

## Coastal Schemes with Multiple Funders and Objectives FD2635

### Case Study Report 13 Tywyn Coastal Defence Scheme



Photograph courtesy of Gwynedd Council

This case study is one of 14 documents supporting the research project Coastal Schemes with Multiple Objectives and Funders - Case Studies FD2635, available from <http://tinyurl.com/6dzyusy>. This research was conducted in 2010/2011 by Maslen Environmental on behalf of Defra and the Environment Agency's Research and Development programme.

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# 1 Case Study: Tywyn Coastal Defence Project

## 1.1 Introduction

### 1.1.1 Description

Tywyn is a seaside town on the Cardigan Bay coast of southern Gwynedd in north Wales.

As is common with many Victorian towns, the introduction of a promenade on the foreshore has led to a legacy of structures requiring maintenance. This part of the coast has a pattern of reduced beach levels, which has meant that wave intensity has increased relative to the increased depth of water at the sea defences. This in turn has led to extending sea defences and providing protection against erosion. Whilst it has been possible to safeguard the structures with intervention measures, the flooding from overtopping of sea defences has increased in intensity, frequency and volume, causing a significant flood and erosion risk to people and property.

Therefore the new scheme (estimated at a total cost of approximately £7.6 million), aimed to manage the consequences of flooding and erosion through the following measures:

- A rock armour breakwater at Warwick Place;
- Sand nourishment of the beach;
- 250m rock armour revetment to protect a sea wall;
- Refurbishment of concrete revetment below the Victorian Promenade sea wall;
- Replacement of timber groynes;
- Reconstruction of Warwick Place Slipway;
- Coastal office (unmanned) is part of resilience measures.

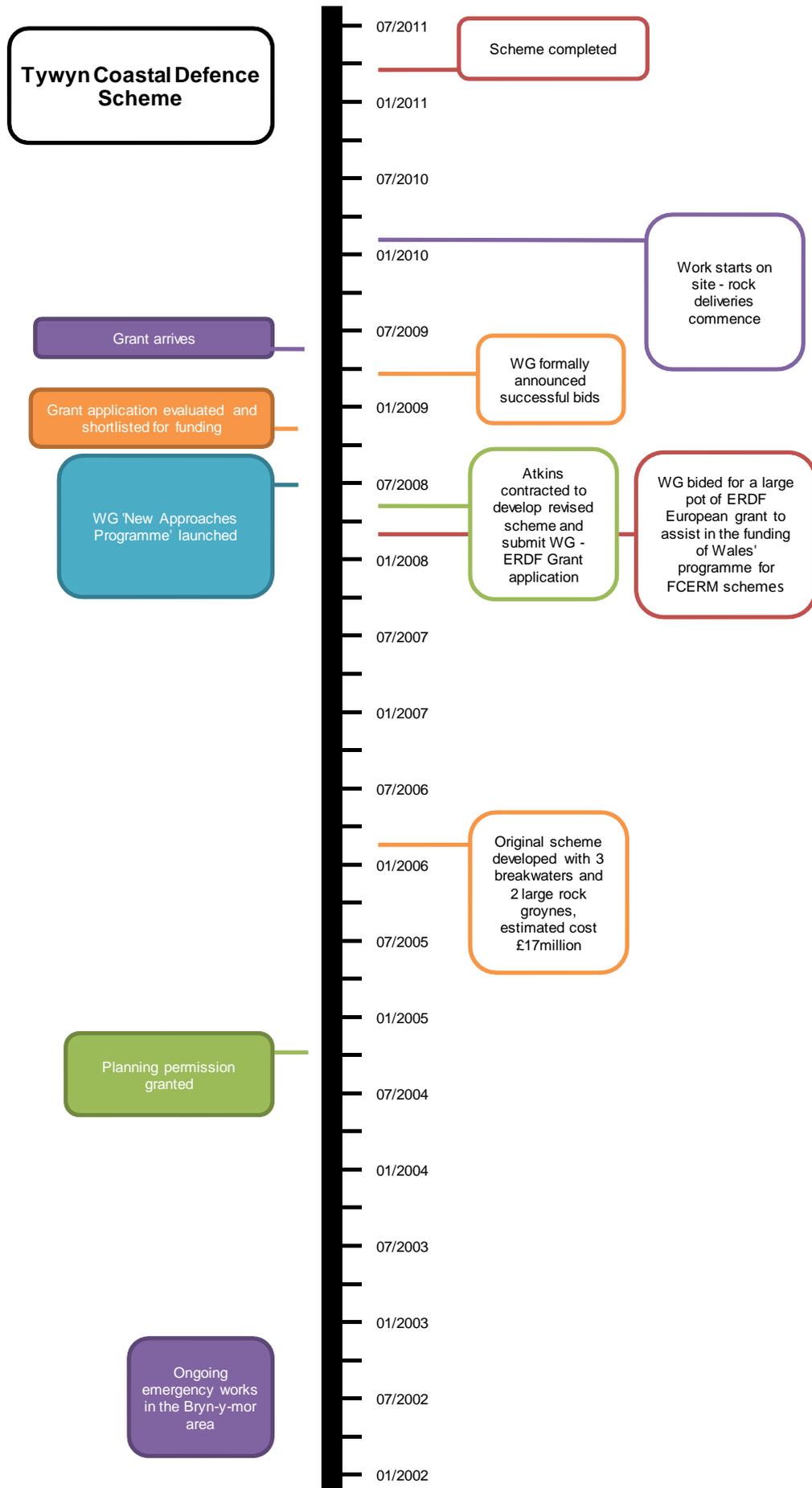
Pedestrian access at several locations was improved by refurbishing worn steps, providing handrailing and improving access for the mobility impaired.

