CURRENT SUDS DESIGN RECOMMENDATIONS

If a Code of Practice is to be proposed as discussed in section 7.2 above, current domestic recommendations for safe design and operational practice needs to be examined to determine if these are sufficient. A study of foreign SuDS design manuals is also prudent to provide comparison and a different perspective on the problem of safety. The requirements detailed below will then be incorporated with those made by RoSPA (section 4) and the legal requirements (section 5) to conclude by proposing a Code of Practice in section 9.

8.1 The UK

Sustainable urban drainage systems in general, as stated by CIRIA (2001) have a number of positive health and safety impacts for the public. There are fewer manhole covers and road drains, features that are of particular safety concern to cyclists, motorcyclists and pedestrians alike and permeable materials (i.e. porous asphalt as described in section 3) reduce the amount of standing water reducing the risk of accidents.

CIRIA (2001) consider the risk of accidents associated with open basins and ponds to be low and state that careful design can lower this risk even further. Both CIRIA and the Wildlife Trusts Water Policy Team (2003) feel that such measures should include:

- Avoid deep fast moving water in the design
- Restricting access:
  - Shallow muddy margins
  - Planting of reeds and shrubs
  - Routing footpaths away from dangerous areas and allow public access to safer areas
  - Fencing

- Enabling people to get out of water

- Shallow slopes
- Scramble rocks

- Education and supervision

CIRIA consider that physical barriers such as fencing may prove to be a challenge, especially to children to be overcome, and thus increase the chances of members of the public gaining access to the pond area. Such barriers may also subsequently hinder emergency rescue personnel and or vehicles. Of onsite life saving equipment, lifebuoys are the least preferred option due to the likelihood of vandalism.

The National SuDS Working Group (2003) state that if a retention pond is properly designed, with shallow shelving banks not steeper than one in four, and (if necessary) reed beds around the edge, it can be as safe as if it were fenced. The Group points out that many rivers, ponds and lakes are unfenced because the public likes to walk alongside them and in general, fences are discouraged because of their visual intrusion. The location of ponds, in particular in very visible positions within the public realm in a development, is strongly recommended by the National SuDS Working Group (2003). This will not only provide enhanced safety but will encourage a good standard of management.

8.2 Foreign Design Manuals

Many SuDS design manuals referred to during this research make only the briefest of reference to safety issues, whilst the safety guidance in others is broadly similar; therefore, the information below is only a sample of that which is available.

8.2.1 Los Angeles County

As the design manual for Los Angeles County Department of Public Works (2002) states, the depth

of the pond is important in the design of the pond. If the pond is too shallow, sediment will be easily re-suspended as a result of wind but if the pond is too deep, safety considerations emerge. A littoral zone of 6 to 18 inches deep that accounts for 25 to 50% of the permanent pool surface for plant growth along the perimeter of the pool is recommended, the littoral shelf will also enhance safety. Gradual side slopes of a wet pond enhance safety and it is recommended that side slopes be no greater than 3:1.

8.2.2 Henrico County

As Chapter 3 of the Henrico County *Environmental Manual* (2003) states, 'the design of the BMP shall contain any features necessary to eliminate safety concerns for the public'. For example, a guardrail may be required due to the proximity of the BMP to vehicular traffic. The County's *Minimum Design Standard* (Chapter 9) for retention ponds clearly defines the safety design requirements. Wet ponds located in or adjacent to residential areas must include a 10-feet wide aquatic 'bench'. Side slopes in wet ponds located in or adjacent to residential areas should be no steeper than 4:1 (horizontal : vertical) and side slopes in wet ponds located elsewhere no steeper than 3:1. Chapter 2 of the *Environmental Manual* encourages public education and participation and intends to publish relevant literature and engage the public in talks and presentations. As several sources have reported in relation to UK SuDS schemes (including RoSPA and CIRIA see sections 4.1 and 8.1 respectively, see also sec 7.1) public awareness is crucial to improving the overall safety of ponds, therefore this commitment from the Henrico County environment manual could easily be incorporated into a UK SuDS safety policy.

