

Safety at the coastline

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Current emphasis on safety at the workplace and in everyday life places growing pressure on civil engineers to ensure that projects are planned, constructed and maintained at minimum risk both to the workforce and the public. This is especially true when work is being carried out at coastal locations, which attract large numbers of visitors. This theme was developed by representatives of contracting and consulting sectors as well as the Environmental Agency as a major client.

Paul Hutchinson of the Royal Society for the Protection of Accidents set the scene by highlighting the various hazards that prevail along the coastline and emphasizing that a thorough understanding of the causes of accidents was essential for providing adequate preventive measures. The design and layout of beaches, sea walls, promenades and jetties and subsequent use for recreational and leisure activities must take into account potential adverse effects of tides, currents, wave actions, storms and visibility, and allow for efficient emergency access to administer first aid to victims of cold water cramps and other accidents.

Existing procedures should be reviewed to determine preventive or mitigating actions. Visitors should be informed of likely hazards, protective barriers provided to restrict access near cliff faces, and warning signs for temporary closure of access to certain areas of promenades and sea walls during adverse storms and poor visibility should be erected. The provision of adequate rescue equipment with supporting trained supervisors with written documentation to assist accident victims should be in place in every location.

Steve Hayman of the Environment Agency, following on, stated that all concerned with the construction and maintenance of coastal structures have a duty of reasonable care for personal safety of employees and members of the public who have access to the coastline. The Agency spends some £120 million on capital projects in England and Wales on engineering works in areas served by coastal footpaths, which attract large numbers of visitors during the summer. For all such works the Agency is concerned with public safety at all stages of implementation as well as the subsequent 'whole-life' of the works.

The CDM regulations specify responsibilities to consider public safety during construction, maintenance and demolition and, as the client, the Agency will work with the designer to prepare a risk register and other documentation to ensure compliance. The client should con-

sider with the contractor ways in which coastal construction risk elements, for example weather and sea state, can be mitigated and assist by not imposing strict timescales which may compromise safety.

Dr Alan Clark of High-Point Rendel focused on matters related to coastal erosion and cliff instability and public safety issues. The eleven thousand kilometres of UK coastline has a great variety of geological conditions, ranging from soft clays to hard rock, and is in a dynamic environment. Cliffs can be attacked at their base by waves, resulting in erosion and undercutting leading to instability and cliff top recession, with consequences to public safety by falling debris. The severity of the instability is largely dependent upon the geological materials of the cliffs, the configuration of the cliffs and foreshore and the presence or absence of natural or man-made coastal defences.

Investigations that were undertaken to study the failure mechanism that caused the 1993 Holbeck Hall landslide, Scarborough, were described in detail. In this incident over 60 m of cliff top were lost overnight and approximately 1 million tonnes of material failed, destroying a cliff top hotel and the sea-wall at the base of the cliff. Remedial measures included toe protection and reinstatement of the embankment to a shallow gradient. Early warning systems for detecting settlement and deformation have been installed, with regular monitoring to minimize the risk to public safety.

John Griffin of Dean & Dyball Construction, in expressing a contractor's view, referred to recent construction work undertaken at Hurst Spit in the built environment. The limitations on handling plant for works along the coast for beach nourishment need constant vigilance to overcome hazards caused by adverse weather, tides, currents, geographical position of site and restricted access to promenades. The subsequent requirement to allow public access to the promenade with limited access to the beach meant that a late change had to be made to the programming and construction sequence. It was necessary to allow for working times to suit tidal conditions. In spite of the constraints, however, construction schedules were achieved. Public interest was controlled by information display boards and an exhibition/information cabin adjacent to the site compound area. This provision attracted visits from members of the public and was very popular, but it was still necessary to employ patrol guards as a safety measure.

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