

# Appendix K – Technical Reports

Includes the following reports:

Performance Review of Rock and Timber Groynes  
Recommendations for Cobbold's Point/ Undercliff Road

Suffolk Coastal District Council  
Melton Hill  
Woodbridge  
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# **Performance Review of Rock and Timber Groynes**

**June 2009**

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# Performance Review of Rock and Timber Groynes

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## Summary

A review of available information on empirical performance, initial capital costs, replacement frequency, maintenance costs of both timber and rock groynes across the East Anglian and South Coast of the UK has been undertaken by Mott MacDonald assisted by HR Wallingford. The aim of the study is to aid Suffolk Coastal District Council to make an informed decision on the preferred coastal protection option for the Central Felixstowe frontage which covers the area from the War Memorial just north of the Pier to Jacob's Ladder just north of Cobbold's Point.

From the scheme optioneering and review considered in this Report Mott MacDonald recommend that the existing rock groyne proposals are implemented at Central Felixstowe in preference to timber groynes based on a number of key issues;

- The more expensive per metre but also more technically efficient rock groynes can be wider spaced than the cheaper per metre but less technically efficient timber groynes, leading to at least equivalent or potentially overall lower initial capital works costs.
- There is significantly reduced whole life replacement costs associated with rock groynes compared to timber groynes.
- There is significantly less whole life maintenance spend associated with providing rock groynes that maintain their function, compared to the whole life maintenance spend associated with timber groynes
- There is significant sustainability issues associated with usage of tropical hardwoods for timber groynes. Although sustainability issues are also associated with provision of rock groynes, on balance the overall impacts are less.
- Timber groynes have historically had a perception of providing aesthetic and amenity value to beach frontages, ie as provision of wind breaks. Our review indicates that other different amenity and aesthetic value can be attributed to rock groynes such as provision of a proportionally larger beach bays between rock groynes compared to closer spaced timber groynes. Rock groynes can also provide the function of wind breaks.
- Poor health a safety issues associated with rock groynes have a high perception. Mott MacDonald considers from our review that whilst this is probably the case there are limited statistics to support such claims. Provision of rock groynes at Central Felixstowe would have to include all sensible and practicable measures to warn and mitigate of hazards to the public. Accidents associated with timber groynes are reported, some of which are very serious. Poorly maintained timber groynes provide additional hazards associated with corroded and jagged sheet piles, splintered wood and rusting exposed bolts
- In order to present a scheme to the Environment Agency at the culmination of this Project Appraisal Reporting process that is the most economically viable in terms of benefit / cost, then a rock groyne system achieves the highest benefit / cost ratio.
- Ultimately, if Suffolk Coastal District Council wish implement timber groynes instead of rock groynes then the Council would have to commit to funding the shortfall in capital works value and provide ongoing replacement and maintenance spend over the life of each groyne cycle

In terms of the review undertaken in order to provide our summary findings presented above the aims of the review were to;

- provide a summary of current understanding of groynes on the south and east coasts. The report considers the purpose of a groyne and the types of groynes available for coastal defence
- provide case studies from the south and east coast of the UK where rock and timber groynes or a combination of both groyne types have been used as beach control structures
- consider the spacing of rock and timber groynes used in successful schemes under differing meteo-oceanographic conditions
- provide up to date examples of the costs associated with construction and maintenance of rock and timber groynes
- provide a summary of knowledge of sustainability issues for rock and timber groynes
- consider health and safety risks reported for each groyne type
- consider the amenity value of beaches controlled by each groyne type
- consider the implications of providing the Environment Agency with an expensive solution which may lead to reduced opportunities for obtaining funding for a coastal protection scheme along this frontage

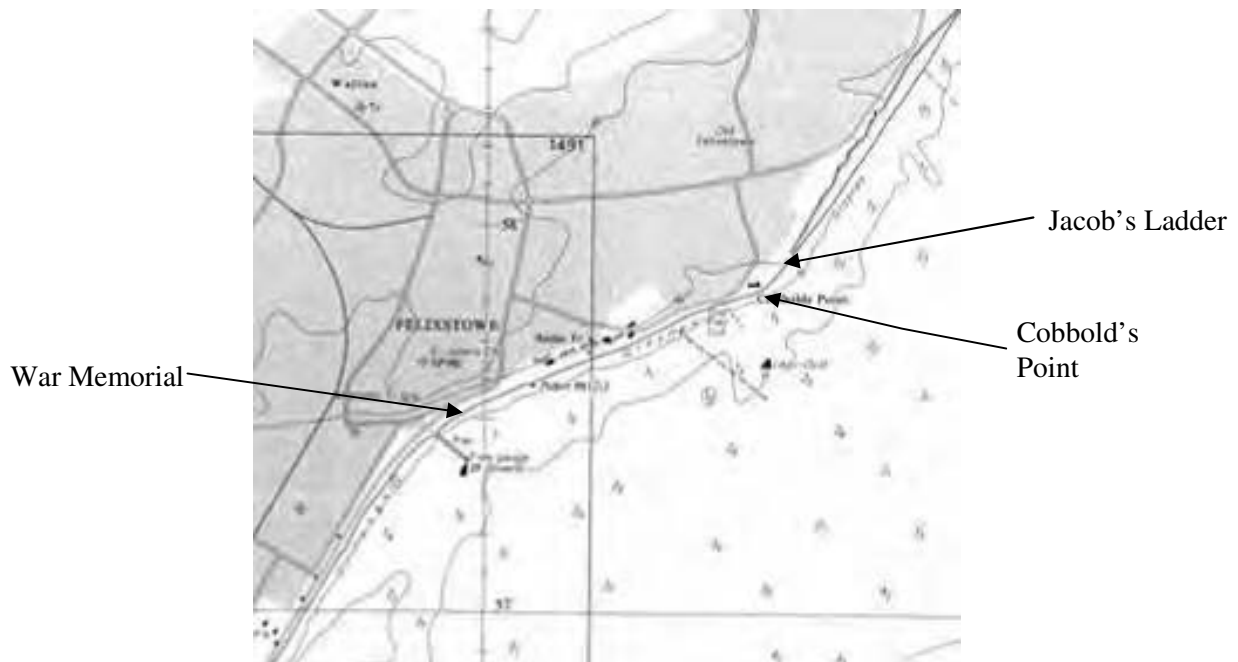
Key findings of the review include;

- Since the mid 1990s rock groynes have become the most frequently chosen method of providing beach control structures with a number of recent schemes opting to use rock rather than timber.
- The frequency of maintenance reported by coastal Councils as required to ensure effective timber groyne schemes is annual, though this is heavily dependent upon the design of the timber groyne, the aspect of coastline, meteo-oceanographic conditions, and the position and spacing of the timber groynes along the beach.
- The average annual maintenance spend which councils have reported for maintenance and repair of timber groynes varies between £500 and £2,000 per groyne per annum. In Great Yarmouth and Lowestoft the Council reported that after 10 years life the cost of the maintenance increased to between £7,000 and £8,000 per groyne, per annum.
- Few Councils reported having undertaken any maintenance on rock groynes. There has been no maintenance carried out on the rock groynes at Brighton since they were constructed 15 years ago. The Borough of Poole reported repair works costing £1,000 per groyne following a severe storm 8 years after construction.

- The reported useful life of a timber groyne is significantly shorter than a rock groyne for an exposed coastline such as the Central Felixstowe frontage. Rock groynes are usually designed with a 50 year design life and at the end of this period much of the material used in the initial installation can be re-used in a renovated scheme. Timber groynes for the Central Felixstowe frontage we postulate to have a maximum 25 year design life with annual maintenance to ensure they perform appropriately.
- A cost sensitivity analysis indicates that the up front capital cost of installing single timber groynes 50m in length are lower compared to rock groynes with the same spacing. However, if rock groynes are constructed with double the spacing of timber groynes then the capital costs are approximately equal. Owing to the different properties of each groyne type (for example rock groynes will dissipate wave energy approaching at an oblique angle whilst timber groynes cause wave reflection disturbing sediment on the beach) timber groynes are typically spaced more closely together than rock groynes and therefore more timber groynes than rock groynes will be necessary along the frontage.
- The PAR submitted to the Environment Agency must take into account the whole life cost of the 100 year coastal protection proposal and as the postulated design life of a timber groyne at Central Felixstowe is half that of a rock groyne refurbishment (not full replacement) allowance must be made for the replacement of timber groynes more frequently than for rock groynes, thereby increasing the whole life costs of the timber groynes significantly
- The predominant sustainability issue for both timber and rock groynes is in relation to the source of the materials. General provisions are that whilst hardwood used for timber groynes can originate from certified plantations there is some un-easiness associated with the acceptability of using such valuable resources. Rock is not considered as scarce a material a tropical hardwood but also has some sustainability issues associated with transportation distances and extraction methods. However, on balance rock groynes are considered as more sustainable than tropical hardwood timber groynes, and the rock materials have the added benefit of being re-usable more efficiently in any re-configuration or enhancement phase.
- Health and safety issues have been reported for both rock and timber groynes. From the information provided by Councils and reported in publications rock groynes appear to have a number of risks associated with them, but this is a general perception and often anecdotal. However, appropriate signs and walkways along the top of rock groynes can reduce the risk of people being trapped etc. and at Southwold particular care was taken with the construction of the rock groynes to reduce the number of large voids between the rock units.

## 1 Introduction

The area considered by the Central Felixstowe Project Appraisal Report is located between the War Memorial and Jacob's Ladder, to the north of Cobbold's Point, see Figure 1-1.



**Figure 1-1 Location map of the Central Felixstowe section**

The present defences along the frontage were constructed from timber in 1850 and followed the natural slope of the beach (1 in 10 in the active tidal zone). In 1946 work was carried out to encase the groynes in concrete to prolong their lifespan. However, the concrete encased timber groynes are disintegrating resulting in a loss of valuable visual amenity for the frontage and health and safety concerns. At Cobbold's Point the old timber groynes are becoming exposed due to the lowering beach levels. This has resulted in pieces of wood splintering off the groynes causing sharp sections of wood to be exposed posing a health and safety risk. There are also sections of exposed rebar on the beach from the concrete encased timber groynes. A seawall was constructed from Cobbold's Point to Manor Road in 1903. In 1999/2000 two fishtail groynes were constructed from pre-cast concrete blocks and beach recharge placed at Cobbold's Point in an attempt to retain a beach.

According to anecdotal evidence the beach levels at Cobbold's Point constantly fluctuate. The general trends indicate that the beach level has been dropping since the recharge was placed following the Cobbold's Point installation. Surveys undertaken by Halcrow in 2001 and Mott MacDonald in 2009 show a beach level drop of 2.8m since 2000. Along the frontage between Cobbold's Point and the War Memorial the beach levels are also dropping, especially to the south of the southern fishtail groyne at Cobbold's Point. Between 8<sup>th</sup> and 9<sup>th</sup> October 2002 a strong easterly storm resulted in the beach levels outside the Fludyer's Arms dropped by 2.65m (Terry Oakes Associates Ltd, 2002) (see Figure 1-2). This drop in beach level resulted in emergency work been undertaken to place rock armour in front of the seawall to stabilise it.



**Figure 1-2 Collapsed concrete encased timber groyne and lowered beach levels outside the Fludyer's Arms (February 2009).**

The current preferred option for the proposed coast protection works in Central Felixstowe are based around the provision of straight rock groynes as presented to the public on 30<sup>th</sup> March 2009. The preference for rock over timber is ultimately down to;

- Wider spacing of the more efficient rock groynes compared to timber leading to overall lower up front costs
- Lower whole life maintenance spend
- Less whole life replacement costs
- Greater efficiency for technical design purposes.

Following the meeting on 30<sup>th</sup> March 2009 Suffolk Coastal District Council (SCDC) requested that Mott MacDonald investigate in further detail the benefits/costs of rock groynes against replacement timber groynes.

This report provides a short description of rock and timber groynes and some schemes where they have been used to protect the coastline from coastal erosion. Information from Local Authorities will provide examples of maintenance budgets and timescales of replacement. A parametric analysis of the cost of rock and timber groynes per metre for a variety of spacing is presented and the sustainability of rock and timber will also be examined. Health and safety, and amenity issues are also explored. The conclusions of this report will provide SCDC with an evidenced based preferred option with which to replace the present disintegrated concrete encased timber groynes along the frontage at Felixstowe.

## 2 Rock and Timber Groynes

### 2.1 General

A groyne is essentially a narrow “rib-like” structure that is built approximately perpendicular to the shoreline in order to trap a portion of the longshore sediment and accumulate beach material<sup>1</sup>. On sand and shingle beaches, they achieve this by interfering with longshore currents created by obliquely incident waves and/or tidal currents, reducing the strength of these within the groyne “bays”.

Groynes typically extend across a part or the entire inter-tidal zone and may be built in groups (known as groyne fields) to protect an entire frontage length<sup>2</sup>.

Groynes are very common, particularly on UK beaches and, as a general guideline, are most appropriate to frontages where there is a low net and high gross drift<sup>3</sup>. Groynes have been successfully employed on both shingle and sand beaches but in the latter case, tend to perform best in micro-tidal environments where the spatial distribution of transport due to waves and tidal currents across the foreshore is limited. Sand beach groynes do not generally trap all the drift but should be long enough to control a sufficient part of the profile and hence protect the upper beach from severe erosion. Sediment that is transported along the shore is trapped against the updrift side of the structure. Consequently, the supply to downdrift beaches is reduced and erosion occurs. The erosion problem is therefore transferred along the coast<sup>3</sup>.

Groynes are constructed to serve three main purposes<sup>3</sup>:

- To stabilise and widen an eroding beach by trapping sand from littoral drift.
- To stabilise the placement of beach fill material on nourished or man made beaches.
- To prevent the movement of littoral material out of a littoral cell.

In addition to the three main groyne functions as described above, a well-designed system can also<sup>4</sup>:

- Deflect strong tidal currents away from the shore,
- Control seasonal shifts of material alongshore and hence the distribution of sediments within and embayment and,
- Increase the depth of beach material cover to an otherwise erodible seabed.

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<sup>1</sup> Komar, P. D., 1998. Beach Processes and Sedimentation. Prentice Hall: 544pp

<sup>2</sup> CIRIA, 1996. Beach Management Manual. CIRIA Report 153. 448pp.

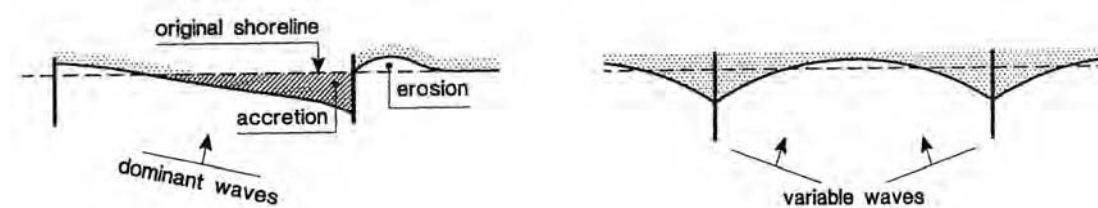
<sup>3</sup> Van Rijn, L. C., 2004. Principles of sedimentation and erosion engineering in rivers, estuaries and coastal seas. Aqua Publications.

<sup>4</sup> Fleming, C. A., 1990. Guide on the use of groynes in coastal engineering. CIRIA Report, 119. 114pp.

Groyne systems cannot usually stop coastal erosion completely but effective systems can retard shoreline recession by a factor of 2 or 3. It stands to reason that groynes will perform best at sites with a significant longshore drift component and an oblique angle of wave approach as present at the Central Felixstowe frontage.

## 2.2 Effects of groynes on beaches

In providing a physical barrier to longshore transport, groynes are intended to alter the orientation of the beach to be more closely aligned with the incoming wave crests<sup>3</sup>. On coasts with a dominant wave approach, sediment is deposited on the updrift side of the groyne whilst erosion occurs in the lee of the structure. Consequently, there is often a step-type difference in elevation across each groyne. On coasts with a highly variable wave climate, a curved, bay-type beach will form<sup>4</sup>. Examples of the shoreline position within groyne compartments are shown in Figure 2-1.



**Figure 2-1 Shoreline position inside groyne compartments (left = single dominant wave direction, right = variable wave direction) (from Van Rijn, 2004).**

Over time, the width of the beach within the groyne compartments increases but in doing so may cause erosion downdrift of the groyne field. Groyne systems can only trap a finite quantity of sand and once filled, the groynes allow any longshore transport to resume around the toe of the structure. To reduce downdrift erosion, artificial nourishment of the groyne bays may be carried out so that the overall littoral sediment budget is not adversely affected<sup>2</sup>.

The effectiveness of a groyne is dependent on the type of beach material, the wave climate and tidal regime, the dimensions and the hydraulic characteristics of the structure<sup>3</sup>. The design of a groyne system will always be a compromise between providing for long-term beach stability and minimising damage due to large storm waves.

## 2.3 Types of Groynes

Groynes can be constructed from a wide range of materials and the choice is essentially based upon the specific requirements of the scheme and the physical characteristics of the site (although price and material availability are often defining criteria)<sup>3</sup>. Two main types of groyne may be distinguished:

- Impermeable, high crested structures. These are generally concrete or sheet piling structures but also include grouted rock and rubble mound groynes<sup>4</sup>. Groynes of composite construction with steel sheet piling or concrete at lower levels and timber at upper levels are common<sup>5</sup>, whilst more diverse structures comprising grout or geotextile filled bags have also been constructed. The crest of these structures is always above mean high water (MHW) level and the resultant shoreline is orientated perpendicular to the dominant wave direction within each compartment. Impermeable groynes are intended to inhibit longshore transport until the beach volume has increased sufficiently for sediment to spill over the crest or around the toe of the structures<sup>5</sup>. The major drawbacks of impermeable groynes are their tendency to reflect wave energy and to create offshore-directed currents particularly along their downdrift face. These hydrodynamic effects are quite localised but can have an adverse effect on the beach, for example forming scour channels alongside the downdrift face of the groyne.
- Permeable groynes can be used on beaches that have sufficient quantities of sediment to allow a proportion to pass through or over the structure without limiting its efficiency<sup>5</sup>. The crest level of permeable groynes is usually fixed between the high and low water marks in order to reduce eddy formation at high tide<sup>4</sup>. These types of groynes are generally used on beaches with lower sediment depletion in order to create a more regular beach plan-shape. Timber, rock and pre-cast concrete have all been used in the construction of permeable groynes. Where there is substantial sediment drift the size of the voids must be considered to avoid blockages. The toe of the structure can be constructed to deform without failure if scouring occurs, or it can be protected with sheet piles.

Groynes can be constructed in a variety of shapes and sizes. Typically in the UK straight groynes are constructed, however, in some locations zigzag groynes are used. Zigzag groynes reduce the wave reflection on the straight section of the groyne and inhibit strong tidal currents running along the length of the groyne. There is however, little evidence that suggests zigzag groynes improves beach material retention<sup>2</sup>.

At the ends of groynes 'T', 'L' and 'Y' shapes have been used to refract and deflect waves resulting in wave energy being redistributed in a way to create stable bays, as has been constructed in South Felixstowe.

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<sup>5</sup> Bird, E. C. F., 1996. Beach Management. J.W. Wiley & Sons: 281pp

## 2.4 Functional Design

### 2.4.1 Crest level

As sand is transported in suspension throughout the water column, then the impact upon longshore transport will be a function of the height of the groyne<sup>3</sup>. The required beach level should be used to determine the crest level for an artificial beach or where a recharge scheme is planned. In order to produce steady accretion of a natural foreshore, it is recommended that around 0.5m of the structure protrudes above the beach profile and that at the extreme landward end of the groyne, the crest level should actually be slightly lower than the beach. At the seaward end of the groyne, the crest level should be slightly higher than MLW and around 1m above the seabed so that all bedload transport is blocked. Submerged groynes are most effective in low wave energy conditions. Gomez-Pina (2004<sup>6</sup>) and Aminti et al. (2004<sup>7</sup>) state that the crest level should be set at 0.5m – 1m above the subaerial portion of the profile in order to hold the submerged portion of the beach profile.

### 2.4.2 Groyne Length

As with crest level, a long high structure that extends across the entire width of the surf zone will have a greater impact than a short, low structure. In practice, the maximum groyne length is determined by the mean low water spring line in tidal environments although the tip should always be within the surf zone to allow sand to pass round it (Van Rijn, 2004).

For estimating a suitable groyne length, it can be assumed that the majority of the longshore drift occurs on the upper part of the profile although sand is still mobile under both wave and tidal currents at relatively large water depths<sup>5</sup>. This being the case, groynes on sand beaches need to be longer than those constructed on shingle. For example, Van Rijn (2004) states that in the UK, groynes on shingle beaches do not generally exceed 60m whereas on sand beaches the length is usually in excess of 100m. In the Netherlands, groynes on sand beaches may be up to 200m long. The optimum length of groynes also depends partly on the dominant angle of wave approach. Wave crests arriving between 40°-50° to the shoreline are most effective in driving longshore transport<sup>6</sup> and groynes in these locations must be relatively long in order to be effective. For locations where the angle of approach is greater or less than this, the groynes can be shorter.

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<sup>6</sup> Gomez-Pina, G., 2004. The importance of aesthetic aspects in the design of coastal groynes. *Journal of Coastal Research*, SI 33. 83-98.

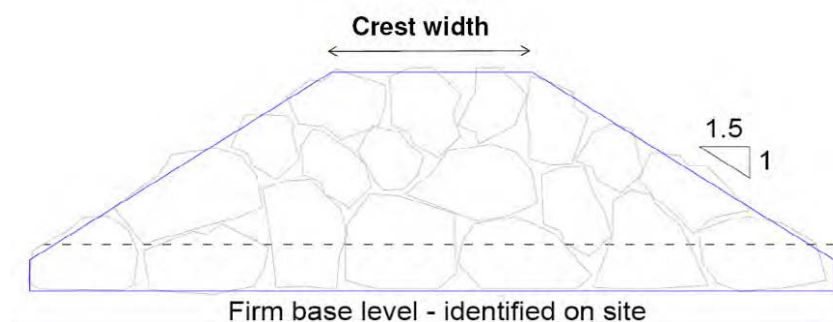
<sup>7</sup> Aminti, P., et al., 2004. Evaluation of beach response to submerged groyne construction at Marina di Ronchi, Italy using field data and a numerical simulation model. *Journal of Coastal Research*, SI 33. 99-120.

### 2.4.3 Spacing

The optimum spacing of the groynes depends primarily on the nature of the beach material (Bird, 1996) and is related to the structure length. The spacing of groynes on shingle beaches is less than that on sand beaches, and is because sand beaches do not re-orientate themselves as quickly as shingle beaches during storm conditions. As a general rule and depending on the construction material used the groyne spacing should be 2-4 times the groyne length in order to prevent the generation of rip currents and excessive erosion between the groynes<sup>4</sup>. The spacing should decrease with increasing wave angle to ensure a uniform distribution of sediment within the compartment<sup>6</sup>. In the UK, the spacing/length (S/L) ratio is between 0.8 and 3 whilst in Holland, S/L is typically between 2 and 4<sup>4</sup>. The current spacing to length ratio at Central Felixstowe is 0.6.

## 2.5 Rock Groynes

Rock groynes are typically long structures which extend past the Low Water Mark. Rock groynes are generally founded between 1.5m and 2m below the beach level, therefore having a larger footprint than can be seen from the beach<sup>8</sup>. Beach material is trapped between the groynes as it moves along the coast. However, material can also become trapped in the voids between the rocks causing the hydraulic performance of the rock groynes to diminish. Along the Felixstowe frontage between Cobbold's Point and the War Memorial it is proposed that the length of the groynes would be between 45m and 70m. The spacing of the groynes will be determined through subsequent analysis of survey data and numerical modelling.



**Figure 2-2 Typical cross section of a rock groyne**

The rock type used to construct rock groynes needs to be sound, hard and durable to withstand wave action and marine weathering. Rock groynes are durable and can be moved or reoriented if required, providing improved protection.

The roughness of a rock groyne allows more wave energy to be dissipated compared to timber groynes.

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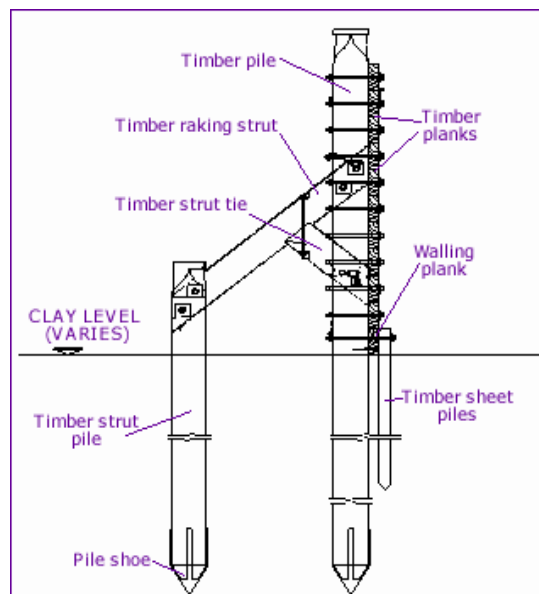
<sup>8</sup> The rock manual - The use of rock in hydraulic engineering CIRIA C683



**Figure 2-3 Rock groyne at Shoreham-on-Sea (May 2009)**

## 2.6 Timber Groynes

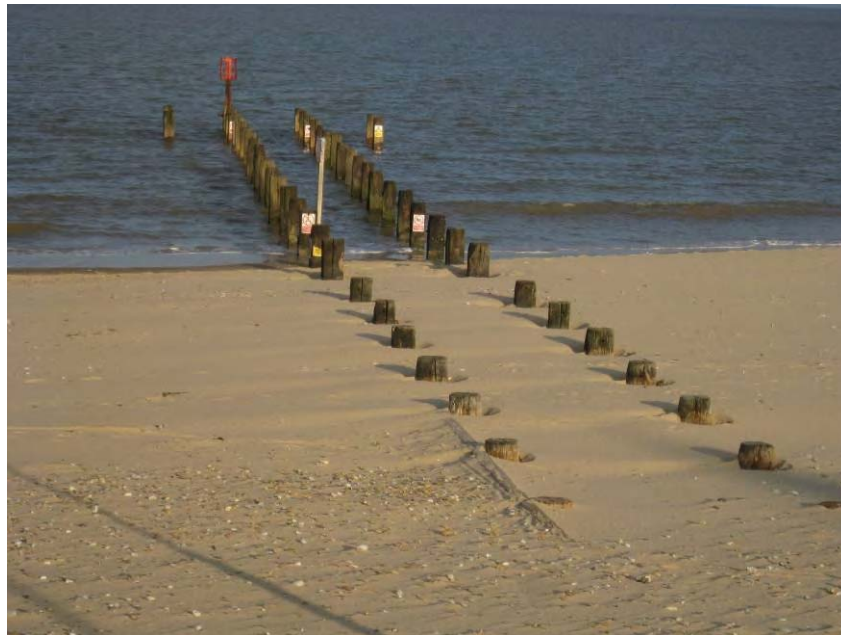
Timber has been the traditional method for groyne construction in the UK. The benefits of using timber are that it is relatively lightweight and has a good strength to weight ratio. However, timber can also contain natural flaws and the required length of timber needed for groynes is available in limited quantities. Timber groynes can also be susceptible to damage by biological attack and abrasion. Above the beach level timber can be damaged by fungal decay and rot, whilst below the beach level marine borers can cause damage.



**Figure 2-4 Typical cross section of a timber groyne** (source:  
<http://www.canterbury.gov.uk/buildpage.php?id=168>)

Timber groynes, from a review of available information, are now constructed of tropical hardwoods such as Ekki and Greenheart rather than British softwoods such as Douglas fir and oak which were used for some original groyne schemes. Tropical hardwoods are reported to have twice the bending and shear strength values of European hardwoods (oak and ash) and three times the strongest softwood (Douglas fir) (Canterbury City Council<sup>9</sup>).

Timber groynes are adaptable in terms of adding and removing planks, allowing the level and profile of the groynes to be altered and maintained. The alteration of the planks can also control the passage of sediment longshore. However, the spacing of the groynes cannot easily be altered once they are constructed. Any groynes that were constructed in along the Central Felixstowe frontage would need to be piled into the London Clay making the removal of them costly compared to rock groynes. On amenity beaches timber groynes have a small footprint and are generally perceived to be more aesthetically pleasing when compared to rock groynes<sup>9</sup>. The design and detail of timber groynes affect the performance and durability of the groyne. Conventional straight timber groynes as presented in Figure 2-4 are constructed using piles and planking and often sheet piles to provide resistance to ground and wave forces. Other groyne types can include permeable pile screens and double or single rows of timber piles as presented in Figure 2-5. Permeable pile screens have been reported to be less effective at retaining a beach, but result in less severe erosion downdrift<sup>10</sup>. King pile groynes, which consist of timber piles constructed in a row next to each other too enable sheet piling beyond the low water mark are present at Lowestoft.



**Figure 2-5 King piles on Lowestoft beach (21/05/2009)**

The prefabrication of sections such as sheet piles can increase safety and improve quality of construction. The prefabrication process may allow the use of preserved treated timbers and reduce the amount of waste produced. Timber groynes can be constructed so that it is possible to adapt the groyne height to the changing beach profile.

<sup>9</sup> Canterbury City Council (CCC) <http://www.canterbury.gov.uk>

<sup>10</sup> Application of timber groynes in coastal engineering, U H Perdok, 2002

## 2.7 Hybrid groynes

Hybrid groynes are constructed with a timber section at the landward end and a rock section at the seawards end of the groyne. The principle of a hybrid groyne at the seawards end works in a similar way to a rock groyne by dissipating the wave energy. The rocks at the seawards end of the groynes require less maintenance compared to timber and therefore require less frequent replacement.



**Figure 2-6 Hybrid groyne at Brackenbury, North Felixstowe (February 2009)**

## 2.8 Schemes where Rock Groynes have been used

Within the following section case studies from the south and east coasts will be described to provide further understanding of where rock and timber groynes have been utilized and the levels of replacement, repair maintenance that is required for them to maintain their optimal function.

### 2.8.1 Poole

The defences along the frontage consist of both rock and timber. Inside the harbour at Rockley Park there are 6 timber groynes were constructed in the early 1900's to protect the coastline from erosion. the length and spacing of these groynes varies. Along the Sandbanks frontage there are 11 rock groynes constructed in 2008 with a length of between 80m and 100m and a spacing of between 120m and 160m (Length to space ratio of 1.33). The beach at Sandbanks is mostly sand with the predominant wave climate from the southwest. HR Wallingford undertook a modelling and review study leading to the construction of an additional 5 rock groynes in east Poole.





**Figure 2-8 Flat concrete walkway on top of a rock groyne at Poole (18/05/2009)**

Following the success of the 1995 rock groyne scheme, four more rock groynes with a similar design were constructed in 2001.

Beach nourishment was undertaken with both schemes to provide protection to the concrete sea wall during stormy conditions. The material was obtained from Poole Harbour and placed on the beach with the majority being placed to the west as the sediment direction is from the west to the east.

Since the construction of the rock groynes at Sandbanks in 2005, the Borough of Poole have reported that ecological benefits have become apparent. Algae and lichen were the first to colonise the groynes, followed by barnacles and seaweeds. Other life forms such as limpets, anemones and crabs are also establishing themselves on the groynes due to their ability to cope with the conditions of the rocky shore. Birds are also visiting both the waters edge (Oystercatchers) and the groynes (Purple Sandpiper).

The generally selected policy at Poole has been to protect their shoreline with rock groynes. However, to the east in Bournemouth the policy has generally to construct timber groynes as beach protection structures. Mott MacDonald has been advised by Bournemouth Borough Council (BBC) that in 1996 they undertook a review of the two types of groynes and it was decided that the effects of timber were less detrimental to the environment. However, the Bournemouth Strategy Study show indicates that BBC will change their policy to rock groynes for future coastal protection schemes<sup>12</sup>. The timber groynes at Bournemouth cost £225,000 per groyne in 2004. The Council noted that the particularly high cost was a result of the macro-tidal environment at Bournemouth.

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<sup>12</sup> David Harlow, Coastal Protection Manager at Bournemouth Council, 01/05/2009

## 2.8.2 Jaywick

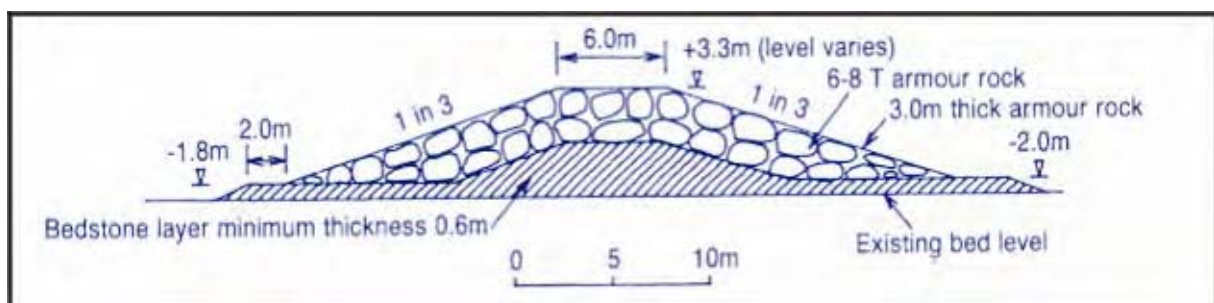
The coastal defences at Jaywick protect a large number of properties and low lying land from flooding. The 1953 storm surge killed 35 people and made 600 people homeless in Jaywick and in 1978 and 1982 storms resulted in people having to be evacuated. The area is now protected for a 1 in 1000 year surge level. The conditions at Jaywick that lead to the most damage are north to north-easterly waves with a height of up to 2.5m. The direction of the waves results in a southerly drift direction. The storm waves can move material up to 0.2mm in size 200m offshore.