The construction work was completed in September 2010 (see Figure 1).

Led by Gwynedd Council (GC) the scheme is financed through the European Regional Development Fund, under the Convergence Programme and Welsh Government (WG) funding. The scheme aimed to reduce flood risk to a 1 in 100yr return. Flood risk will not be eliminated; instead, the coastal defence improvements aim to reduce the frequency and intensity of flooding. It will also safeguard the sea defence structures against erosion problems previously experienced.



**Figure1. New installed break-water part of unique feature.  
Photograph courtesy of Gwynedd Council**



**Figure 2. Timeline for the Tywyn Coastal Defence Project**

## 1.2 Objective Setting

### 1.2.1 Project Drivers

The Victorian promenade was built in Tywyn in 1890, since then it has developed organically, being extending both north and south in line with the accelerated pattern of erosion. Over the years numerous extensions have been added, such as extra groynes, increasing protection but also the maintenance burden to the council. Erosion processes have reduced beach levels by approximately 3m in 100 years, causing problems to structures erected in the 1960s and 70s. In addition to erosion, voids have formed behind the sea defences, resulting in the collapse of several sections of promenade footpath.

This problem has reoccurred numerous times over the years with a significant amount spent on emergency works.

Key support took place in 2002 where GC spent over £250,000 carrying out emergency works in the Bryn-y-mor area with a 55% contribution from WG.



**Figure 3. Toe scour to sea defence at the promenade and dilapidation to groynes. Photograph courtesy of Gwynedd Council**

Recurring emergency works (i.e. a Do Minimum approach) was simply an un-economical option in the longer term, therefore a new scheme implementing a sustainable strategy was required. The main objective was to reduce the frequency and intensity of flooding and to mitigate the effects of erosion on sea defences in the proposed works locations.

Strategic schemes have been developed over the past 15 years at Tywyn. In 1995 an ambitious strategic scheme was put together that included a 10km frontage, many unique design features and multiple partners including Network Rail, the Environment Agency and Meirionnydd District Council, along with the local community who were in strong support of this scheme. The Council applied to Welsh Office (WO) for flood and coast risk grant who commissioned a second opinion study, which suggested a more conservative scheme could be provide adequate coastal defence. The proposition left the community feeling 'robbed' of a scheme that could provide not only significant flood risk and erosion management benefits, but also regeneration benefits to the area.

By 2006, a scheme was developed which included three breakwaters and two large terminal rock groynes. This was estimated at a cost of £17m. Although the scheme provided high benefit outcomes, it exceeded Council and WO budget provisions and was deemed unaffordable. Multiple funding options were considered particularly PFI (Private Finance Initiative) where multiple private sector partners were considered using a brokerage consultant to assist. Approximately three years ago through negotiations it

was agreed to go with a phased approach to meet the available budget. This was done using multi-criteria analysis which considered a range of needs and risks carried out by Atkins to prioritise the key areas most at risk from flooding and erosion, it was these areas where engineering works could be concentrated into an initial phase, thus deferring further spending into successive phases of work. Originally the scheme required three breakwaters and two large terminal rock groyne structures, however one breakwater was prioritised initially (at Warwick Place) as it provided the greatest benefit; with the option to extend the scheme in the future.

GC became aware in 2008 that WG were bidding for a large pot of ERDF European grant to assist in the funding of Wales' programme for FCERM schemes. WG was granted ERDF funding and launched its 'New Approaches programme'<sup>1</sup>, which suggested schemes should take a 'risk management approach' towards FCERM enabling adaptation to the unavoidable impacts of climate change. The programme, while recognising that traditional defence will continue to play an important part in our future management, will encourage working with nature rather than against it; these approaches have been adopted at Tywyn.

