

The Shetland Islands

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Abstract

Shetland is one of the stormiest places in Europe. The islands are very exposed to westerly gales from the North Atlantic and over the years the population has learned to ensure that the buildings are constructed to high standards of resilience. As a result, wind damage is rare and minor even in the strongest storms. The islands are therefore a good example of how resilient design and construction can reduce vulnerability to such an extent that the risk is minimised even in areas exposed to severe hazards.

Key words: Shetland, storm, vulnerability, flood, climate change, insurance.

Introduction

The Shetland Islands, or Shetland² is a group of islands, located 200km to the North of the British mainland. Most of the islands are north of 60⁰ latitude, and the most northerly island, Unst, is as far north as Anchorage, Alaska, and further north than Leningrad. Despite this, the climate is mild, thanks to the influence of the North Atlantic Drift, the “Gulf Stream” and snow or frost is unusual. In summer the nights never really get dark, but in winter the days are short.

Shetland is one of the most beautiful parts of the world, especially on a good day. It is also one of the stormiest places in Britain, with up to five times as many gale days

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² Note it is no more correct to say “the Shetlands” than it is to say “the Scotlands” or “the Englands”.

as mainland Scotland. Houses are therefore designed, built, and maintained to extremely high standards by local builders, and storm damage is rare. It has full employment, little crime, and a hospitable, friendly, population who are proud of their Norse heritage and separate legal system. There are 9,891 houses and a population of 22,740, in an area of 1,408 square kilometres (543 square miles). A third of the population live in Lerwick, from the Norse “leir vik”, meaning “muddy bay” (the polite translation). Lerwick is situated on the biggest island, which the people call simply “the mainland”, an indication perhaps of their independent spirit. Although Shetland is part of Scotland, for many islanders, the Scottish “mainland” is another country a long distance away.

Although isolated, thanks to frequent air and ferry services within the islands and with mainland Scotland, the islanders are remarkably cosmopolitan, prosperous, and well travelled. They are also sophisticated internet users, and many buy goods through the internet. Although there is no undersea broadband connection, a growing number of businesses and individuals subscribe to satellite broadband links.

There is no consensus amongst scientists on whether climate change will make storms more frequent or severe, but in the UK it is likely that storm tracks will shift south to areas where buildings are less resilient, such as the South of England and Northern France³. This means that Shetland may have fewer storms in the future. However, coastal flood events, when they do occur, are likely to become more severe, for reasons explained later.

The Council has funded a large number of small coastal defence schemes, and has now established a flood appraisal group of experts to advise planning authorities.

Risk of damage or injury is a combination of hazard, vulnerability and exposure. Shetland has a high hazard from coastal storms, but risk is kept low by resilient construction, which reduces vulnerability. However, some newer properties have been located in more exposed areas, and the risk of damage to these is higher.

Historical background⁴

Between 780 and 850 AD Norse raiders and emigrants arrived in Orkney and Shetland from Norway. Current opinion is that this was a peaceful and gradual colonisation as opposed to an armed struggle. However, in 1471 the islands were annexed to Scotland as security for the unpaid part of the Norwegian Princess Margaret’s dowry for her marriage with James III of Scotland. The remainder of the dowry has never been settled; as a result Orkney and Shetland remain part of Scotland, although the Norwegian Crown still has some residual sovereignty. Some legal academics argue that Norway could theoretically be entitled to buy the Shetland Islands back for 8,000 florins, although this is unlikely to happen. Many Viking traditions still exist in Shetland, the most famous of which is “Up Helly Aa” to celebrate the rebirth of the sun after the long winter nights. Approximately 900 local

³ Dronia, H., 1991. “Zum vermehrten Auftreten extremer Tiefdruckgebiete über dem Nord-atlantik.” Die Witterung in Übersee, 39(3), 27. Cited in Parry, M.L. (Editor), 2000 “Assessment of Potential Effects and Adaptations for Climate Change in Europe: The Europe ACACIA Project.” Jackson Environment Institute, University of East Anglia, Norwich, UK, 2000, 320pp

⁴ McGlashan, 2002. “Udal Law and Coastal Land Ownership” Juridical Review 2002, Part 5: 251-260. Green, Edinburgh.

people in various costumes participate. This takes place on the last Tuesday in January every year.