At Jaywick is a steep shingle beach with a series of rock groynes that were constructed approximately 10 years ago. The groynes are approximately 1.5m high, 70m long, and 75m spacing (L/S ratio 1.07).



**Figure 2-9 Rock groynes at Jaywick (May 2009)**

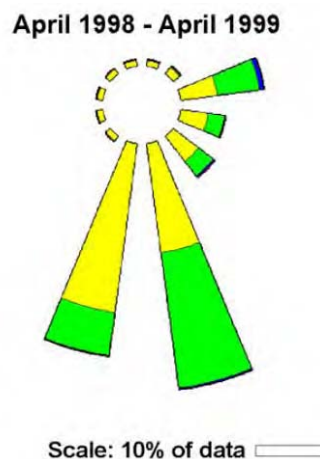
A cross section through the rock groynes at Jaywick is presented below (Figure 2-10)



**Figure 2-10 Cross section through the a rock groyne at Jaywick**

### 2.8.3 South Felixstowe

The rock groynes at South Felixstowe were constructed in 2008 with a length of between 30m and 50m. The beach material is mixed, consisting mainly of sand but with some shingle. The rock groynes were constructed with the landward 10m of groynes being buried beneath the beach to improve the visual amenity of the beach. The decision to construct rock groynes included a number of environmental enhancements including the ability for users to walk along the beach and that an open beach would be created as a result of the wider spacing of the rock groynes. It has been observed that the rock groynes are being used as a windbreak by beach users. The prevailing wave direction along the frontage is from the south and south east. The inshore height of the waves varies between 0.5m to 3m.



**Figure 2-11 Wave Rose for inshore waves at South Felixstowe (source: Halcrow 2003<sup>13</sup>)**



**Figure 2-12 A T head rock groyne at South Felixstowe (October 2008)**

<sup>13</sup> Halcrow, 2003 „Suffolk Coastal District Council Southern Felixstowe Coastal Strategy Volume 3: Coastal Processes

## 2.9 Schemes where Timber Groynes have been used

### 2.9.1 Dover

The coastline of Dover is 33.2km long, of which 25.9km is defended and the remaining length is natural cliff. The beach material along the coastline is predominantly shingle. The wind direction is primarily from the southwest.



**Figure 2-13 Location map of Dover**

At St Margaret's Bay the original twelve timber groynes were built of steel rail piles and wallings with steel sheet pile and timber planks. The length of these groynes is 40m with 30m spacing. In 1982 the groynes were strengthened by concrete plinths encasing worn steel sheet piles and double planking to protect the steel posts from abrasion. Since then maintenance has been undertaken on a regular basis.

At Kingsdown the former rifle range is protected by rock armour and concrete defences. To the north of this section three timber groynes were constructed in 2001 along with a rock revetment. Kingsdown village is protected by fifteen timber groynes constructed in 1965 and 1979. The groynes are 40m in length and have 50m spacing (L/S ratio 1.25). Beach recharge schemes have also been carried out in 1995 with 58,000m<sup>3</sup> of shingle and in 1998 with 80,000m<sup>3</sup> of shingle to increase the height of the beach owing to material being lost.

The defences at Deal, to the north of Dover, were originally constructed in 1889 to protect the lower part of the town. Over time the town grew in size and between 1938 and 1957 groynes were constructed in the northern half of the town. Further groynes were also added between 1958 and 1974. Following a storm in 1978, 32 new timber groynes with a length of 50m and a spacing of 45m (L/S ratio 0.9) were constructed to protect the beach. Beach nourishment has taken place historically including 22,000m<sup>3</sup> in 1960 and 9000m<sup>3</sup> in 1974. Recently the beach levels have been relatively stable most likely owing to the volumes of material coming from Walmer and Kingsdown (Dover District Council<sup>14</sup>).

## 2.10 Schemes where a Combination of Rock and Timber Groynes have been used

### 2.10.1 Waveney

According to the 1996 Shoreline Management Plan of the 26.1km of Waveney coastline, 12.0km is defended by the council, 6.6km is defended by the Environment Agency, 0.7km are owned by Association of British Ports (Lowestoft Harbour) and the remaining 6.8km of frontage is natural soft cliffs. Though complex the general sediment drift along this frontage is southwards. However, during a prolonged period of southerly or easterly winds which drive the seas onto the shore the beach levels can temporarily be reduced and built back up over the following months.



**Figure 2-14 Pile-group Kingpile timber groynes at Lowestoft. A dual row of king piles is used to create an access platform for piling plant, allowing construction of groynes below the low water mark. Photograph taken 21/05/09**

<sup>14</sup> Dover District Council, [http://www.doverdc.co.uk/council\\_property/coast\\_protection/coastal\\_defences.aspx](http://www.doverdc.co.uk/council_property/coast_protection/coastal_defences.aspx)

A £7 million groyne scheme funded by Waveney District Council and the Environment Agency has recently been constructed in Southwold. Within the scheme a field of rock groynes have been constructed to the north of the pier which have been successful in trapping sediment and holding a stable mixed sand and shingle beach. The rock groynes are 45m in length with a 70-80m spacing (a 1:1.8 length to spacing ratio) and cost approximately £200,000 per groyne to construct. The scheme has been successful in maintaining the mixed sand and shingle beach.

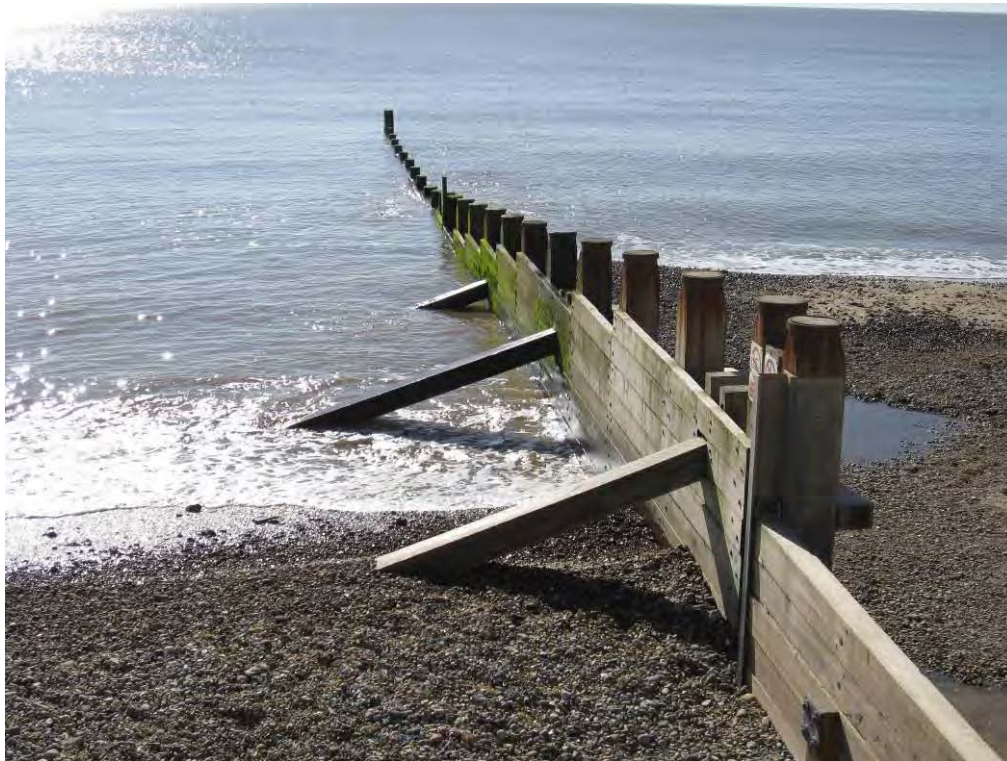


**Figure 2-15 One of the 2005 rock groynes at Southwold. The rock groynes were carefully constructed to reduce the voids between the rocks in an attempt to reduce health and safety issues. The head of the groyne at the seawall has removable timber struts to enable access. Photograph taken 22/05/09**

South of the pier a field of timber groynes was constructed in 2005 each approximately 45m in length and have a spacing of 110m (giving a length to spacing ratio of 1:2.4) at a cost of approximately £105,000 per groyne. The beach along the frontage is mixed with sand and shingle. The 2005 defences along the section of the frontage in the historic town are timber groynes intended to protect both the cliffs and residential properties behind from erosion.

The timber groynes along the frontage are becoming more exposed with lowering beach levels. Paul Patterson of Waveney District Council has noted that the groynes are not performing well and that the beach levels are highly variable with storm events.

In the aggressive wave and current climate at Southwold, the life of these groynes is unlikely to exceed 20 years even with the regular monitoring and extensive maintenance described in detail in Section 3.3 (Paul Patterson, personal communication).



**Figure 2-16 – A 2005 timber groyne at Southwold. Similar to the rock groynes to the north the timber groynes also have removable struts near to the seawall allowing access. Photograph taken 22/05/09**

### 2.10.2 Brackenbury

The Brackenbury frontage is a shingle frontage and has a prevailing wave direction from the south-east. Timber groynes with a length of 35m were constructed of Greenheart along the frontage in 1986. Various other sources of timber were considered for the scheme but it was found that softwood timbers were not sufficiently durable for the type of sand/ shingle beach where the potential for abrasion is high. Softwood timbers have also been found to be less strong at the joints and their ability to endure under moderate wave action is questionable. The use of Oak was also considered for the groynes, however, it was decided that the resistance to marine organisms (marine borers) was poorer compared to Greenheart. Rock, concrete, and masonry were also considered along the frontage. However, it was considered in 1986 that rock would not be suitable on the intensively used amenity beach. Concrete and masonry were also decided against due the lack of flexibility to adapt the groyne height for fluctuating beach levels along the frontage<sup>15</sup>. Work to partially remove the dilapidated groynes, construct 12 new timber groynes and extend 5 existing timber groynes was completed in 1986. Since then little work has been carried out to maintain the groynes. The current groynes along the frontage have a spacing of 1 to 1. The individual planks of Greenheart are 2m in length and 75mm in width. The five existing groynes that were extended with rock were extended in line with the new timber groynes. It has been reported that the groynes along this section of the beach have been used as windbreaks.

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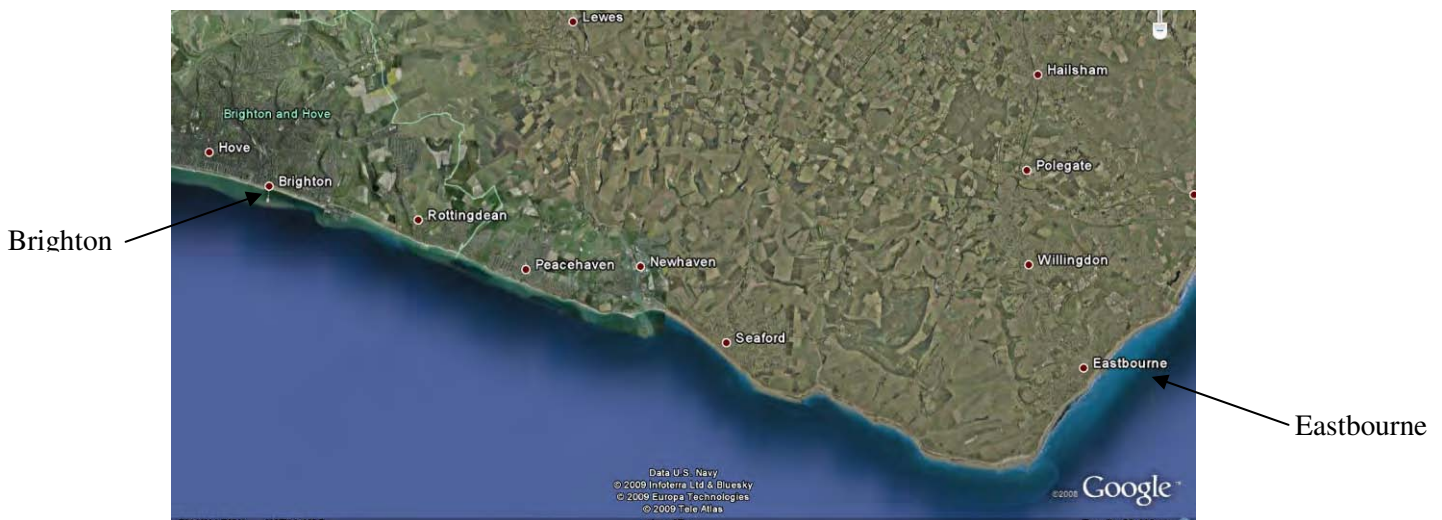
<sup>15</sup> Brackenbury groynes and Beach Replenishment, Dobbie and Partners, 1990



**Figure 2-17 Timber groynes in the distance with Hybrid groynes in the foreground at Brackenbury (February 2009)**

### 2.10.3 Brighton

Brighton beach is predominantly a shingle beach with twelve concrete groynes. The groynes present along the frontage were constructed in 1998. The groynes are between 65m and 110m in length and have a spacing of between 130m and 150m (L/S ratio 1.6).



**Figure 2-18 Location map showing Brighton & Hove and Eastbourne frontages**

The first groynes along the frontage at Brighton and Hove were constructed in the 1720's from timber as a result of the coastline eroding by as much as 2.5m per year<sup>16</sup>. Since 1977 new defences have been constructed in four phases. The first phase, between Groyne 14 (colloquially known as 'Banjo groyne') and the Eastern Terminus, was constructed between 1977 and 1978. The second and third phases were constructed between 1977 and 1983 between Groyne 13 and the Western Terminus. Groynes 13 and 14 were constructed in the fourth phase between 1996 and 1998.

A condition survey undertaken in 2000 indicated that most of the groynes were generally in good condition. However, the foundations of the groynes had started to become undermined. These groynes required immediate attention to prevent them from falling over.



**Figure 2-19 Concrete groyne at Brighton beach (May 2009)**

BHCC have a number of rock groynes along the frontage which were constructed over 15 years ago and have never had any maintenance carried out to them. Mott MacDonald were advised by the Council that rock groynes can wear and settle. BHCC advised that they had constructed one of the groynes using carboniferous limestone. However, this groyne is now starting to split. The main disadvantage that Brighton and Hove perceive with rock is the large footprint, which needs a large beach to accommodate such a large structure.

The replacement of the timber groynes is dependant on the severity of the weather and the damage that is incurred. The general frequency for replacing top planks and stub piles is approximately 5 to 15 years in the intertidal zone and longer if at the stable landward end of the beach.

At Roedean, to the east of Brighton, the defences were constructed in 1907 when five concrete groynes were built to prevent the recession of the cliff line northwards. The coastal defences along the frontage have a variety of spacings owing to the groynes being constructed to protect individual sections of the coast (BHCC<sup>17</sup>).

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<sup>16</sup> [http://www.sdcg.org.uk/sdcg\\_right2.html](http://www.sdcg.org.uk/sdcg_right2.html)

<sup>17</sup> <http://www.brighton-hove.gov.uk/index.cfm?request=c1115514>

Along the coastline at Eastbourne the coastal protection scheme was replaced in the mid to late 1990's. The scheme designed by Posford Duvivier and modelled by HR Wallingford included 94 timber groynes from Holywell to Langney Point. The modelling provided by HR Wallingford indicated that 1:9 sloped timber groynes with a 20m berm spaced between 60m and 80m at a spacing to length ratio of 1:1 would retain a sufficient beach to keep overtopping rates at the sea wall at an acceptable level. HR Wallingford also recommended that the detailed design of the groynes should consider the groyne stability owing to a difference of 2m in beach elevation near the beach crest from one side of the groyne to the other. The total cost of the scheme was £30 million and was funded by the Ministry of Agriculture, Fisheries and Food, now DEFRA.

#### 2.10.4 Arun

Arun District Council looks after approximately 300 timber groynes, 12km of concrete seawalls and timber breastworks and 8 rock groynes and groyne extensions. Much of the frontage is composed of a shingle upper beach and a sandy lower foreshore. Shingle dissipates wave energy and is successfully restrained from excessive movement along the beach (littoral drift) by the groynes<sup>18</sup>. The predominant wind/wave direction is from the southwest and so is oblique to the shore for much of the shoreline.



**Figure 2-20 Predominant wind/wave direction** (www.arun.gov.uk)

The groynes along the frontage at Bognor Regis are predominantly timber structures with a few larger rock groynes. The length of the groynes varies between 20m and 35m and a spacing of 45m to 50m (L/S ratio 1.67) The groynes are thought to have been constructed in the 1960's to 1970's. Little repair has been carried out to the groynes since this.

<sup>18</sup> Arun Council website accessed on 23/04/2009 at 10.42am <http://www.arun.gov.uk/cgi-bin/buildpage.pl?mysql=90#Flood>



**Figure 2-21 Hybrid groynes at Bognor Regis (May 2009)**

### 2.10.5 Worthing

Worthing Borough Council is responsible for approximately 7.5km of shingle coastline. The primary coastal defence along the frontage is a shingle berm which was formed in the 1800's. At Shoreham and Lancing 33 rock groynes sourced from Norway were constructed to provide improved protection from flooding. The groynes are 70m in length at a spacing of 95m to 105m thus giving a L/S ratio (0.75). The scheme was split into 3 phases owing to the size of the project. Rock groynes were selected rather than timber groynes for this scheme based on the whole life costs.



**Figure 2-22 New rock groynes constructed alongside timber groynes at Shoreham-on-Sea (May 2009)**

At Worthing the coastal defences were constructed in 2000. The design of the scheme took into account information derived from a coastal monitoring scheme. The orientation of the groynes was between 230 and 250 degrees North based on the longest fetch and largest waves. From observations from the existing groynes a length of 55 m was adopted with 1 to 1 spacing. It was also observed that a 15m berm was required to prevent flooding by overtopping. A hybrid groyne design was decided upon for this location owing to past experience had indicated that the marine borers and rot affected the groyne. Rock filled gabions were placed at the seawards end of the groyne. In 2001 it was reported that the gabions were working well and were allowing beach movement<sup>19</sup>.



**Figure 2-23 Repairs to a timber groyne at Worthing (May 2009)**

## 2.10.6 Swanage

There is approximately 1.8km of coastal defence along Swanage Bay which is managed by Purbeck District Council<sup>20</sup>. A combination of both timber and rock groynes were installed along the sand frontage which is affected by waves predominantly from the south-west. At the southern part of the bay timber groynes were constructed in 1925 to stabilise the beach.

In the central section between Mowlem and Ocean Bay there was an increase in the rate of erosion due to changes to the seawall and therefore in 1930 a timber groyne defence system was constructed. This was effective at retaining the sand but however caused problems to the north by increasing the erosion rate.

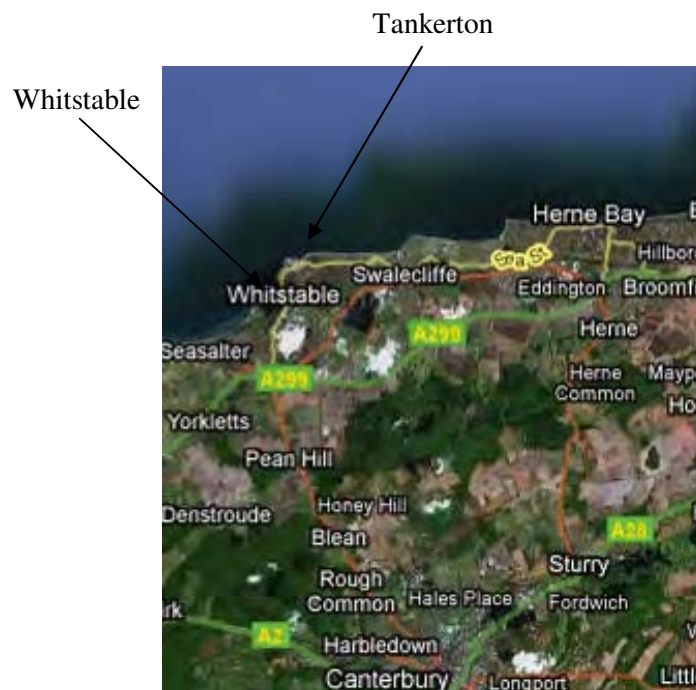
<sup>19</sup> <http://www.worthing.gov.uk/worthings-services/technicalservices/coastalissues/fileupload,47707,en.pdf>

<sup>20</sup> [http://www.purbeck.gov.uk/environment/environmental\\_services/coastal\\_protection.aspx](http://www.purbeck.gov.uk/environment/environmental_services/coastal_protection.aspx).

Between October 2005 and June 2006 work was carried out to construct 18 new groynes from Greenheart timber. The initial plan for the frontage was to construct rock groynes with sand recharge. However, the local community had a preference for timber groynes and the scheme was altered. The length of the groynes was 40m with spacing of 85m (L/S ratio 2.13). The Greenheart used to construct the groynes was salvaged from the old groynes and also from a certified source.

### 2.10.7 Canterbury City Council (CCC)

The Canterbury coastline is particularly erosive with a very high transport rates (CCC<sup>21</sup>). The predominant wave direction is from the south to south-west. In order to keep the beach in place there is a need for the majority of the timber groynes to be spaced approximately 40m apart. CCC determined that the use of rock groynes at this sort a spacing would be uneconomical, unsightly and a waste of natural resources. Design considerations of increasing the spacing of the rock groynes were not advised to Mott MacDonald by CCC. The Council sourced the timber for the groynes from Guyana (Greenheart) and Cameroon (Ekki). Oak and Douglas fir have also been trialled by CCC and were found to start deteriorating after as little as five years and were expected to fail after 10 years. CCC reported to Mott MacDonald that one problem with timber groynes along the frontage is people place lit barbeques on the top occasionally resulting in the groynes catching fire.



**Figure 2-24 Location map of the Canterbury coastline** (source: Google maps)

Along the Canterbury coastline there are 405 timber groynes which vary in length from 25m to 75m. Of these timber groynes approximately 100 are less than 10 years old, a similar number are between 10 to 20 years old and the remaining are 20 to 50+ years old.

<sup>21</sup> Coastal Management Best Value Review, Canterbury City Council.



**Figure 2-25 Timber groynes at Tankerton** ([www.kent.ac.uk](http://www.kent.ac.uk))

The coastline at Tankerton is 480m in length of mixed beach. At Tankerton the original groynes were constructed of Greenheart in the 1950's. A new scheme was carried out by CCC to replace the groynes in three phases. The length of the groynes is 40m with spacings of 40m (L/S ratio of 1).

The timber groynes along the Tankerton frontage completed in phases 1 and 2 which were completed in 1998 are a tropical hardwood (Ekki) which was purchased by the City Council under a separate contract to ensure that it was environmentally sourced. The contract was worth £340,000 and was won by Wijma Kampon BV to supply approximately 1275m of pre cut timber from the forests and sawmills of Cameroon.

Canterbury City Council also reused any timber which was in a good condition to construct new timber groynes. The scheme was able to re-use approximately 13.3% recycled timber.

The third phase of the coastal defence work at Tankerton began in 2003 and was completed in 2004. The scheme comprised of 15 new timber groynes and 50,000m<sup>3</sup> of shingle recharge material. The hardwood timber for the third stage was supplied by Aitken and Howard, a Scottish company with over 150 years experience in importing hardwood timber. The contract price was £180,000 to supply Greenheart from Guyana. The Council also recycled as much timber as possible from the existing groynes.

CCC also constructed rock groynes along their frontage in approximately 1999. The preferred material for the construction was granite. However, it was found that Caen limestone from France would be a more economical option.

### 2.10.8 Summary of Groynes Types

The table below presents a summary of the information that was discussed in section 2.4, 2.5 and 2.6.

Location	Local Authority	Type of beach	Type of groynes	Date of Scheme installation	Length (m)	Spacing (m)	Length to spacing ratio	Significant wave direction
Sandbanks	Borough of Poole	Sand	Rock	2001- 2009	80 – 100	120 – 160	1.33	SW
Jaywick	Tendring District Council	Shingle	Rock	Approx 1999	70	75	1.07	N, NE
South Felixstowe	Suffolk Coastal District Council	Mixed	Rock	2008	30-50			NE
Shoreham on Sea	Adur District Council	Shingle	Rock	2003	70	95 - 105	1.43	SW
Brackenbury	Suffolk District Council	Shingle	Timber and hybrid		35	35	1	SW
St Margaret's Bay	Dover District council	Shingle	Timber	1982	40	30	0.75	SW
Kingsdown	Dover District Council	Shingle	Timber	2001	40	50	1.25	SW
Deal	Dover District Council	Shingle	Timber	1978	50	45	0.9	SW
Waveney	Waveney District Council	Shingle	Timber	2005	80	155	1.94	S – SE
Tankerton	Canterbury City Council	Mixed	Timber	1998 onwards	40	40	1	
Brighton	Brighton and Hove City Council	Shingle	Mixed (Timber and Concrete)	1998	65 - 110	130 – 150	1.6	
Hove	Brighton and Hove City Council	Shingle	Concrete		55 – 65	105 – 115	1.83	various

Bognor Regis	Arun District Council	Shingle	Mixed	1960's-1970's	20 - 35	45 – 50	1.67	SW
Worthing	Arun District Council	Shingle	Mixed	2000	38 - 45	30	0.75	SW
Swanage	Purbeck District Council	Sand	Mixed	2005	40	85	2.13	SW
Whitstable	Canterbury City Council	Mixed	Mixed		65	25	0.38	

**Table 2-1 Summary of the information gathered from each of the case study sites**

### **3 The Lifespan of Timber Groynes**

The lifespan of timber groynes is dependant on a number of factors. The major ones will be discussed in the following chapter.

#### **3.1 Biological Attack**

Timber that is subjected to constant contact with water is likely to be affected by biological attack. Biological attack can include fungal decay, marine borers and insect attack. Along the Bournemouth frontage the groynes have been subjected to marine attack by gribbles. Gribbles can weaken the wood which can result in the surface layers being eroded away by tidal action. The rate of erosion may be accelerated by soft rot fungi. Recently plastic panels have been used in Bournemouth to try and prevent the risk of gribble attack on the timber groynes.

#### **3.2 Abrasion**

Sediment that is carried around or along the structure, predominantly by wave action can result in abrasion. Increased amounts of abrasion can lead to the deterioration of the groyne and reduce the life expectancy. The type of timber and sediment will affect the amount of abrasion. The greatest abrasion usually occurs in the intertidal zone between the lower limit of the shingle beach and the average high tide<sup>22</sup>. The timber groynes at Brackenbury have had little maintenance work carried out on them since construction in 1986. However, it would be expected that on the Central Felixstowe section increased maintenance would be required owing to the beach comprising of predominantly shingle with major oblique wave attack from the East and North East.

Arun District Council reported that the timber piles and planking above the level at which the shingle is constantly being moved by wave action is affected by abrasion. To prevent abrasion the Council has adopted a maintenance policy to allow the beach to settle for approximately two years after the groyne installation. After this period the location of where pile rubbing strips are required is assessed and sections of timber are bolted to the pile. This allows the replacement of the pile rubbing strips more easily and cost efficiently when compared to replacing the main pile<sup>28</sup>.

#### **3.3 Wave climate**

The wave climate can determine the life expectancy of the timber groynes. In areas where there is a more aggressive wave climate the timber groynes have been seen to have a lower life expectancy. As waves break against the groynes high, short duration, dynamic pressures are exerted that can result in damage. Waveney District Council reported that in Southwold the life expectancy of the timber groynes is 20 years compared with the timber groynes life expectancy at Lowestoft of 30 years. The wave and current climate at Lowestoft is reported as less aggressive when compared to the wave and current climate Southwold<sup>23</sup>.

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<sup>22</sup> Croosman, M., and Simm, J., Manual on the Use of Timber in Coastal and River Engineering.

<sup>23</sup> Paul Patterson, Waveney District Council

The wave climate along the Central Felixstowe is more aggressive when compared to Brackenbury owing to the alteration in the orientation of the coastline, for example storm waves approach the Brackenbury groynes at a shore parallel angle but if timber groynes are installed along the Central Felixstowe frontage the more aggressive storm waves will approach at an oblique angle putting additional pressure on the groyne. Therefore it is expected that if timber groynes were selected as the preferred coastal protection option along the Central Felixstowe frontage they would have a shorter life expectancy than the timber groynes at Brackenbury.

## **4 Health and Safety**

Making an assessment of public safety risks of any scheme is necessarily a subjective exercise, since there are few collated long-term statistics for accidents associated with the many different types of beach control structures under consideration. Where accidents on beaches are reported, the location of an incident is often given by referring to a nearby groyne, although that structure may have had no influence on the incident itself. This latter point has been well-proven at Sandbanks, Poole where the reporting system on minor injuries sustained by beach users was changed in 2005 to separate the locations of the accident in relation to the groynes. This change dramatically reduced the apparent number of “groyne related” injuries between 2004 and 2005.

In the following paragraphs the safety issues associated with proposed beach control schemes are considered from the viewpoint of a number of different “user groups”, bearing in mind their different interactions with the structures. Any differences in safety aspects between groyne types (rock and timber), are discussed, where appropriate.

### **4.1 Beach users (sunbathers, “sitters”, picnickers, games players etc.)**

Beach users are not considered to be as mobile as some of the other user groups (surfers and swimmers for example). However, timber groynes along the frontage that have not being maintained properly can result in health and safety issues for example exposed rebar, jagged and corroded sheet pile remnants, splintered wood and protruding bolts.

### **4.2 Children**

Any proposed groyne scheme (permeable, impermeable, of either rock or timber construction) poses a potential hazard to children. Furthermore, groyne size and spacing plays a role in safety; the greater the number of groynes there are on the beach the greater the risk of an incident and the longer the groynes the more they project into deeper and potentially more dangerous water. Surprisingly groyne type also matters in respect of public safety. Timber groynes are generally relatively safe and few incidents have been reported with this type of structure (children occasionally try and walk along their crests or try and jump over them). A broken neck incurred by a member of the public was reported by Great Yarmouth, where an individual dived off a timber groyne and hit a supporting timber post (Section 4.6). Rock groynes are potentially less safe for children in particular, as there is the possibility of children slipping on the rocks by trying to climb up or along the groynes. Sometimes children (as well as other users) will also try and jump from one stone to another. For this reason was decided by the Borough of Poole that a walkway should be provided on the crest of such groynes to forestall any such tendency for misuse of the groynes.

### **4.3 Walkers**

For walkers, groynes can lower the safety of a beach as they present a potential trip hazard for anyone attempting to walk over them. The spacing, and therefore number of groynes, is thus an important issue, as the more structures that are present on the beach the more risk they represent to walkers.

#### **4.4 Swimmers**

Longer groynes are clearly more hazardous than shorter ones, since they extend into deeper water; the risks of collisions, rip currents and beach users falling into deep water are therefore somewhat greater. Wave action at the seaward ends of the structures is also likely to be significantly greater, potentially sweeping the swimmer against the structure. By their very presence such structures will also encourage swimmers to swim out to their seaward ends.

The reflective faces of timber groynes give no “purchase” for those trying to clamber out of the sea in an emergency and are therefore potentially more hazardous than the (sloping) faces of rock groynes. Similarly it is likely that any seaward flowing (rip) currents will be more strongly concentrated along the smooth straight and vertical face of a timber groyne than that of a rock groyne, and hence be more hazardous. The latter type of structure, however, is more likely to cause abrasions to swimmers that venture too close to them.

The risks of rip currents becoming a hazard to swimmers may be decreased by installing permeable groynes; by their porous nature these structures will tend to prevent return flows becoming concentrated along their sides. However, they may pose a risk of swimmers being swept through them, or becoming trapped underneath them, a problem that does not arise with impermeable structures. Note that this has not been reported as a particular problem at Bournemouth, where two such structures have been in place for many years and it is considered that the likelihood of this occurring to be very low.

#### **4.5 Boat Users**

For groynes, the main hazards to boat users will be their seaward projection, particularly from any underwater sections of the structures that are not easily visible.

It is generally the case that the further any beach control structure projects out from the shore, and hence into deeper water, the greater the associated hazards to the public will be. Longer groynes will tend to intercept more of the longshore currents and hence produce stronger currents at their heads, which are in deeper water than for shorter groynes. Shorter groynes, which extend into shallower water, are less of a navigation hazard, because for example larger boats will be more likely to have grounded before reaching their seaward ends.