In September 2008 Atkins were contracted through GC's framework to assist in putting a grant application in to WG for its ERDF funding.

The time it took for WG to process the funding application was underestimated and GC was unsure of its success. Whilst, WG received confirmation that they had been successful in their bid in December 2009, formal announcements of successful bids were not made until March 2009. The European Funding Programme Board shortlisted funding applications through an evaluation process based on criteria laid down by the Welsh European Funding Office. It was suggested that the Tywyn scheme should take a phased approach with phase 1 receiving funding and phase 2 to be put on hold for future funding rounds. Climate change was an important driver, phase 1 provides a 1 in 100 year standard level of protection.

The scheme now constructed provides a number of erosion and flood risk benefits, whilst retaining and enhancing its amenity and tourist function. In addition, shorter groynes were put in place to manage the upper shingle part of the beach, this had the benefit of increasing beach accessibility. The beach is an important amenity for the small town of Tywyn with its many caravan parks and high influx of seasonal visitors.

### 1.2.2 Partnership Objectives

There was a strong vision set by the partners within this project, 'to protect people and property from the effects of climate change over the next 20-30 years'. This was driven strongly by the funding objectives of the ERDF programme and WG, which stated that projects developed must be used to help the region transform into a sustainable and competitive economy, by tackling climate change. Through ERDF, WG set a FCERM programme which falls under ERDF's Climate Change funding, and set out to protect 2000 people and property across the Convergence area of Wales<sup>2</sup> from the risk of coastal erosion and flooding through the construction of around fifteen schemes supported by awareness-raising activities.

It was important for GC to manage the objectives of all stakeholders in the negotiation process including WG, the local community and its contractors. It was important to convey the quality outcomes to the contractors tendering for the scheme and to select contractors based on quality and cost certainty.

The ERDF climate change funding was matched with WG coastal protection grant finance and under the conditions of the joint funding Tywyn was limited in that it could only be used exclusively for coastal protection. Enhancement was the wish of the community and therefore these requirements were taken on board in consultation.

### 1.2.3 Project Objectives

The overall objectives of this project were to:

- Protect people and property from the risk of coastal erosion and flooding for the next 20-30 years;
- Protect public assets such as roads and utilities for the next 20-30 years; and
- Raise awareness about the coastal works and the pressures of flooding and erosion in the local community,
- Provide amenity value for the public to ensure tourism can thrive.

<sup>1</sup> <http://wales.gov.uk/desh/policy/enviroprotect/water/flooding/newapproaches/item?lang=en>

<sup>2</sup> The Convergence area contains the 15 Local Authorities of Isle of Anglesey, Conwy, Denbighshire, Gwynedd, Ceredigion, Pembrokeshire, Carmarthenshire, Swansea, Neath Port Talbot, Bridgend, Rhondda Cynon Taff, Merthyr Tydfil, Blaenau Gwent, Caerphilly and Torfaen.

## 1.3 Partnerships

### 1.3.1 Building the Partnership

The vision and message GC was working to was 'to get the best for the people of Tywyn'. GC maximised every opportunity for enhancements, and utilised best practice designs where practicable. .

Specific community engagement tasks included:

- On-site information office, containing scheme drawings, programme for works, details of sea deliveries of rock, historical photos and photos of past flooding, to aid community liaison;
- Rock deliveries were posted up in the office; hundreds of people were recorded watching this delivery;
- A DVD was produced containing images of construction, raising £2,000 for the local air ambulance;
- The planned post-scheme awareness raising campaign aims to inform the community as to the schemes function and level of protection. This element is included within the schemes flood risk management lessons learnt report;
- Information boards have been erected at three strategic locations raising awareness of the scheme.

### 1.3.2 Partnership Working and Governance

GC took the role as project director from the client side ensuring the council received the best quality scheme. It also took the role of professional services consultancy, delivering the project. This relationship is particularly unique, few Local Authorities have its own internal consultancy teams.

WG funded the scheme, using its Welsh European Funding Office (WEFO) to assist with brokerage and management of the ERDF funding. Statutory consultees were required for planning approval and marine consents approval, these included Countryside Council for Wales (CCW), Centre for Environment, Fisheries & Aquaculture Science (CEFAS) Environment Agency Wales, Gwynedd Archaeological, and GC and Environmental Health.

The scheme was delivered by GC, with WG as funding partner. It is important to note the condition of the WG funding was the promotion of a risk management approach, which involves partnership working and a shared understanding of the flood risk in the area between both the professional partners and the affected community; this was carried through out the schemes development and construction.

