

COASTAL PROTECTION & FLOOD DEFENCE TOPIC AREA PAPER

GENERAL OVERVIEW

Unlike some parts of England and South-east Wales, erosion problems and the risk of flooding in coastal areas of Pembrokeshire are restricted to just a few areas. Both erosion and flooding are linked to the interaction between land, air and water and particularly where energy in the water exceeds normal levels. Flooding risk is high in areas of low altitude above sea level and is exacerbated by high tidal range, high wind velocity following the flow of the water and, in estuaries and river channels, high freshwater discharge. The lateral and depth compression of the water body within the Bristol Channel and Irish Sea can magnify the effects of tidal surge and wind push to give higher water levels than in open water locations. Erosion predominates in areas of high wind and water energy and low land resilience.

Inundation of undeveloped land is, by and large, considered as a natural event and little if any preventative action is taken. Such areas of land can provide important habitats for a range of specialist plants and animals and can therefore be of high conservation and landscape value. Greater attention is paid to prevention and control when property or public safeties are at risk. Erosion is also largely considered as a natural event and allowed to continue unchecked where property or human safety are not at risk. Prevention of erosion can be a complex and costly process, and it would normally only be considered in cases where the damage resulting from inaction was very significant. Flood warning systems are operated by the Environment Agency to give as much advance warning of impending flooding to communities at risk as possible.

Climate change and sea level rise due to the effects of global warming are likely to have an effect on flooding and erosion risk in the longer term. Ocean expansion and melting of ice reservoirs are estimated to produce increases in sea level height from 0.2m to 0.5m over the next 100 years. The impact of this on the extent of land inundation will depend in part on whether the land mass in question is rising or falling at the same time.

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WHAT DO WE HAVE IN PEMBROKESHIRE?

The coastline of Pembrokeshire is over 350 km in length. It is predominantly rocky with limestone and sandstones in the south and resistant volcanic rocks of Precambrian age, some of the oldest in the UK, in the west and north which help to define the cliffs and offshore islands of the County. The rugged landscape continues into the southern end of Cardigan Bay giving way to low lying sand dunes and alluvium. Climate change and sea level rise are less important in Wales than in many parts of England, as the rugged nature of much of its coastline restricts potential problems of flooding and significant coastal erosion to the low-lying land around the estuaries. Generally, however, whereas the northern part of Wales is static, the southern part of the country is sinking as a result of isostatic factors resulting from the end of the last glaciation.

Low lying, developed areas in Pembrokeshire where flooding is a potential risk include Amroth, Little Haven, Saundersfoot, Haverfordwest, Newgale, Solva, Dale and the Parrog at Newport. Some of these are at particular risk of inundation by the sea at times of high tides and strong on-shore winds (Amroth, Saundersfoot, Little Haven, Dale and Newgale) whereas others are at particular risk when high flooding tides meet high freshwater flows (e.g. the Parrog at Newport, Haverfordwest, and Solva).

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How do Coastal Protection and Flood Defence affect the coastal zone in Pembrokeshire?

Compared to many other regions of the UK, Pembrokeshire's coastal protection and flood defence problems are relatively minor and localised. However, for those private home or business owners who are affected the effects can be emotionally disturbing, hugely disruptive and financially crippling. The areas most at risk within the coastal zone are those on the lower reaches of rivers where the channel capacity is restricted either naturally or through man-made development and low lying, exposed areas of coast. The return period of "1 in 100 year" flood events is decreasing and a lack of accurate historical baseline data is not the only reason for this.

Many factors are at work, both natural and man-made, some of them with their basis remote from the actual coastal zone itself. South and south – westerly winds and waves can carry uninterrupted from South America and build up tremendous energy before meeting the Pembrokeshire shore. Drainage of the uplands through forestry, agriculture or other land use development can dramatically increase the rate of surface water run-off causing erosion of land and channels as it passes, and bringing large volumes of water and silt down into the lower reaches of rivers and into estuaries. Where high freshwater discharge flows coincide with a big flooding tide backed up by strong on-shore winds within a confined channel, the likelihood of a flood event is very high. This is most likely to occur in those lower reaches of rivers before they broaden into the estuary proper, and this is of course exactly where man often chooses to build his towns and work places. High water levels in the channel can lead to holding back of flows from tributaries and storm water and other drains further exacerbating flooding over a wider area. Local examples are Haverfordwest, Cardigan, St. Dogmaels, Newport, Fishguard and Solva. Development within these floodplains still continues despite the flooding risk and the construction of more areas of roof and tarmac adds to the run-off problem.

Changes in weather patterns and onshore wind direction may be responsible in part for changes in both flooding and erosion. The predominant wind direction experienced in the south of the County has reportedly changed from south – westerly to south – easterly which is affecting the deposition and erosion of sand and sediment at many locations including Saundersfoot, Tenby and Freshwater West. This has resulted in the net loss of sand from some important tourist beaches. Whilst responsibility for this phenomenon is being levelled at offshore aggregate dredging activity by some, natural processes are certain to be having a major impact. The importance of sandy beaches to the tourist industry in these coastal areas cannot be over-emphasised and therefore the mechanisms by which the changes to beaches is occurring need to be fully understood and steps taken to restore the situation.