Legal Aspects

In 1567 an Act of the Parliament of Scotland was passed allowing the Norse laws of Orkney and Shetland to prevail over the Scottish common law. This remains the position today. The term ‘udal’ is in current use to mean any relict of the Norse laws operating in Orkney and Shetland⁵. Case law has held that the UK Crown has no rights over the foreshore as in the rest of the UK (except for Treasure Trove) where an udal title exists. The foreshore is in private ownership, right down to the “lowest low tide” where the adjacent landowner holds an udal title⁶. (However, a number of titles in Orkney and Shetland have been converted from udal to feudal through dealings with the Crown⁷.)

A consequence of this could be that there are problems in building a continuous coastal defence if owners of the foreshore refuse to co-operate. There is nothing to stop an udaller constructing buildings or infrastructure on the foreshore unless the development requires planning permission through the Town & Country Planning (Scotland) Act 1997. For example the sailing club at Scalloway has constructed their own berthing and coastal protection facilities on the foreshore without the need for planning consent from the local planning authorities.

Social, Economic and Moral Hazard Aspects

Shetland has the lowest unemployment rate in Scotland, at less than 1.5%. Crime levels are low, but drug abuse is a growing problem. There is no longer any HM Customs presence on the islands, despite frequent sea traffic from all over the world. Public concern is such that in 2002 there was a successful public collection to raise funds to enable the police to provide two drug sniffer dogs and handlers. There is a high rate of alcohol consumption and suicide, probably due to the remoteness of the area.

There is a major oil processing plant and terminal at Sullom Voe, in the North West of the main island. It collects, filters, and stores oil from a large number of North Sea oil fields, and also from Russia. In terms of tonnage shipped, it is in the top ten British ports (see table).

Top ten ports in 2002 in terms of tonnage:

	Million tonnes
Grimsby and Immingham	56.1
London	51.2
Tees and Hartlepool	50.4
Forth	42.0
Milford Haven	34.5
Southampton	34.1
Liverpool	30.4
Sullom Voe	29.4

⁵ As opposed to the feudal system operating on the mainland.

⁶ Unlike the rest of the Scotland where the foreshore ends at Mean Low Water Spring (MLWS), in Orkney and Shetland it ends at the lowest astronomical tide level (LAT). Ordnance Survey shows MLWS on its maps in Orkney & Shetland and strictly speaking this is incorrect.

⁷ McGlashan *op. cit.*

Felixstowe	25.1
Dover	20.0

Source: Provisional Port Statistics 2002. Freight traffic through UK ports, Department for Transport (29 May 2003.).

The Council has invested money received from the oil industry (well over £100m) in the Stock market, and interest and dividends have supported many community welfare schemes, such as swimming pools, leisure centres, and sheltered housing. In recent times this source of income has been suffering from the downturn in share prices, leading to cut backs in council spending. There are also problems in the oil industry, with redundancies planned at Sullom Voe, and several local businesses are suffering. Tourism and fish farming are doing well. Shetland wool is world famous for its fine texture and warmth (even the sheep have adapted to the stormy conditions) and remains popular, especially in Japan. Much of the wool is woven or knitted by hand in people's homes.

Property values in Lerwick are comparable to Aberdeen, but fall away sharply outside a radius of ten miles from Lerwick. For example, a three bedroom detached bungalow at Sumburgh would cost around £45,000. There are a large number of purpose built holiday cottages (and a number of second homes) most of which are unoccupied during the winter. Caravans are virtually non existent and would be vulnerable to storms.

Lerwick has a good range of shops, but those facing the harbour have outward opening doors as a protection against the wind and most of the shops are set well back from the sea in a narrow sheltered street. The major banks all have branches in Lerwick. The Halifax building society has an agency office in the main street. Mobile telephone and terrestrial television and radio reception can be poor in some areas especially in adverse atmospheric conditions – the aurora borealis is a relatively common sight in winter - but satellite television reception is generally good. There is one local newspaper.

Resilient Construction

The majority of houses have Welsh slate roofs⁸, and thick stone walls. In all cases, storm resilience is high. Maintenance standards also seem to be very good. All construction is by local builders using traditional Scottish or Scandinavian designs. Only three days before one of the visits by the author (November 2002), there had been a force 12 storm, which had prevented the large Lerwick to Aberdeen ferry from docking for 42 hours. Despite the force of the storm, the author could see no indication of any damage whatsoever to any housing or other buildings. Even garden sheds in Shetland are built to last.