Upon GC's leadership and direction, team meetings took place within the council, using its internal professional services consultancy. There was also early contractor involvement with the scheme, to ensure buildability and cost certainty.

GC Consultancy Services was born mainly out of GC's highways design team in 1996. This evolved overtime and in 2004 due to council restructuring numerous other service areas were adopted. The majority of professional services in construction and engineering now include civil engineering, flood risk management, building control, coast protection, architecture, environment, staff levels fluctuate between 140 - 150 staff. This consultancy is not restricted to carrying out GC work, they bid competitively for private sector contracts externally as well. Within the Tywyn scheme GC acted as the client and project manager, managing, this allowed significant cost saving to take place, this required careful management. To ensure there was no confusion between the consultancy and GC staff, project roles were clearly defined, as follows:

- GC - client
- GC Consultancy Services - project manager
- Atkins - designer
- Jones - main construction contractor

This model proved to be very successful by keeping design and development costs down in a particularly time constrained programmed. Savings made in procurement enabled additional construction works to be included. It also enabled the client to be more informed and by having a close working relationship with the professional services consultancy, the client was able to use its technical skills and experience to make informed decisions.

## 1.4 Approvals, Planning Context and Legislation

The previous scheme developed in 2004 had already gained planning permission, but due to the design changes, the environmental impact statement had to be updated with reapplication for planning and marine consent.

A FEPA and CPA licence was required before construction could take place, the granting of this was time consuming, taking in excess of the 12-week period. Due to spending restrictions, it was important that construction work started at the beginning of January 2010, therefore it was vital that a FEPA licence was granted on time, without this delays would have incurred additional costs or resulted in loss of grant allocation.

CCW had concerns over impacts of the sediment transportation along the coastline once the scheme was put in place. Concerns were raised relating to adjacent Internal Drainage District (IDD) owned stretches of beach adjacent to Environment Agency and Network Rail assets/areas of responsibility, which included SSSI and SAC sites. Through consultation, a programme was put in place during and post-scheme to ensure impacts on sensitive sites was monitored.

## 1.5 Funding Arrangements

The total cost of the scheme was £7,620,000 with £3,485,000 being derived from the EU's ERDF Convergence funding managed by Welsh European Funding Office (WEFO) and £4,135,000 from WG budgets, including funding from the Strategic Capital Investment Fund (SCIF). The cost to benefit ratio was 1.3 more benefits than costs.

GC applied to WG in November 2008 for the Coastal Protection Act Grant. The time to complete the appraisal process was underestimated for written confirmation. In March 2009, WG gave verbal but not written consent that the scheme had been successful and due to project management constraints, GC took a risk and started work. The team felt confident enough to go ahead without 'written consent' as all the approvals had been granted. The confirmation letter for funding did not actually arrive until May 2009.

In-kind staff time was contributed by GC's internal consultancy services. The council claimed salary pensions and National Insurance contributions (reduced multipliers) to cover the individual costs. The admin costs were not charged to scheme.

## 1.6 Lessons Learnt

- This scheme benefitted from almost 15 years of partnership working, through various scheme negotiations, which eventually led to the scheme we see today;
- Appointed contractor at the ECI stage, to develop the project, and worked up the scheme with the contractors. Early tender needed to ensure start on site as soon as practicable to meet spending deadlines;
- Develop trust amongst the project team consisting of designers, project managers and contractors. Trusted and collaborative working aided project risk planning for both client and contractor. Due to the fast track nature of the project, the contractor, consultant and had to identify risks which they had to take on;
- A 'Target Cost' contract with incentivised pain/gain share mechanism was used initially to incentivise the project, this aided the client and contractor relationship as it was in both parties' interests to complete project on-time and on-budget. During the risk management stage, this contract was changed through negotiation to a 'Lump Sum' contract in order to give the client cost certainty and protect against cost over-runs for which the client would be liable;
- To obtain public support various methods were used, an effective one was holding a 'meet the team' meeting, where GC and contractors met with the public and other affected stakeholders;
- Critical to success was the Early Contractor Involvement stage. At the end of summer 2009, the contractor was involved to provide input into the design and buildability, to ensure smooth running of construction;
- Good project management and planning was vital for scheme success;
- It is important to have an 'intelligent' client, to challenge all elements of project development, particularly contractor suggestion. This was an advantage of the unique client and consultancy model GC had set-up;
- Planning for the weather conditions was important, the outcome of the Tywyn scheme could have been very different if the conditions had been poor, a risk pot was set-aside in case of problems; and

Low maintenance flood risk management options were used, and therefore GC expect minimal spending over the next 20 years.

## **1.7 References**

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