The forces of nature are powerful and the measures required to counteract them need to be robust and durable. In the case of sea and many river defence works, this often means the installation of large and imposing structures which can be intrusive in landscape and environmental terms. The environmentally sensitive design of coastal defences has received increasing attention in recent years, most recently through the

report Guidance for Coastal Defence Design (Environmental Consultancy University of Sheffield, March 2003) commissioned by the CCW and the Welsh Assembly Government. River works design has been well covered by a number of books and papers in recent years with the emphasis where possible of “soft” engineering solutions with the use of natural materials wherever possible. Urban flood and erosion prevention schemes usually require more conventional methods, however.

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ORGANISATIONS AND OTHER INTERESTS INVOLVED

Amongst the organisations working within or who have an interest in the coastal protection and flood defence fields are : -

Welsh Assembly Government; Environment Agency Wales; Pembrokeshire County Council; Pembrokeshire Coast National Park Authority; Farming Organisations such as the Farmers Union of Wales, the National Farmers’ Union, the Young Farmers network; Country Landowners Association; The Crown Estates Commission; DEFRA; Town / Community Councils; National Trust; Countryside Council for Wales; Ministry of Defence; Council for the Protection of Rural Wales; Milford Haven Port Authority / Milford Docks Company; Welsh Coastal Groups Forum; The Arfordir Group; Carmarthen Bay and Swansea Bay Coastal Engineering Group; Cardigan Bay Coastal Group.

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HOW IS IT MANAGED?

The Welsh Assembly Government has responsibility for policy on flood and coastal defence in Wales and operates under a number of Acts of Parliament, including the Coast Protection Act 1949, Water Resources Act 1991 and Land Drainage Act 1991 (as amended 1994). Delivery of the policy is the responsibility of a number of flood and coastal defence “operating authorities”, i.e. the Environment Agency through Local Flood Defence Committees, Local Authorities and Internal Drainage Boards. There are no IDBs in Pembrokeshire.

In April 2001, the National Assembly for Wales Environment Division published a document entitled “High Level Targets for Flood and Coastal Defence and Elaboration of the Environment Agency’s Flood Defence Supervisory Duty to complement similar targets produced for England. The Assembly’s policy aim stated in this document is : -
To reduce the risks to people and the developed and natural environment from flooding and coastal erosion by encouraging the provision of technically, environmentally and economically sound and sustainable defence measures.

The key objectives to achieve the policy were stated as : -

To encourage the use of adequate and cost effective flood warning systems

To encourage the provision of adequate, economically, technically and environmentally sound and sustainable flood and coastal defence measures

To discourage inappropriate development in areas at risk from flooding and coastal erosion

The document sets out a number of High Level Targets for the realisation of the aim and key objectives. A subsequent document entitled “High Level Targets for Flood and Coastal Defence in Pembrokeshire – Strategy Statement” produced by Pembrokeshire County Council in January 2003 sets out the Council’s plans for delivering the Government’s Policy aims and objectives.

The Joint Unitary Development Plan prepared jointly by the Pembrokeshire Coast National Park Authority and Pembrokeshire County Council contains two policies relevant to flooding and erosion of the coastline. Policy 69 provides that coastal development will only be permitted where, inter alia, the land is not subject to flooding, inundation or erosion from the sea; and, the development does not prejudice the capacity of the coast to form a natural sea defence. Policy 70 provides that new and improved sustainable coastal defence work will only be permitted where, inter alia, the development takes into account and works with the requirements of natural processes along the shoreline as far as possible and the design and construction is of the appropriate standard and all practical measures are taken to reduce visual impact.

Coastal Protection

Pembrokeshire County Council is an operating authority under the Coast Protection Act with permissive powers to carry out coastal protection work (works to protect against

erosion or encroachment from the sea). Under the CPA, coast protection works proposed by a local authority, other than maintenance or repair, must have Assembly approval prior to commencing. Local Authorities also have powers to carry out works under the Land Drainage Act 1991 (as amended 1994).

The Environment Agency Wales is the operational body under the Water Resources Act with permissive powers to carry out sea defence works (works to protect against flooding from the sea). The EAW is also empowered to carry out works on rivers under the Land Drainage Act 1991 (as amended).

In simplistic terms, in respect of coastal defence the EAW is responsible for freshwater and the Council is responsible for the seawater. The boundaries between the respective powers are defined under Schedule 4 of the CPA and are effectively the tidal limit with the EAW operating inland and the PCC operating seaward of this line. In practice, the operational boundary on the Milford Haven / Daugleddau is the Cleddau Bridge and on the River Teifi is the line of the old ferry at St. Dogmaels but it is soon to change to the new Priory road bridge.