Geology and Climate

Shetland has been largely treeless for the last 10,000 years, but abundant peat deposits indicate that in the past it had a warmer climate and forests. Peat can pose a serious landslip hazard if there is a period of drought followed by heavy rain⁹. The peat acts

⁸ According to Vic Hawthorne of Shetland Islands Council, this originally this came from the slate ballast used in ships calling at Lerwick (Personal communication, November 2002).

⁹ Dr O.M. Bragg, University of Dundee. Personal Communication, November 2002.)

as a sponge and when it dries out, heavy rainfall quickly filters down to the bottom of the peat layer and acts as a lubricant, allowing the peat to slide. This could be a particular concern at the Sandy Loch reservoir where a peat slide into the reservoir could cause overtopping. Long periods of drought are to be expected with climate change along with more severe bursts of rain and this hazard has been emphasised to the SIC.

The effects of glaciation are easily seen. Lowering of the sea level during Ice Ages enabled the glaciers to carve out steep sided valleys to well below current sea level. As the ice melted, these valleys, or “voes”, flooded as sea levels rose by some 8 or 9 metres to produce these characteristic deep-water sea inlets¹⁰.

A number of small settlements have been established at the heads of these voes, and may be vulnerable to flood as storm surges are funnelled up the voe. Narrow spits of shingle or sand, called “ayres” are quite common, cutting off a sheltered stretch of water to form a shallow freshwater loch, or “oyce” which may silt up to become first marsh, then a stretch of fertile land. Sometimes ayres form “tombolos” joining islands to offshore islands.

An interesting anomaly is that during the last Ice Age, while the North of Scotland was covered in glaciers, there is no evidence of glaciers in Shetland or Orkney at this time, perhaps due to the effects of the Gulf Stream. This means that while land in the North of Scotland is rising due to isostatic rebound, the land in Shetland may actually be sinking. However, measurements seem to indicate that the net rise in sea level in Shetland is currently only around 2mm per annum¹¹.

Historic Storms¹²

Professor Dawson and his colleagues at Coventry University have compiled a detailed record of storm and flood events for the last 500 years. He has detailed gale data for Lerwick and Muckle Flugga (Unst) from 1866.

The following are some very brief extracts from his records, just to give a taste of the information he has collected:

- *July 1832, a “great gale”, 100 men drowned*
- *August 1833, a “hurricane”*
- *September 1840 ‘... the most severe gale of wind known in memory of the oldest in Shetland at this season of the year’. ‘Furthermore the financial consequences of losses incurred as a result of the storm contributed significantly to the closure of the Shetland Bank that was later declared bankrupt owing approximately £60,000.’*
- *1854, at Muckle Flugga, Shetland where David Stevenson was conducting his initial survey for a lighthouse site, he made note of a six-ton block of stone which had been “torn from its moorings eighty feet above sea level and hurled into the sea below”.*

¹⁰ Auton, C., Fletcher, T., Gould, D., (undated) “*Orkney and Shetland*” British Geological Survey, Edinburgh, and Scottish Natural Heritage, Battleby.

¹¹ Dr Andrew Black and Dr Rob Duck, University of Dundee, personal communication.

¹² Prof. A. Dawson, Coventry University, Personal communications, 2002..

In more recent times, the highest wind speed recorded since 1922 is 109mph in January 1992. The “Braer Storm” in January 1993, produced an atmospheric pressure of 916mb, very near the European record low of 914mb. (The 1953 storm which killed 300 people in England was a low of 972mb). The Braer was an oil tanker, which ran aground during the storm causing widespread oil contamination. Some of the oil was blown into the Sandy Loch water supply reservoir, covering the whole reservoir with an oil slick, even though the top of the reservoir wall is 76.45m above Ordnance Datum¹³.

Coastal flood risk

In Shetland there is a tradition of living near the coast, as the sea provided livelihoods and transport. When roads were built, they were often near the coast too, encouraging more coastal development. Many of the newer houses are on higher ground, but this is perhaps more for the sake of the views, which are spectacular, than for lower flood hazard.

Anyone can apply to the Council for an 80% grant to have their own coastal flood defence built, a feature which may be unique in Scotland and is perhaps due to the udal legal system. This has resulted in a large number of individual coastal defences, built to varying standards of service, mainly using rock armour quarried in the Council’s own quarries.