#### **4.6 Specific Health and Safety Issues**

- At Great Yarmouth the Council has reported to Mott MacDonald that a member of the public suffered from a broken neck having fallen over a timber groyne.
- Brighton and Hove City Council reported that people can get trapped in gaps in rock groynes and children will play on them despite the provision of signs declaring the groynes as unsafe structures for climbing.
- The rock groynes at Brighton were also reported to have problems with rat infestations on sections of the groynes outside the high tide mark.
- In Southwold a field of rock groynes has recently been constructed (See section 2.8.1). To reduce the voids in the groynes the rocks were placed close together. The close spacing of the rocks although reducing the risk of being trapped between the rocks can reduce the hydraulic performance of the groynes. The reduced permeability of the groynes will result in less wave

energy being dissipated and therefore closer spacings required and potentially more sediment movement.



**Figure 4-1 Closely spaced rocks preventing large voids in the rock groynes**

- The Borough of Poole when designing the rock groynes for the frontage raised a concern that they could be dangerous for people to walk along. To attempt to make the groynes safer a flat concrete walk way was constructed along the top of the groynes.
- The Borough of Poole was also advised that the groynes should have warning signs installed to warn the public about the potential dangers. Swim areas near to the rock groynes were moved to reduce the risk of people grazing their skin against the rock. The movement of the swim areas was carried out with the assistance of the Royal National Lifeboat Association (RNLI).

## **5 Maintenance Cost of Rock and Timber Groynes**

### **5.1 Cost of Rock Groynes**

This Section provides information on the cost of the maintenance that is undertaken by the various Councils that Mott MacDonald consulted with. A number of Councils have provided Mott MacDonald with details of the cost of maintenance for rock and timber groynes which we present in the following Section. Section 5.4 provides a summary of the cost per groyne for various councils.

#### **5.1.1 Poole**

In 2007/2008 the budget for Poole's coastal protection work was £217,000. It is not clear how this amount is divided up into groyne repair and other maintenance work.

In April 2008 Poole Borough Council undertook one off maintenance on five rock groynes at a cost of £5,000. The work involved repositioning rocks which had been disturbed by a storm on groynes that were constructed in 2000. The life expectancy of these groynes is 50 years and were constructed of locally available Portland limestone (Dave Robinson, Borough of Poole).

#### **5.1.2 Jaywick**

The annual maintenance budget for Jaywick, as indicated by John Ryan from Tendring District council, is included in the whole of the Tendring frontage (18km) for £600,000. This budget covers all aspects of coastal protection.

#### **5.1.3 Clacton**

The timber groynes at Clacton have such a high maintenance cost and are nearing the end of their lifespan that the Tendring Council have stopped trying to maintain them leading to major beach erosion and knock on issues.

#### **5.1.4 South Felixstowe**

The cost of maintenance for all the rock groynes along the South Felixstowe frontage was estimated by Black and Vetch to be £2,400 per annum. A discussion with Van Oord revealed that they had recently undertaken some repair work to the rock groynes after a storm that had moved a number of rocks. The cost of the work was £10,000. The work was not urgent work and could potentially have been left longer.

## **5.2 Cost of Timber Groynes**

### **5.2.1 Brackenbury**

The timber groynes, built in 1986, have had very little repair work carried out on them. The groynes are now, in 2009, beginning to show signs that repair work is needed. It is envisaged that these one-off repairs will cost no more than £40,000<sup>24</sup>. The angle that the storm waves approach the shore at Brackenbury differs from the direction along the majority of the Central Felixstowe section. The storm waves at Brackenbury are shore parallel compared to the storm waves along the Central Felixstowe beach that approach at an oblique angle. The difference in storm wave angle results in the groynes at Brackenbury being damaged less compared to Central Felixstowe.

### **5.2.2 Dover**

The coastal defence maintenance budget for Dover is £20,000 per annum. This budget is to repair the 30 groynes that are along the frontage. Therefore the maintenance price per groyne is approximately £667 per annum.

### **5.2.3 Great Yarmouth**

Great Yarmouth has a frontage protected with timber groynes which have been in place for 50 years. Since their construction there has been limited repair work carried out, as the amount of sediment accumulation has swamped the groynes. The estimated repair work if carried out would be approximately £1000 to £2000 per year per timber groyne.

### **5.2.4 Bournemouth**

Dave Harlow from Bournemouth Borough Council advised that they have an annual maintenance budget of £1,000 per timber groyne. Maintenance is usually concentrated in the last 10 years of the groynes life. The life of the present groyne field is estimated to be approximately 23 years rather than the 25 years they were expecting.

## **5.3 Cost of the Combination of Rock and Timber**

### **5.3.1 Waveney**

The life expectancy of the timber sheet and timber planked groynes at Southwold is approximately 15-20 years owing to the shingle beach being highly exposed to waves (Waveney District Council (WDC))

The maintenance cost for the timber groynes on the Waveney frontage as advised by Paul Patterson of WDC is as follows.

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<sup>24</sup> Terry Oakes Associates, 27<sup>th</sup> April 2009

<b>Environment type</b>	<b>First 10 years</b>	<b>Final 10 years</b>
Aggressive (high wave climate) E.g. Southwold	£1,500 (per annum, per groyne)	£7k to £8k (per year)
	<b>First 20 years</b>	<b>Final 10 years</b>
Sand beach (low wave climate) E.g. Lowestoft	£1,500 (per annum, per groyne)	£7k to £8k (per year)

### 5.3.2 Brighton

Brighton and Hove City Council (BHCC) have an annual fixed amount for coastal protection, where the money spent depends upon the priority of the repair works (Martin Eade, BHCC).

### 5.3.3 Arun

Correspondence with Roger Spencer from Arun District Council has indicated that they do not have a preference for either rock or timber with regards to cost or maintenance. They have a budget of £85,000 to £90,000 per year which is spread between both the timber and rock groynes. In 2008 the maintenance budget was spent on repairing the timber groynes. In 2009 the plan is to spend the money on repairing the rock groynes if required. The approximate cost per timber groynes using the 2008 maintenance budget was £300.

### 5.3.4 Worthing and Shoreham

Worthing Borough Council spent £115,855 on coastal protection works in 2006/2007<sup>25</sup>. In 2007/2008 the council spent £118,650 and in 2008/2009 the estimated spend on coastal defences is £144,290. The Council undertake an inspection of the groynes twice a year in March and August. Maintenance work usually required along the frontage involves replacing missing and damaged planks and occasionally after large storm events replacing the piles. The replacement timber is Douglas fir, from a sustainable source. The planks are fixed to the piles using mild steel coachscrews or spikes.

In addition to this there is a £0.718 million programme of capital works to replace and maintain the groynes for the next three years funded by DEFRA.

### 5.3.5 Swanage

A cost benefit analysis was undertaken for a scheme proposed in 2004. The cost of timber groynes for the scheme was £1,333.30 per m length, equating to £960,000 for the whole scheme. However, this amount would increase significantly if the groynes were to be built below low water. Rock groynes were also priced at £2,412.50 per m length and £965,000 for the whole scheme for groynes 30-50m in length and £3,928.60 per m length and £2,750,000 for the whole scheme for groynes 175m in length.

<sup>25</sup> <http://www.worthing.gov.uk/worthings-services/finance/pdf/54728,en.pdf>

### 5.3.6 Canterbury

Canterbury City Council has an annual maintenance budget of £140,000. This budget is for both the seawall and the groynes along the frontage, but it may be used on any other coastal maintenance if required. The majority of the maintenance work is carried out on the groynes that were constructed just after the war<sup>26</sup>. The design and cost of a groyne is based on it lasting 40 years with minor maintenance and then require at least two thirds re-planking and total reconstruction after 80 years. CCC use a monitoring programme to examine the length and spacing of the groynes and the required beach fill to allow the optimum length/spacing ratio and groyne type to be determined. The increase of beach shingle prices recently has resulted in CCC designing their groynes with narrower spacing and shorter length to reduce the reorientation of the beach angle. This has resulted in timber being used in recent schemes rather than rock.

At Tankerton where timber groynes have been constructed between 1998 and 2004 there is a budget of approximately £7 million which is spread over the schemes 60 year lifetime. The budget includes the re-planking of the groynes in 2030<sup>27</sup>.

### 5.3.7 Hunstanton

Along the frontage at Hunstanton, West Norfolk, 30 groynes have been constructed of timber. In 1980 a large number of groynes were replaced at a cost of between £100,000 and £200,000. A recent inspection has shown that repair work in the order of £40,000 needs to be undertaken. Kings Lynn & West Norfolk Council has estimated that their maintenance budget for repair works is between £5,000 and £10,000 per annum.

## 5.4 Summary of maintenance costs per groyne

Location	Groyne type	Approximate annual maintenance cost per groyne	Additional information
Poole	Rock		£1,000 per groyne as a one off maintenance after 8 years
Dover	Timber	£667	
Yarmouth	Timber	£1,000 - £2,000	Estimated and if it was required
Bournemouth	Timber	£1,000	

<sup>26</sup> Peter Brooks, Canterbury City Council Engineer. 27/04/2009

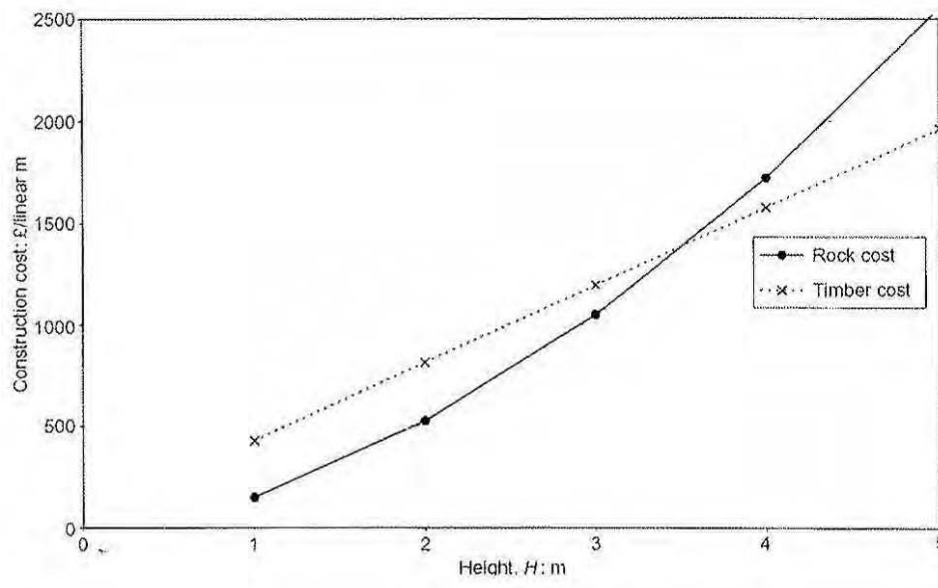
<sup>27</sup> <http://www.canterbury.gov.uk/buildpage.php?id=787>

Waveney	Timber	£1,500 for first 10 - 20 years £7,000 - £8000 final 10 years	
Arun	Timber	£300	
North Norfolk	Timber	£500 for first 10 years £1,000 after 10 years	
Hunstanton	Timber	£500 - £1,000	

Note: Rock groynes have generally not been subject to annual maintenance in their lifetime, and many are less than 15 years old.

## 6 Cost Sensitivity of Rock and Timber Groynes

The variation of height and cost of rock and timber groynes is presented in Figure 6-1. Figure 6-1 indicates that below a groyne height of 3.5m the construction cost to cost per linear metre ratio was lower for rock groynes compared to timber groynes. However, if the groynes are constructed above 3.5m then timber groynes have a lower construction cost to cost per linear metre ratio<sup>28</sup>.



**Figure 6-1 Variation in costs with height for rock and timber groynes (Crossman and Simms, 2002<sup>24</sup>)**

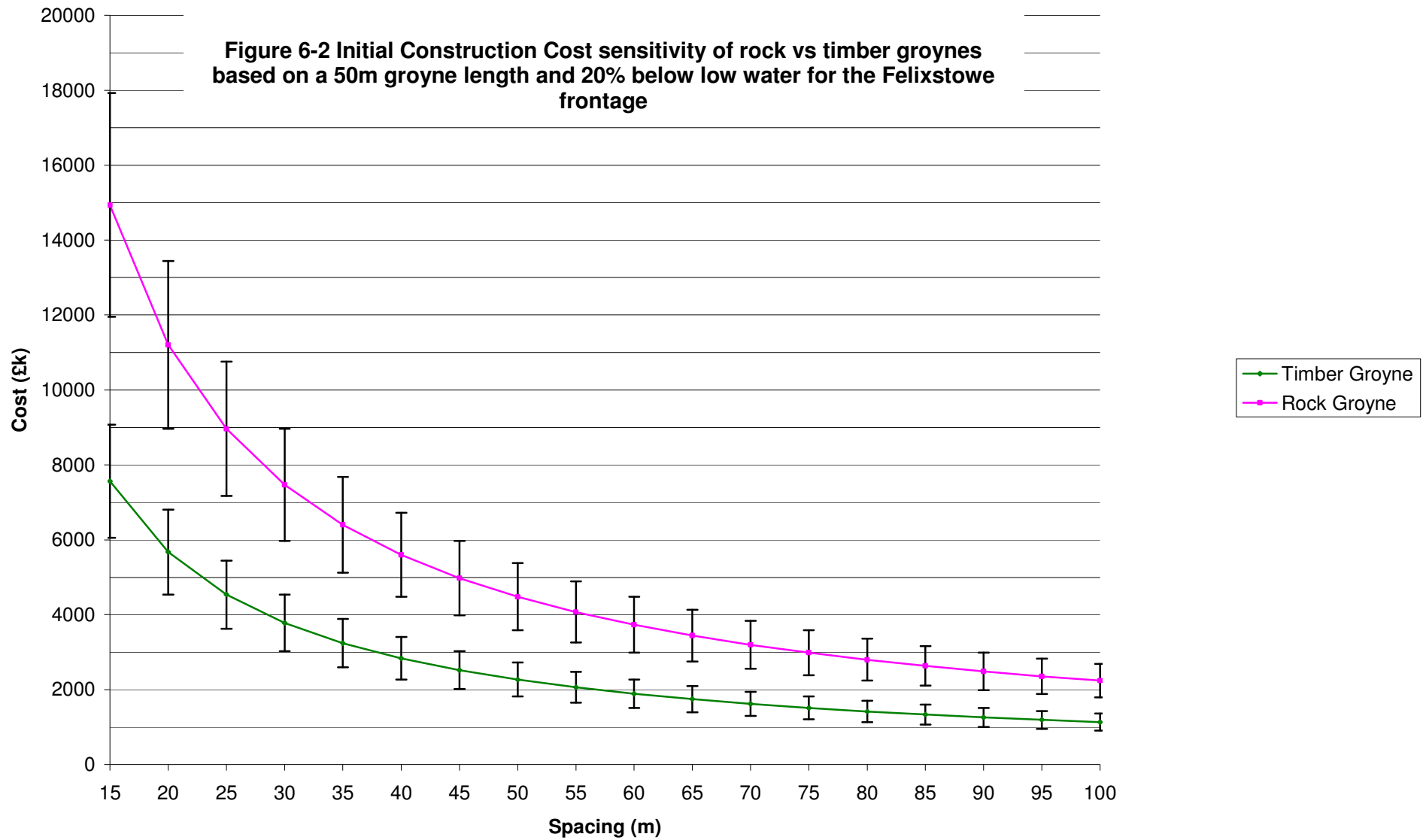
The cost sensitivity of rock and timber groynes presented in Figure 6-2 is based on a groyne length of 50m. The cost of the groynes for the Felixstowe frontage we have estimated the lowest potential price of timber is £1,714.10 per metre (Mackleys, May 2009) and for rock groynes £3,384.00 per metre. The cost of the timber groynes from discussions with Local Authorities can vary typically between £1,800 to £2,000 per metre.

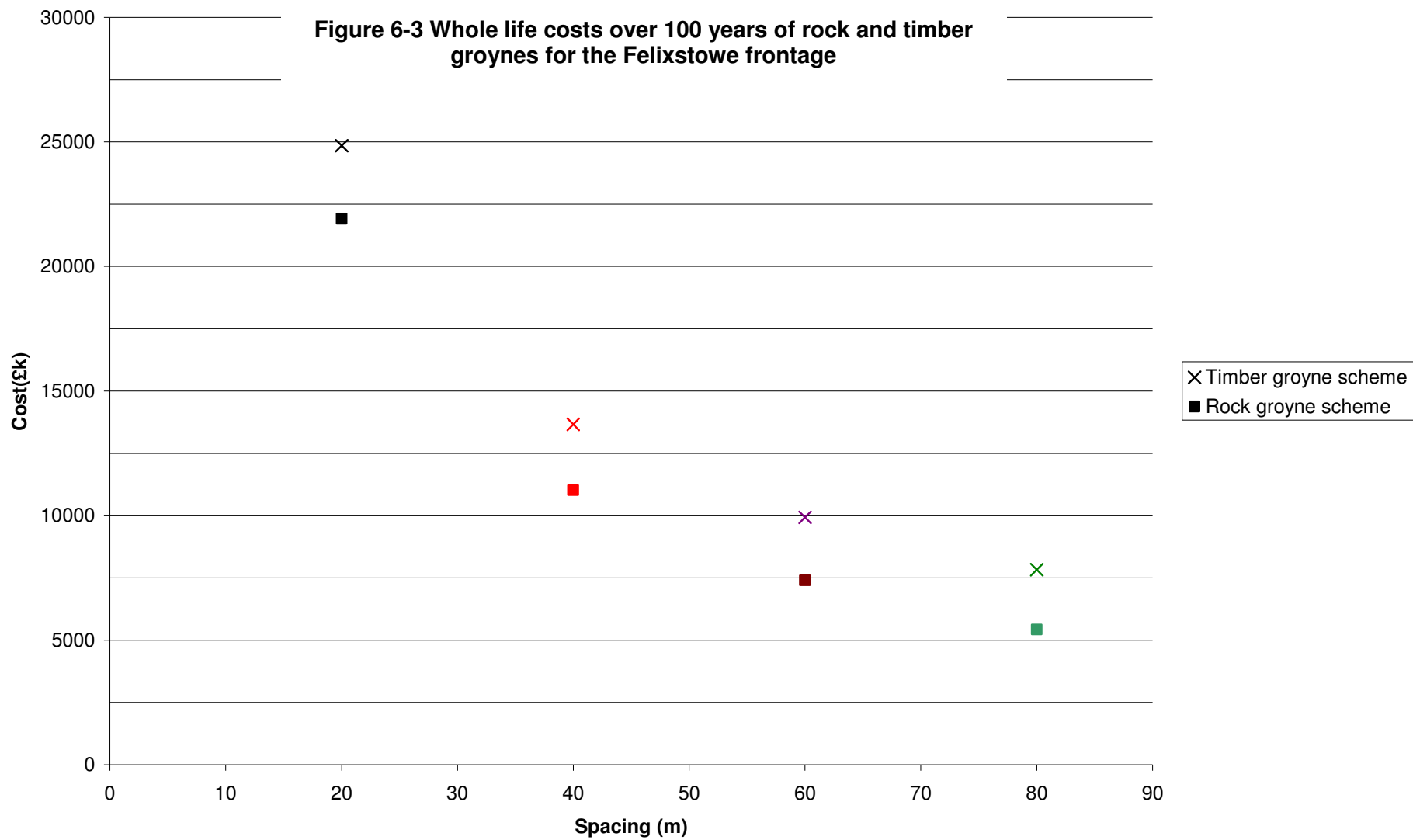
The graph in Figure 6-2 takes into account the cost of the timber and rock groynes with a 20% spread in the costing, representing any changes in exchange rate and potential optimism bias variations that may occur during construction (e.g. temporary works etc).

From Figure 6-2 the timber groynes during initial construction are cheaper to build compared to rock groynes per installation if at the same spacing.

The analysis undertaken for Figure 6-2 demonstrates that in general if the spacing of a rock groyne scheme is double that of a timber groyne scheme the up-front capital costs of the rock groyne scheme is lower than the timber groyne scheme.

<sup>28</sup> Sustainable coastal defences – the use of timber and other materials. Crossman, M. and Simm, J. 2002 Municipal engineer 151 (3) pp 207 – 211





The whole life cost of rock and timber groynes is presented in Figure 6-3. The assumptions made were as follows:

- A groyne length of 50m was adopted
- The cost of the timber groynes was based on a conservative £1,714.10 per metre and for rock groynes £3,384.00 per metre.
- Timber groynes are considered to be fully replaced every 25 years. Whilst not probable rock groynes have been considered with a full replacement at year 50
- The costs include annual maintenance for timber groynes at a cost of £800 per groyne. This value was based on a low average maintenance cost of a variety of schemes discussed in Section 3.
- The maintenance for rock groynes was based on £1,000 per groyne every 25 years.
- A 1300m frontage at Felixstowe is considered.

Figure 6-3 indicates that the whole life costs for timber are higher compared to rock groynes for the same spacing. Increased whole life costs are owing to the amount of replacement and maintenance each year that is required for timber groynes to maintain their function, compared with nominal rock maintenance.

The spacing of the timber groynes would need to be 75m or more to produce a whole life cost equal to the whole life cost of rock groynes spaced at 50m. Such a spacing for timber groynes is considered to be too wide to retain sediment along the central Felixstowe frontage and is not a viable solution.

For the probable timber groyne spacings at Felixstowe of 30m and possibly up to 40m the whole life costs would be at least 50% to 100% more than for the proposed rock groynes (see Figure 6-3).

Cost benefit analysis indicates that the cost benefit ratio for the timber groynes schemes along the Central Felixstowe frontage are lower compared to the ratio for rock groyne schemes. The availability of funding from the Environment Agency is based on obtaining the highest cost benefit score and therefore rock groynes are currently the recommended scheme. Mott MacDonald have been advised by the Environment Agency that the average national cost-benefit ratio for schemes must be 5. Without the inclusion of contingent benefits (the inclusion of additional tourism to the town on the basis of having a more attractive frontage to offer) a timber groyne scheme would have a cost-benefit ratio of *ca.* 2.87 whilst a rock groyne scheme would be *ca.* 3.69.

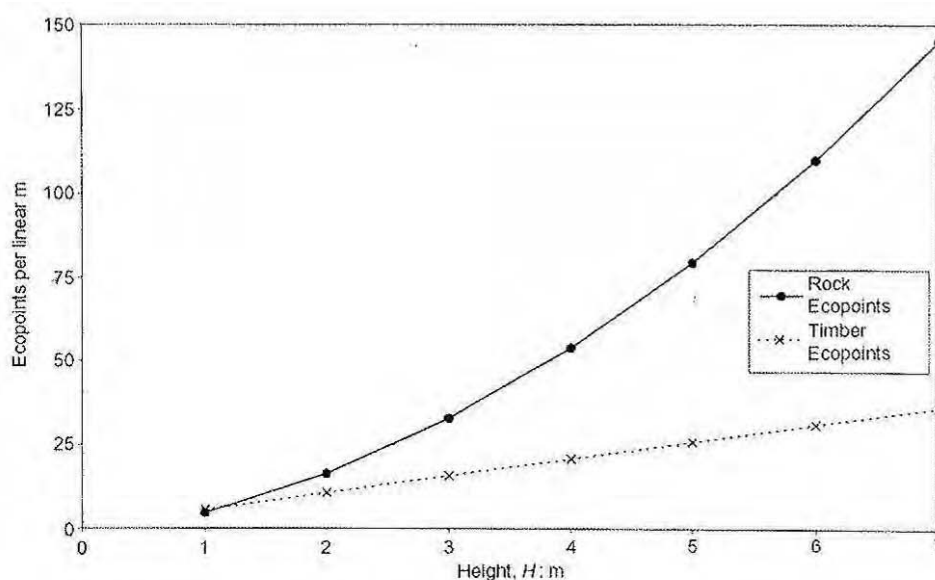
In recognition of the likely tourism benefits brought to Felixstowe by a healthy beach-front Mott MacDonald have re-run the cost-benefit analysis to include these benefits which significantly improves the cost-benefit ratios of the schemes to between 7 and 8 depending on design variables. This methodology has previously been agreed in principle by the Environment Agency but again is not guaranteed.

There must be some recognition that the aim of the project team is to ensure that the Central Felixstowe frontage is awarded funding for coastal protection works and with this in mind the higher cost-benefit ratio poses a strong case for selecting the methodology with the highest cost-benefit ratio, the rock groyne scheme.

## 7 Sustainability of Rock and Timber Groynes

When considering any proposal it is important to consider the social, economic and environmental impact a scheme may have. It allows a pathway to be developed to limit adverse effects on the environment or to prevent disadvantages of the social or economic interests of present or future populations.

The wider environmental impacts that rock and timber have can be assessed in terms of Ecopoints. Ecopoints take into consideration the life cycle of materials including raw material extraction, production, transportation, maintenance, recycling and disposal. Figure 7-1 presents the results based on 2002 prices. The analysis shows that the Ecopoints are similar when the height of the groyne is 1m. However, above 1m rock has higher Ecopoints meaning that it has more detrimental impacts on the environment compared to timber on the basis of materials issues (raw material extraction, production, processing and transportation, construction, use and maintenance, re-use and recycling and disposal). This analysis does not take into account the other local environmental impacts such as habitat creation<sup>29</sup>.



**Figure 7-1 Variation in Ecopoints with height for rock and timber groynes**

### 7.1 Rock Groynes

Worthing Borough Council (WBC) used imported rock from Norway as they considered there were no sources of suitable rock in south-east England (in terms of size and durability). WBC acknowledged that there were potential sources of suitable rock in the north of the UK for example quarries in National Parks. However, this would mean that large numbers of vehicles would be travelling long distances making it an expensive and potentially environmentally damaging method of transporting the rocks. Therefore, it was decided by WBC that sourcing and delivering rocks by sea was a more sustainable method.

<sup>29</sup> Sustainable coastal defences – the use of timber and other materials. Crossman, M. and Simm, J. 2002 Municipal engineer 151 (3) pp 207 – 211

Tendring District Council has advised Mott MacDonald that they consider the supply of rock is more sustainable if it is delivered by barge rather than by road.

Rock groynes are more adaptable in comparison to timber groynes in terms of being able to reuse the majority of material.

## 7.2 Timber Groynes

Through discussion with Mackley's Construction it was identified that their wood is sourced through an agency contractor and all their wood adheres to the Environmental Agency Category B UK government policy on the procurement of timber for legality and sustainability. The cost of Greenheart is currently £850/m<sup>3</sup> (24/04/2009). Mackley's also use Ekki wood. However, in their opinion the quality of Ekki wood is less than Greenheart and it is more expensive and less reliable to obtain. Ekki, at present, costs in the region of £1,200/m<sup>3</sup>.

Further information supplied by Mackley's indicated that they are registered with the Forest Stewardship Council (FSC). They have a cutting schedule of 12 to 16 weeks from the wood cutting to construction. If the timber groynes are to be constructed underwater at low tide then the cost of *ca.* £1,700 would be doubled owing to a gantry causeway needing to be constructed to install the piles etc. (as demonstrated at Lowestoft in Figure 2-4).

The UK Government's policy on the procurement of timber is designed to combat illegal and unsustainable logging. The policy tackles the issue of deforestation to help reduce and mitigate against climate change. As the UK is a major importer of timber the policy will encourage legal and sustainable management for the world's forests.

Principal engineers from Canterbury City Council visited Guyana to purchase the timber for their timber groynes. The saw mill that was visited was not FSC certified owing to the haul road being too wide. However, this was necessary because it would be too muddy if there was a full canopy over the road. Additional timber was purchased as a separate contract to the construction works and was also cut in South America. The cost of this additional timber was higher. However, the Council believed that it was more sustainable and would provide more money for the local economy. Each tree was logged and tracked and the suitability of each pile could be tracked by the stump. This approach allowed each log to be individually chosen, rather than a bundle.

Aitken and Howard Ltd supply timber to Canterbury City Council, Waveney, North Norfolk and the EA. The timber they source is Greenheart from Guyana and, if it is supplied by them, satisfies the criteria laid out by the Central Point of Expertise on Timber Procurement (CEPT) for Category B. Aitken and Howard Ltd have a fully audited chain of custody from the Forest to the site.

Along the Tankerton frontage Ekki (Azobe) was chosen because of its resistance to marine borers and to erosion by shingle. The company that logs the wood selects trees with a diameter greater than 700mm which allows younger trees to develop and reproduce. The forest is disturbed by the logging as minimised during the felling and extraction process, and the company does not practice clear cutting of the forest (CCC).

### **7.3 Environment Agency Policy**

The Environment Agency provides guidelines for purchasing legal and sustainable timber and tropical hardwoods. The guidance explains the issues that are associated with obtaining and evaluating evidence to determine the legality and sustainability of timber and tropical hardwoods. It also provides detailed information of the process which must be followed to source materials for a timber groyne scheme. We have included their policy documents in Appendix A

#### 7.4 Summary table of considerations for the use of rock and timber groynes

Issue	Rock groynes	Ref	Timber Groynes	Ref
Extraction and delivery	Traditionally along the south east coast of the UK rock groynes have been sourced overseas due to the lack of suitable rock in south east England in terms of size and durability. There are sources of rock further a field within the UK however this would often mean large scale quarrying in areas such as National Parks and would involve additional trucks travelling long distances between the quarry and the beach (even large articulated lorries can only carry three or four rocks at a time). It may be that rocks can be sourced from more sustainable sources such as 'waste' from quarries - for example at Felpham (West Sussex) whereby the Norwegian rocks produced as a by-product of quarrying were shipped across for use on their sea defences.	1,2,3	<p>Timber is a renewable resource however this is only within the timescales for re-growth of the trees used. Timbers used for groynes need to be durable, long-lasting and resistant to marine borers. Typically hardwoods from overseas are sought, such as Greenheart Ekki, Opepe and Basralcous from Guyana, throughout West Africa, Nigeria and Surinam respectively. In previous years the wood was sourced from the UK for Douglas fir and Oak. Hardwoods should be taken from sustainable forests where the negative environmental impacts are reduced. Should sustainable hardwood sources be sought, then certification from an independent organisation such as the Forest Stewardship Council should also be actively sought, or where plantations known to be managed by organisations such as WWF exist they should be actively considered. Note this may also offset the carbon footprint where the natural carbon sink is not just removed but the managed forests are replacing the trees as well. Before timber can be used it has to be kiln dried and treated. This adds to the costs of timber.</p> <p>The trees which are felled are selected from the forest, trees with a diameter of 325mm are left to replace those felled. The large 'mother trees' are also left to allow regeneration of the logged areas.</p>	3
Health and Safety issues related to human use	The public may fall on the rocks and get cuts and bruises. Although signs/railings to prevent and warn people of the hazard should be erected.		Splinters and if maintenance not upheld planks and sheet piles can break and pose hazardous to the public.	3

Issue	Rock groynes	Ref	Timber Groynes	Ref
	For rock groynes there is the ability to have different endpoints such as fishtail, or to adapt a scheme following installation.	5	No different ending practicable.	
	Groyne markers will be required for both types of timber and rock groynes to alert swimmers and boat users alike.	5,6	Groyne markers may be needed to mark the end of the groyne to swimmers and boat users	
	Coastal groynes will normally be exposed to considerable abrasion from mobile beach material and are often also exposed to marine borers below the mean water table.			
Economic	The initial cost of construction is higher compared to timber groynes	2	The initial cost of construction is lower compared to rock groynes	
	Maintenance costs are much lower for rock groynes.	2	Maintenance costs for timber groynes are higher than rock groynes as they require more frequent maintenance	
	Rock groynes have a longer useful life reducing the number of re-installations necessary over the 100 year period of planning required for the PAR	2	Timber groynes have shorter useful life and require a number of installations during the 100 year period of consideration for the PAR.	
	The construction of rock groynes is a relatively simple endeavour in comparison to timber groynes	6		
	Rock groynes are generally preferred on high wave energy beaches as they are less reflective and reduce scour potential at the tips of groynes.	5		

1. [http://www.netregs.gov.uk/static/documents/Research/str\\_ben\\_area\\_b\\_2072443.pdf](http://www.netregs.gov.uk/static/documents/Research/str_ben_area_b_2072443.pdf)
2. <http://www.worthing.gov.uk/worthing-services/technicalservices/coastalissues/pdffile,47721,en.pdf>
3. [http://books.google.co.uk/books?id=sxYA2LJeaz0C&pg=PR19&lpg=PR19&dq=timber+and+rock+groynes+sustainability&source=bl&ots=STgh4dDMpB&sig=u\\_KhZH2I4BpY-](http://books.google.co.uk/books?id=sxYA2LJeaz0C&pg=PR19&lpg=PR19&dq=timber+and+rock+groynes+sustainability&source=bl&ots=STgh4dDMpB&sig=u_KhZH2I4BpY-)

QC0pvZS3pwHM81U&hl=en&ei=6fruSdqoJ8G2jAfb8\_0b&sa=X&oi=book\_result&ct=res=ult&resnum=3#PPP1,M1

4. The rock manual - the use of rock in hydraulic engineering CIRIA C683
5. Manual on the use of timber for river and coastal engineering  
[http://books.google.co.uk/books?id=dc\\_8gu02ycwC&pg=PR21&dq=sustainability+timber+and+rock+groynes#PPA156,M1](http://books.google.co.uk/books?id=dc_8gu02ycwC&pg=PR21&dq=sustainability+timber+and+rock+groynes#PPA156,M1)
6. Investigation and management on soft rock cliffs  
<http://books.google.co.uk/books?id=HKNXpSmupm0C&pg=PA223&dq=sustainability+timber+and+rock+groynes#PPA223,M1>

## 8 Conclusions

The coastal defences along the south and east coasts of England comprise of both rock and timber groynes. Rock groyne schemes are relatively new in comparison to the timber groyne schemes along this section of the UK's coastline. In the Borough of Poole the earliest rock groyne was constructed in 1991 and has since been extended. The success of this single rock groyne was the basis upon which more rock groynes were recently constructed in Poole. The earliest timber groynes in this report were originally constructed in Brighton in the 1720's to protect the coast from erosion.

