

STRANGFORD LOUGH ECOLOGICAL CHANGE INVESTIGATION (SLECI)

Work Package 7. Dredging activities and shore works

7.1 DESK STUDY.

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1 Introduction

The depositing of material in the sea as a result of shore works and coastal development is under the statutory control of the Department of the Environment in accordance with Part II of the Food and Environment Protection Act 1985 (FEPA). This act aims to protect both the marine environment and human health and to minimise nuisance and interference with the legitimate uses of the sea by regulating inputs up to High Water Mean Spring (HWMS) tide level (EHS). In Northern Ireland, the Water Management Unit (EHS) controls deposits at sea through FEPA licences and Rivers Agency is responsible for the maintenance of sea defences under the Drainage (NI) Order 1973 although new sea defences require FEPA licences. Part of the assessment process prior to FEPA licensing may involve analysis of sediments for toxins.

The aim of this part of the study was to review coastal zone developments in Strangford Lough which may have had a direct or indirect effect on sedimentary processes within the Lough over the last 10 years.

This desk study is based on a review all recent FEPA licenses, and of relevant reports produced by the University of Ulster and Queen's University.

2 Strangford Lough

Only 5 FEPA licences were issued between 1994 and 2004 (Table 1) and no disposal operations were carried out within the Lough during this period (Water Management Unit, EHS). In addition, refurbishment of the sea defences at the northern end of the Lough was started in 1999.

Table 1. Details of FEPA licences were issued between 1994 and 2004.

Date	Ref. No	Licensed Development	Location	Licence valid
1994	4/94	Killyleagh Yacht Club: extension to dingy park	54° 22.45'N 005° 38.8'W	02:03:1994 – 01:03:1995
1996	6/96	Portaferry Regeneration Ltd.: Visitors Berthing Facility	54° 22'45"N 005° 32'50"W	20:06:1996 – 19:06:1997
1996	49/96	Ards Borough Council: Cook Street refurbishment, Portaferry	NA	03:03:1997 – 02:03:1998
1996	50/96	Water Service: Ards/Bangor bulk allocation, Newtownards Road, Comber: Storm Sewer	NA	11:02:1998 – 10:02:1999
2000	90/2000	McLaughlin & Harvey: Killyleagh Walkway	The Quay, Killyleagh	05:05:2000 – 04:05:2001

2.1 Extension to Dinghy Park 1994: Killyleagh Yacht Club (4/94)

This involved reclamation of a small area of land by deposition of 2,100 m³ of quarried rock.

2.2 Visitors Berthing Facility construction At Sea 1996: Portaferry Regeneration Ltd - - Copy of Licence 6/96 Issued under DU 6/94

This comprised:

1. A new access pier which involved construction of an 84m³ reinforced concrete deck supported by 14 tubular steel piles.
2. A floating breakwater consisting of 150m pre-cast concrete pontoons restrained by mooring chains and concrete anchor blocks
3. Internal pontoon fingers consisting of standard manufactured pontoons restrained by mooring chains and concrete anchor blocks.

No dredging was required.

2.3 Cook Street Refurbishment, Portaferry (Construction Licence) 1996: Ards Borough Council (49/96)

This involved encapsulation of the existing steel jetty using 1025 m³ mass concrete and 628 m³ of rockfill, which was deemed essential to maintain the long term structural adequacy of the jetty, and extension of the existing slipway, pontoon and walkway.

2.4 Storm Sewer Newtownards Road, Comber 1996: Water Service -- Ards / Bangor Bulk Allocation, (50/96)

This involved construction of a base slab for an outfall storm sewer at Newtownards Road, Comber. In response to concerns raised by Water Management Unit about the siting of this proposal because: 1) the discharge would be carried beside Island Hill, a popular bathing area; 2) the proposed construction was in an ASSI, the developers (Water Service) agreed to an alternative location.

2.5 Killyleagh Walkway 2000: Mclaughlin & Harvey, (90/2000).

This development was to reclaim a small part of the intertidal mudflats at Killyleagh Bay for the purposes of constructing a coastal path. The development required 19,900 tonnes of quarry faced stone and 2,700 tonnes of granular stone at the top of the beach. Reclamation involved infilling and the redistribution of surcharged mud along the shore. The weight of the infill caused lateral surcharge of approximately 100m³ over a small area in the bay as predicted in the developer's proposal. In response to concerns that the development may have resulted in the mobilisation of sediment metals EHS commissioned the Industrial Research and Technology Unit (IRTU) to

examine metal levels in released sediments. Comparison of pre- and post-construction results showed that there was no rise in levels of chromium or other heavy metals in or around the Killyleagh Bay area [see also WP6].