Coastal storms in Shetland can be very severe. Storm beaches, where rocks have been washed inland, sometimes up to 18 metres above sea level, illustrate the power of the sea during Westerly gales¹⁴.

Future coastal storm floods could become more severe with climate change. There are four main factors, high tides, wave heights driven by an offshore or alongshore wind, storm surges caused by wind and low air pressure, and rising sea levels¹⁵.

Tides

The tidal range in Shetland is moderate. There is a tide gauge in Lerwick Harbour, operated by Proudman Oceanographic Laboratory. Maxima data from Jan 1959 to Oct 2000 show that the highest recorded level in this series is 1.774 m AOD Lerwick in January 1993. (Note the reference to “AOD Lerwick”. Normally “Above Ordnance Datum” (AOD) refers to Newlyn, Cornwall. However, the Ordnance Datum used for Shetland is located at Lerwick.)

Waves

Average wave heights are around 3 metres, and the wave climate is rising. By 2080, the average could be around 4 metres, and maximum offshore wave heights could be as high as ten metres¹⁶

¹³ Milroy Lionel, Scottish Water, Shetland. Personal communication, January 2003.

¹⁴ Auton et al *Op Cit*

¹⁵ Zong, Y., and Tooley, M.J., 2003. “*A Historical Record of Coastal Floods in Britain: Frequencies and Associated Storm Tracks.*” *Natural Hazards* **29**: 13–36, 2003. Kluwer Academic Publishers.

¹⁶ W. McGuire, Benfield Greig Hazard Research Centre, 2001 “*A Guide to the End of the World*” Oxford University Press

Storm Surge

Storm surges around mainland Scotland have been predicted to become around 3 to 4 metres by 2080¹⁷, and similar levels can perhaps be assumed in Shetland.

Rising sea levels

Climate change could raise relative sea levels in Shetland by between 16-30cm, by 2050. By 2100 AD the rise could be between 30-50cm¹⁸.

The combined effect of high tide, increasing wave climate, increasing storm surge heights and rising sea levels could theoretically result in seawater reaching 10 metres above Mean High Water Spring (MHWS) by 2080. However, many sites in Shetland may not be vulnerable to increased wave heights as they are protected by offshore islands or by their position within a voe. Also Lerwick and most coastal properties are on the east coast of the islands rather than the more exposed west coast. There would need to be a really exceptional storm to affect housing in Lerwick, for example. Unfortunately, as has been shown above, Shetland has already had more than its share of exceptional events.

Surface Water and Culvert flooding

Surface water run off is a growing problem. It used to be limited during the crofting era when crofters dug and maintained “herring bone” drainage ditches on hillsides, but as more crofts are displaced by sheep and as new developments disrupt the drainage ditches, houses are increasingly being flooded by rainwater run off¹⁹. Local elected councillors seem to favour culverting as a solution and various sizes of culverts are used, leading to the possibility of localised flooding due to blockages. There is no sign of the introduction of sustainable drainage systems (SUDS) on any large scale although these are referred to in the draft Local Plan²⁰. It is hoped that this will lead to more SUDS installations.

Surface water run off flooding is likely to get worse, at least in the winter. The latest Hadley Centre Regional climate change scenarios predict that winter rainfall in Shetland will increase by 10% while summer rainfall will reduce by 19%²¹. As indicated above, such conditions, along with the removal of herring bone ditches increase the risk of peat slides.

Freeze Hazard

The Shetland Islands are situated on the same latitude as Alaska, Siberia, Leningrad, Oslo, and the southern tip of Greenland. Because of this there may be a perception that there is a severe risk of freeze and burst pipes. This is not the case, the temperature is usually quite mild thanks to the Gulf Stream. See table²²:

¹⁷ Dawson, A.G., Smith, D.E., and Dawson, S. 2001 “*Potential Impacts of Climate Change on Sea Levels Around Scotland*” Scottish Natural Heritage, Edinburgh.

¹⁸ Professor Alistair Dawson, Coventry University, personal communication, December 2002.

¹⁹ Hawthorne, V., Shetland Islands Council. Personal communication, November 2002.

²⁰ Discussions at Flood Appraisal Group meeting on 19th November 2002.