The rock groynes that are present along the Brighton frontage have had no maintenance carried out on them since they were constructed 15 years ago. However the timber groynes along the frontage require maintenance in the intertidal zone every 5 to 15 years. The maintenance of the timber groynes varies from location to location, for example Waveney District Council has advised Mott MacDonald that the groynes along their frontage require maintenance costing £1,500 per annum for timber for the first 10 years of the scheme. After this period the cost of the maintenance increases to between £7,000 and £8,000 per year for timber groynes. Such costs relate closely to the design of timber groynes constructed. In general, cost information provided by Local Authorities indicates that timber groynes require a higher maintenance budget than rock groynes owing to timber groynes needing repair annually and often complete replacement after 25 years. These maintenance costs are normally borne by the Local Authority.

From the review there is limited long-term information about rock groynes and maintenance costs when compared to timber groynes. However, the information that is available from literature reviews and from discussion with coastal Councils indicates that rock groynes are suitable for long term protection of the coastline against coastal erosion. Rock groynes can also promote greater ecological advantages<sup>30</sup> as has occurred at Poole where new habitats have been created in the rocks. Rock groynes can also be made safer by the use of signs, swim zones, and concrete walkways on the top.

The predominant sustainability issue for both rock and timber is where the material is sourced. The preferred source for timber groynes as indicated from the case studies in this report is Greenheart from Guyana. Rock for groynes has been sourced from a number of locations including France, UK and Norway. The main issue is the distance that the rock is transported owing to the size of each rock

For amenity beaches timber groynes have the advantage of having a smaller footprint when compared to rock groynes. However, timber groynes typically require closer spacing than rock groynes reducing the size of the embayment between each groyne.

Information surrounding health and safety issues of rock groynes include people becoming trapped in or under the rocks and reports of rat infestations where groynes are not 'washed' with each high tide but is an issue which can be mitigated through considerate design of the groynes. Timber groynes are associated more with trip hazards and splinted wood. A benefit of rock groynes is that they can allow swimmers in an emergency to climb out of the water and to safety compared to timber groynes which do not allow this. At Poole a safe walkway on the top of a rock groyne can provide access along the groyne has been included in the design to try and prevent people climbing on the rocks.

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<sup>30</sup> Sustainable coastal defences – the use of timber and other materials. Crossman, M. and Simm, J. 2002 Municipal engineer 151 (3) pp 207 – 211

A review of whole life cost sensitivity of proposals for rock and timber groynes for the same spacing indicates that the initial capital cost of installing rock groynes is less than for timber groynes. The maintenance allowance required for the repair of the timber groynes is higher compared to rock groynes.

From the available information Mott MacDonald recommends that rock groynes are used along the frontage of Central Felixstowe. The grounds for this choice of rock rather than timber are based on the following:

- Although capital costs for rock are higher per groyne than for timber, the wider spacing necessary for rock groynes reduces the capital cost of the initial installation of rock groynes. The replacement and maintenance costs are also lower as rocks are not affected by degradation such as rot or biological impacts.
- Rock groynes require less maintenance and it may be possible to reuse a significant quantity of rock to rebuild the groynes when reconstruction is required.
- Construction of timber groynes along the frontage will require piling into the London Clay substrate which could in the long term cause further lowering of the substrate. Rock groynes are typically constructed on the sand and do not have the same interaction with the London Clay platform
- The frontage at Felixstowe is exposed to large storms typically occurring obliquely of the shore and storm surges which could result in the timber groynes requiring increased maintenance. The Council will need commit to an annual maintenance budget to repair the groynes as and when required so that the groynes do not fall into disrepair and need replacing earlier than accounted for in the economic plan set out in the PAR.
- The life expectancy of any timber groynes constructed along the Central Felixstowe frontage would almost certainly be shorter than compared to the timber groynes at Brackenbury. The difference in the orientation of the coastline resulting in the easterly storm waves approaching at an oblique angle along the Central Felixstowe frontage is a major factor. Along the Brackenbury frontage those same wave fronts would approach the shore in parallel with the coastline. Such wave attack on the Central Felixstowe frontage would be dissipated by the more efficient and permeable nature of the rock groynes proposed but will be reflected around timber groynes causing additional damage to the beach and timber groynes. The timber groynes would require replacement potentially every 20 to 25 years.
- In order for the whole life cost of a timber groyne field along the Central Felixstowe frontage to cost the same as a rock groyne field the spacing of the timber groynes along the would have to be 75m apart if rock groynes were 50m apart. The present spacing of the timber, rock and concrete groynes across the Felixstowe frontage is 30m and it is considered that a field of timber groynes at 75m spacing will not provide an acceptable technical solution.
- The cost benefit ratio analyses indicate that the proposed rock groyne scheme has a higher cost benefit ratio when compared to the timber groynes scheme. As a key priority of the scheme is to obtain the funding from the Environment Agency to protect Central Felixstowe for the next 100 years, the scheme with the highest cost benefit ratio has the greatest opportunity to secure the required funding from the Environment Agency.

## **Appendix A Environment Agency Policy Documents on the Sustainable use of Timber and Tropical Hardwoods**

## Guidance

### Evaluating evidence of legal and sustainable timber

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<b>Document Owner:</b>	Mark Yeomans	<b>Post:</b>	Head of Procurement
<b>Document Author:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor
<b>Primary Contact:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor

<b>Approved by:</b> (as set out in Schedule B of the NFSoD)	David Jordan David King	<b>Post:</b>	Acting Director of Operations Director of Water Management
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<b>Purpose:</b>	<p>To provide additional guidance on evaluating evidence which demonstrates that timber is purchased from a legally felled forest that is managed as sustainably as possible, and that the movement of timber from the forest source to the Environment Agency is known and verifiable, so that:</p> <ul style="list-style-type: none"> <li>• The Environment Agency does not purchase illegally logged timber.</li> <li>• The Environment Agency does not support unsustainable forest management practices.</li> <li>• The Environment Agency delivers “Creating a Better Place” objectives by encouraging a “Greener Business World” and “Wiser Sustainable Use of Natural Resources”.</li> <li>• The Environment Agency demonstrates best practice.</li> <li>• The risk of exposure by pressure groups is minimised, thus avoiding negative PR for the Environment Agency.</li> <li>• The Environment Agency has verifiable, auditable evidence to demonstrate compliance with its commitment to buy timber from a legally felled forest that is managed as sustainably as possible.</li> </ul>
<b>Scope:</b>	This guidance document is relevant to all purchases of timber and wood derived products, and is of relevance to all Environment Agency employees, temporary staff and consultants / contractors undertaking work on behalf of the Environment Agency. It may also be helpful information for suppliers of timber to the Environment Agency.
<b>Related Documents:</b>	<p><a href="#">126_04 Procedure: Contracting for goods, services and works valued at less than £2,500</a></p> <p><a href="#">127_04 Procedure: Contracting for goods, services and works valued between £2,500 and £25,000</a></p> <p><a href="#">128_04 Procedure: Contracting for goods, services and works valued between £25,000 and the EC public procurement threshold</a></p> <p><a href="#">129_04 Procedure: Contracting for goods and services valued above the EC public procurement threshold and less than £1,000,000</a></p> <p><a href="#">130_04 Procedure: Contracting for goods, services and works valued over £1,000,000</a></p> <p><a href="#">589_06 Procedure: Purchasing softwood and temperate hardwood timber</a></p> <p><a href="#">590_06 Procedure: Purchasing tropical hardwood timber</a></p> <p><a href="#">591_06 Work Instruction: Purchasing legal and sustainable timber</a></p> <p><a href="#">592_06 Work Instruction: Suppliers selling timber to the Environment Agency</a></p>

If you have any queries on the content of this document or suggestions for improvement, refer to the Primary Contact named above.

If any term or acronym used in this document is unfamiliar you might find the definition in the Glossary on Easinet: Information Resources > [Glossary of Terms and Acronyms](#).

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# 1 Introduction

## 1.1 *Why the need for guidance on purchasing timber?*

- 1.1.1 This guidance document should be read in conjunction with the associated AMS procedures and work instruction on purchasing timber.
- 1.1.2 Purchasing timber that is known to come from a legal and sustainably managed source can be a challenge. This guidance document explains in more detail some of the issues associated with obtaining and evaluating the types of evidence that exist to demonstrate legality and sustainability.

# 2 Evaluating evidence of legality, chain of custody and sustainability

## 2.1 *Introduction*

- 2.1.1 Evidence of legality, sustainability and chain of custody can be provided by a recognised certification scheme (Category A evidence) or through other acceptable forms of evidence (Category B evidence).
- 2.1.2 The terms Category A and Category B are used to help buyers / requisitioners distinguish between the different types of evidence, but these terms may not be widely recognised by the timber trade.

## 2.2 *Category A evidence – certification schemes*

- 2.2.1 Evaluating Category A evidence is a relatively simple process. The Central Point of Expertise on Timber (CPET), a DEFRA funded service operated by a company called ProForest, has assessed five leading timber certification schemes to see whether they provide adequate assurances about legality, sustainability and chain-of-custody. The five schemes are listed below:
- Forest Stewardship Council (FSC)
  - Programme for the Endorsement of Forest Certification Schemes (PEFC)
  - Canadian Standard Association (CSA)
  - Sustainable Forest Initiative (SFI)
  - Malaysian Timber Certification Council (MTCC)
- 2.2.2 All five (FSC, PEFC, CSA, SFI and MTCC) have been shown to meet UK Government (and Environment Agency) legality requirements, and four of the five (FSC, PEFC, CSA and SFI) also satisfy UK Government (and Environment Agency) sustainability requirements.
- 2.2.3 What this means is that timber purchased from a FSC, PEFC, CSA or SFI certified supplier is from a proven legal and sustainable source, with full chain of custody from the forest to the Environment Agency.
- 2.2.4 In relation to timber purchased from a MTCC certified supplier, it means the timber is from a proven legal (but not sustainable) source with full chain of custody from the forest to the Environment Agency.
- 2.2.5 In practice, the majority of our timber be from FSC and PEFC certified suppliers, as there are few CSA and SFI certified suppliers in the UK.
- 2.2.6 It is important to remember that certification is an active, on-going process, and a supplier can lose their certification at any time if they fail an audit / inspection or are suspected of

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misconduct. For this reason, a supplier's certification status should be checked at least every six months (if the supplier is on contract to us), or every time timber is purchased in all other cases.

2.2.7 In relation to the Environment Agency's requirements, Category A evidence will apply to all purchases of softwood and temperate hardwood. It will also apply to purchases of tropical hardwoods, unless certified product is not available, in which case Category B evidence will apply.

2.2.8 Suppliers of certified timber can be identified by either:

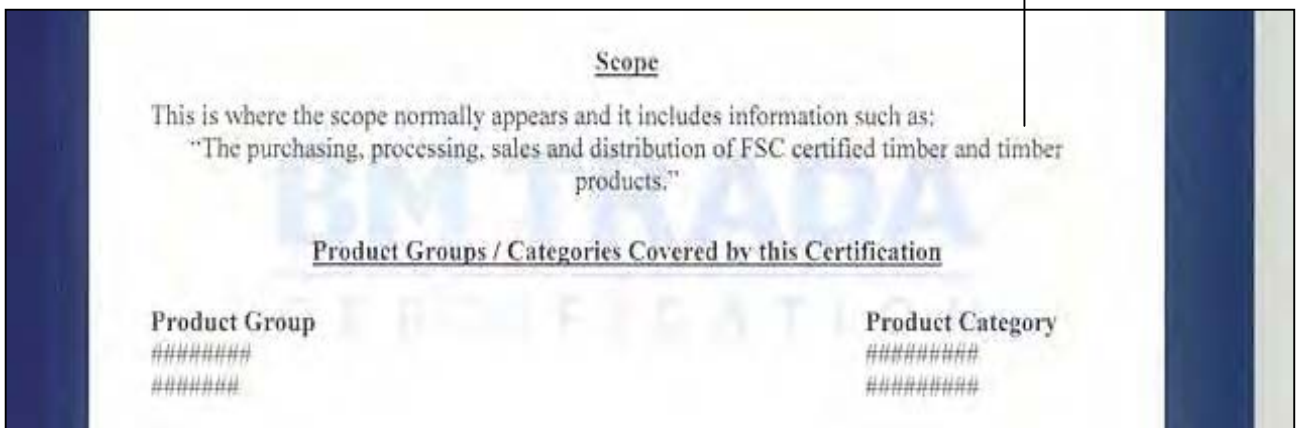
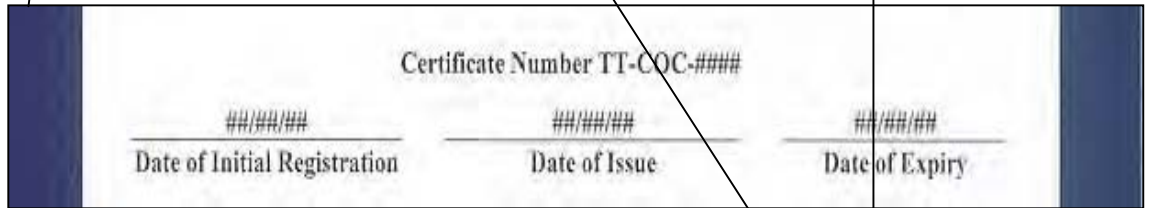
- looking up contracted suppliers (via regional / national contracts or framework agreements) on Easinet or 1B1S
- searching membership databases maintained by:
  - FSC - <http://www.fsc-uk.org/product-search/>
  - PEFC - <http://register.pefc.cz/search1.asp>
  - the Certification Resource Centre (covering FSC, PEFC, SFI and CSA) - <http://www.certifiedwoodsearch.org/SearchProducts.aspx>

2.2.9 The first requirement when evaluating Category A evidence is to request a copy of the supplier's chain-of-custody certificate and then check and verify the information contained on the certificate. The checks that need to be made are detailed in the [Work Instruction: Purchasing legal and sustainable timber](#) (Appendix E)

2.2.10 An example of a certificate and the checks that need to be made, is shown overleaf.

2.2.11 One of the most important checks is looking at the scope of the certificate (registration schedule). This is because it is quite common for suppliers to sell certified and non-certified timber. If the registration schedule doesn't cover the type of timber we want to purchase, then an alternative supplier should be found.

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2.2.12 The second requirement is checking the delivery note to make sure it states that certified timber has been delivered (this is a requirement of certification scheme standards). If this statement is missing from the delivery note the timber should be rejected, as certified product has not been delivered. An example (excerpt) of a delivery note is shown below.

Item	Quantity	m3	Description	Discount %	Vat	Unit Price	Total	
1	1	1.0245	Kiln Dried Hardwood Beech Pack No 12345	xxxx	xxxx	xxxx	xxxx	
2	1	0.9456	Kiln Dried Hardwood Ash Pack No 12346	xxxx	xxxx	xxxx	xxxx	
							Subtotal	xxxx
							Tax (17.5%)	xxxx
							P&P	
							Miscellaneous	
							<b>Balance Due</b>	xxxx

All the above products have been manufactured using FSC certified wood, certification TT-COC-1234

Note: reference to Chain of Custody certificate number.

### 2.3 Category B evidence – all other types of evidence

- 2.3.1 Category B evidence also relates to legality, sustainability and chain of custody, but instead of the evidence being provided via a certification scheme, we have to obtain and piece together the evidence ourselves. This can be a very time consuming and complex exercise, which is why we prefer to buy certified timber.
- 2.3.2 Category B evidence could take the form of a declaration from a contractor, supplier or third party, or independent verification.
- 2.3.3 The key issue with Category B evidence is that it must be credible. Often information provided by suppliers / timber merchants / contractors is worth little more than the paper it's written on. Any information that is provided needs to be sufficiently robust and transparent that it could be audited to verify the source of the timber, whether the forest was legally logged and sustainably managed, and whether there was full chain of custody.
- 2.3.4 In relation to the Environment Agency's requirements, Category B evidence will only ever apply to purchases of tropical hardwood, and only then when certified tropical hardwood is not available.
- 2.3.5 Obtaining robust Category B evidence can be complex, resource-intensive and time consuming. Essentially it means that the Environment Agency has to do the work of a certification body – for every individual order of tropical hardwood. The supplier / contractor obtaining the timber (i.e. the person we want to place the order with) is responsible for being able to provide the documentary evidence we require.
- 2.3.6 The requirements for evaluating Category B evidence are detailed in the [Work Instruction: Purchasing legal and sustainable timber](#). In summary, credible evidence must be obtained which demonstrates legality (mandatory), chain of custody (mandatory) and sustainability (as far as possible) for the tropical hardwood we wish to purchase [Note: the purchase of tropical hardwood must have been first approved by a Sustainable Procurement Advisor and a Regional Director].

- 2.3.7 If faced with a Category B scenario, it could take weeks or even months to obtain the necessary documentation so advance planning is essential. The Sustainable Procurement Advisor should be notified at the earliest opportunity if Category B evidence has to be obtained.
- 2.3.8 Suppliers of non-certified tropical hardwoods can be identified by either:
- looking up contracted suppliers (via regional / national contracts or framework agreements) on Easinet or 1B1S
  - searching membership databases<sup>1</sup> maintained by:
    - FSC - <http://www.fsc-uk.org/product-search/>
    - PEFC - <http://register.pefc.cz/search1.asp>
    - the Certification Resource Centre (covering FSC, PEFC, SFI and CSA) - <http://www.certifiedwoodsearch.org/SearchProducts.aspx>
    - Timber Trade Federation – <http://www.ttf.co.uk>
- 2.3.9 The checks that then need to be made are detailed in the [Work Instruction: Purchasing legal and sustainable timber](#) (Appendix G). Before awarding a contract / placing an order, it must be ascertained whether the tropical hardwood timber is “legal timber” (i.e. that the tree has been legally felled, all local and national laws have been complied with and all relevant royalties and taxes paid). The supplier / contractor should know where the timber they are buying is coming from (i.e. the country of origin), and should therefore be able to provide credible documentary evidence to demonstrate legality.
- 2.3.10 If the supplier does not know the country of origin and / or cannot provide evidence of legality, an alternative supplier must be found. Evidence of legality is mandatory.
- 2.3.11 Having established that the tropical hardwood is from a legal source, the supplier / contractor must be asked to map out the supply chain of the timber (i.e. how the timber will get from the forest to the UK, and then the Environment Agency) and explain the types of evidence they will be able to provide to demonstrate full chain of custody.
- 2.3.12 At this stage, the supplier may not be able to provide specific chain of custody evidence for the timber we require (e.g. if the tree has not yet been felled), but by asking questions about the type of chain of custody information that will be available, it will be clear whether the supplier is likely to be able to meet our requirements.
- 2.3.13 If the timber we require is already in stock, the supplier / contractor should be able to provide full chain of custody information. If they can't provide this information, there is nothing to link the timber in their yard to the forest where they say it has been legally logged. This is unacceptable and an alternative supply of timber must be found.
- 2.3.14 If the timber we require is in transit, the supplier / contractor should be able to provide partial chain of custody evidence. The remainder should become available when the timber arrives in the UK and is transferred to the supplier / contractor.
- 2.3.15 Having obtaining information about legality and chain of custody, the supplier must be asked to provide information about sustainable management practices in the forest where the timber has come from. The credibility of this information is likely to be the most difficult to assess, as what constitutes “sustainable forest management” is open to interpretation.
- 2.3.16 In relation to Category B evidence, it is likely that some information provided by the supplier /contractor will have to be taken at face value as a legitimate promise. If there are serious

<sup>1</sup> This is because certified suppliers of tropical hardwoods also commonly stock non-certified tropical hardwoods as well.

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concerns about the adequacy, robustness or credibility of the evidence presented by the supplier/ contractor at any stage in the process, then the Environment Agency has the option of requesting independent verification of the evidence provided. This would be paid for by the supplier / contractor, as per the Supplementary Conditions of contract detailed in the [Work Instruction: Purchasing legal and sustainable timber](#) (Appendix C). The supplier / contractor should also be reminded of the implications of failure to perform.

- 2.3.17 The evaluation of Category B evidence should be undertaken in consultation with the Sustainable Procurement Advisor, and the Central Point of Expertise on Timber (CPET) as relevant.
- 2.3.18 At the stage of placing the order / awarding the contract, it must be made absolutely clear what documentation we require on delivery of the timber (e.g. outstanding / consignment-specific chain of custody information). It is important that this information accompanies the delivery note rather than the invoice, as invoices are typically issued later when the timber may already have been used by which time it will be too late to rectify any problems.
- 2.3.19 If the information / evidence provided on delivery is not acceptable, then a decision will have to be taken to accept / reject the timber. At this point, further advice should be sought from the Sustainable Procurement Advisor.

### 3 Sources of additional information and guidance

**Central Point of Expertise on Timber (CPET)** – advice and guidance on evaluating Category A and B evidence. Service is available to public sector buyers and their suppliers.

Website: [www.proforest.net/cpet](http://www.proforest.net/cpet)

Helpline: 01865 243 766

Email: [cpet@proforest.net](mailto:cpet@proforest.net)

**Forest Stewardship Council (FSC)** – information on the certification scheme, including members Amy Mulkern

Website: [www.fsc-uk.org](http://www.fsc-uk.org)

Email: [info@fsc-uk.org](mailto:info@fsc-uk.org)

Tel: 01686 413 916

**Canadian Stewardship Council (CSA)** – information on the certification scheme

Kelly Deeton

Email: [kelly.deeton@csa.ca](mailto:kelly.deeton@csa.ca)

Tel: 001 866 747 4118

**Malaysian Timber Certification Council (MTCC)** – information on the certification scheme

Harnarinder Singh/ Chew Lye Teng

Website: [www.mtcc.com.my](http://www.mtcc.com.my)

Email: [mtcc@tm.net.my](mailto:mtcc@tm.net.my)

Tel: 0060 392 005 008

**Programme for the Endorsement of Forest Certification (PEFC)** – information on the certification scheme

William B Walker

Website: [www.pefc.co.uk](http://www.pefc.co.uk)

Email: [info@pefc.co.uk](mailto:info@pefc.co.uk)

Tel: 01829 770 438

**Sustainable Forestry Initiative (SFI)**

Michael Virga

Email: [michael\\_virga@afandpa.org](mailto:michael_virga@afandpa.org)

Tel: 001 800 878 8878

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**BM Trada**

Website: [www.trada.co.uk](http://www.trada.co.uk)  
Email: [rwhite@trada.co.uk](mailto:rwhite@trada.co.uk)  
Contact: Richard White

**Building Research Establishment (BRE)**

Website: [www.bre.co.uk](http://www.bre.co.uk)  
Tel: 01923 664 200  
Email: [construction@bre.co.uk](mailto:construction@bre.co.uk)  
Contact: Vahik Enjily

**Forestry Commission** – publications on UK forestry standard, forest management etc

Website: [www.forestry.gov.uk](http://www.forestry.gov.uk)  
Enquiry service: 0845 367 3787  
Email: [enquiries@forestry.gsi.gov.uk](mailto:enquiries@forestry.gsi.gov.uk)

**Timber Trade Federation (TTF)** – includes information on buying wood and a supplier database

Website: [www.ttf.co.uk](http://www.ttf.co.uk)  
Tel: 020 7839 1891  
Email: [ttf@ttf.co.uk](mailto:ttf@ttf.co.uk)

**UK Woodland Assurance Scheme** (recognised by FSC and PEFC)

Website: [www.ukwas.org.uk](http://www.ukwas.org.uk)

**Wessex Coppice Group** – information on coppicing practices and products, and a list of suppliers

Website: [www.coppice.org.uk](http://www.coppice.org.uk)  
Email: [linda.glynn@coppice.org.uk](mailto:linda.glynn@coppice.org.uk)

**Coppice Products** – information on coppice management, grants and benefits and products

Website: [www.coppice-products.co.uk](http://www.coppice-products.co.uk)  
Tel: 01952 432 769  
Email: [dominique@greenwoodcentre.org.uk](mailto:dominique@greenwoodcentre.org.uk)

**British Trust Conservation Volunteers** – publication on Woodlands including a section on coppicing (Chapter 9)

Website: [www.btcv.org.uk](http://www.btcv.org.uk)  
Publication on coppicing: <http://handbooks.btcv.org.uk/handbooks/content/chapter/690>

Comprehensive information on timber that can be used in coastal / fluvial environments is available in the following document:

- Manual on the use of timber in coastal and river engineering by Matt Crossman and Jonathan Simm. Published 2004 by Thomas Telford Publishing, ISBN 0 7277 3283 8.

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## Procedure

### Purchasing tropical hardwood timber

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<b>Document Owner:</b>	Mark Yeomans	<b>Post:</b>	Head of Procurement
<b>Document Author:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor
<b>Primary Contact:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor



<b>Approved by:</b> (as set out in Schedule B of the NFSoD)	David Jordan David King	<b>Post:</b> <b>Post:</b>	Acting Director of Operations Director of Water Management
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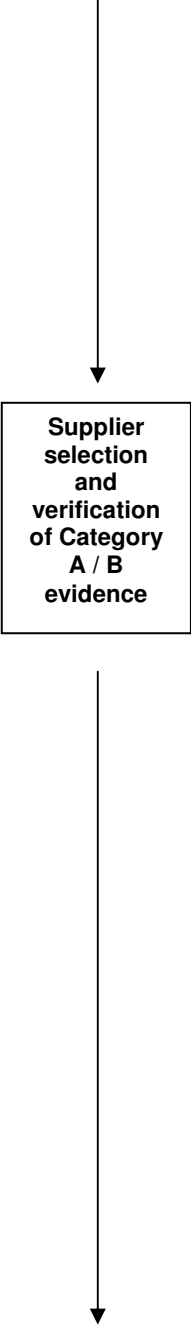
<b>Purpose:</b>	To ensure that purchases of <u>tropical hardwood</u> timber: <ul style="list-style-type: none"> <li>• Are from a legally felled forest that is managed as <b>sustainably</b> as possible.</li> <li>• Have a known and verifiable chain of custody from the forest to the Environment Agency.</li> <li>• Meet the business needs of the Environment Agency.</li> <li>• Are good value for money (cost, quality, <b>sustainability</b>).</li> <li>• Are fit for purpose.</li> </ul>
<b>Success Criteria:</b>	<ul style="list-style-type: none"> <li>• The Environment Agency has the <u>tropical hardwood</u> timber it needs to perform its duties.</li> <li>• The Environment Agency only purchases tropical hardwood from forests that are legally logged and managed as <b>sustainably</b> as possible, and has documentary evidence to prove this.</li> <li>• The Environment Agency can demonstrate chain of custody for all purchases of <u>tropical hardwood</u> timber.</li> <li>• The Environment Agency demonstrates best practice <b>sustainable</b> business management in its own business processes.</li> </ul>
<b>Scope:</b>	<p>This procedure is concerned with the purchase of all <u>tropical hardwood</u> timber. There is a separate procedure for the purchase of softwood and temperate hardwood timber.</p> <p>Timber is defined as any product that contains wood or wood fibre, with the exception of 'recycled' materials. In the Environment Agency, this is practically restricted to timber used in connection with a building or construction project (e.g. wood planks, groynes, footbridges, window frames, floor joists, site hoardings, shuttering, excavator mats, lock gates etc), as well as office furniture. There is no deminimus to this requirement.</p> <p>This procedure details specific, supplementary requirements and actions that apply to the purchase of <u>tropical hardwood</u> timber which are additional to Environment Agency requirements for contracting for goods, services and works.</p> <p>The procedure applies to everyone working for and on behalf of the Environment Agency, including temporary staff, consultants and contractors.</p>
<b>Related Documents:</b>	<a href="#">126_04 Procedure: Contracting for goods, services and works valued at less than £2,500</a> <a href="#">127_04 Procedure: Contracting for goods, services and works valued between £2,500 and £25,000</a> <a href="#">128_04 Procedure: Contracting for goods, services and works valued between £25,000 and the EC public procurement threshold</a> <a href="#">129_04 Procedure: Contracting for goods and services valued above the EC public procurement threshold and less than £1,000,000</a> <a href="#">130_04 Procedure: Contracting for goods, services and works valued over £1,000,000</a> <a href="#">589_06 Procedure: Purchasing softwood and temperate hardwood timber</a> <a href="#">591_06 Work Instruction: Purchasing legal and sustainable timber</a> <a href="#">592_06 Work Instruction: Suppliers selling timber to the Environment Agency</a> <a href="#">593_06 Guidance: Evaluating evidence of legal and sustainable timber</a>


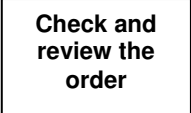
If you have any queries relating to the content of this document, or suggestions for improvements, please contact your local Procurement Team.

If any term or acronym used in this document is unfamiliar you might find the definition in the Glossary on the Agency's Intranet site: Information Resources > [Glossary of Terms and Acronyms](#).