The Welsh Assembly Government may make grants available to the Agency and local authorities towards the cost of approved sea defence and coast protection schemes (coastal defence schemes). No grant is available to private individuals or organisations for flood defence work relating to the protection of private property. In Wales as a whole, operational responsibility for the provision and maintenance of coastal sea defences is shared between the Environment Agency Wales (48%), Local Authorities (30%) and the private sector (22%). In Pembrokeshire, the majority of the responsibility falls on the County Council, there being no sea flood defence structures established and maintained by the EAW in the County. In some areas, e.g. Newgale, where roadways are at risk, it is the Highway Authority that carries out repair and maintenance of the shingle bank. There are no areas of erosion or flooding risk in the County which are maintained by the Strategic Rail Authority. On inland waters, maintenance responsibility is shared between the Environment Agency Wales and the Pembrokeshire County Council. The Environment Agency has statutory responsibility for maintenance of 'main rivers', watercourses designated by the Welsh Assembly Government as being major or which have a significant risk of flooding or a high land drainage function. Responsibility for the

maintenance of 'non-main rivers' rests with the County Council. In practice, all schemes are considered and approved solely on economic rather than on social grounds. The Welsh Assembly Government has encouraged Local Authorities, the Agency and other interested bodies to form coastal groups to consider the strategic management of coastal defence in their regions by preparing Shoreline Management Plans. An SMP provides a strategy for coastal defence management for a specified length of coast taking account of natural coastal processes and human and other environmental influences and needs. Two Shoreline Management Plans have been prepared to include areas in Pembrokeshire, namely the Pembrokeshire SMP covering the area between St. Govan's Head and the Teifi Estuary and the Carmarthen Bay SMP covering the area between St. Govan's Head and Worm's Head. The aims of these Plans are to improve the understanding of coastal processes, predict the likely evolution of the coast, identify assets at risk and improve consultation between organisations with an interest in the coastline. These Plans consider options and detail preferred approaches, recommend monitoring programmes and identify environmental enhancements.

Inland Protection

On inland waters, there is a shared responsibility for land drainage and flood defence between the Environment Agency Wales (designated main rivers) and Pembrokeshire County Council and the Pembrokeshire Coast National Park Authority (non-main rivers). Historically, since the war and up until the early 1980's, Government Agricultural Policy was focused on maximising food production by increasing the acreage of cultivated land and optimising its productivity. Capital agricultural land drainage schemes were a major tool in the Government's plans and these paid little if any regard to the environmental impacts of such work or the channel capacity in the lower reaches of "improved" catchments. Government funded Capital Land Drainage schemes on the Rivers Western Cleddau and Solfach in the 1960s and '70s created major environmental and river flow changes in those catchments. A requirement that the catchments be maintained to their engineered benefit specification has meant that the damage (and environmental impacts) was perpetuated for many years. Subsequent flooding problems at Solva and Haverfordwest arose which have required major and on-going flood prevention work to be carried out. It is only recently that attempts have been made to reverse the damage and these measures have included the re-creation of flood storage areas and a reduction in the level of maintenance.

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INTERACTIONS

The following interactions are particularly relevant to this Topic Area

- Coastal development and infrastructure in exposed and / or low-lying areas are at risk of flooding and erosion damage
- Perceived threat of sea bed disturbance by marine industries on the stability of substrates and causing erosion of coastal features, e.g. sandy beaches
- Land use practice changes, particularly farming and forestry, increasing peak freshwater discharge flows and exacerbating flooding and erosion risks in lower river catchments and estuaries
- Development in flood plains exacerbating flooding risk
- “Greenhouse gas” emissions fuelling climate change and contributing to sea level and weather pattern changes
- Coastal erosion causes damage to / loss of landscape, geological and archaeological features of value
- Coastal erosion and flooding can have negative socio-economic / tourism impacts

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ISSUES

1. The determination and prioritisation of schemes is on economic grounds solely with no consideration of social issues.
2. Private property in some high risk areas e.g. Amroth and Newgale, could become uninsurable.
3. Inadequate monitoring of the effects of wave / tide action (e.g. cliff stability / beach profiling) to allow for predictions to be made and preventative action taken
4. Inadequate long term data on global warming and its effects particularly on rising sea level predictions
5. Lack of public awareness of position re responsibilities over protection of private and public property
6. No action has been taken on SMP recommendations to date

7. More cohesion is required between the Council, the EAW the PCNPA and others on dealing with storm / flooding events
8. There is a need for improved relationships and greater communication between organisations and communities regarding data collection and flood management
9. Greater integration is required between the PCC and the EAW's capital expenditure programmes
10. Greater public awareness of the existence and role of Shoreline Management Plans would be valuable
11. Current legislation is out of date and requires review.
12. Water Level Management Plans (WLMPs) are needed for some sites in the area
13. Flood protection standards do not achieve identified targets
14. Minor flooding problems exist in some parts of the area
15. Improvements are required to the flood warning service in some cases
16. Section 105 catchment surveys are needed to identify the extent of land liable to flooding
17. Impact of Japanese Knotweed and other alien species on biodiversity and flood defences
18. Inappropriate development and land use can exacerbate flooding problems
19. Natural processes can have negative impact on communities, landscape, archaeological and geological features
20. Beach access and condition
21. The future impacts of accelerated climate change and increased climatic extremes are unknown

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