2.6 Refurbishment of the sea defences at the northern end of Strangford Lough

Refurbishment of the sea defences at the northern end of the tidal flat at Newtownards was subject to physical and biological monitoring during pre-construction [1997-1999] and construction [1999-2001] phases of the development and post-construction surveys will be conducted (Malvarez *et al.*, 2000; Portig *et al.*, 2001). The project was undertaken jointly by staff of the University of Ulster, Coleraine (UUC) and Queen's University, Belfast (QUB) on behalf of Rivers Agency (Department of Agriculture and Regional Development for Northern Ireland) and the first phase started in April 1997. The aim of the project was to monitor and assess potential change during the period of refurbishment.

Digital colour infrared (CIR) images were collected covering the total area under investigation and the reference sites. This represents a unique and valuable image database that could be used in conjunction with earlier maps and photos to investigate various aspects of tidal flat evolution as well as to map vegetation types and monitor temporal evolution of vegetation patterns in the area.

Physical monitoring during the construction phase [1999-2001] indicated that:

- The northern tidal flats at Newtownards have experienced alternate periods of sand and mud dominance over the past 200 years (Portig *et al.* 2001). The reasons for such changes remain unclear and may involve climate, biological or human forcing factors, or a combination of these potential influences.
- Eleven cross sections were monitored to accurately describe the tidal flats, with the objective of picking up potential disturbances induced by the sea-wall works. No major alteration of the near shore or general tidal flats topography occurred during the construction phase although small localised fluctuations of level occurred within 1-2m of the sea-wall. The patterns and levels of sedimentation during the period of construction were similar to those recorded before construction.
- The location of channels draining the tidal flats were not affected by construction during the monitoring program (construction phase) as indicated by repeated transect profiles across major and minor channels around the sea-defences. A slight seasonality, which does not appear to be connected with any effects derived from the works at the sea-wall, was apparent following sediment deposition of the flats in spring and depletion in autumn; spring surveys tended to show slightly higher elevations than autumn surveys.
- Two reference sites outside the study area, which were surveyed simultaneously with the main northern tidal flats site, were found to have

different energy environments. However, these sites were affected by the same natural variables, and were thus directly comparable to those on the Newtownards tidal flats.

- Sea level and wind records did not show any major anomalies and the construction phase was characterised by relatively calm conditions, with all variables at values close to the long term mean. Water levels did not overtop the sea-defences in any instance and wind, although of high velocity in some occasions, did not affect the tidal prism in a way that affected the sea-wall.

Biological monitoring during the construction phase indicated that

- Variations in the distribution and biomass of *Zostera* spp. during the construction phase were well within the normal limits of variation seen during the preconstruction period.
- Photographic data suggest that *Zostera* biomass had increased and its distribution had become less patchy between the early and late 1990s and that these changes occurred before the start of the study (see Appendix 2, WP 1.3).
- There were no significant changes in the distribution of the larger intertidal invertebrates in the study area. The large mussel bed that could be vulnerable to large changes in hydrodynamic regime has remained stable, as has the major cockle bed in the area. The distribution of the more mobile polychaetes has been variable, but normal for these species. Although local changes occurred, the animals are still present in good numbers within the study area. There has been no large scale disruption or mortality of intertidal invertebrates as a result of the refurbishment of the seawall.
- There have been no detectable adverse effects of reconstruction on the distribution or abundance of the over-wintering wildfowl and waders using the study area.
- The abundance of wildfowl and waders in the study area, as for *Zostera* spp. have also shown changes since the early 1990s, with an increase in abundance in most common species especially, Brent Geese, Redshank, Oystercatcher and Shelduck.
- The reasons for these ecological changes are not known. It is likely that they may be related, through a particular controlling factor or factors. The historical alternate periods of mud / sand dominance as described above could be as a result of these changes or part of the process driving these changes.

3 Conclusions

Impacts of coastal development on sedimentation in the Lough are not easily separated from the complex underlying natural sedimentary processes within the Lough. However, in general these impacts are not thought to exceed natural processes in the main body of the Lough. For example slight seasonality in sediment deposition on the northern tide flats does not appear to be connected with any effects derived from recent refurbishment of the sea-wall. Assessments for the purposes of FEPA licensing suggests that although

there were changes as a result of coastal developments these were in general small scale and unlikely to have had significant impacts on the Lough outside the locality of the specific development.

4 References

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