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Who	Activity	Steps	References/links
Requisitioner	<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <b>Planning / Business Case</b> </div> 	<ul style="list-style-type: none"> <li>⇒ Determine what type of timber (i.e. softwood, temperate / tropical hardwood) or wood derived product (e.g. office furniture) is required</li> <li>⇒ Determine if this need can be avoided, or if something else can be adapted/ re-used to avoid having to buy new</li> <li>⇒ Based on the type of timber required, ensure you have selected the correct AMS procedure [Note: this procedure is for tropical hardwood only].</li> <li>⇒ <b>If a need for tropical hardwood is identified, complete and submit a business case for consideration / approval (Appendix F of Work Instruction: Purchasing legal and sustainable timber).</b></li> <li>⇒ Determine if the business need is covered by an existing contract / framework agreement</li> <li>⇒ <b>If the contract/ expenditure is over £10,000 you must contact Procurement to discuss and agree the level of Procurement input</b></li> <li>⇒ Determine the degree of documentation that needs to be obtained to demonstrate legality, sustainability and chain of custody (i.e. Category A or B evidence, depending on the availability of different species of tropical hardwood)</li> <li>⇒ <b>Ensure you allow enough time for the procurement activity, as documentation / timber may take weeks or months to obtain / source.</b></li> <li>⇒ Determine payment method for the purchase. [Note: it is prohibited to buy tropical hardwood using a purchasing card].</li> </ul>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and sustainable timber</li> <li>• Guidance on purchasing legal and sustainable timber</li> <li>• For further advice on sustainability issues contact the Sustainable Procurement Advisor.</li> <li>• For further advice on procurement issues contact your Regional Procurement Team.</li> </ul>
Requisitioner	<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <b>Write specification</b> </div> 	<ul style="list-style-type: none"> <li>⇒ Produce a specification, as simple or complex as it needs to be. Use common sense.</li> <li>⇒ Ensure the most appropriate design-life is chosen. [Note: do not over-specify / over-design, as this may mean that a tropical hardwood is the preferred solution when a temperate hardwood or treated softwood would suffice].</li> <li>⇒ Ensure the specification details requirements in performance output terms rather than demanding a particular timber species by name unless this is unavoidable. [Note: This will give suppliers more flexibility in finding sources of legal and sustainable timber].</li> <li>⇒ Insert the standard sustainability clauses for timber into the specification.</li> </ul>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and sustainable timber</li> <li>• Guidance on purchasing legal and sustainable timber</li> <li>• For further advice on sustainability issues contact the Sustainable Procurement Advisor.</li> <li>• For further advice on procurement issues contact your Regional Procurement Team.</li> </ul>

<p>Requisitioner</p>	 <p style="text-align: center;"><b>Supplier selection and verification of Category A / B evidence</b></p>	<ul style="list-style-type: none"> <li>⇒ Identify a list of supplier(s) that can meet your requirements for tropical hardwood timber</li> <li>⇒ Communicate the specification and if appropriate other written documentation (e.g. conditions of contract) to the supplier(s). Use common sense on the degree of any documentation needed.</li> <li>⇒ Ensure that the supplementary conditions of contract relating to timber are communicated to the supplier (s). <b>It is essential that the supplementary conditions are provided.</b></li> <li>⇒ Contact potential supplier(s) to verify that they can meet the Environment Agency's requirements for tropical hardwood regarding legality, <b>sustainability</b> and chain of custody (i.e. Category A / B evidence)</li> <li>⇒ For Category A evidence, complete section 1 of the Category A checklist (Appendix E of the Work Instruction) to verify the validity and scope of the supplier's chain of custody certificate. If these checks reveal a problem, discount the supplier.</li> <li>⇒ For Category B evidence, follow the actions listed in section 1 of the Category B checklist (Appendix G of the Work Instruction). Note: This will necessitate asking suppliers to complete sections 1-3 of the Category B checklist for suppliers (Appendix H of the Work Instruction).</li> <li>⇒ Check and review the information and evidence provided by suppliers in completing sections 1-3 of Appendix H.</li> <li>⇒ Seek advice from the Sustainable Procurement Advisor if evidence provided by suppliers is difficult to evaluate.</li> <li>⇒ Select the supplier(s) that best meet your requirements. Compliance with the Environment Agency's timber procurement policy is mandatory. If the requirements of Category A / B are met, then you would usually evaluate on lowest cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Work Instruction: Contractor compliance with Environment Agency requirements to purchase legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> <li>• For further advice on sustainability issues contact the Sustainable Procurement Advisor.</li> <li>• For further advice on procurement issues contact your Regional Procurement Team.</li> </ul>
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<p>Requisitioner</p>	 <p style="text-align: center;"><b>Raise an order</b></p>	<ul style="list-style-type: none"> <li>⇒ If appropriate, raise a non-catalogue request within the I Procurement Module of Oracle 11I (i.e. a requisition submitted via 1B1S)</li> <li>⇒ Follow the requirements detailed in section 2 of the Category B checklist (Appendix G of the Work Instruction). Ensure that the requisition includes the following information:             <ul style="list-style-type: none"> <li>• The correct 1B1S category code for the type of timber required</li> <li>• A completed “information template” [Note: there are mandatory fields requiring information on the suppliers Category A / B evidence, as relevant]</li> </ul> </li> <li>⇒ Submit the requisition and await approval from the Sustainable Procurement Advisor <u>before</u> placing the order. [Note: all requisitions via 1B1S for tropical hardwood timber are “flagged” and routed to the Sustainable Procurement Advisor for approval]. This is in addition to Line Manager approval and the initial business case approval process for tropical hardwoods.</li> </ul>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> <li>• I Procurement Module within Oracle 11i.</li> <li>• For further advice on sustainability issues contact the Sustainable Procurement Advisor.</li> <li>• For further advice on procurement issues contact your Regional Procurement Team.</li> </ul>
<p>Sustainable Procurement Advisor</p>	 <p style="text-align: center;"><b>Check and review the order</b></p>	<ul style="list-style-type: none"> <li>⇒ On receipt of notification that a requisition has been submitted, check the details of the requisition.</li> <li>⇒ Ensure that:             <ul style="list-style-type: none"> <li>• The correct 1B1S category code has been used</li> <li>• All mandatory information fields relating to Category A / B evidence (as relevant) are completed with credible answers that make sense.</li> </ul> </li> <li>⇒ For Category A evidence, double check the information provided by the requisitioner by typing the supplier’s chain of custody certificate number into the relevant database on the web.</li> <li>⇒ For Category B evidence, obtain and review the evidence / information obtained to demonstrate legality, chain of custody and <b>sustainability</b> to ensure it is robust and credible.</li> <li>⇒ If necessary, contact the forest certification scheme’s helpdesk and / or the supplier to clarify any queries.</li> <li>⇒ Approve the requisition if all information is verified as correct. Reject the requisition if incomplete information is provided or problems / inconsistencies are identified. [Note: the requisitioner will be notified of the decision via 1B1S].</li> </ul>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> </ul>

<p>Requisitioner</p>	<p style="text-align: center;">↓</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px; text-align: center;"> <b>Placing the order / making the purchase</b> </div> <p style="text-align: center;">↓</p>	<p>⇒ Determine if the purchase needs a formal written award letter or an oral award. Use common sense for this decision</p> <p>⇒ For Category A evidence, place the order following the requirements detailed in section 3 of the Category A checklist (Appendix E of the Work Instruction). Ensure the order is for <u>certified</u> timber.</p> <p>⇒ For Category B evidence, place the order following the requirements detailed in section 3 of the Category B checklist (Appendix G of the Work Instruction). Make it absolutely clear to the supplier what documentation is required on <u>delivery</u> of the timber (e.g. outstanding chain of custody evidence).</p> <p>⇒ Communicate method of payment to the successful supplier. [Note: it is prohibited to buy tropical hardwood using a purchasing card].</p>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Work Instruction: Contractor compliance with Environment Agency requirements to purchase legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> <li>• For further advice on sustainability issues contact the Sustainable Procurement Advisor.</li> <li>• For further advice on procurement issues contact your Regional Procurement Team.</li> </ul>
<p>Requisitioner / Workforce</p>	<p style="text-align: center;">↓</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px; text-align: center;"> <b>Receipt of timber</b> </div> <p style="text-align: center;">↓</p>	<p>⇒ On delivery of the tropical hardwood timber (but before accepting the goods), ensure that either</p> <ul style="list-style-type: none"> <li>• For Category A evidence, the requirements detailed in section 4 of the Category A checklist (Appendix E of the Work Instruction) are followed (i.e. the delivery note / invoice states that certified timber has been supplied</li> <li>• For Category B evidence, the requirements detailed in section 4 of the Category B checklist (Appendix G of the Work Instruction) are followed (i.e. the delivery note is accompanied by all outstanding evidence/ information that is needed).</li> </ul> <p>⇒ If the above requirements are not met, seek further advice on whether the timber should be accepted or rejected.</p>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Work Instruction: Contractor compliance with Environment Agency requirements to purchase legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> <li>• For further advice contact the Sustainable Procurement Advisor.</li> </ul>
<p>Requisitioner</p>	<p style="text-align: center;">↓</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px; text-align: center;"> <b>Records and evidence</b> </div> <p style="text-align: center;">↓</p>	<p>⇒ Collate and file all evidence, documents and notes of discussions relating to the purchase for future audit / inspection.</p> <p>⇒ Retain all records for a period of three years.</p>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> </ul>
<p>Requisitioner</p>	<p style="text-align: center;">↓</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 150px; text-align: center;"> <b>Surplus timber</b> </div>	<p>⇒ If there is timber surplus to requirements, ensure this is clearly marked (i.e. segregated and labelled) so that it can be identified in the future and linked to the necessary evidence and documentation showing legality, chain of custody and sustainability.</p>	<ul style="list-style-type: none"> <li>• Work Instruction on purchasing legal and <b>sustainable</b> timber</li> <li>• Guidance on purchasing legal and <b>sustainable</b> timber</li> </ul>

## Work Instruction

### Purchasing legal and sustainable timber

<b>Number:</b>	591_06	<b>Status:</b>	Version 1	<b>Issue Date:</b>	29/08/06	<b>Review Due:</b>	29/08/07
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<b>Document Owner:</b>	Mark Yeomans	<b>Post:</b>	Head of Procurement
<b>Document Author:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor
<b>Primary Contact:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor

<b>Approved by:</b> (as set out in Schedule B of the NFSoD)	David Jordan David King	<b>Post:</b>	Acting Director of Operations Director of Water Management
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<b>Purpose:</b>	<p>To ensure that timber is purchased from a legally felled forest that is managed as sustainably as possible, and that the movement of timber from the forest source to the Environment Agency is known and verifiable, so that:</p> <ul style="list-style-type: none"> <li>• The Environment Agency does not purchase illegally logged timber.</li> <li>• The Environment Agency does not support unsustainable forest management practices.</li> <li>• The Environment Agency delivers “Creating a Better Place” objectives by encouraging a “Greener Business World” and “Wiser Sustainable Use of Natural Resources”.</li> <li>• The Environment Agency demonstrates best practice.</li> <li>• The risk of exposure by pressure groups is minimised, thus avoiding negative PR for the Environment Agency.</li> <li>• The Environment Agency has verifiable, auditable evidence to demonstrate compliance with its commitment to buy timber from a legally felled forest that is managed as sustainably as possible.</li> </ul>
<b>Scope:</b>	<p>This work instruction applies to all purchases of timber, without exception. There is no deminimus to this requirement.</p> <p>Timber is defined as any product that contains wood or wood fibre, with the exception of 'recycled' materials. In the Environment Agency, this is practically restricted to timber used in connection with a building or construction project (e.g. wood planks, groynes, footbridges, window frames, floor joists, site hoardings, shuttering, excavator mats, lock gates etc), as well as office furniture.</p> <p>The work instruction applies to all Environment Agency employees, temporary staff and consultants / contractors undertaking work on behalf of the Environment Agency.</p>
<b>Related Documents:</b>	<p><a href="#">126_04 Procedure: Contracting for goods, services and works valued at less than £2,500</a></p> <p><a href="#">127_04 Procedure: Contracting for goods, services and works valued between £2,500 and £25,000</a></p> <p><a href="#">128_04 Procedure: Contracting for goods, services and works valued between £25,000 and the EC public procurement threshold</a></p> <p><a href="#">129_04 Procedure: Contracting for goods and services valued above the EC public procurement threshold and less than £1,000,000</a></p> <p><a href="#">130_04 Procedure: Contracting for goods, services and works valued over £1,000,000</a></p> <p><a href="#">589_06 Procedure: Purchasing softwood and temperate hardwood timber</a></p> <p><a href="#">590_06 Procedure: Purchasing tropical hardwood timber</a></p> <p><a href="#">592_06 Work Instruction: Suppliers selling timber to the Environment Agency</a></p> <p><a href="#">593_06 Guidance: Evaluating evidence of legal and sustainable timber</a></p>

If you have any queries on the content of this document or suggestions for improvement, refer to the Primary Contact named above.

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# 1 Background information

## 1.1 *Why is timber an issue?*

- 1.1.1 There is growing international concern about the state of the world's forests and the trade in illegal timber. Each year, it has been estimated that over 14 million hectares of natural forest are lost. This is equivalent to an area larger than England.
- 1.1.2 Illegal logging and unsustainable forest management practices threaten the future of the world's remaining forests. Forests are a precious natural resource, and their destruction has wide-ranging social, economic and environmental impacts.
- 1.1.3 It has been recently estimated that 28 per cent of timber arriving in the UK is illegal. This is of great concern to the Environment Agency. As an organisation committed to protecting and conserving the natural environment, we do not want to support illegal and unsustainable forest management practices around the world.

## 1.2 *Why the need for a specific work instruction on timber procurement?*

- 1.2.1 Purchasing timber that is known to come from a legal and sustainably managed source can be a challenge. When asked, many suppliers and contractors will claim to be able to supply legal and sustainable timber but when challenged, they are often unable to support this claim with documentary evidence. This is when problems arise because without auditable evidence, we cannot be certain that we are purchasing timber from legal and sustainably managed forests.
- 1.2.2 To avoid this problem it is essential that all employees and contractors working on our behalf understand the types of evidence that exist to demonstrate legality and sustainability. These need to be understood in the context of the Environment Agency's requirements so that it is clear what types of evidence are required for softwood, temperate hardwood and tropical hardwood species.
- 1.2.3 The aim of this work instruction is to ensure a common level of understanding about timber procurement issues, and to ensure that we can demonstrate full compliance with our requirements (see section 2.2).
- 1.2.4 A separate work instruction ([592\\_06 Work Instruction: Suppliers selling timber to the Environment Agency](#)) deals with the implications of our requirements for suppliers, and includes a standard letter which explains our approach.

## 1.3 *Understanding the jargon - definitions*

- 1.3.1 The meanings of words commonly used when talking about timber procurement and types of evidence (e.g. chain of custody) are explained in Appendix A – Glossary of Terms.

# 2 Environment Agency approach and requirements

## 2.1 *Introduction*

- 2.1.1 The Agency's approach and requirements were approved by Paul Leinster in April 2006. **These requirements are mandatory for all purchases of timber (as defined in Appendix A), regardless of the value or the procurement route (i.e. purchasing card / 1B1S / contractors acting on our behalf). There are no exceptions to these requirements.**

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- 2.1.2 The Agency's requirements are not about discontinuing the use of timber in preference to other materials such as steel and concrete. Timber is a renewable resource and an excellent construction material. It is about ensuring that we purchase the right type of wood – wood that is legal and sustainable.
- 2.1.3 When specifying and purchasing timber, issues such as durability, strength, cost, availability, thermal and chemical stability therefore need to be considered within the context of using a proven legal source of timber that is managed as sustainably as possible.

## 2.2 Detailed requirements

Type of Timber	Requirements
<b>Softwood</b>	FSC <sup>1</sup> / PEFC <sup>2</sup> / CSA <sup>3</sup> / SFI <sup>4</sup> certified softwoods only [Note: coppiced material is exempt].
<b>Temperate hardwood</b>	FSC / PEFC / CSA / SFI certified temperate hardwoods only [Note: coppiced material is exempt].
<b>Tropical hardwood</b>	<p>Tropical hardwood will not be purchased unless it is an operational necessity.</p> <p>A <u>business case</u> must be completed for all potential applications / uses of tropical hardwood and senior management approval will be needed before any purchases can be made.</p> <p>If tropical hardwood is purchased, it must be FSC / PEFC / CSA / SFI / MTCC<sup>5</sup> certified whenever possible. If certified timber is not available, credible evidence must be obtained which demonstrates legality, sustainability and traceability through the supply chain.</p>
<b>Coppiced material</b>	<p>Coppiced material is exempt from the requirements for softwood and temperate hardwood if documentary evidence which demonstrates the following is obtained:</p> <ul style="list-style-type: none"> <li>• The source of the coppiced material</li> <li>• The coppicer has legal rights to coppice the wood</li> </ul>
<b>Recycled timber</b>	<p>From a waste hierarchy and resource use perspective the purchase of recycled timber is preferable to the purchase of virgin timber.</p> <p>Recycled timber is defined as timber which is being used for a different purpose than the purpose for which the tree was originally felled<sup>6</sup>.</p> <p>For recycled timber, the previous use must be established and documented [Note: this will be strictly monitored]. However, it is not necessary to prove legality or sustainability of the recycled timber.</p>

<sup>1</sup> Forest Stewardship Council – see Appendix B

<sup>2</sup> Programme for the Endorsement of Forest Certification Schemes – see Appendix B

<sup>3</sup> Canadian Standard Association – see Appendix B

<sup>4</sup> Sustainable Forest Initiative – see Appendix B

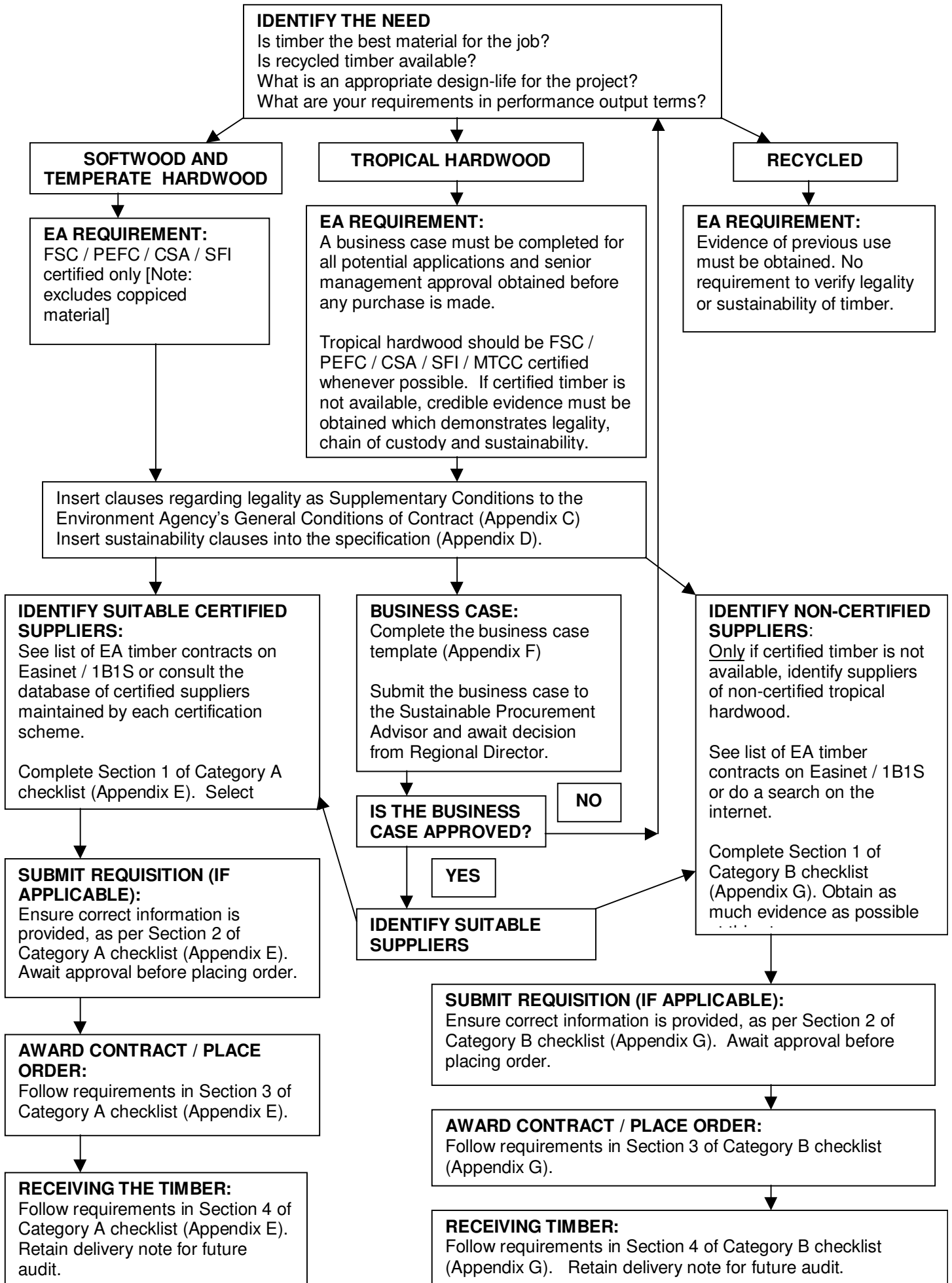
<sup>5</sup> Malaysian Timber Certification Council – see Appendix B

<sup>6</sup> E.g. If a beach groyne is removed and re-sawn to make fencing posts. If the beach groyne was removed and used again as a beach groyne somewhere else, this is re-use not recycling.

### 3 Purchasing in practice – buying timber

- 3.1 The flow chart overleaf explains how to purchase timber to ensure compliance with the requirements detailed in section 2.2. This flow chart should be used in conjunction with Appendices A to H.

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## 4 Roles and responsibilities

### 4.1 Introduction

- 4.1.1 It is important that the roles and responsibilities of various individuals involved in purchasing timber are clear so that important checks and evidence are not overlooked or effort is duplicated.

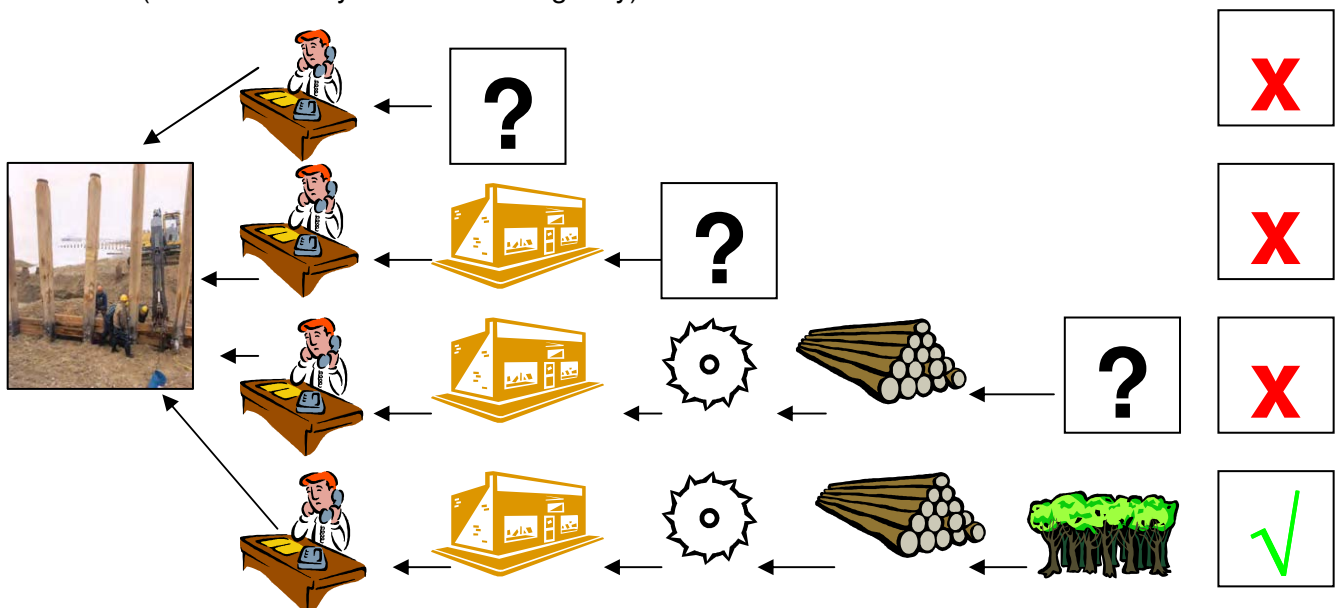
### 4.2 Detailed requirements

- 4.2.1 The tasks / stages detailed in the table below are those given in the AMS procedures that accompany this work instruction.

Tasks / stages	Responsibility
Planning	<ul style="list-style-type: none"> <li>Requisitioner in consultation with Procurement if the total value of the contract is over £10k</li> </ul>
Completion of business case template (tropical hardwood only)	<ul style="list-style-type: none"> <li>Requisitioner with technical support and input as necessary.</li> </ul>
Approval / rejection of business case (tropical hardwood only)	<ul style="list-style-type: none"> <li>Sustainable Procurement Advisor and a Regional Director</li> </ul>
Writing specification	<ul style="list-style-type: none"> <li>Requisitioner with technical input as necessary, and support from Procurement if needed / previously agreed.</li> </ul>
Supplier selection and verification of Category A / B evidence	<ul style="list-style-type: none"> <li>Requisitioner if under £10k. If over £10k, Requisitioner with Procurement as agreed.</li> <li>If there are more than two people on the project team, there must be a nominated lead person to take overall responsibility for obtaining and checking all Category A / B evidence.</li> <li>If timber is being purchased by consultants / contractors working on our behalf, they are responsible for obtaining all necessary evidence. However, it is the responsibility of the lead nominated person internally to ensure that the consultants / contractors carry out this work.</li> </ul>
Raising an order	<ul style="list-style-type: none"> <li>Requisitioner</li> </ul>
Checking and reviewing the order	<ul style="list-style-type: none"> <li>Sustainable Procurement Advisor or nominated representative (e.g. REMA)</li> </ul>
Placing the order / making the purchase	<ul style="list-style-type: none"> <li>Requisitioner if under £10k or framework call-off. If over £10k one-off purchase, Procurement in consultation with Requisitioner.</li> </ul>
Receipt of timber and checking of delivery documentation / evidence	<ul style="list-style-type: none"> <li>Requisitioner</li> </ul>
Management and retention of records and evidence	<ul style="list-style-type: none"> <li>Requisitioner</li> </ul>
Management and storage of surplus timber	<ul style="list-style-type: none"> <li>Requisitioner</li> </ul>

## APPENDIX A - Glossary of Terms

1. "Timber" means any product that contains wood or wood fibre with the exception of 'recycled' materials. In the Environment Agency, it is taken to mean timber used in connection with a building or construction project (e.g. wood planks, groynes, footbridges, shuttering, window frames, floor joists, site hoardings, lock gates, excavator mats etc), as well as office furniture.
2. "Legal" means that the organisation or body who felled the trees must have had legal rights to use the forest, must have complied with all relevant local and national laws and codes of practice including environmental, labour and health and safety laws, and must have paid all relevant royalties and taxes.
3. "Sustainable source" refers to production and process methods that minimise harm to ecosystems, sustain forest productivity, ensure that forest ecosystem health and vitality is maintained and ensure forest bio-diversity is maintained.
4. "Forest certification" is a system of forest inspection. It is a form of independent verification that the management of a forest meets a defined set of requirements (standards). These standards cover legality and sustainability issues such as compliance with national legislation, respect for local people's rights, ecological integrity, economic viability, protection of bio-diversity and the need for adequate monitoring of operations.
5. "Chain of Custody (COC) certification" is a means of tracking timber products through the supply chain, from the forest to the end user. It is applicable to anyone who takes "legal or physical possession" of the timber once it has left the forest (e.g. sawmill, timber merchant, manufacturer, wholesaler etc).
6. To become a COC certificate holder, you have to be inspected to ensure that you meet the criteria set by a certification scheme. These criteria cover issues such as timber identification, tracking, segregation and documentation. By becoming a COC certificate holder, it means that you can sell "certified timber products". In order for one stage in the chain to be certified, all previous stages must be certified, otherwise the chain-of-custody is broken and certified timber is no longer available. This is illustrated on the diagram below – the situation we want to be in is shown with a tick, i.e. where we know the source of the timber we are purchasing. Source: CPET (as amended by Environment Agency)








7. "Registration schedule" is the term used to describe the scope of a supplier's certification. A supplier can become certified for all or part of their product range. It is therefore possible that a certified supplier may stock certified and non-certified timber. This is a very important distinction, as the scope of a supplier's certification always needs to be checked.
8. "Certification scheme" refers to a scheme established and run by an independent organisation (often non-governmental and not-for-profit) for the purposes of inspecting and auditing forests / the timber supply chain. Each certification scheme is based on a core set of principles and policies which are translated into inspection criteria / standards. Additional information is provided in Appendix B.
9. "Certification body" refers to an organisation that conducts audits / inspections against criteria / standards established by a certification scheme. A certification body must be accredited to undertake such inspections (in the UK, the accreditation body is UKAS).
10. "Softwood" is a general term used to describe timber produced from needle and / or cone bearing trees, most of which are evergreen. Included in this group are pine, spruces, firs and cedars. The term does not refer to the hardness of the wood.
11. "Hardwood" is the general term applied to groups of deciduous trees that have broad leaves. Included in this group is oak, maple, ash, elm, walnut, poplar, birch, eucalyptus. The term has does not refer to the hardness of the wood.
12. "Temperate" hardwood is hardwood from temperate latitudes (i.e. between the tropics and the polar regions). These areas are characterised by moderate temperatures, wind and climate; neither hot nor cold. Examples of temperate regions / countries include north America and Canada, Europe, Russia, China, southern half of Australia, New Zealand, Argentina, South Africa.
13. "Tropical" hardwood is hardwood from tropical latitudes (i.e. centred on the equator and limited in latitude to the Tropic of Cancer in the north and the Tropic of Capricorn in the south). These areas are characterised by a climate with high temperatures, humidity and rainfall. Examples of tropical regions / countries include central Africa, Indonesia, Thailand, Myanmar, Cambodia, Philippines, Brazil, Ecuador, Colombia, central America.
14. "Category A evidence" refers to evidence of legality, sustainability and chain of custody which is provided by recognised certification scheme.
15. "Category B evidence" refers to all other types of credible evidence of legality, sustainability and chain of custody (i.e. not a certification scheme). Category B evidence could take the form of a declaration from a contractor, supplier or third party, or independent verification. Examples of Category B evidence include a timber sales agreement, forest licence, forest management plan, export/import documents, bill of lading etc.

## APPENDIX B - Certification schemes (Category A)

The UK Government periodically evaluates and re-evaluates certification schemes to establish their adequacy in assuring that UK Government timber procurement requirements are being met. If you are using a hard copy of this document and are not sure if this information is up-to-date you can check the electronic version at:

- The CPET website at [www.ProForest.net/cpet](http://www.ProForest.net/cpet)

Currently, there are five certification schemes (listed below) whose certification programmes have been evaluated as satisfying the requirements for either legal and /or sustainable timber. These are applicable in the context of the Environment Agency's timber procurement policy.

Logo	Certification Scheme	Legal	Sustainable*
	Canadian Standards Association (CSA)	Yes	Yes
	Forest Stewardship Council (FSC)	Yes	Only products or product lines containing >70% certified or recycled raw material.
	Malaysian Timber Certification Council (MTCC)	Only products containing 100% certified raw material.	No
	Programme for the Endorsement of Forest Certification (PEFC)	Yes	Only products or product lines containing >70% certified or recycled raw material.
	Sustainable Forestry Initiative (SFI)	Yes	Only products or product lines containing >70% certified or recycled raw material.

## APPENDIX C - Supplementary conditions of contract relating to legality

- Clause 1: For the purposes of the Contract 'timber and wood derived products' is deemed to include products that contain wood or wood fibre, with the exception of "recycled materials", that fall into the following categories: building or construction materials (e.g. wood planks, groynes, footbridges, window frames, floor joists, site hoardings, shuttering, excavator mats, lock gates etc), as well as office furniture. 'Recycled timber' in the context of this Contract means recovered wood that prior to being supplied to the Environment Agency had an end use as a stand-alone object or as part of a structure.
- Clause 2: The Contractor shall ensure that no virgin timber or wood derived products it procures for supply or use in performance of the Contract shall have derived from any species of tree that is protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) unless the supplier can prove, by producing official documentation, that they have complied with the CITES requirements that permit trading in the particular species of tree so listed under that Convention.
- Clause 3: All timber and wood derived products procured by the Contractor for supply or use in performance of the contract shall be Legal Timber. The term 'Legal Timber' in the context of this Contract Condition refers to the timber from a forest that meets the requirements set out in the document titled "*UK Government Timber Procurement policy- Definition of 'legal' and 'sustainable' for timber procurement*" (available from the Authority on request and visible on the UK Government authorised Central Point of Expertise on Timber web site). The edition current on the day the Contract is awarded shall apply. In summary, the organisation or body that felled the trees and provided the timber from which the wood supplied under the Contract derived shall have had legal use rights to the forest, complied with all relevant local and national laws and codes of practice including environmental, labour and health and safety laws and paid all relevant royalties and taxes.
- Clause 4: Before delivering any timber or wood product under this Contract, the Contractor shall provide documentary evidence that the timber and wood derived products is 'legal timber'. The Contractor shall identify, as part of the evidence submitted, a chain of custody from the forest source of the timber or wood product through to delivery of the final product. For all species of timber, it is the Environment Agency's requirement that this evidence shall take the form of a chain of custody certificate ("Category A" evidence) issued by one of the certification schemes recognised by the UK Government as meeting the criteria set out in the document titled "*UK Government Timber Procurement Policy: Criteria for Evaluating Category A Evidence*" (available from the Authority on request and visible on the UK Government authorised Central Point of Expertise on Timber web site). The edition current on the day the Contract is awarded shall apply. A list of assessed certification schemes that currently meet the government's requirements can be found in Appendix B [Note: Contractors should be provided with a copy].
- Clause 5: In relation to tropical hardwood species only, if Category A evidence is not available then other forms of evidence ("Category B" evidence) that demonstrate legality and chain of custody will be required. In this context "legality" and "chain of custody" is defined in the document titled "*UK Government Timber Procurement Policy: Evaluation of Category B Evidence: Methodology*" (available from the Authority on request and visible on the UK Government authorised Central Point of Expertise on Timber web site). The edition current on the day the Contract is awarded shall apply. Such Category B evidence may include, for example, independent audits and declarations by the Contractor or his suppliers

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- Clause 6: The Contractor shall maintain records of all timber and wood derived products delivered to and accepted by the Environment Agency *[as detailed on the Form described in the Contract Specification]*. Such information shall be made available to the Environment Agency if requested at any time.
- Clause 7: The Environment Agency reserves the right to decide whether the evidence submitted to demonstrate that the timber or wood product is 'legal timber' is adequate. In the event that the Environment Agency is not so satisfied, the Contractor shall, on written request by the Environment Agency, commission and meet the costs of an 'independent verification' and report that will (a) verify the forest source of the timber or wood and (b) assess whether the source meets the criteria for legality as defined in Clause 3 of this Supplementary Condition).
- Clause 8: In this Contract 'Independent Verification' means that an evaluation is undertaken and reported by an individual or body whose organisation, systems and procedures conform to *ISO Guide 65:1996 (EN 45011:1998) General requirements for bodies operating product certification systems* or equivalent: and who is accredited to audit against forest management standards by a body whose organisation, systems and procedures conform to *ISO 17011: 2004 General Requirements for Providing Assessment and Accreditation of Conformity Assessment Bodies* or equivalent. This condition is met automatically where Category A evidence is supplied.
- Clause 9: The requirements of Conditions 4-8 for documentary evidence, records and independent verification shall also apply to recycled timber except that tracking shall be back to the previous use, not the forest source.
- Clause 10: The Environment Agency reserves the right to reject any timber or wood derived products that do not comply with the provisions of these Conditions or the Contract Specification. Where the Authority exercises its right to reject any timber, the Contractor shall supply alternative timber, which does so comply, at no additional cost to the Authority and without causing delay to the Contract completion period.