8.2.3 Idaho

The Idaho Department of Environmental Quality *Catalogue of Stormwater Best Management Practices* (2001) recommends that a stormwater BMP pond that is readily accessible to populated areas should incorporate all possible safety precautions. Steep side slopes (steeper than 3:1

horizontal: vertical) at the perimeter should be avoided and dangerous outlet facilities should be protected by enclosure. It is also recommended that warning signs (as discussed under English law in section 4.3) for deep water and potential health risks should be used wherever appropriate. Such signs should be placed so that at least one is clearly visible and legible from all adjacent streets or paths. Importantly it is also stated that a notice should be posted warning residents of potential waterborne disease (i.e. algal toxins see section 5.3, or Weil's disease) that may be associated with swimming or fishing in these facilities.

The *Catalogue of Stormwater Best Management Practices* recommends a safety bench around the basin with a width of 5 feet may also be incorporated, with a depth not exceeding one foot during non-storm periods with vegetation be planted on the bench to inhibit entry by unauthorized persons. Local governments and homeowners associations may also require appropriate fencing as an additional safety requirement in any event.

8.2.4 Houston and Harris County

The Houston and Harris County *Minimum Design Criteria for Implementation of Certain Best Management Practices for Stormwater Runoff Treatment Options* (2001) guide makes only brief mention of safety features related to permanently wet ponds. The guide recommends a safety bench of ten-feet width and a slope no greater than 1 to 2 %. Alternatively a vegetative bench may be considered, again 10 feet wide with the submerged portion of the bench no greater than 3 feet deep and accounting for 20 to 30% of the permanent pool area. A vegetative bench enhances the pool area aesthetically and making it more attractive to wildlife and thus as a public amenity. It should be noted that, as the title of this document implies, these are minimum design criteria considered for wet ponds.

8.2.5 US Department of Transportation Federal Highway Administration

The Department's document *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring Fact Sheet – Detention Ponds* provides excellent safety design information. It states that pond design is site-specific and dependent on a number of factors. Additional space constraints may reduce the applicability of some pond features, for example the additional area needed to provide a safety bench (as discussed above) may not exist in an urban setting. A safety alternative such as a chain-link fence, although not as aesthetically pleasing, may be required. The side slopes of the pond and embankment may be steep and to protect pedestrians and passengers, sufficient barriers, such as fences, guardrails, and safety zones, must be incorporated into the design.

8.2.6 Auckland Regional Council, New Zealand

The Auckland Regional Council (ARC) *Stormwater Management Devices Revision to Technical Publication #10* (2002) details the following safety features of wet pond design.

Stormwater ponds should not be deeper than 2 metres, if possible. Uniquely in the literature, ARC recommend a reverse slope bench or slope break should be provided 300 mm above the normal pool for safety purposes, an excellent idea to stop anyone who is slipping or riding towards the water. In addition, ponds should also have a shallow bench that extends from the shoreline out at least 3 metres whose maximum depth is also 300 mm prior to steeper slopes down to the bottom of the pond. The shallow bench will facilitate the growth of emergent wetland plants and also act as a safety feature. In addition to the benches, the steepness of the pond slope down to the invert of the pond should not exceed 4:1.

Fencing is not a requirement of the ARC. Natural features such as reverse benching and dense vegetation can provide a similar level of protection to fencing.

9. DISCUSSION AND CONCLUSIONS

Sustainable drainage systems have clear environmental benefits in terms of pollution reduction and flood mitigation. As reported in section 3.5 the number of ponds in the UK has declined from about 470,000 in 1945 to 243,000 in 1998, therefore the creation of new, well designed SuDS schemes can assist in reversing this unfortunate decline at the same time as creating valuable new wildlife habitat and providing local communities with aesthetically pleasing amenity facilities. However, as this document has discussed, open water presents a permanent and serious threat to public safety to which people seem irresistibly drawn towards, with 51 fatalities at pools and lakes in 2000 (RoSPA 2001).

The Occupiers' Liability Acts make clear the responsibility of the owner or operator to ensure that their premises are reasonably safe, however even where there are warnings communicating dangers to visitors, made in accordance with the requirements of the law, litigation can still be pursued against an owner or occupier as seen in the *Tomlinson* case. As discussed, all the facts of the case are used to determine a personal injury lawsuit and by using general safety guidance made by CIRIA, that makes little or no reference to relevant legal points operators of SuDS systems leave themselves open to such court proceedings and thus the adoption difficulties increase. Adoption difficulties are nothing new as seen with the problems of water companies adopting domestic sewers, with householders responsible for expensive repairs and maintenance. New regulations go some way to solving this problem by ensuring that new sewers are of an adoptable standard with DEFRA currently consulting on the best strategic options to formulate workable solutions to address the problems of ownership and adoption (Government News Network 2003). In proposing solutions to the problem of personal injury litigation, it is important that the primary objectives are clearly defined:

- The reduction of the likelihood of litigation and ultimately the complete exemption of SuDS from the Occupiers' Liability Acts to abate adoption difficulties.
- Ensuring continued and or improved public safety through stringent safety measures.