²¹ Jenkins, G, Cooper, C., Hassell, D., Jones, R., (Hadley Centre for Climate Prediction and Research), 2003 “*Scenarios of climate change for islands within the BIC region*” British-Irish Council (Environment). Available from www.british-irishcouncil.org/climatechange

²² Stirling, R., 1997 “*The Weather of Britain*” Giles de la Mare, London, p142

Table

Average number of days below zero degrees centigrade all day from 1971 to 1990.

	Average per winter	Most in a winter
Lerwick	2.1	7
Aberdeen	2.8	13
Birmingham	4.8	17

It has been predicted by some that the Gulf Stream may decrease in strength by about 20% over the next 100 years due to climate change (although this is still a controversial issue). Even taking this into account, the Hadley Centre regional climate change model predicts that by the 2080s, winters in Shetland may be on average 1.8 degrees Centigrade warmer²³.

Planning Policy

Because of the coastal flood risk, there is a presumption against planning consent for new properties below the 5-metre contour. However, political pressure means that consents are sometimes given for such properties. In such cases, planners may consider asking Building Control to insist on more flood resilient construction methods. They also ask the property owner to sign a declaration that he is aware of the flood hazard and will not complain if his property is flooded. However there is no procedure for transferring this undertaking to new owners. The Scottish Executive planning guideline, NPPG 7, suggests that councils consider erecting permanent warning signs in flood hazard areas, and the author has suggested to the Council that this should be considered, to warn visitors and prospective buyers of the flood hazard.

Flood Mapping

The Flood Estimation Handbook²⁴ is used by civil engineers and their advisers in the UK to assess flood hazard contains no data on Shetland. The indicative flood maps produced for the Scottish Environment Protection Agency (SEPA) by the Centre for Ecology and Hydrology do not cover Shetland. As the majority of the population lives near the coast, storm surge is the biggest hazard, but much of the coast rises steeply from the sea, so the main flood mapping problems are with the relatively small areas of low lying level land.

Insurance issues

Although only a small number of properties are exposed to coastal flood risks, there are only 517 postcodes for the whole of the Shetland Islands, which makes it difficult for insurers to identify such low lying properties. As a result sometimes the islanders have problems obtaining insurance. This is not helped by the fact that insurance companies are generally based in England and perceive Shetland as a high risk area because of the frequency of storms, without being aware that the risk is really very low thanks to resilient construction and a low crime rate.

²³ Jenkins, G, Cooper, C., Hassell, D., Jones, R., (Hadley Centre for Climate Prediction and Research), 2003 "*Scenarios of climate change for islands within the BIC region*" British-Irish Council (Environment). Available from www.british-irishcouncil.org/climatechange

²⁴ Institute of Hydrology (1999) *Flood Estimation Handbook* (5 volumes); Institute of Hydrology, (now called the Centre for Ecology and Hydrology) Wallingford, Oxfordshire

Flood Warning Systems

There is no flood warning system. Shetland is entitled to the Flood Watch service from SEPA, but SEPA have very little data, although a river flow gauging station has recently been installed at Weisdale Mill. Apart from rainfall run off and peat slides, the main flood hazard is from coastal storm surge, and the author has suggested to the authorities that it may be possible to liaise with HM Coastguard to produce some form of warning service.

Emergency Planning

The Council's IT services are to be centralised in a building on low-lying land in the harbour area. Access to this building may be dangerous during a storm (two sailors were killed in the harbour the week before the author's visit in separate incidents each involving wind blown equipment). Flooding could make access difficult and could affect IT and communication equipment in an emergency. It is understood the emergency control room may be located in an upper floor in the same building.

Power Supplies

Any small island is vulnerable to loss of power supplies and Shetland is not linked by electricity cable to the mainland. 300 (rising to 600) houses are supplied with heat and hot water by underground water pipes from a new waste to energy plant, which takes more than 70% of Shetland's waste. It is located at the coast less than 5-metres above high tide level, so is very vulnerable to coastal flooding. The main oil fired power station is adjoining. Neither have any flood defences and the islands heat and power supplies would be vulnerable in a storm surge situation.

There are also experimental wave and tidal power installations, and three large wind turbines. Two additional wind turbines were commissioned in January 2003, generating 3.68MW of wind power to supply 8% of Shetland's winter electricity, and 15% of its summer needs. Scottish and Southern Energy have plans to look into the possibility of enormous wind farms on Shetland which would generate up to 300MW. This would meet all of Shetland's needs, even with very little wind, and would be linked to a new sub sea cable to export power to the mainland. This would presumably reduce vulnerability to loss of power considerably in that power could be imported if necessary using the sub sea cable.