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## APPENDIX D - Sustainability clauses for inclusion in the specification

- Clause 1: The Contractor's attention is drawn to the Supplementary Conditions of Contract relating to timber and wood derived products in respect of the Contractor's obligation to ensure that all timber and wood derived products acquired for supply or use in performance of the contract is 'legal timber' and that as part of the evidence submitted, the Contractor shall identify a chain of custody from the forest source of the timber or wood product through to delivery of the final product.
- Clause 2: In addition to the requirements concerning legality and chain of custody, all timber and wood derived products procured by the Contractor for supply or use in performance of the contract shall be from as sustainable a source as possible. The term 'sustainable source' in the context of this Contract Specification refers to production and process methods, also referred to as sustainable timber production standards, as defined by the document titled "*UK Government timber procurement policy: Definition of 'legal' and 'sustainable' for timber procurement*" (available from the Authority on request and visible on the UK Government authorised Central Point of Expertise on Timber web site). The edition current on the day the Contract is awarded shall apply. In summary, 'sustainable source' refers to production and process methods that minimise harm to ecosystems, sustain forest productivity, ensure that forest ecosystem health and vitality is maintained and ensure forest biodiversity is maintained.
- Clause 3: Before delivering any timber or wood product under this Contract, the Contractor shall provide documentary evidence that the timber and wood derived products is from a 'sustainable source'. For all species of timber, it is the Environment Agency's requirement that this evidence shall take the form of a chain of custody certificate ("Category A" evidence) issued by one of the certification schemes recognised by the UK Government as meeting the criteria set out in the document titled "*UK Government Timber Procurement Policy: Criteria for Evaluating Category A Evidence*" (available from the Authority on request and visible on the UK Government authorised Central Point of Expertise on Timber web site). The edition current on the day the Contract is awarded shall apply. A list of assessed certification schemes that currently meet the government's requirements can be found in Appendix B [Note: Contractors should be provided with a copy]. In the event that the Contractor is sourcing timber directly from the forest, a certificate of sustainable forest management issue by one of the above listed certification schemes should be provided.
- Clause 4: In relation to tropical hardwood species only, if Category A evidence is not available, then other forms of evidence that provide assurance that the source of timber is sustainable will be required. In this context "sustainable" is defined in the document titled "*UK Government Timber Procurement Policy: Evaluation of Category B Evidence: Methodology*" (available from the Authority on request and visible on the UK Government authorised Central Point of Expertise on Timber web site). The edition current on the day the Contract is awarded shall apply. Such Category B evidence may include, for example, independent audits and declarations by the Contractor or his suppliers.
- Clause 5: In relation to Category B evidence, the Contractor's attention is drawn to the Supplementary Conditions of contract which requires him or her to provide credible evidence on the source of products supplied that has been or can be independently verified as such by an individual or body whose organisation, systems and procedures conform to *ISO Guide 65:1996 (EN 45011:1998) General Requirements for Bodies Operating Product Certification Systems* or equivalent: and who is accredited to audit against timber production standards by a national or international

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body whose organisation, systems and procedures conform to *ISO 17011: 2004 General Requirements for Providing Assessment and Accreditation of Conformity Assessment Bodies* or equivalent. This condition is met automatically where Category A evidence is supplied.

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## APPENDIX E - Category A checklist

This checklist details how to verify Category A evidence. It applies to ALL purchases of softwood and temperate hardwood, and some purchases of tropical hardwood. These checks should be made for EVERY purchase of timber, regardless of the quantity, value, or frequency of purchases.

### SECTION 1: Five checks to be made before submitting a requisition / awarding a contract

Checks	Yes	No	Comments and actions
Is the supplier a chain of custody (COC) certificate holder?			<i>If yes, obtain a copy of the certificate. If no, discount the supplier.</i>
Is the name on the certificate that of the company you wish to purchase from?			<i>If yes, proceed to the next check. If no, discount the supplier.</i>
Is the certification scheme one of these:			
Forest Stewardship Council (FSC)			<i>If yes, proceed to the next check. If no, discount the supplier (it is not Category A evidence and therefore does not comply with the Agency's requirements).</i>
Programme for the Endorsement of Forest Certification (PEFC)			
Sustainable Forestry Initiative (SFI)			
Canadian Standards Association (CSA)			
Malaysian Timber Certification Council (MTCC) [Note: tropical hardwood only]			
Is the certificate valid?			<i>If yes, proceed to the next check. If no, discount the supplier</i>
Is the product you want to purchase covered by the registration schedule?			<i>If yes, proceed with the purchase. If no, discount the supplier.</i>

Answers to some of these questions can be checked by typing the supplier's COC certificate number (e.g. TT-COC-1234) into a database on the following websites:

- FSC - <http://www.fsc-info.org/english/dbcoce.asp>
- PEFC – <http://register.pefc.cz/search1.asp>

These databases will confirm the supplier's name, COC number, certificate validity and scope.

### SECTION 2: Submitting a requisition

- Ensure that the requisition includes the following information:
  - the correct 1B1S category code for the type of timber
  - a completed "information template" [Note: there are mandatory fields requiring the supplier's COC number, confirmation that the five checks have been completed etc]
- Submit the requisition and await approval before placing the order.

### SECTION 3: Placing the order:

- It must be specified that certified timber is required, otherwise the supplier could supply non-certified timber (they may stock both).

### SECTION 4: Receiving the timber:

- Check the delivery note states that certified timber has been delivered (this is a certification scheme requirement). If this statement is missing, the timber should be rejected as certified timber has not been supplied.

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## APPENDIX F - Business case template for tropical hardwood

**This should be completed for all potential applications / uses of tropical hardwood, regardless of the value or quantity of timber required.**

<b>SECTION A: BACKGROUND INFORMATION</b>					
Name of Project:					
Location of Project:					
Brief description of Project:					
Business case completed by:					
Business case completed on:					
<b>SECTION B: POTENTIAL APPLICATION / USE OF TROPICAL HARDWOOD</b>					
Type of application / use (e.g. beach groyne):					
Preferred tropical hardwood species:					
Country of origin of tropical hardwood species:					
Estimated quantity of timber required (m <sup>3</sup> ):					
Estimated value (£) of timber required:					
<b>SECTION C: EVALUATION OF REQUIREMENT FOR TROPICAL HARDWOOD</b>					
Explain why a tropical hardwood species is required for this application / use:					
Have you considered using a temperate hardwood instead of a tropical hardwood species? (Tick one box)	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;"><input type="checkbox"/> YES</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/> NO</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	<input type="checkbox"/> YES	<input type="checkbox"/>	<input type="checkbox"/> NO	<input type="checkbox"/>
<input type="checkbox"/> YES	<input type="checkbox"/>	<input type="checkbox"/> NO	<input type="checkbox"/>		
If yes, please give details (including an explanation of why it had been discounted)  If no, please explain why not.					

<p>Explain why you require the particular species you have identified in Section B:</p> <p><i>(Note: a detailed response is required, including information about the properties / characteristics of the tropical hardwood species you have identified that make it suitable for your requirements)</i></p>			
<p>Is the species you require available as a FSC / PEFC / CSA / SFI / MTCC certified product? (Tick one box)</p>	<input type="checkbox"/> Yes <input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/>	<input type="checkbox"/> Don't know <input type="checkbox"/>
<p>What is the design-life of the project (i.e. how long is the timber expected to last?):</p>			
<p>Have you considered using alternative tropical hardwood species? (Tick one box)</p>	<input type="checkbox"/> YES <input type="checkbox"/>	<input type="checkbox"/> NO <input type="checkbox"/>	
<p>If yes, please give details (including an explanation of why it had been discounted)</p> <p>If no, please explain why not.</p>			
<p><b>SECTION D: SUMMARY AND JUSTIFICATION</b></p>			
<p>Please provide a summary justification for your requirement for a tropical hardwood, taking into account your responses in Sections B and C:</p>			
<p><b>SECTION E: APPROVAL / REJECTION OF BUSINESS CASE</b>  <b>(FOR COMPLETION BY SUSTAINABLE PROCUREMENT ADVISOR &amp; REGIONAL DIRECTOR)</b></p>			
<p>Decision of Sustainable Procurement Advisor:</p>	<input type="checkbox"/> APPROVE <input type="checkbox"/>	<input type="checkbox"/> REJECT <input type="checkbox"/>	
<p>Date of decision:</p>			
<p>Comments / reasons:</p>			
<p>Decision of Regional Director:</p>	<input type="checkbox"/> APPROVE <input type="checkbox"/>	<input type="checkbox"/> REJECT <input type="checkbox"/>	
<p>Name of Regional Director:</p>			
<p>Date of decision:</p>			
<p>Comments / reasons:</p>			

## APPENDIX G - Category B checklist

This checklist explains how to verify Category B evidence (all evidence other than certification). It will only apply to tropical hardwoods when certified product is not available. These checks should be made for every purchase of timber, regardless of the quantity or value, or whether we have used the supplier before. Note: Tropical hardwood must not be purchased using a purchasing card.

All potential applications/ uses of tropical hardwood have to be approved by a Regional Director. If your purchase has not been approved, complete a business case (Appendix F) before proceeding.

### What must Category B evidence show?

- Legality (i.e. forest has been legally felled and all necessary taxes paid) - MANDATORY
- Chain of custody (COC) from the forest to the Environment Agency - MANDATORY
- Sustainability (i.e. that the forest is sustainably managed) – AS FAR AS POSSIBLE

### **ADVANCE PLANNING IS ESSENTIAL AS EVIDENCE CAN TAKE MONTHS TO OBTAIN**

#### **SECTION 1: Before submitting a requisition / awarding a contract:**

- **Prove legality** – ask the supplier to complete the checklist for legality (Section 1, Appendix H). *Note: If evidence of legality is unavailable, an alternative supplier / timber source must be found. If evidence is available, the supplier should proceed to Section 2.*
- **Establish COC** - ask the supplier to complete the checklist for COC (Section 2, Appendix H).

At this stage full COC evidence may not be available (e.g. if the timber is in transit), but by asking questions it will be clear whether the supplier is likely to be able to meet our requirements. *Note: If the supplier cannot prove COC there is nothing to link the timber with the forest source. If this is the case, an alternative supplier / source of timber must be found. If COC is available, the supplier should proceed to Section 3.*

- **Obtain information about sustainable management practices in the forest** - ask the supplier to complete the sustainability checklist (Section 3, Appendix H).
- **Check and review the evidence** – review the completed checklists (Appendix H) and assess compliance against each criterion. *Note: at this stage, further help and guidance should be sought from the Sustainable Procurement Advisor as it can be difficult to evaluate evidence.*

#### **SECTION 2: Submitting a requisition:**

- Ensure that the requisition includes the following information:
  - the correct 1B1S category code for the type of timber
  - a completed “information template” [Note: there are mandatory fields requiring information on evidence that has been obtained]
- Submit the requisition and await approval before placing the order.

#### **SECTION 3: Placing the order:**

- It must be made absolutely clear what documentation we require on delivery of the timber (i.e. outstanding chain of custody information).

#### **SECTION 4: Receiving the timber:**

- If the information / evidence provided on delivery is not acceptable, then a decision will have to be taken to accept / reject the timber. Contact the Sustainable Procurement Advisor for advice.

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## APPENDIX H - Category B checklist<sup>7</sup> for suppliers: legality, chain of custody and sustainability

### Section 1: Legality

Criteria	Does the forest source comply	Mechanism for verification	Evidence provided or available
L1: The forest owner/manager holds legal use rights to the forest			
L2: There is compliance by both the forest management organisation and any contractors with local and national laws including those relevant to: <ul style="list-style-type: none"> <li>• Forest management</li> <li>• Environment</li> <li>• Labour and welfare</li> <li>• Health &amp; safety</li> <li>• Other parties' tenure and use rights</li> </ul>			
L3: All relevant royalties and taxes are paid			
L4: There is compliance with the requirements of CITES.			

### Section 2: Chain of custody - information should be provided for each type of timber or wood product supplied.

Supply chain stage	Supply chain description		Mechanism for preventing mixing or substitution	Mechanism for verification	Evidence available or provided
	Description	Location			
Forest					
Stage 1					
Stage 2					

<sup>7</sup> Source: CPET "Category B: Evaluation framework"

Stage 3					
Stage 4					
Stage 5					
Stage 6 (etc)					

**Section 3: Sustainability**

<b>Criteria</b>	<b>Does the forest source comply</b>	<b>Mechanism for verification</b>	<b>Evidence provided or available</b>
S1: There must be a definition of sustainable based on a widely accepted set of international principles and criteria defining sustainable or responsible forest management at the forest management unit level.			
S2: The definition of sustainable must be performance-based and cover all the issues set out in S5 – S8.			
S3: The process of defining 'sustainable' must seek to ensure balanced representation and input from the economic, environmental and social interest categories.			
S4: The process of defining 'sustainable' must seek to ensure: <ul style="list-style-type: none"> <li>• No single interest can dominate the process;</li> <li>• No decision can be made in the absence of agreement from the majority of an interest category.</li> </ul>			

Criteria	Does the forest source comply	Mechanism for verification	Evidence provided or available
<p>S5: Management of the forest must ensure that harm to ecosystems is minimised. In order to achieve this there must be:</p> <ul style="list-style-type: none"> <li>a. Appropriate assessment of impacts and planning to minimise impacts;</li> <li>b. Protection of soil, water and biodiversity;</li> <li>c. Controlled and appropriate use of chemicals and use of Integrated Pest Management wherever possible.</li> <li>d. Proper disposal of wastes to minimise any negative impacts.</li> </ul>			
<p>S6: Management of the forest must seek to ensure that productivity of the forest is maintained. In order to achieve this the definition of sustainable must include requirements for:</p> <ul style="list-style-type: none"> <li>a. Management planning and implementation of management activities to avoid significant negative impacts on forest productivity.</li> <li>b. Monitoring which is adequate to check compliance with all requirements, together with review and feedback into planning.</li> <li>c. Operations and operational procedures which minimise impacts on the range of forest resources and services.</li> <li>d. Adequate training of all personnel, both employees and contractors.</li> <li>e. Harvest levels that do not exceed the long-term production capacity of the forest, based on adequate inventory and growth and yield data.</li> </ul>			

Criteria	Does the forest source comply	Mechanism for verification	Evidence provided or available
<p>S7: Management of the forest must seek to ensure that forest ecosystem health and vitality is maintained. In order to achieve this the definition of sustainable must include requirements for:</p> <ul style="list-style-type: none"> <li>a. Management planning which aims to maintain or increase the health and vitality of forest ecosystems</li> <li>b. Management of natural processes, fires, pests and diseases.</li> <li>c. Adequate protection of the forest from unauthorised activities such as illegal logging, mining and encroachment.</li> </ul>			
<p>S8: Management of the forest must seek to ensure that biodiversity is maintained. To achieve this the definition of sustainable must include requirements for:</p> <ul style="list-style-type: none"> <li>a. Implementation of safeguards to protect rare, threatened and endangered species.</li> <li>b. The conservation/set-aside of key ecosystems or habitats in their natural state.</li> <li>c. The protection of features and species of outstanding or exceptional value.</li> </ul>			

For further information and guidance, consult the document “Category B: Evaluation framework” available on the Central Point of Expertise (CPET) website – [www.proforest.net/cpet](http://www.proforest.net/cpet).

Alternatively, contact the CPET **Helpline** which is available to public sector buyers and their suppliers. Specific advice can be provided to individual enquirers on whether the legality, chain of custody and sustainability information for a particular product is adequate. The CPET Helpline can be accessed by telephoning 01865 243766 or by emailing [cpet@proforest.net](mailto:cpet@proforest.net).

## Work Instruction

### Suppliers selling timber to the Environment Agency

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<b>Document Owner:</b>	Mark Yeomans	<b>Post:</b>	Head of Procurement
<b>Document Author:</b>	Melanie Meaden	<b>Post:</b>	Sustainable Procurement Advisor
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<b>Approved by:</b> (as set out in Schedule B of the NFSoD)	David Jordan David King	<b>Post:</b>	Acting Director of Operations Director of Water Management
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<b>Purpose:</b>	<p>To ensure that suppliers of timber to the Environment Agency only supply timber that is from a legally felled forest that is managed as sustainably as possible, and that the movement of timber from the forest source to the Environment Agency is known and verifiable, so that:</p> <ul style="list-style-type: none"> <li>• The Environment Agency does not purchase illegally logged timber.</li> <li>• The Environment Agency does not support unsustainable forest management practices.</li> <li>• The Environment Agency delivers “Creating a Better Place” objectives by encouraging a “Greener Business World” and “Wiser Sustainable Use of Natural Resources”.</li> <li>• The Environment Agency demonstrate best practice.</li> <li>• The risk of exposure by pressure groups is minimised, thus avoiding negative PR for the Environment Agency and its suppliers.</li> <li>• The Environment Agency has verifiable, auditable evidence to demonstrate compliance with its commitment to buy timber from a legally felled forest that is managed as sustainably as possible.</li> </ul>
<b>Scope:</b>	<p><b><u>This work instruction applies to all purchases of timber without exception. There is no deminimus to this requirement.</u></b></p> <p>Timber is defined as any product that contains wood or wood fibre, with the exception of 'recycled' materials. In the Environment Agency, this is practically restricted to timber used in connection with a building or construction project (e.g. wood planks, groynes, footbridges, window frames, floor joists, site hoardings, shuttering, excavator mats, lock gates etc), as well as office furniture.</p> <p>The work instruction applies to suppliers of timber to the Environment Agency.</p>
<b>Related Documents:</b>	<p><a href="#">589_06 Procedure: Purchasing softwood and temperate hardwood timber</a></p> <p><a href="#">590_06 Procedure: Purchasing tropical hardwood timber</a></p> <p><a href="#">591_06 Work Instruction: Purchasing legal and sustainable timber</a></p> <p><a href="#">593_06 Guidance: Evaluating evidence of legal and sustainable timber</a></p>

If you have any queries on the content of this document or suggestions for improvement, refer to the Primary Contact named above.

If any term or acronym used in this document is unfamiliar you might find the definition in the Glossary on Easinet: Information Resources > [Glossary of Terms and Acronyms](#).

<b>Title</b>	Suppliers selling timber to the Environment Agency						
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# 1 Background information

## 1.1 Introduction

- 1.1.1 Suppliers of timber to the Environment Agency have a key role to play in ensuring that we meet our requirements surrounding the purchase of legal and sustainable timber.
- 1.2.1 When asked, many suppliers will claim to be able to supply legal and sustainable timber but when challenged, they are often unable to support this claim with documentary evidence. This is when problems arise because without auditable evidence, the Environment Agency cannot be certain that it is purchasing timber from legal and sustainably managed forests.
- 1.2.2 The main part of the work instruction is a letter (Appendix A) which can be sent to suppliers to ensure that they understand the types of evidence that exist to demonstrate legality and sustainability, and the Environment Agency's specific requirements for softwood, temperate hardwood and tropical hardwood species.
- 1.2.3 If suppliers request more detail and information about the Environment Agency's approach, they should be given a copy of the [Work Instruction: Purchasing legal and sustainable timber](#) and accompanying [Guidance: Evaluating evidence of legal and sustainable timber](#).

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## APPENDIX A: Letter for suppliers

<b>Title</b>	Suppliers selling timber to the Environment Agency					
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**Date:**

Name  
 Address 1  
 Address 2  
 Town / City  
 Postcode

Dear Sirs,

**ENVIRONMENT AGENCY REQUIREMENTS FOR PURCHASING TIMBER**

**1. INTRODUCTION**

The Environment Agency requires that all its suppliers of timber and wood products comply with its timber purchasing requirements. There have been instances of timber in our supply chains being from an unknown source or even possibly illegal and the Environment Agency cannot condone such activity. Therefore as a supplier of timber to the Environment Agency we need you to examine your own timber procurement processes to ensure that legality, chain of custody, sustainability can be demonstrated and proven.

**2. WHY IS TIMBER AN ISSUE TO BE WORRIED ABOUT?**

There is growing international concern about the state of the world's forests and the trade in illegal timber. Forests are a precious natural resource and their destruction has wide-ranging social, economic and environmental impacts.

It has been recently estimated that 28 per cent of timber arriving in the UK is illegal. As an organisation committed to protecting and conserving the natural environment, this is of great concern to the Environment Agency as we do not want to support illegal and unsustainable forest management practices around the world. We need your help as a supplier to stop this.

**3. ENVIRONMENT AGENCY REQUIREMENTS**

The Environment Agency's requirements in relation to the purchase of timber are detailed in **Annex A** to this letter.

Timber is defined as any product that contains wood or wood fibre, with the exception of 'recycled' materials. In the Environment Agency, this is practically restricted to timber used in connection with a building or construction project (e.g. wood planks, fencing posts, groynes, footbridges, lock gates, window frames, floor joists, site hoardings, shuttering, excavator mats etc), as well as office furniture.

These requirements are mandatory for all timber, regardless of the value or quantity being supplied. There are no exceptions to these requirements.

**4. IMPLICATIONS**

As a supplier to the Environment Agency, it is your responsibility to ensure that all timber supplied to the Environment Agency is from a legally felled forest that is managed as sustainably as possible, and that there is full chain-of-custody from the forest to the Environment Agency. This will be audited and non-compliance will result in legal action by the Environment Agency. In the majority of cases, this will mean that you need to be a certified supplier.

In accordance with the Environment Agency's requirements, this will mean the following evidence is required for each and every purchase of timber:

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**Softwood and temperate hardwood (Category A evidence):**

- A copy of your Chain of Custody certificate together with the registration schedule which details the scope of your certification. These will need to be seen before an order can be placed.
- A delivery note / invoice which indicates that certified timber has been supplied to the Environment Agency [*Note: this is a certification scheme requirement*].

**Tropical hardwood (Category A / B evidence):**

- As for softwood and temperate hardwood if certified timber is being supplied [*Note: globally there is less certified tropical hardwood available*]
- If non-certified tropical hardwood is being supplied then other forms of credible evidence (Category B evidence) must be provided to demonstrate legality, chain of custody and sustainability. The checklist provided as **Annex B** will need to be completed and returned to the Environment Agency for review and approval BEFORE an order for timber can be placed.

**5. PERFORMANCE MONITORING AND COMPLIANCE**

To ensure that all suppliers are adhering to our requirements, periodic audits and reviews will be undertaken by the Environment Agency to ensure that acceptable forms of evidence of legality, chain of custody and sustainability are provided. If illegal or non-certified timber is shown to have been supplied, legal action may taken by the Environment Agency to remedy the contract.

**6. ADDITIONAL INFORMATION AND GUIDANCE**

If you would like more information and guidance about the Environment Agency's requirements, please contact the undersigned and request copies of the following documents:

- Work Instruction: Purchasing legal and sustainable timber
- Guidance: Evaluating evidence of legal and sustainable timber.

You will appreciate that the purchase of illegal or unsustainable timber cannot carry on and as such the Environment Agency as a champion of the environment must take a leadership stance. Therefore we ask for you co-operation to ensure that all supplies of timber to the Environment Agency meet our requirements. If you wish to discuss the above, please do not hesitate to contact the undersigned.

Yours sincerely

**NAME**  
**JOB TITLE**

Enclosed:

- Appendix A - Environment Agency timber purchasing requirements
- Appendix B - Category B checklist for suppliers: legality, chain of custody and sustainability

<b>Title</b>	Suppliers selling timber to the Environment Agency					
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## Annex A: Environment Agency timber purchasing requirements

Type of timber	Environment Agency requirements
<b>Softwood</b>	FSC <sup>1</sup> / PEFC <sup>2</sup> / CSA <sup>3</sup> / SFI <sup>4</sup> certified softwoods only [Note: coppiced material is exempt].
<b>Temperate hardwood</b>	FSC / PEFC / CSA / SFI certified temperate hardwoods only [Note: coppiced material is exempt].
<b>Tropical hardwood</b>	<p>Tropical hardwood will not be purchased unless it is an operational necessity.</p> <p>A <u>business case</u> [prepared internally by the Environment Agency] must be completed for all potential applications / uses of tropical hardwood and senior management approval will be needed before any purchases can be made.</p> <p>If tropical hardwood is purchased, it must be FSC / PEFC / CSA / SFI / MTCC<sup>5</sup> certified whenever possible. If certified timber is not available, credible evidence must be obtained which demonstrates legality, sustainability and traceability through the supply chain.</p>
<b>Coppiced material</b>	<p>Coppiced material is exempt from the requirements for softwood and temperate hardwood if documentary evidence which demonstrates the following is obtained:</p> <ul style="list-style-type: none"> <li>• The source of the coppiced material</li> <li>• The coppicer has legal rights to coppice the wood</li> </ul>
<b>Recycled timber</b>	<p>From a waste hierarchy and resource use perspective the purchase of recycled timber is preferable to the purchase of virgin timber.</p> <p>Recycled timber is defined as timber which is being used for a different purpose than the purpose for which the tree was originally felled<sup>6</sup>.</p> <p>For recycled timber, the previous use must be established and documented [Note: this will be strictly monitored]. However, it is not necessary to prove legality or sustainability of the recycled timber.</p>

<sup>1</sup> Forest Stewardship Council

<sup>2</sup> Programme for the Endorsement of Forest Certification Schemes

<sup>3</sup> Canadian Standard Association

<sup>4</sup> Sustainable Forest Initiative

<sup>5</sup> Malaysian Timber Certification Council

<sup>6</sup> E.g. If a beach groyne is removed and re-sawn to make fencing posts. If the beach groyne was removed and used again as a beach groyne somewhere else, this is re-use not recycling.

## Annex B: Category B checklist<sup>7</sup> for suppliers: legality, chain of custody and sustainability

### Section 1: Legality

Criteria	Does the forest source comply	Mechanism for verification	Evidence provided or available
L1: The forest owner/manager holds legal use rights to the forest			
L2: There is compliance by both the forest management organisation and any contractors with local and national laws including those relevant to: <ul style="list-style-type: none"> <li>• Forest management</li> <li>• Environment</li> <li>• Labour and welfare</li> <li>• Health &amp; safety</li> <li>• Other parties' tenure and use rights</li> </ul>			
L3: All relevant royalties and taxes are paid			
L4: There is compliance with the requirements of CITES.			

### Section 2: Chain of custody - information should be provided for each type of timber or wood product supplied.

Supply chain stage	Supply chain description		Mechanism for preventing mixing or substitution	Mechanism for verification	Evidence available or provided
	Description	Location			
Forest					
Stage 1					
Stage 2					

<sup>7</sup> Source: CPET "Category B: Evaluation framework"

Stage 3					
Stage 4					
Stage 5					
Stage 6 (etc)					

**Section 3: Sustainability**

<b>Criteria</b>	<b>Does the forest source comply</b>	<b>Mechanism for verification</b>	<b>Evidence provided or available</b>
S1: There must be a definition of sustainable based on a widely accepted set of international principles and criteria defining sustainable or responsible forest management at the forest management unit level.			
S2: The definition of sustainable must be performance-based and cover all the issues set out in S5 – S8.			
S3: The process of defining 'sustainable' must seek to ensure balanced representation and input from the economic, environmental and social interest categories.			
S4: The process of defining 'sustainable' must seek to ensure: <ul style="list-style-type: none"> <li>• No single interest can dominate the process;</li> <li>• No decision can be made in the absence of agreement from the majority of an interest category.</li> </ul>			

Criteria	Does the forest source comply	Mechanism for verification	Evidence provided or available
<p>S5: Management of the forest must ensure that harm to ecosystems is minimised. In order to achieve this there must be:</p> <ul style="list-style-type: none"> <li>a. Appropriate assessment of impacts and planning to minimise impacts;</li> <li>b. Protection of soil, water and biodiversity;</li> <li>c. Controlled and appropriate use of chemicals and use of Integrated Pest Management wherever possible.</li> <li>d. Proper disposal of wastes to minimise any negative impacts.</li> </ul>			
<p>S6: Management of the forest must seek to ensure that productivity of the forest is maintained. In order to achieve this the definition of sustainable must include requirements for:</p> <ul style="list-style-type: none"> <li>a. Management planning and implementation of management activities to avoid significant negative impacts on forest productivity.</li> <li>b. Monitoring which is adequate to check compliance with all requirements, together with review and feedback into planning.</li> <li>c. Operations and operational procedures which minimise impacts on the range of forest resources and services.</li> <li>d. Adequate training of all personnel, both employees and contractors.</li> <li>e. Harvest levels that do not exceed the long-term production capacity of the forest, based on adequate inventory and growth and yield data.</li> </ul>			

Criteria	Does the forest source comply	Mechanism for verification	Evidence provided or available
<p>S7: Management of the forest must seek to ensure that forest ecosystem health and vitality is maintained. In order to achieve this the definition of sustainable must include requirements for:</p> <ul style="list-style-type: none"> <li>a. Management planning which aims to maintain or increase the health and vitality of forest ecosystems</li> <li>b. Management of natural processes, fires, pests and diseases.</li> <li>c. Adequate protection of the forest from unauthorised activities such as illegal logging, mining and encroachment.</li> </ul>			
<p>S8: Management of the forest must seek to ensure that biodiversity is maintained. To achieve this the definition of sustainable must include requirements for:</p> <ul style="list-style-type: none"> <li>a. Implementation of safeguards to protect rare, threatened and endangered species.</li> <li>b. The conservation/set-aside of key ecosystems or habitats in their natural state.</li> <li>c. The protection of features and species of outstanding or exceptional value.</li> </ul>			

Suffolk Coastal District Council  
Melton hill  
Woodbridge  
IP12 1AU

# **Recommendations for Cobbold's Point/Undercliff Road**

**May 2009**

Mott MacDonald  
St Anne House  
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UK

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# Recommendations for Cobbold's Point/Undercliff Road

## Issue and Revision Record

Rev	Date	Originator	Checker	Approver	Description
A	29 <sup>th</sup> May 2009	V Tonks	R Turner	P Phipps	For Issue

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## Summary

A review of available data was undertaken to gain a further understanding of the conditions at Cobbold's Point. The review focuses on making recommendations for Cobbold's Point taking into consideration the changes to the coastline both prior to and following the construction of the fishtail groynes in 1999/2000. Mott MacDonald considered this review important in order to;

- Provide a statement on current collated knowledge
- To provide recommendations for coastal protection at Cobbold's Point

The key findings of the review are;

- Cobbold's Point is a point of drift divergence. To the north of Cobbold's point sediment drift generally occurs in a northerly direction above 0mCD. Below 0mCD sediment movement occurs in a southwards direction. To the south of Cobbold's Point the sediment movement is generally southwards.
- However, the net drift to the north of Cobbold's Point is still typically southwards, although in some years there may be a small net northwards drift.
- The actual volume of sediment drift that occurs past any particular point is extremely variable year to year.
- Modelling of the tidal currents at Cobbold's Point indicate that the currents are strong and close to the shore.
- Prior to the construction of the fishtail groynes in 1999/2000 the beach at Cobbold's Point appears from aerial photographs to have been narrowing.
- The Knolls, at the mouth of the River Deben, have historically, under certain wave conditions, released material to nourish the beaches at Felixstowe. However, the unpredictable and irregular nature of them means that material release to the beaches cannot be relied upon.
- A storm in January 2001 removed some of the beach recharge that was placed at Cobbold's point in 1999/2000 although different from the prevailing wave conditions this was not an unusual event, there was also a general loss of beach material over the autumn 2000, prior to the January 2001 storm event.
- Between the construction of the fishtail groynes in 1999/2000 and a condition survey carried out on 15/01/2009, the beach levels dropped by approximately 2.8m.
- The preferred option for Cobbold's Point is to include an access pathway from the existing promenade to Jacob's Ladder. A rock revetment will be constructed in front of the walkway to provide protection and stabilisation for the headland.

## 1 Introduction

### 1.1 Setting

Cobbold's Point is a narrow and volatile coastline due to its plan form. The coastline at Cobbold's Point represents a significant convex change in the coastal alignment of approximately 60 degrees. This change in the coastline exposes Cobbold's Point to high wave energy (Halcrow, 2003<sup>1</sup>). The beach width at Cobbold's Point had been reported to fluctuate over time, with both high and low water reaching the base of the backing seawall (Halcrow, 1998<sup>2</sup>) prior to the construction of the present fishtail scheme.



**Figure 1-1 Chart indicating the location of Cobbold's Point (Admiralty Chart, 2693)**

### 1.2 Sediments and beach slopes

The original groyne on the beach followed the natural slope of the beach, which was approximately 1 in 10 in the active tidal zone (Dobbie, 1990<sup>3</sup>). In the Dobbie Report (1990) it was indicated that the groyne between Cobbold's Point and Manor End were of sound construction beneath the beach. However, above the beach level the groyne were found to be disintegrating.

<sup>1</sup> Halcrow, 2003, Cobbold's Point Design Review

<sup>2</sup> Halcrow, 1998, Shoreline Management Plan for sub cell 3C Harwich to Lowestoft

<sup>3</sup> Dobbie and Partners, 1990, Felixstowe Town Frontage Report on Coastal Protection



**Figure 1-2 Drift parting at Cobbold's Point (Halcrow 2003)**

Originally Halcrow (2003<sup>4</sup>) undertook longshore sediment transport modelling of the upper beach for the Southern Felixstowe Coastal Strategy (2003). The theoretical results indicated that there is drift parting at Cobbold's Point, as summarised in Figure 1-2. To the north of Cobbold's Point the net sediment drift direction under normal wave conditions tends to be to the north. The majority of sediment moving in this direction is likely to be the result of smaller, but more frequent, southerly wave fronts that impinge the shore at a more acute angle. There is however a small amount of southerly drift as a result of north-easterly waves being refracted, resulting in their direction becoming normal to the coast (SMP, 1992<sup>5</sup>).