As the complete exemption from occupiers' liability would obviously take some considerable time, this concluding chapter will briefly summarise the measures that can be taken immediately, either in the design stage or implemented at existing SuDS retention ponds to improve public safety and reduce the likelihood of litigation and then examine how SuDS may be exempted from the Occupiers Liability Acts, possibly through the exemption of all recreational land or more likely through a design Code of Practice that incorporates many of the safety measures discussed throughout this manuscript.

9.1 Short Term Measures

In the immediate future, the operators of existing SuDS schemes, and those which are at the advanced planning and design stage, can reassess their current safety measures, and using the risk based approach outlined in section 4.1.1 can determine whether their systems require additional investment to fulfil the legal requirements and principles (see section 5) in order to reduce the potential for public injury and consequent litigation. The operator can also establish whether safety can be improved upon using the safety measures outlined in the various case studies contained in this document, or from UK and international SuDS design manuals (section 8).

Short-term measures may include, introducing or increasing the number of warning signs at relevant parts of the site and at relevant times of year (i.e. ice) in line with the ruling from *Darby* (see sec 5.3), signs that exclude liability, the planting of vegetative barriers, fencing off steep slopes and or deep water and beginning community education programmes to increase awareness of the risks of deep water.

9.2 Longer Term Solutions

In order to remedy the current fear of litigation and remove this as a barrier to the adoption of sustainable drainage systems it may be desirable to initiate a proposal by which sustainable drainage systems could be exempted from the Occupiers' Liability Acts. This research has demonstrated that this may be achieved in one of two ways:

- The exemption of all land used for recreational purposes from liability, possibly under an amendment to the Countryside and Rights of Way Act 2000
- The specific exemption of SuDS from liability where safety design (and maintenance) meets specified criteria in a Code of Practice

It should be remembered that any law change (either through exemption of recreational land or a code of practice) would provide exemption from Occupiers Liability Acts only where care has been taken to ensure the safety of visitors and any deliberate, wilful or malicious act would still be classed as negligent. Consequently, care must still be taken to ensure public safety and a change in the law would not provide SuDS operators with a 'licence to kill'.

9.2.1 Countryside and Rights of Way Act 2000

The provisions contained within the Countryside and Rights of Way Act 2000 are, as discussed in section 6.1, intended to give greater freedom for people to explore open countryside introducing a new statutory right of access for open-air recreation to mountain, moor, heath, down and registered common land but removes liability in respect of natural features of the land. However, a SuDS retention pond in isolation obviously falls outside of these definitions and such designation would seemingly only occur where the pool is already part of such land, and land that is already designated may hold some degree of appeal to SuDS authorities for the location of a sustainable drainage pond. There is though the possibility that the provisions already enacted by the CRoW Act 2000 could be extended to include all land used recreational purposes, as has been the case in Canada and the US. In these countries, liability has been restricted to encourage the use of private land for recreational pursuits but does not remove liability where there have been deliberate or malicious acts with intent to do harm to another person. Liability in these cases has been restricted so as to calm the fears of landowners that they may be forced to pay substantial damages to visitors injured on their land and in

essence remedies precisely the same adoption difficulties as being experienced in the SuDS context.

There is also the potential, as discussed in section 6, to redefine 'natural features' to encompass sustainable drainage systems and this may indeed present the most simple solution by which a legislative change could be made. The CRoW Act 2000 already contains some interesting provisions that should the restriction of liability be extended to include all recreational land, would be of use in the management of a SuDS retention pond. Section 2 of the CRoW Act 2000 gives people a right of entry onto access land for recreational purposes but schedule 2 restricts activities and behaviour whilst accessing the land that could feasibly include swimming and allows the owner of the land to treat persons in breach of schedule 2 as trespassers.