Examples of Flood Hazard areas

Please note, this list is not comprehensive, and only shows some selected cases. It should be emphasised that such cases are not typical. Most property in Shetland is located in safe areas, well away from flood hazard zones.

1. Tingwall (Old Norse name for "Field of Parliament"). Postcode ZE2 9-- (OS grid reference HU 420450)

This is a large area of fertile and marshy flat land, where the Burn of Strand runs into Lax Firth (1°13'06"/60°12'03"). It could be considered a floodplain, and it includes an airstrip for inter island flights. The area is all below 5 metres, as is the nearby village of Veensgarth. Some new houses have been built in the middle of the floodplain, near the Burn, and may be in danger of sinking into the marsh.

2. Eid (English name "Aith", Old Norse for "isthmus"). Postcode ZE2 9-- (OS grid reference HU 345560)

A small village and lifeboat station at the head of Aith Voe (1°22'31"/60°17'10"). While sheltered, there have been a number of flooding events in the past.

3. Hellister. Postcode ZE2 9--

(OS grid reference HU 388498)

This village lies on an "ayre", a strip of flat land between Weisdale Voe and the Loch of Hellister (1°18'02"/60°14'05"). It is vulnerable to storm surges from the West and rainfall run off from the East. There is also a risk to the low lying A971 road which is the only trunk road linking Lerwick to the west of Shetland.

4. Scalloway. Postcode ZE1 0--

(OS grid reference HU 405395)

The capital of Shetland in the 17th Century and the second largest town (1°16'47"/60°08'14"). Scalloway stands on the banks of the Voe of Scalloway. Waterfront properties are less than 3 metres above sea level, with the exception of the old "Laird's House" which has been built on raised land several metres higher. Three recent stretches of coastal defences have been installed, with rock armour, but these are not to consistent standards of service, and there is no continuous protection, as some owners of waterfront properties have not asked for it or refuse to have it. This means that a storm surge could simply wash round the new flood defences. On the other hand, much of the town is built on raised ground behind the waterfront properties. Almost all the ground floor waterfront properties are used as shops or for other commercial purposes.

5. The Sound, Lerwick. Postcode ZE1 0--

(North and West of OS grid reference HU 453400)

While most of Lerwick has been built on raised ground, there has been considerable recent development at The Sound, an area of low lying flat land to the South and West of the old town (1°09'55"/60°08'44"). A short length of new sea defence has been constructed by a supermarket company to protect its shop, but this would not stop the sea from coming onto the land where the defence ends.

A number of houses have been built in the last ten years right up to the dam wall of the Sandy Loch Reservoir and the author has expressed some concerns to the council about the wisdom of this, and the need to engage a peat slide expert to assess the hazard.

Conclusions

The hazard in Shetland from storms and coastal floods is undoubtedly high, but the vulnerability is low, thanks to resilient construction practices, and most coastal buildings are on the relatively sheltered east side of the islands.

However, recent building developments have resulted in some new properties being constructed in areas exposed to a coastal flooding hazard, and the unusual legal system makes it difficult to build continuous sea defences to a consistent standard. In addition, some of the newer property may be more vulnerable than the traditional properties, thanks to features such as floor to ceiling glazing on the seaward side of the buildings to give a good view of the sea.

General information and advice on flood risks is contained in the publication “Flood risk and insurance in England and Wales: are there lessons to be learned from Scotland?” Available free of charge from www.benfieldhrc.org

David Crichton
July 2003.

Postscript, February 2005.

The concerns expressed in this paper about peat slides were emphasised to the council in July 2003 with particular reference to the reservoir. They were unfortunately validated on 19th September 2003 when several peat slides were reported causing the loss of a number of crofts, farm buildings and livestock and the closure of the main road from Lerwick to the airport. Fortunately the rainfall was concentrated just a few miles to the south of the Sandy Loch reservoir, otherwise the event could have had catastrophic consequences.

Following the Freedom of Information (Scotland) Act 2002, it became possible after the 1st January 2005 to obtain hitherto secret engineers’ reports on the Sandy Loch reservoir and dam. These show that following the author’s report to the council they did check the peat hillsides surrounding the reservoir. It is not known if a peat expert has been engaged to review the peat slide hazard.