To the south of Cobbold's Point, towards the Pier, the drift direction is south-west. North-easterly storm wave fronts run virtually parallel to the shore resulting in high transport rates. These north-easterly waves result in the formation of edge waves that run from Cobbold's Point to the Pier. The wave action pushes the material south and with the predominant ebb tidal flow fighting against rather than with the wave the material is transported further offshore and does not return back to the Point (SMP, 1992).

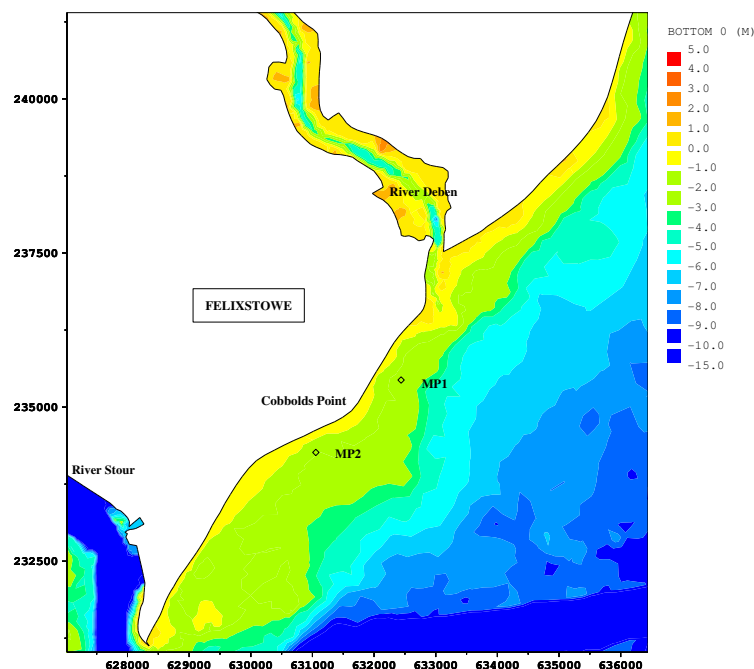
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<sup>4</sup> Southern Felixstowe Coastal Strategy, 2003, Halcrow

<sup>5</sup> Cobbold's Point Investigation, 1992, Shoreline Management Partnership

The healthiness of the beach at Cobbold's Point has reportedly been dependent on the periodic release of material from The Knolls at the mouth of the River Deben (Halcrow, 2003, Burningham and French, 2006<sup>6</sup>). Under certain wave conditions the sediment from The Knolls has historically moved southward and nourished the Felixstowe frontage. The unpredictable and irregular nature of material release from The Knolls means that the transport of material to and around Cobbold's Point cannot be relied upon. At Cobbold's Point, if no control structures are present any material from The Knolls is unlikely to be retained for a significant amount of time due to the exposed location and the normal drift regime (Halcrow, 2003)

HR Wallingford have undertaken longshore drift modelling to provide further understanding of the sediment transport directions on the Felixstowe frontage. The points where data was extracted from the model are presented in Figure 1-3. MP1, located to the north of Cobbold's Point, is at 2.38mCD and MP2, to the south of Cobbold's Point, is at 1.95mCD. Chart datum (CD) at Felixstowe is -1.95mODN.



**Figure 1-3 Position of MP1 and MP2**

The longshore drift in the upper beach along the frontage was previously calculated, by HR Wallingford, for Harwich Haven from time series wave data using a drift calculator (DRCALC). The upper beach in this report relates to the beach above 0mCD. SMEAR was then used to obtain the cross shore distribution of this drift for a specific depth. The results of the calculation for the upper beach are provided in Table 1-1 for both the pre and post dredged bathymetries (positive drift rates indicate northerly drift and negative drift rates indicate southerly drift).

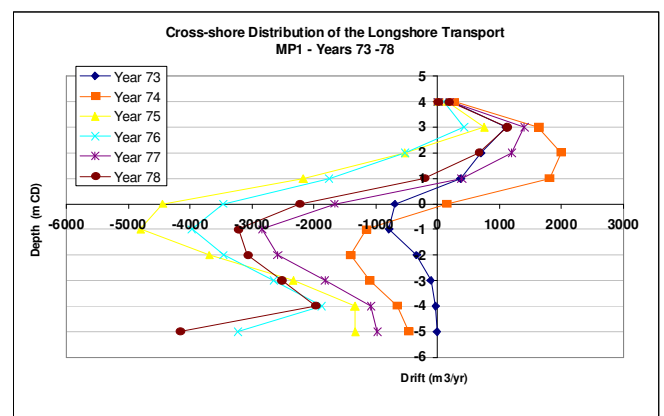
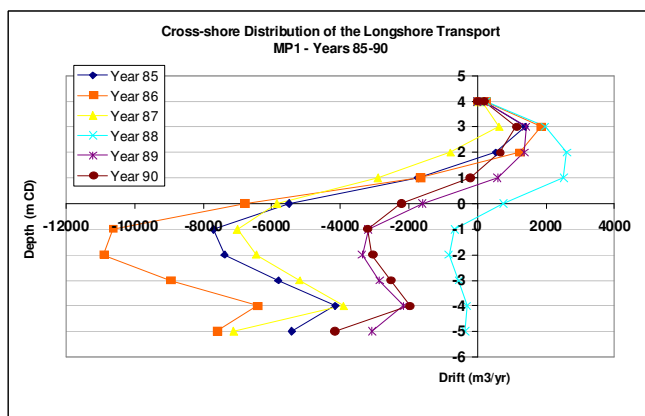
<sup>6</sup> Burningham, H and French, J, 2006 Morphodynamic behaviour of a mixed sand-gravel ebb tidal delta: Deben estuary, Suffolk, UK. Marine Geology 225 pp23 -44

**Table 1-1 Potential upper beach drift rates (m<sup>3</sup>/yr)**

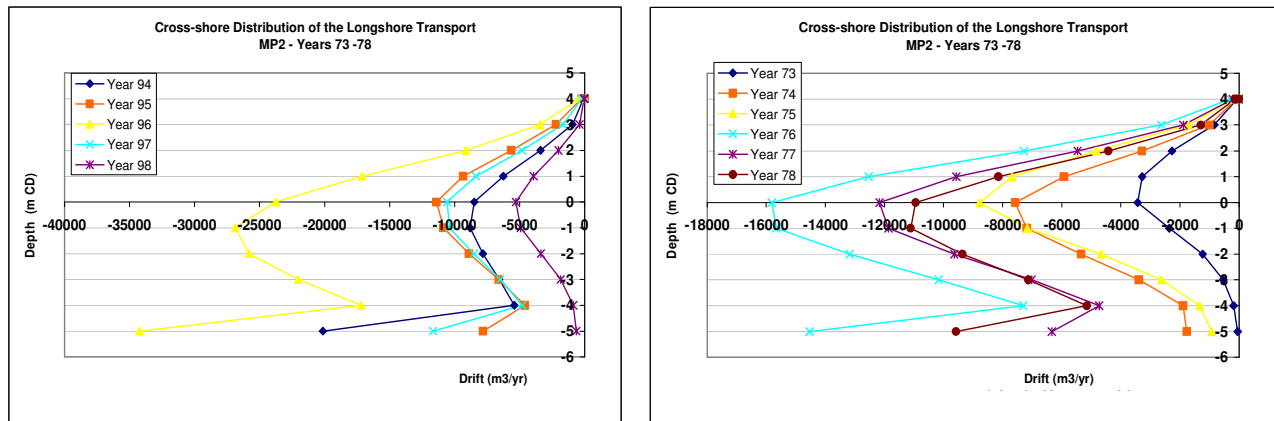
Wind data	Bathymetry	MP1	MP2
1973-90	Pre-dredged	+3,200	-13,600
1973-90	1995	+2,700	-14,200
1994	Pre-dredged	+7,600	-10,200
1994	1995	+7,100	-10,700
1973-90 & 1994-96 data	1995	+2,900	-15,100
1997	Pre-dredged	+5,400	-13,100
1997	1995	+5,800	-15,100
1973-90 & 1994-96 data	1995	+2,900	-15,100
1998	Pre-dredged	+7,000	-5,800
1998	1995	+7,600	-6,400

### 1.3 Present Modelling by HR Wallingford

A DRCALC model was also run by HR Wallingford for the whole beach profile to include above and below 0mCD. The modelling results indicate that north of Cobbold's Point (MP1) sediment is moving in a northwards direction above the 0mCD contour. However, generally below the 0mCD contour the sediment is moving in a southwards direction. To the south of Cobbold's Point (MP2) the sediment is always moving southwards along the profile with the exception of 1990, owing to only 6 months wave data being available for that year. Figures 1-4 and 1-5 provide examples of the modelling results from DRCALC for various years, negative values indicate sediment movement to the south and positive values indicate sediment movement to the north. The graphics clearly show north of Cobbold's Point the balance between northwards and southwards sediment movement changes year to year as does the volume of material.



**Figure 1-4 Sediment direction to the north of Cobbold's Point (MP1)**



**Figure 1-5 Sediment direction to the south of Cobbold's Point (MP2)**

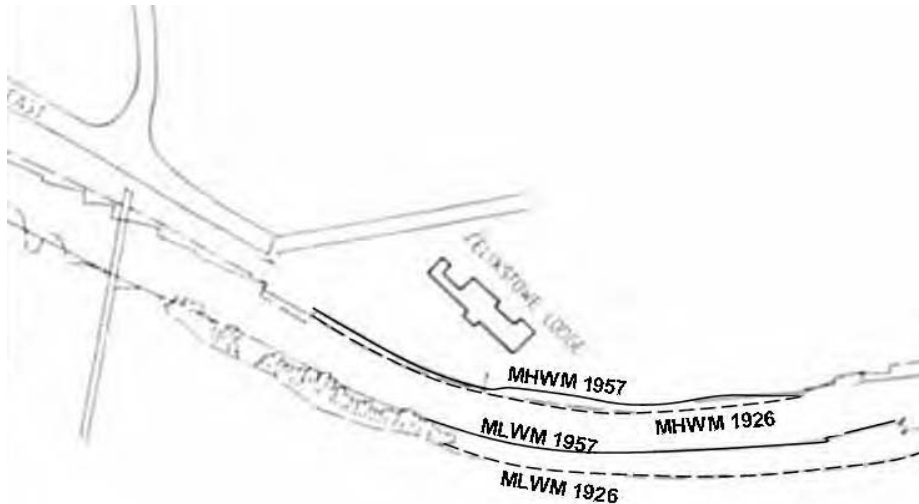
#### 1.4 Change in Water Marks and Water levels

Shoreline Management Partnership (SMP, 1996<sup>7</sup>) carried out a review of the movement of the Low Water Mark along the Felixstowe frontage. The results indicated that between 1879 and 1902 the Low Water Mark moved landwards along the whole of the frontage with the exception of Cobbold's Point. It was reported by the Shoreline Management Partnership (1996) that this was likely due to the sea defences that were built in 1903 when a seawall was constructed from Maybush Lane to 50m south of Jacob's Ladder. The south section of the seawall was constructed from limestone masonry and the north of mass concrete. In 1955 repairs were made to the wall due to the breaking up of a section of mass concrete (Dobbie, 1990).

Between 1902 and 1938 the Low Water Mark north of and including Cobbold's Point continued to move landwards. However, between the Pier and Cobbold's Point the Low Water Mark was recorded to move seawards, most likely due to the construction of the seawall and groynes in the early 1900's (SMP, 1996).

Historical water marks for Cobbold's Point between 1926 and 1967 indicate that the Mean High Water Mark has remained relatively stable due to the construction of the seawall in 1903. The Mean Low Water Mark however has moved landwards (SMP, 1996).

<sup>7</sup> Cobbold's Point – do nothing benefit evaluation , 1996, Shoreline Management Partnership



**Figure 1-6 Historical water marks for Cobbold's Point for 1926 and 1967 (Dobbie, 1990)**

From a review of historical OS maps the High Water Mark of ordinary tides has been at the present day position of the seawall since 1875, despite groynes been present.

The predicted tidal levels taken from Proudman Oceanographic Laboratory (POL, 2009) for Felixstowe Pier are:

**Table 1-2 Predicted tidal levels (POL, 2009<sup>8</sup>)**

HAT:	2.45mODN
MHWST:	1.88mODN
MHWNT:	1.20mODN
MTL:	0.11mODN
MLWNT:	-0.86mODN
MLWST:	-1.47mODN
LAT:	-1.95mODN

The predicted tidal levels between 2009 and 1990 have increased. A report by Dobbie and Partners (1990) indicated that Mean High Water Spring was at +1.75mODN, in 2009 it was predicted by POL to be at +1.88mODN. Mean Low Water Springs in 1990 were at -1.55mODN, in 2009 they were predicted at -1.47mODN.

<sup>8</sup> Proudman Oceanographic Laboratory, 2009 <http://www.pol.ac.uk/ntslf/tgi/portinfo.php?port=feli.html>

## 1.5 Tidal currents

Tidal currents for Cobbold's Point were investigated by Shoreline Management Partnership (1992) over two days (05/03/1992 and 06/03/1992) using float trackers (Appendix A). The results showed a good correlation with tidal stream data from Admiralty Chart 2052.

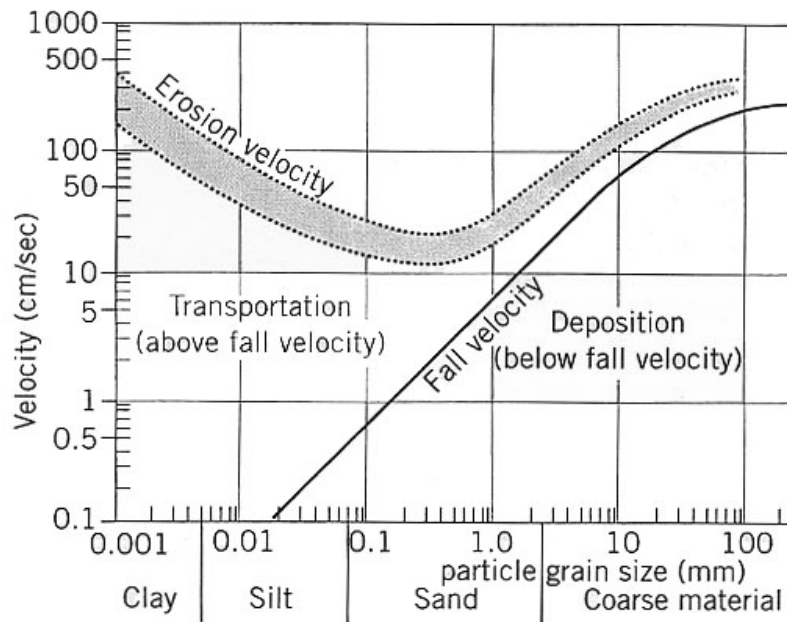
**Table 1-3 Tidal currents for Cobbold's Point (SMP, 1992) derived using float trackers (see Appendix A)**

	Tide State	Tidal Current
Flood	HW-3 to HW -1½	0.5-0.6m/s
	HW-1½ to HW-½	0.2-0.4m/s
High Water	HW-½ to HW+½	0.1-0.2m/s
Ebb Tide	HW+½ to HW+1	0.5-0.7m/s
	HW+1 to HW+2	0.7-0.9m/s
	HW+2 to HW+3	0.5-0.7m/s

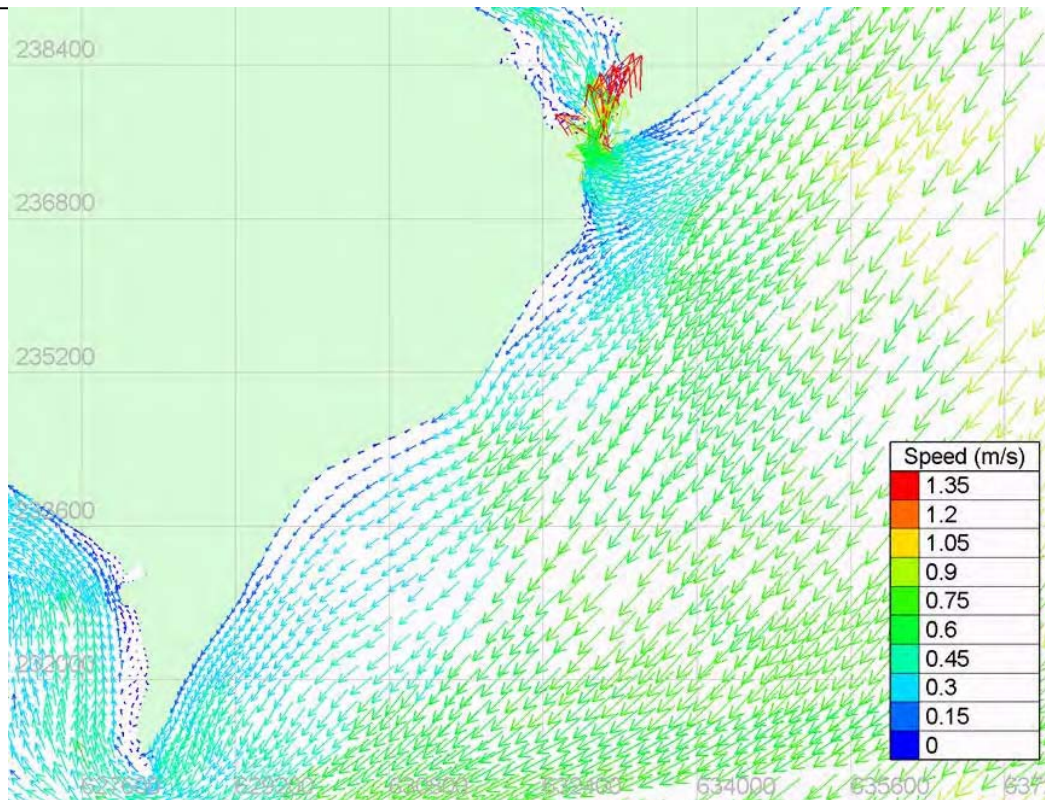
HR Wallingford modelled tidal flows at Cobbold's Point for the Southern North Sea Sediment Transport Study (2002<sup>9</sup>) and concluded that the tidal currents at mid flood tide are approximately 0.6m/s in a southwards direction. Along the frontage, between Cobbold's Point and the War Memorial, these tidal currents are reduced to approximately 0 – 0.15m/s. Between the War Memorial and Cobbold's Point the tidal currents on the ebb are strong compared to the tidal currents on the flood.

During the ebb tide, between 1 and 2 hours after high water, the tidal currents at Cobbold's Point are approximately 0.9m/s to the north. The strong tidal currents close to the shore will tend to carry the fine grained sediments (<0.25mm) away from the frontage. Figure 1-7 indicates the velocity at which sediment moves. The tidal currents at Felixstowe between the War Memorial and Cobbold's Point can transport particles up to approximately 0.5mm (sand). At Cobbold's Point where tidal currents are stronger larger grained material can be moved.

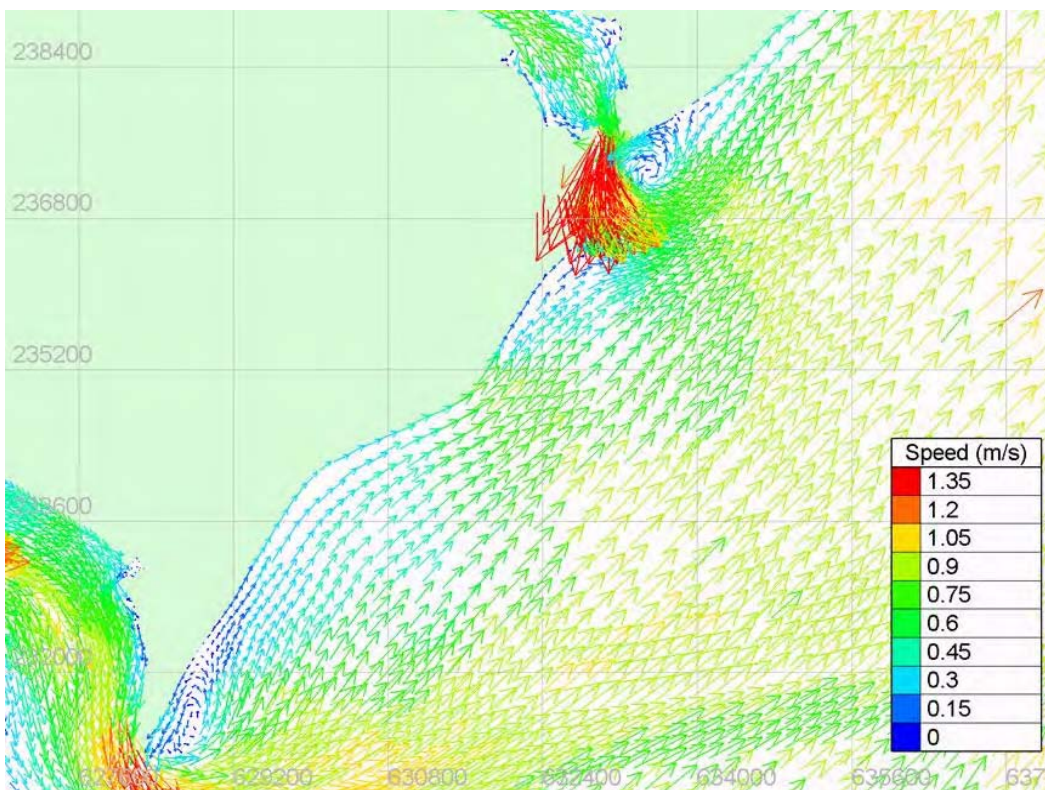
<sup>9</sup> Southern North Sea Sediment Transport Study, 2002 HR Wallingford Report EX 4526



**Figure 1-7 Velocity threshold for sediment transport** (source: [http://www.geographyalltheway.com/ib\\_geography/ib\\_drainage\\_basins/imagesetc/hjulstrom\\_curve\\_task.jpg](http://www.geographyalltheway.com/ib_geography/ib_drainage_basins/imagesetc/hjulstrom_curve_task.jpg))



Flood Tide

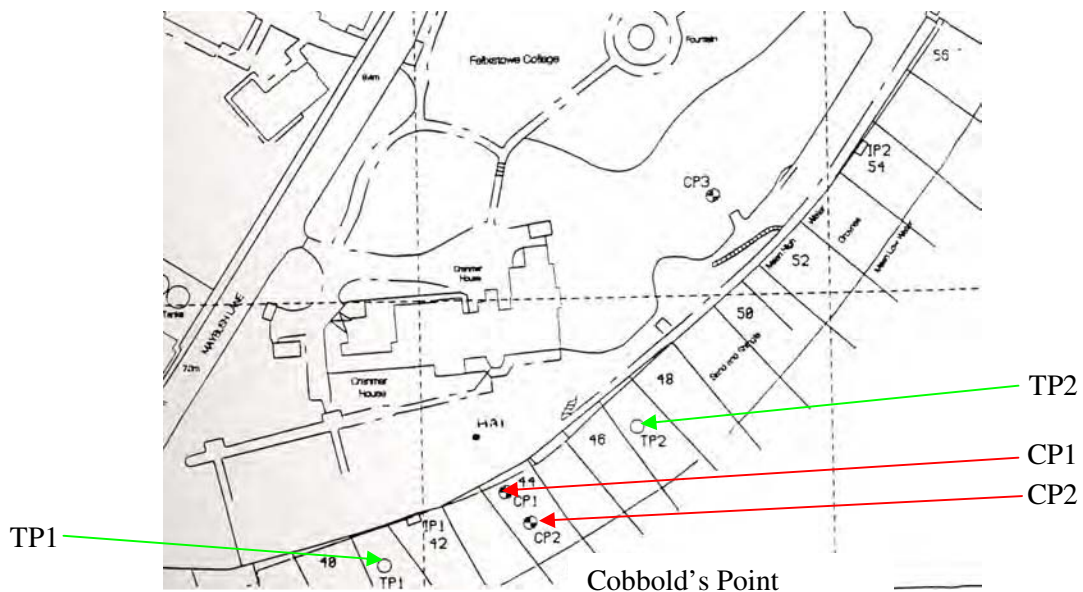


Ebb Tide

**Figure 1-8 Tidal flows along the Felixstowe frontage (source: Southern North Sea Sediment Transport Study)**

## 1.6 Geotechnical information

A ground investigation at Cobbold's Point undertaken in 1995 by Suffolk County Laboratory indicated that the foreshore is composed of a thin layer of mobile marine shingle and sand overlying London Clay. In certain areas of the foreshore outcrops of London Clay are present and can be observed at low water owing to the present beach profiles. The thickness of beach shingle varied between 0.3m to 1.8m at the time of the investigation. However, owing to the high mobility of the material in heavy seas the thickness will vary with time as part of the normal geomorphological processes that affect the frontage (Suffolk County Laboratory, 1995<sup>10</sup>).



**Figure 1-9 Borehole locations for Cobbold's Point (Suffolk County Laboratory, 1995)**

Within the investigation trial pits (TP) and cable percussion drilling (CP) were undertaken by Suffolk County Laboratory (1995<sup>11</sup>). For Cobbold's Point the locations are indicated in Figure 1-8. The results are presented in Table 1-4. There were no particle size distribution tests recorded for these investigations.

<sup>10</sup> Cobbold's Point/Spa Gardens, Felixstowe, 1995, Suffolk County Laboratory

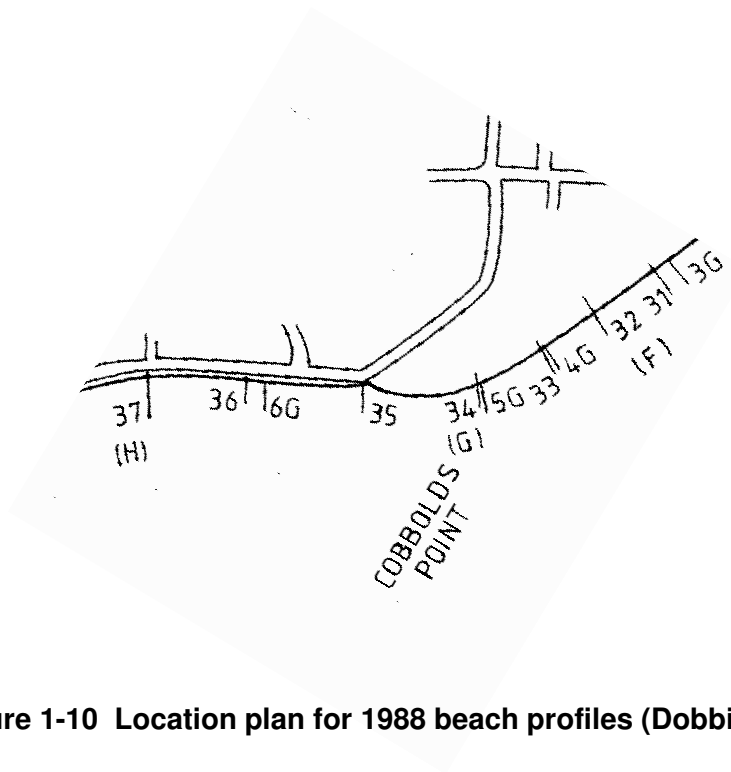
<sup>11</sup> Cobbold's Point/Spa Gardens, Felixstowe, 1995, Suffolk County Laboratory

**Table 1-4 Results for cable percussion drilling and trial pits from Suffolk County Laboratory, (1995)**

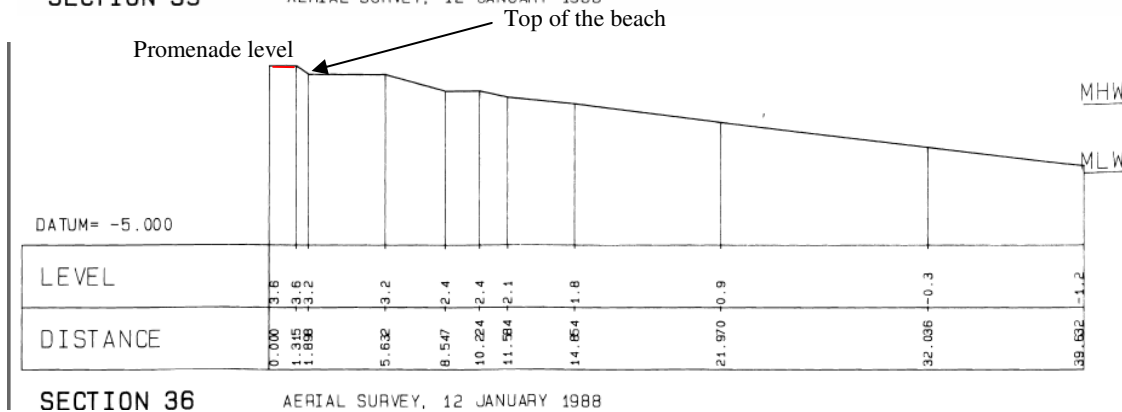
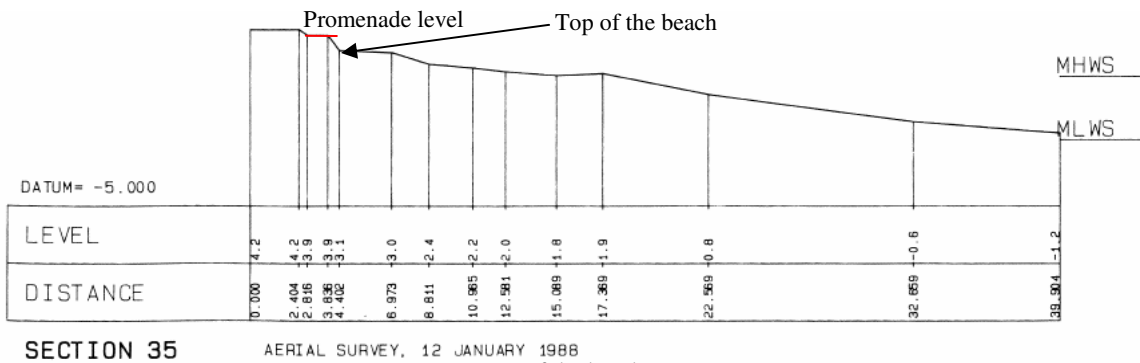
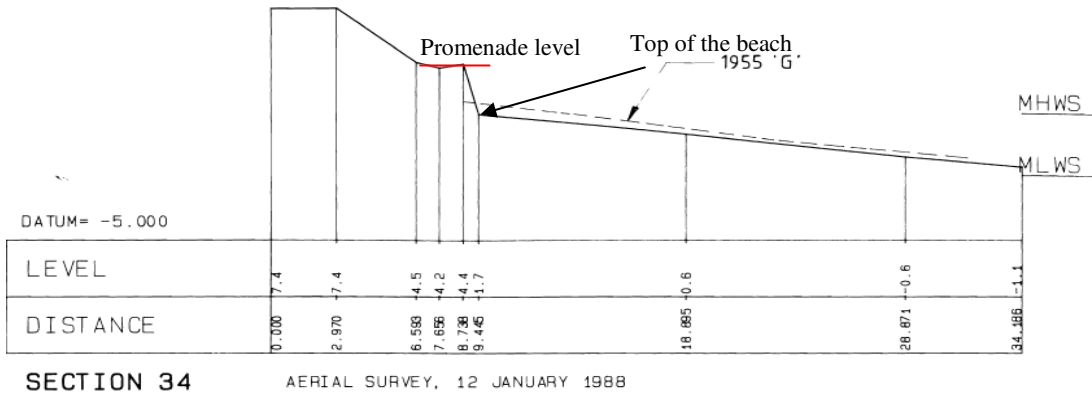
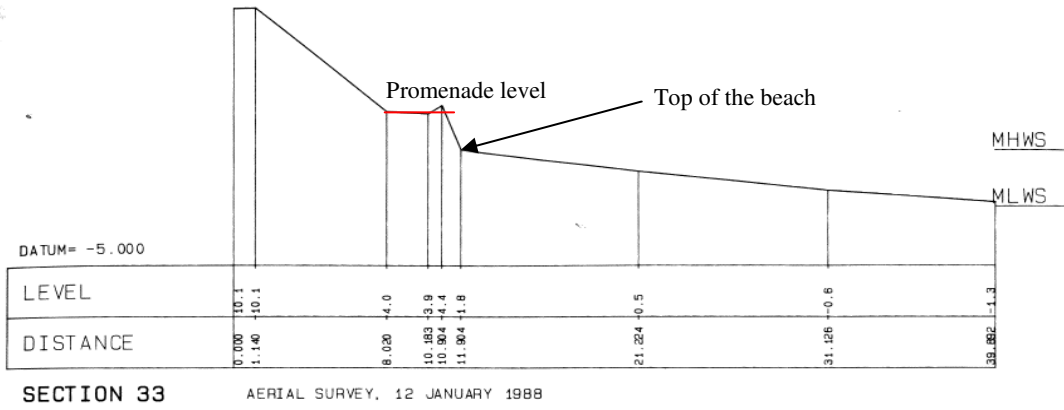
	Ground level (m)	Beach gravel thickness (m)	Level of London Clay (m)
CP1	0.55	0.70	-0.15
CP2	-0.53	0.30	-0.83
TP1	-0.04	0.60	-0.64
TP2	0.02	0.80	-0.78

### 1.7 Beach profile data

Beach profile data (Figure 1-11) extracted from aerial photography at Cobbold's Point in 1988 (Dobbie 1990) indicates that the beach level was approximately 1.7mODN at the seawall at location 34. To the north of Cobbold's Point (33) the beach level is 1.8mODN, whereas to the south of the Point (35 and 36) the beach increases to 3.2mODN.