Under S.6 the provision for landowners to exclude or restrict access for any reason for up to 28 days a year when maintenance work could be carried out would obviously prove useful for the periodic removal of contaminated silt and sediment, bankside maintenance, vegetation removal etc without having to conform to the requirements of S.3 (1)(b) of the Health and Safety at Work Regulations 1992 regarding the safety of visitors when carrying out such operations. Crucially under Sections 17, 18 and 19 local authorities may make byelaws to preserve order (i.e. swimming as with Yorkshire Water), appoint wardens to advise landowners and visitors and secure compliance with byelaws and also to erect notices to provide important information to visitors all of which have relevance to the aforementioned safety aspects of open water discussed in chapters 3, 4 and 7.

Furthermore, the removal or restriction of liability from all land used for recreational purposes would surely prove popular with landowners where liability is a significant cause for concern. Conversely, however, this proposal may not encompass SuDS schemes where the retention pond has little or no amenity value and not used for recreational purposes, for instance a pond located in the middle of a roundabout that forms part of the sustainable drainage system of the Dunfermline East Expansion described in section 3.5.

9.2.2 The SuDS Safety Code of Practice

Chaplin (2002) in the paper *'Sustainable Urban Drainage Systems – The Problems Associated with Wildlife and Habitat Protection Law to the Operation and Maintenance of SuDS and Suggestion for Reform'* concluded that the most effective way for SuDS to be exempted from wildlife law whilst maintaining rigorous species protection was under licence using a set series of conditions. Likewise, the proposed safety Code of Practice suggested below would remove liability in respect of personal injury (except for deliberate or malicious acts) and yet maintain the highest possible safety standards at stormwater retention ponds and at the same removing any ambiguity or contradiction regarding safety design that is encountered in the relevant literature. This proposal could easily be incorporated into the new National Suds Working Group (2003) proposal for a wider SuDS Code of Practice that is expected to be complete by late 2003. Furthermore, this proposal for a safety Code of Practice, has already won support, through personal correspondence from noted SuDS authorities such as HR Wallingford, Johnston Smith Consultants and David Harley from SEPA and the Scottish SuDS Working Group. A safety Code of Practice should embrace the relevant legal principles and existing safety guidance and therefore should include the following requirements:

Situation

The position of the pond clearly requires careful consideration. In the DEX example discussed in section 3.5, the councillors and residents fears regarding safety were in part removed by the open and accessible situation of the ponds so that local roads, footpaths and indeed houses provided a high degree of natural surveillance for the pools, a feature endorsed by the National SuDS Working Group (2003). As discussed previously no UK cases of litigation involving SuDS have been discovered; however as mentioned in section 5 situation of a pond proved crucial in determining liability in the US. The *Cope v Doe* [1984] case illustrates this perfectly where the developer was found not to be liable as the pond was located only 100 metres from residential apartments and clearly visible and the area included other recreational facilities including a children's play area. Under this proposal for

legislative change, a SuDS pond would be required to have an open and visible aspect that would serve to improve accessibility and amenity.

Safety Bench

As was discussed in section 4 accessibility to the water appears to be the most crucial safety aspect of all. Side slopes with shallow gradients adjacent to the water are recommended both by CIRIA (2001) and a number of foreign SuDS design manuals (section 8.2) and are referred to as 'safety benches' by US manuals. A safety bench is easily incorporated into a SuDS pond under current domestic guidance as CIRIA recommend that at least 25% of the pond area should consist of shallow margins to facilitate the maximum biological remediation of pollutants. Under this proposal the objective of the safety bench would be to reduce the risk of a person entering the water and to reduce the chances of those who do of drowning, and regain a standing position to assist easy egress. The exact dimensions vary in the literature but it seems that the bench should be a minimum 10 feet wide, above and below water level, be a maximum of 500mm (18 inches) deep, cover a minimum 30% of the pool area and have slopes no greater than 4:1 (horizontal: vertical). The use of safety benches is also in accordance with RoSPA (1999) guidance that reduces the proximity between visitors and deep water. Also of note is the principle of a reverse slope just above the water line as recommended by Auckland Regional Council (section 8.2.6). This is designed to stop persons slipping or riding unhindered into the water and should be incorporated into the pool design under this Code of Practice proposal.