**Figure 1-10 Location plan for 1988 beach profiles (Dobbie, 1990)**

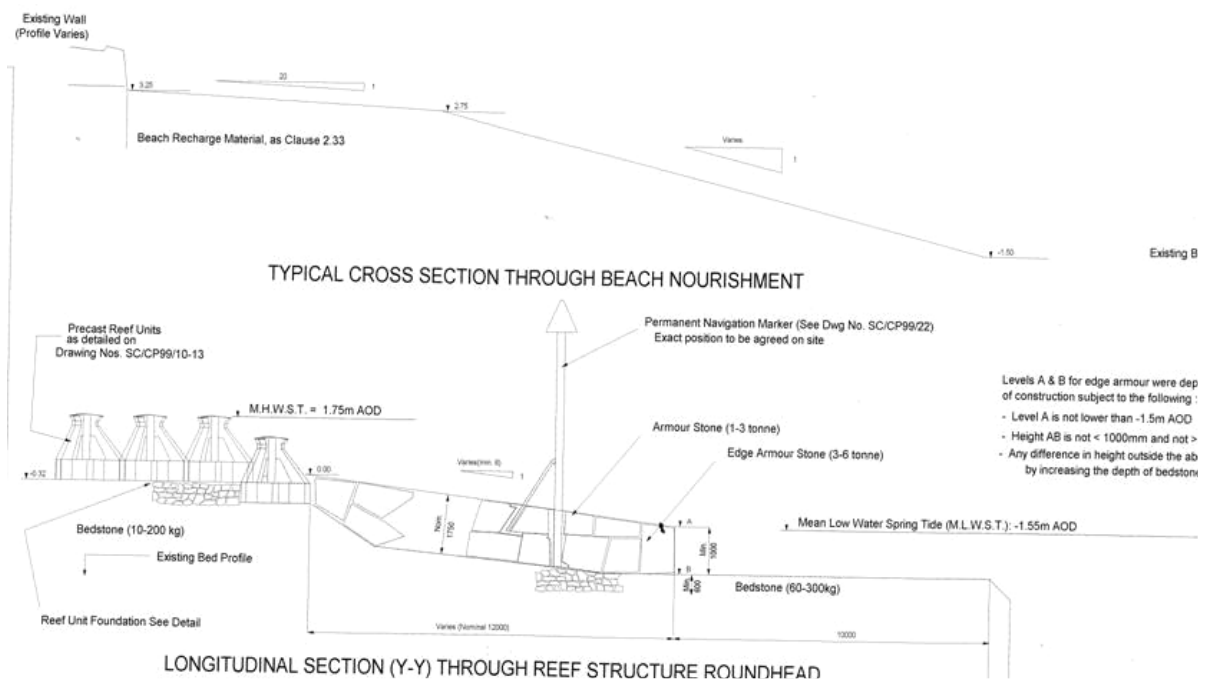


**Figure 1-11 Beach profiles from 1988 (Dobbie, 1990)**

## 2 Existing defences at Cobbold's Point

The original groynes at Cobbold's Point were constructed in 1850 from timber. In 1946 the groynes were encased in concrete owing to the deterioration of the groynes and the beach levels not been retained, resulting in the groynes standing 5 feet above the beach level (Dobbie, 1990<sup>12</sup>).

In 1999/2000 two fishtail groynes were constructed at Cobbold's Point from concrete armour units and two rock fishtail groynes placed further south of the Point. In addition to the construction of these fishtail groynes beach recharge was carried out. The As-Constructed drawings produced by Shoreline Management Partnership for the scheme are shown in Figure 2-1 and in Appendix B for a larger scale version.



**Figure 2-1 Cross section through Cobbold's Point scheme (Shoreline Management Partnership, 2002)**

The reef blocks were constructed of pre-cast concrete elements placed on top of concrete pads and bedstone. The elevation of the fishtail groynes top surface was +1.75mODN with a beach recharge placed between the groynes to a height of +3.25mODN. This beach recharge had a slope of 1 in 20 from the top of the beach to +2.75mODN, the slope then steepens to a 1 in various to -1.50mODN.

<sup>12</sup>Dobbie and Partners, 1990, Felixstowe Town Frontage Report on Coastal Protection

The particle size distribution of the recharge material has not been made available to Mott MacDonald. However Halcrow (2003) reported that the size of the material was confirmed by Shoreline Management Partnership to be from the Harwich Haven shipping channel and was considerably coarser than the native material. However, it is understood by Mott MacDonald that the sediment from the Harwich Haven shipping channel is fine silts rather than sand. There do not appear to be any definitive records of the material placed, nor monitoring of the recharge post placement.

To the north of Cobbold's Point a rock armour revetment extends from the northern most fishtail groyne to protect the seawall. Beyond this is a privately owned revetment with timber groynes.

Halcrow (2003) reported that the scheme had not performed as expected with beach levels dropping by 2.8m between 2000 and 2009. Between 10<sup>th</sup> and 13<sup>th</sup> January 2001 the frontage was subjected to predominantly easterly storm conditions. During the storm material placed during the recharge was removed and the beach levels dropped. Since this storm it has been reported by SCDC that the beach has not recovered. Mott MacDonald understands that the beach levels were dropping prior to the storm in January 2001 as discussed in section 2.1.

Modelling was undertaken by Halcrow (2003) to determine the theoretical response of the beach to the predicted wave conditions that occurred during the January 2001 storm using in house models COSMOS and SHINGLE. The model was run for six hours with a water level that corresponded with the peak water level recorded by Harwich Haven Authority during the January 2001 storm event of +2.05mODN. The results of the COSMOS modelling indicated that for a beach with a  $d_{50}$  of 2mm using the predicted wave conditions was approximately 0.75m for a beach with a slope of 1 in 10 and approximately 1.0m for a 1 in 7 beach slope. The SHINGLE model was run with a higher water level resulting in erosion of approximately 2.0m for a 1 in 10 beach slope and 1.75m for a 1 in 7 beach slope. The results of the models are not directly comparable as coarser material is more likely to remain stable. Therefore, it is suggested that the way the models predict beach responses has caused the difference in the predicted erosion rates rather than the variability in particle size.

## 2.1 Beach Level Changes

As discussed in section 2 Halcrow (2003) reported that the drop in beach levels occurred predominantly during the 2001 January storms. However, from images that have been obtained the drop in beach levels may not have been as rapid as first reported.



1<sup>st</sup> October 2000 Following the completion of the scheme



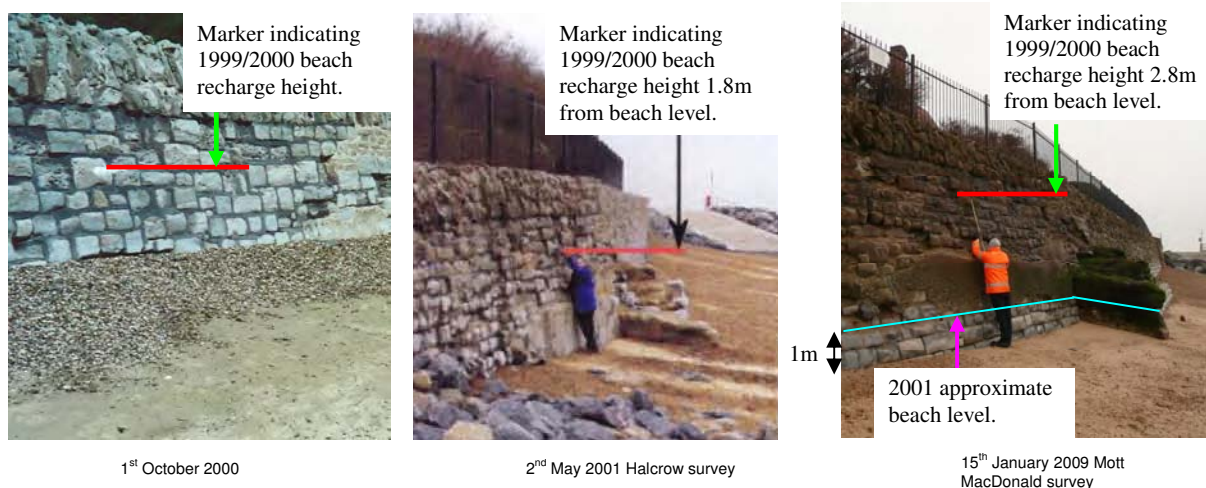
15<sup>th</sup> January 2009

**Figure 2-2 Fishtails and beach levels at Cobbold's Point**

From images taken in 1991 the beach level is observed to be approximately 1.5m from the top of the seawall (Figure 2-3). This image was taken before the present Cobbold's Point scheme was constructed.



**Figure 2-3 Beach level at Cobbold's Point in 1991 (Shoreline Management Partnership)**



**Figure 2-4 Beach level change at Cobbold's Point between 2000 and 2009**

From the images in Figure 2-4 it is observed that the beach level had dropped by approximately 1.0m between the completion of the beach recharge and 1<sup>st</sup> October 2000. By 2<sup>nd</sup> May 2001 the beach levels were reported to have dropped by 1.8m and by 15<sup>th</sup> January 2009 the beach levels were 2.8m lower than the 2000 level.

The loss in beach level between the beach recharge scheme and 1<sup>st</sup> October 2000 indicates that the beach levels were beginning to drop before the January 2001 storm and therefore, the loss may not have been as rapid as Halcrow first suggested. However, due to the lack of monitoring of the frontage the beach level changes cannot be accurately determined, but general evolution is discernable from available records.

The continuing lowering of the beach levels at Cobbold's Point has caused the ramps over the trunks of the fishtail groynes at the seawall to become undermined and partially collapse, making beach access extremely hazardous (Figure 2-5). It is understood that the ramps were constructed on the beach and were not toed into the underlying London Clay.



**Figure 2-5 Collapsed access slipway at Cobbold's Point.**

The beach to the south of the fishtail groynes (opposite Fludyer's Arms) was reported by Terry Oakes Associates Ltd<sup>13</sup> to have dropped by approximately 2.65m during a strong easterly gale on 8<sup>th</sup> and 9<sup>th</sup> October 2002. The lowering of the beach led to the exposure of a former gun emplacement base projecting from the front face of the seawall, beach hut supports and an opening of approximately 5.0m by 0.5m below the concrete platform and extending 3.0m into the promenade. Emergency works were carried out to minimise the risk of failure of the seawall. The works included placing 450 tonnes of 2t to 4t rocks on a layer of geotextile fabric over an area of 20.0m by 8.0m by 1.8m. An additional 150 tonnes of rock was placed close to the groyne. The void behind the seawall was filled with 40N strength concrete. The surplus material was placed adjacent to the access ramp at Cobbold's Point. The works were completed on 19th October 2002 and by 31st October 2002 there was an increase in beach levels of 1.6m in front of the wall to the south of the rock armour. This section of rock armour has since been extended.

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<sup>13</sup> Report on Emergency Works 14<sup>th</sup> to 19<sup>th</sup> October 2002, Terry Oakes Associates

## 2.2 Failure of Cobbold's Point

Mott MacDonald considers that the Cobbold's Point scheme has not performed as expected for a number of reasons:

- The inner fishtail spurs were too short, enabling too much wave energy to pass into the Cobbold's Point system. This has resulted in the beach at Cobbold's Point still being exposed to high wave energy especially during easterly storms, allowing the removal of beach material
- The fishtail groynes were not constructed high enough to prevent the loss of sediment that was placed during the beach recharge
- The beach material that was placed during the recharge was too fine to stay on the beach
- The access ramps were not toed into the London Clay. Once the beach material they were founded on was removed these structures collapsed.
- There were no retaining structures placed between Cobbold's Point and the two T head groynes to the south of the Point. Since the construction of the new scheme strong eddies have formed in the bay during the flood tide aiding the removal of beach material in this section. This has resulted in a bay forming that is becoming narrower at the top near the sea wall.

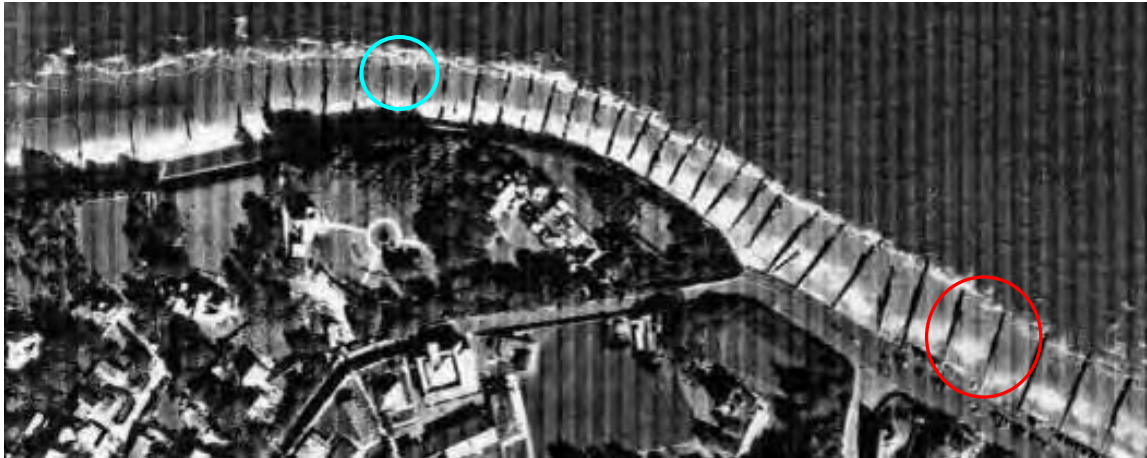
Further details of the failure are discussed in the modelling report EX6017, HR Wallingford.

### 3 Comparison of aerial photographs for Cobbold's Point



**Figure 3-1 Aerial photograph from 09/07/1946**

The beach in 1946 appears from the above photograph to be narrower compared to 1991 and 1999 photographs. It should be noted that there is a deficit of material on the southern side of Cobbold's Point (circled in red). During 1946 the groynes at Cobbold's Point were encased in concrete due to the beach levels not being retained. It should be noted that the tidal state during this photograph was not known.



**Figure 3-2 Aerial photography from 1991**



**Figure 3-3 Aerial photography from 29/08/1999**

Changes between 1991 and 1999 appear to indicate that the beach is becoming narrower. The outfall pipe indicated by the blue circle has become more exposed between 1991 and 1999. On the beach at Cobbold's Point debris has appeared since 1991, this debris may be due to the shoreline platform becoming exposed and/or from the disintegration of the sea defences.

To the south of Cobbold's Point sediment to the south of the groynes is apparently reduced (indicated by red circle), however, this may be due to differing tidal states at the time that the photographs were taken.



**Figure 3-4 Aerial photography from 12/08/2000**

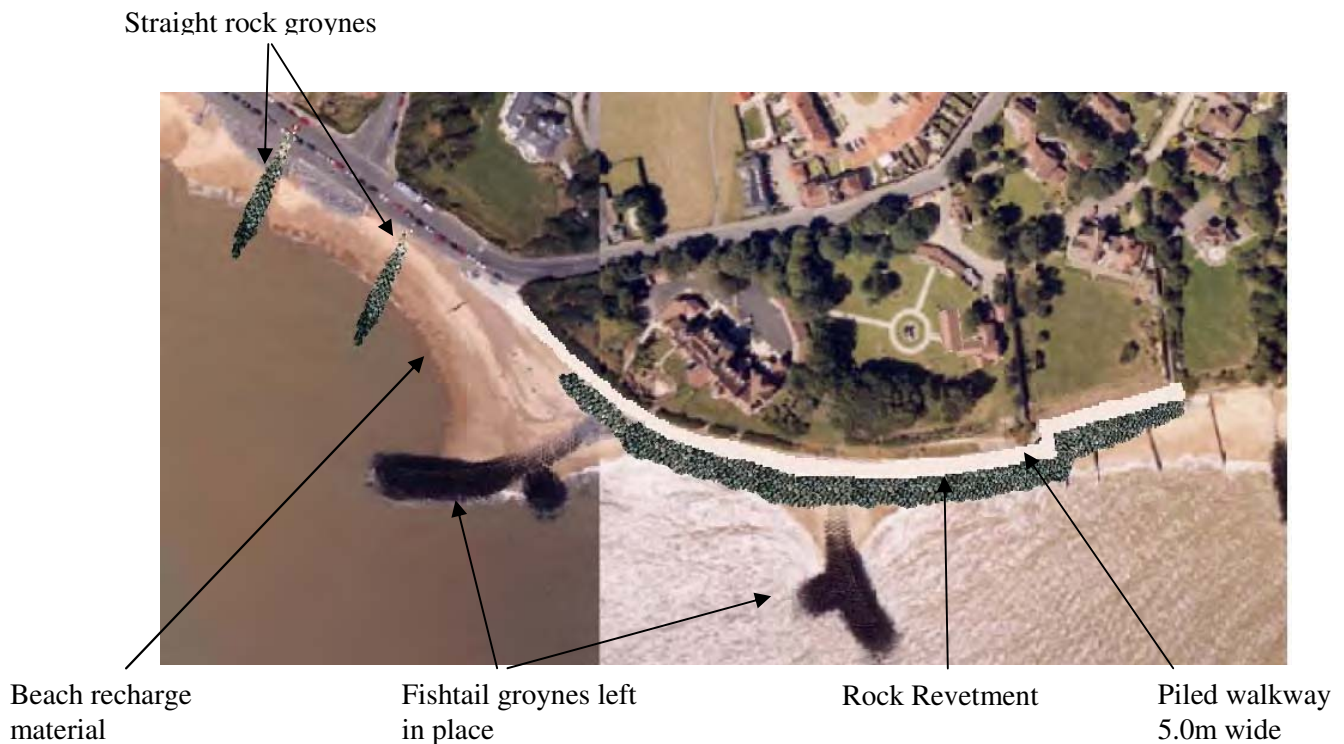


**Figure 3-5 Aerial photography from 19/07/2002**

It is unknown whether the tidal state is the same for each of the photographs in Figure 3-4 and Figure 3-5. However, it may be possible to identify the following changes since 12/08/00 and 19/07/02. The most notable change is that there is a local accumulation of sediment to the south side of the southern fishtail groyne. However, the beach to the south of this embayment towards the T head groynes is becoming narrower. Other changes include the width of the embayment between the two fishtail groynes and also to the north of the northern fishtail groynes the beach appears in 2002 to be narrower. There has also been a loss of sediment next to the fishtail groynes on the inside of the embayment between 12/08/2000 and 19/07/2002.

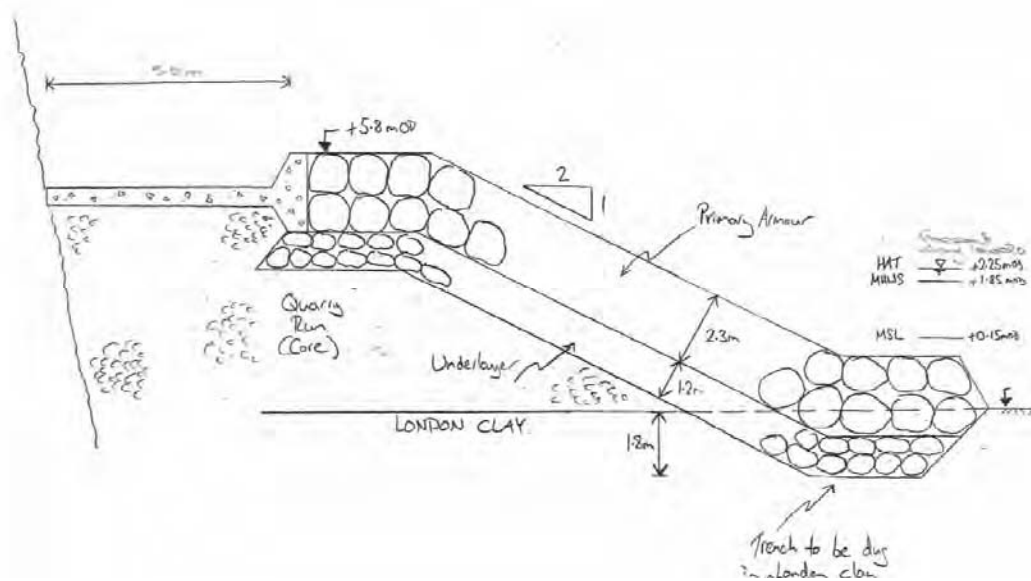
#### 4 Recommendations for Cobbold's Point and Undercliff Road

The Preferred Option for Cobbold's Point, presented to the Public at the Public Exhibition held 30<sup>th</sup> March 2009 in Felixstowe Town Hall, is to construct a walkway from the existing promenade to Jacob's Ladder. In front of the walkway a rock revetment will be constructed to protect and stabilise the walkway. The existing fishtail groynes which were constructed in 1999/2000 will, at present, be left in position. However, Mott MacDonald are looking at the options for removal and the associated costs. To the south of the southern most fishtail groyne shingle recharge is proposed to be placed in the vicinity of the Fludyer's Arms to raise the beach levels level with the Promenade.



**Figure 4-1 Preferred Option for Cobbold's Point**

A rock revetment would be constructed inside the bay in front of the back wall using armourstone, concrete or other materials to support and protect the walkway behind from wave overtopping, erosion and scour. A permanent walkway would be constructed to allow access from the promenade to Jacob's Ladder during most sea states. Our proposed walkway is in keeping with the Marine and Coastal Access Bill (2008), which is an initiative from the Government to promote increased access to the coastline and ensure greater protection to the marine environment and biodiversity, and the local initiative undertaken by the Felixstowe Futures Regeneration Team to enable access from Landguard Point to Felixstowe Ferry.



**Figure 4-2 Cross section through the proposed rock revetment and walkway**

To the south of Cobbold's Point to the first T head rock groyne straight rock groynes and beach recharge will be placed to protect the bay which is forming as a result of the tidal eddy and prevention of southward sediment movement by the southern fishtail groyne. The length and spacing of these groynes will be subject to further modelling. The rock which was placed outside the Fludyer's Arms during the emergency repair works on 14<sup>th</sup> to 19<sup>th</sup> October 2002 will be removed and the beach levels raised, using shingle recharge, to become level with the promenade. At Cobbold's Point there will be no beach recharge carried out owing to the difficulties with holding a beach at a headland. The tidal currents on the ebb tide at Cobbold's Point have been predicted by HR Wallingford to reach 0.9m/s.

The scheme will require a maintenance beach recharge or recycling scheme. The time frame for this will be considered during the refinement of the preferred option following a review of the output from the modelling study. However, it is thought that the timescale would be between 10-15 years.

## 5 Conclusions

The beach levels at Cobbold's Point are reported to have significantly lowered since the construction of the fishtail groynes. The beach levels between the completion of the scheme in 2000 and 2<sup>nd</sup> May 2001 were observed by Halcrow to have dropped by 1.8m. During a recent survey by Mott MacDonald in January 2009 they were observed at a level 1.0m lower than the level reported by Halcrow. The lack of ongoing monitoring data in the area and the natural variation in beach levels however, makes changes difficult to analyse accurate long term trends.

The general sediment drift direction to the north of Cobbold's Point is in a northwards direction above 0mCD. However, below this level the sediment movement occurs in a southwards direction. To the south of Cobbold's Point the sediment movement is predominantly in a southwards direction. The Knolls, under certain wave conditions, have historically moved sediment southwards and nourished the beaches at Felixstowe. However, due to the unpredictability and irregular nature of the material release the transport of sediment towards Cobbold's Point cannot be relied upon.

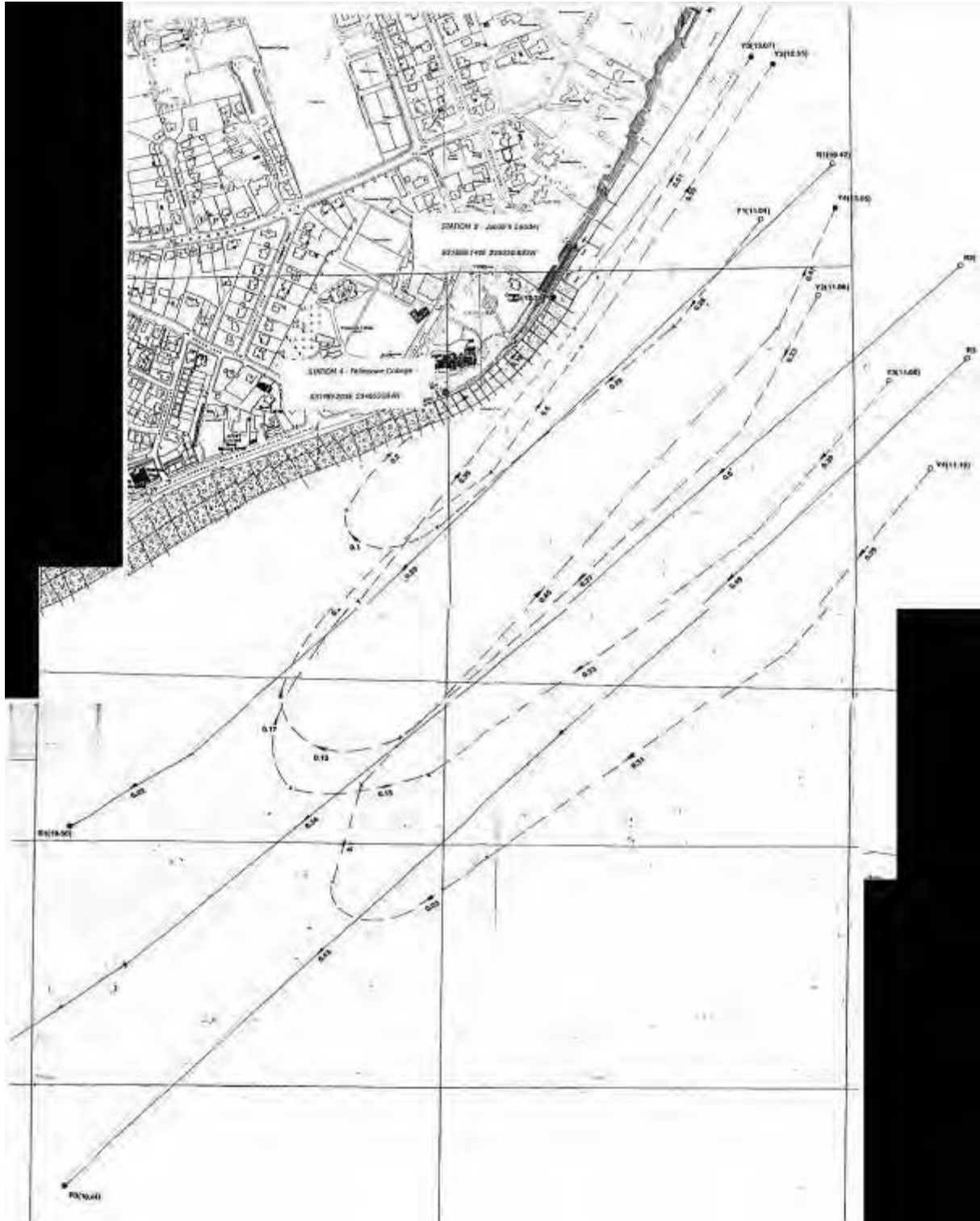
The period of time over which material was removed from Cobbold's Point following the construction of the fishtail groynes and the recharge scheme in 1999/2000 is still unclear. The drop in beach levels from 2001 to 2009 is approximately 2.8m. The wave height and direction of the 2001 storm that may have led to a proportion of the material being removed was not an unusual event based on Halcrow's previous analysis of the data.

Aerial photography between 1991 and 1999 appears to indicate that the beach was narrowing prior to the construction of the fishtail groynes. However, unknown tidal state data makes this difficult to determine accurately. Since the construction of the fishtail groynes the beach appears to be becoming narrower in the central section of the embayment and also to the north of the northern groyne. However, as observed from condition surveys sediment is building up to the south of the southern groyne.

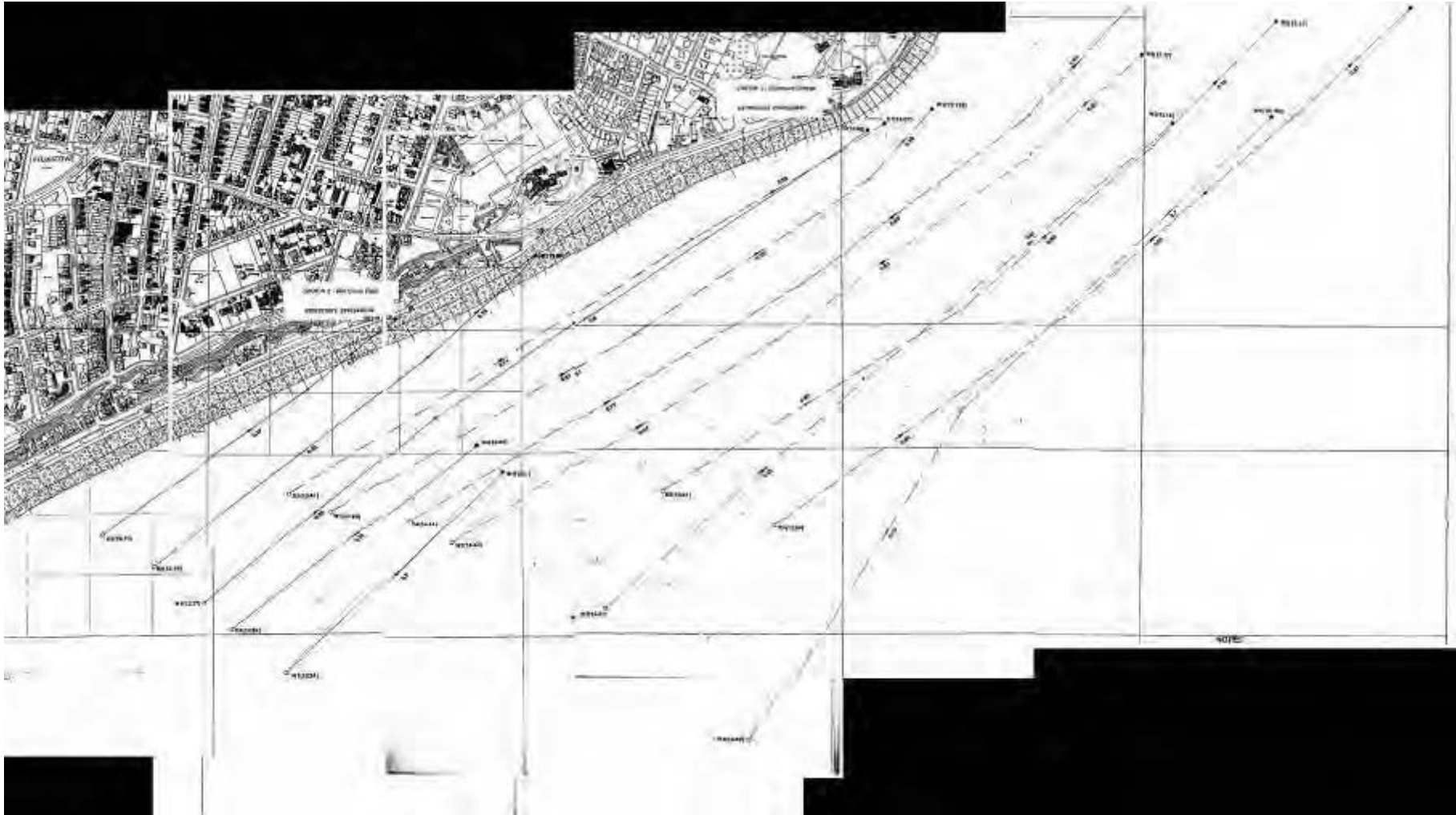
The recommended option for Cobbold's Point includes constructing a walkway from the existing promenade to Jacob's ladder, allowing access around Cobbold's Point. In front of the walkway a rock revetment would be constructed to provide protection and stabilisation to the back wall and walkway. The rock size for the revetment will be determined through further studies and the whole option will be incorporated into the modelling studies undertaken by HR Wallingford.

## Appendix A Float Trackers (Shoreline Management Partnership, 1992)

Flood tide float tracks



Ebb tide float tracks



A-1

## Appendix B Cross section through Cobbold's Pont scheme (Shoreline Management Partnership, 2002)