Vegetative Barriers

Vegetative barriers can be as effective as fencing in deterring entry to water (as discussed previously) but without the visual obstruction and greater aesthetic appeal (note also role of *Phragmites spp* in pollution remediation). A vegetative barrier under the safety Code of Practice would be used in conjunction with safety benches (note the term 'vegetative benches' in the literature) to provide an effective but safe deterrent and barrier to paddling and swimming. Furthermore, practically every

SuDS and water safety authority recommend the use of vegetative barriers that may also include a swampy, boggy area as an additional deterrent. Tall reed species would seem to be the obvious choice to form the majority of the barrier but spiny, or stinging species (e.g. thistle *Cirsium spp*, stinging nettle *Urtica dioica*) could also be included in the boggy area.

Fencing

As discussed fencing is something of a controversial issue. SuDS authorities do not advocate the use of fences and many authors point out that rivers and streams are not fenced off because people like to walk besides them; likewise roads and streets that are inherently more dangerous are not fenced. Under this proposal for a safety Code of Practice fences would not be considered essential where other features are in place, for example vegetative barriers, because of their visual obstruction (reducing natural surveillance), the challenge to children to climb them and their likely hindrance to rescuers in emergencies. However the innovation of a 1 metre high fence in the DEX would be particularly appropriate where very young children are resident nearby and may serve to reduce residents own fears regarding the safety of having a retention pond in their neighbourhood without the visual obstruction of a higher fence. Under this Code, fences would only be necessary where other features are not present, for example because lack of space prohibits safety benches and where there are steep slopes. However, these problems could be rectified at the design stage by identifying a more suitable and spacious site on which to locate the retention pond, as discussed above situation is extremely important in ensuring safety.

Footpaths

Well-constructed, clearly defined footpaths have an obvious role to play in safety. Not only do footpaths enhance the recreation value, providing a route for visitors, paths can also lead visitors away from areas that are more dangerous and allow views of the water where it is safest. Paths can also increase the natural surveillance of the site (as in DEX example section 3.5) and if routed

intelligently serve as short cuts for the community, effectively creating neighbourhood 'security' patrols of the site.

Life Saving Equipment

Life saving equipment is in general discouraged because of the risk of vandalism or theft by CIRIA and Yorkshire Water and therefore unreliability in the event of an emergency. This is confirmed by the author's own experience of the theft and vandalism of throw lines, whilst working as a Ranger for Severn Trent Water at Draycote Water Reservoir, near Rugby.

Signs

Signs are the primary means by which to relay information regarding dangers to visitors. Signs warning of the proximity of deep water and the risk of drowning would obviously be required under a safety Code of Practice as would signs warning of the risk of Weil's disease from the ruling in *Darby v National Trust* (section 5.3) where the Court held that a sign was warranted due to the insignificant cost. Indeed if we extend this legal principle then signs warning of blue green algae and ice would also be required at the times of year when they are likely to be encountered. A general information sign should also be positioned at a prominent part of the site to give site information outlining areas of particular danger, hazards and general information about sustainable drainage as part of community education. However, from the *Tomlinson* case it is clear that the law does not consider signs alone to be sufficient where there is a history of incidents such as swimming at a particular site. Under this proposed Code of Practice the SuDS operator would be required to initiate some form of site security presence to deter or remove swimmers.

Byelaws

The Code of Practice would allow the SuDS operator to impose byelaws on the site where it feels they are required, for example, where there is a history of problems at a site. Section 157 of the Water

Industries Act 1991 allows Yorkshire Water use this strategy successfully under their own Code of Practice to prohibit bathing.

Allurements

Careful thought must be given to what constitutes an allurement in the design and planting stages of construction of new SuDS ponds and those already in operation. Shrubs with shiny berries should be avoided close to the waters edge, as should islands or boulders (see section 4.1) within the water body itself. Note that the liability of those who design and construct SuDS is not discussed in this document.

Education

This proposal would also require that the operator instigated a public awareness initiative outlining the need for sustainable drainage to encourage community participation as has been so successfully used in the US and Australia. RoSPA (1999) feel that familiarity with a danger increases safety and information should be made available to residents, community groups and schools, who may also use the SuDS ponds as part of a wider water safety project.

Audits and Inspections

Periodic audits and safety inspections of the site would be required, as would continual risk assessments. Despite exemption from liability, safety should remain of paramount importance and a continual review process would examine the adequacy of safety measures at the site and highlight any potential problems should conditions change and give a sound basis for improvements.

9.3 Final Conclusion

It was noted in chapter 6.1 and again in chapter 9.1 that Section 13 of the CRoW Act 2000 provides (by amending the OLA 1984) that, '…occupiers of access land will owe no liability to those

exercising the right of access, nor to trespassers, in respect of risks arising from natural features of the landscape; any river, stream, ditch or pond; and the passage of any person across a wall, fence or gate (except by proper use of a gate or stile).' The question was also raised that could the term 'natural features of the landscape' be amended or redefined to include sustainable drainage systems? Indeed this appears to be the most straightforward and practical solution to achieving the desired legislative reform and may still encompass the safety Code of Practice discussed in section 9.2 where SuDS in acquiescence with good design practice are included under the amendment. Furthermore, existing provisions contained within the 2000 Act (see chapter 6.1) would enable local authorities or water companies to effectively manage a sustainable drainage system, for example closure of the facility for up to 28 days to complete maintenance activity (note the requirements of S.3 (1)(b) of the Health and Safety at Work Regulations 1992) and the power to make relevant byelaws.

The author therefore feels that it is this proposal that deserves the utmost consideration in order to achieve the objective of removing the fear of litigation as a possible barrier to the adoption of SuDS.

9.4 Accomplishment of Research Objectives

The objectives that were set out at the beginning of this research have, in the most part been achieved. This document has shown that sustainable drainage ponds pose a significant threat to public safety and that the Environment Agency, among others, are actively promoting and advocating the benefits of SuDS in urban communities for recreational use, with the potential effect of increasing the proximity of water and people. This research has also demonstrated that tragically, between 300 and 400 people die each year at inland water sites, a problem that is apparently accentuated during very hot weather as discussed in section 1.

It has also been shown that SuDS operators are potentially liable, under the Occupiers' Liability Acts for death and injury occurring at a SuDS pond as a result of negligent practice. It should be reiterated

again that this research has considered only liability in relation to SuDS operators and not designers or those involved in construction and neither has it considered liability in respect of the Health and Safety at Work Act 1974 or the 1992 Regulations. The fear of litigation can be considered as a barrier to the widespread adoption of SuDS by water companies and local authorities.

The part of this research that is the least complete is regarding the current experience of operating SuDS and the safety measures taken by the owners of other open water features such as reservoirs and park lakes. Approximately 40 water companies and local authorities were contacted in relation to this, as were CIRIA, the EA and noted SuDS consultants. The number of replies was particularly disappointing and in the author's opinion possibly serves to undermine the strength of the arguments contained within this document. The author also notes that much of this research was undertaken in July and August, traditionally popular holiday periods when relevant staff members at these organisations are possibly on vacation, and recommends that those who seek to undertake similar research account for this accordingly.

The disappointment regarding the low number of replies was to some extent rectified by the excellent information provided by those who did reply and indeed the author owes a particular debt of gratitude to Sarah Austin, Miles Foulger, Howard MacKenzie, Michelle Malcolm, David Moore, Steve Morgan, and Mike Whitehead (see section 11 and Appendix A).

The primary objective was to suggest how the litigation adoption barrier could be removed through legislative reform. It is the author's opinion that this can be achieved relatively simply by amending the Countryside and Rights of Way Act 2000, and incorporating the good design practices discussed into the wider SuDS Code of Practice currently being prepared by the National SuDS Working Group.

9.5 Closing Comments

As environmental awareness increases and further sustainable patterns of development are encouraged, there is the potential for additional instances where statutory legislation effectively discourages investment in such development. CIRIA (2001b) and the National SuDS Working Group (2003) admit that there is no clear guidance on who is responsible for the maintenance and operation of SuDS and report that DEFRA is currently considering whether legislative change is required to facilitate and encourage investment and adoption of SuDS.

Newman (1999) in his article *The Water Abstraction Licensing System in England and Wales: Is There a Case for a New Approach to Hydropower?* recommends a type of licence that recognises the special contribution of hydropower to the environment; similarly the Code of Practice proposed above for a SuDS system would recognise the contribution and benefits of SuDS in terms of environmental improvement and flood reduction and encourage rather than discourage the development and adoption of sustainable urban drainage systems.

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APPENDIX B. SIMPLE RISK ASSESSMENT MATRIX

(Refer to matrices in section 4.1.1 for definitions)

Risk	Probability	Severity	Risk Level	Required Action
Persons swimming	Medium	Medium	Moderate	Improved design. Shallow, boggy/muddy margins with vegetative barrier to deter access. Increased signage and education (i.e. children). Repeat incidents will require on site supervision.
Ice skating on frozen pond	Medium	High	Substantial	Marginal deterrents less effective when heavily frozen. Ice warning signs, displayed when pool is frozen and on site supervision will be required.
Slipping/falling into water by:				
(i) Angling	Medium	Medium	Moderate	Shallow marginal water with safety bench/ scramble rocks allowing easy egress from water. Vegetative barrier may prevent egress from water.
(ii) Walking	Medium	Medium	Moderate	Clearly marked footpaths routed away from waters edge. Gentle slopes adjacent to water. Steep slopes will require fencing. Maintenance and inspection schedule.

Risk	Probability	Severity	Risk Level	Required Action
Blue green algae	Medium	Low	Tolerable	Warning signs displayed at times of algal blooms. Shallow, muddy margins should deter swimming and therefore contact with algal bloom. Repeat swimming incidents will require supervision.
Weil's disease	Low	High	Moderate	Warning signs required from ruling in *Darby v National Trust*. Additional vermin control measures i.e. litter removal add to aesthetic appeal. Heavy infestation may require poison or trapping to minimise nuisance to local community. Monitoring program.
Falling trees or branches	Medium	Medium	Moderate	Tree inspections. Removal of dead/diseased trees or branches
Dog fouling	Medium	Medium	Moderate	Dogs Fouling of Land Act 1996. Signs, dog bins.
Poisonous plants	Low	Medium	Tolerable	Can be avoided at design and construction stage. Fruit bearing shrubs may act as allurement to children and should be removed. Risk from seeds dispersed from other sources considered.

APPENDIX C. SCENARIO BASED LIABILITY

Scenario A. Optimum Scenario

In this scenario, the SuDS retention pond complies with best practical design. The pond has been incorporated into a wider housing and industrial development on former Brownfield land and is designed to receive runoff from the housing estate and its roads. The amenity value of the pond is a positive selling point, and the pond has been designed in such a way that it is open, visible, easily accessible and attractively landscaped so that the local community are well aware of its presence. The pond is situated close to the main road through the development with housing, footpaths and cycle ways close by providing a high degree of surveillance from passers by.

The pool is 2 metres deep with 30% shallow marginal area as specified for maximised water treatment and safety. The shallow marginal area incorporates a vegetative bench 5 metres into the pool and less than 50 cm deep. The water line is marshy and boggy to discourage entry and planted with tall reeds. The slopes at the edge of the pond are gentle and flat, less than 4:1. Footpaths lead around the site and indeed across it to give local people a short cut that further encourages the use of the area improving natural surveillance. These footpaths are flat, constructed with gravel for maximum grip and clearly defined with overhanging vegetation regularly cut back. The footpath also leads the public away from the inflow culvert as a precaution. As a concession to worried parents, a 1 metre high fence is sited between the footpath and vegetative barrier as a barrier to the youngest children without acting as a visual barrier or hindrance to rescuers.

Information signs are positioned at prominent access points to the pond. These show a map of the site and the water depths. It also includes information on the dangers of swimming and an outline of the role of SuDS in improving the environment highlighting particularly the levels of pollution and low water quality likely to be encountered within the pond as an extra deterrent to persons entering the water. There are additional ‘nag’ signs around the perimeter of the pond i.e. ‘danger, no swimming’ at set intervals and in prominent, visible positions.

Signs warning of ice and blue green algae are displayed only when required. The local authority, who have agreed to adopt the facility despite reservations over possible litigation, have undertaken a community awareness campaign with door to door leaflets, talks to community groups and visits to the pond by schoolchildren. There has been no history of swimming or other problems at the site

In this scenario we examine liability issues for 2 separate incidents at this site:

A 30-year-old local man died whilst swimming in the pond following a night out with friends. The man had been drinking and swam in the pond to cool off and the man's widow is seeking to recover damages under the OLA 1957. The first relevant legal point is made by Scrutton LJ who stated in *The Carlgarth* [1927] P83 110 'when you invite a person into your house to use the stairs you do not invite them to slide down the banister'. There were clear warning signs at the site of which the man must have been aware and has obviously exceeded his invitation by climbing the fence and overcoming the vegetative barriers. The man can therefore be classed a trespasser and owed only the duty of care under the OLA 1984. As section 1(5) of the 1984 Act states liability can 'in an appropriate case be discharged by taking such steps as are reasonable in all the circumstances of the case to give warning of the danger concerned or to discharge a person from incurring the risk'.

Clearly, the SuDS operator has fulfilled this requirement and the court would probably hold them not to be liable for the man's death. Furthermore the direction of the law as far as adults are concerned is that you must take responsibility for your own actions and the SuDS operator has exceeded the requirements laid down in *Staples v West Dorset District Council* [1995] PIQR 439, where the court stated 'if the danger is obvious, the visitor is able to appreciate it, he is not under any kind of pressure and he is free to do what is necessary for his own safety, then no warning is required'.

An 8-year-old boy who lived opposite the site drowned in the retention pond while playing. The SuDS operator has been careful to consider children less careful than adults and possibly not

understand the dangers of the site through the erection of the safety fence, to not present any allurements to entice children to fall or enter the water and improve water safety awareness of schoolchildren generally and specifically regarding the SuDS pond through their community education scheme of which both the boy and his parents had been involved. The same legal principles apply as above and from the ruling in the American case *Cope v Doe* [1984] the SuDS operator would probably be found not to be liable for the drowning as the pond was located in close proximity to houses and roads and clearly visible presenting an 'open and obvious danger'. Furthermore there is some expectation that the parents should take some responsibility for their children's actions and it is reasonable to expect that both parents and child should have been fully aware of the danger presented by the pond.

Such good design would easily conform to the proposed Code of Practice and allow the operator of the site exemption from liability. Costly and lengthy court proceedings would then never arise from cases such as those hypothesised above removing the fear of litigation as a barrier to widespread SuDS adoption.

Scenario B. Worst Case Scenario

In this scenario the retention pond was constructed some years previously as part of an industrial development. Adoption difficulties meant that the developer is still responsible for the operation and maintenance of the site. Several problems were encountered during construction, mainly that the lack of space in which to situate the retention pond means that the pond has very steep sides and is several metres deep, so to accommodate the necessary volume of water.

The pool is 4 metres deep with no shallow margins. The pond was never designed with recreation in mind, however the developer did erect a 5-foot high fence as a deterrent to access with no swimming signs at either side. No other safety measures or deterrents are present as the developer did not consider it necessary as the pond was not for general recreational use. Some efforts were made at

landscaping the site, an island and some shrubs but the general appearance is one of neglect. The fence is broken and the banks are overgrown and the pond surface covered in algae and duckweed (*Lemna sp*) during the summer.

The pond is located at the side of a large industrial unit but has no nearby footpaths or roads and although near to some residential housing and offices cannot be seen because of the adjacent factory, the fence and undergrowth and local residents and employees of the site are unaware of its presence. There has in the past, due to the secluded nature of the location been some problems at the site with youths drinking and reported to be swimming by police officers. The developer responded by positioning the no swimming signs.

If the same incidents discussed in Scenario A had occurred at this site, liability issues are very different.

In Scenario A the 30 year old man who drowned after drinking was owed only the duty of care under OLA 1984, which was fulfilled by the local authority. In this instance, however the developer has taken minimal safety precautions and has not conveyed sufficient warning regarding the nature of the risks as required under the OLA 1957. Furthermore from the House of Lords ruling in *John Tomlinson v Congleton BC,* (where a quarry was used by members of the public for swimming and diving over a period of time despite warning signs), that the local council must have been aware that the signs were not working, that water is an attractive destination for the public and that the local authority had failed to take further measures to prevent people from swimming in view of the failure of the signs, the developer has a strong probability of being found liable to pay damages.

In the case of a child, drowning the developer is again potentially liable. The developer has taken no precautions for children to be less careful than adults. The child or their parents may not have been

aware of its presence due to the sheltered nature of the site and from the rule in *Guillot v Fisherman's Paradise Inc* [1983] the overgrown banks and weedy surface may have prevented the child from fully appreciating the presence or depth of water. The presence of the island and ornamental shrubs may be considered by the Judge to have acted as an allurement to a child increasing the risk.