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CASE STUDY
Recycled Plastic Boardwalk, Howden Marsh Local Nature Reserve

Research Report: Procurement

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CASE STUDY – Recycled Plastic Boardwalk, Howden Marsh

Howden Town Council / The Ponds Conservation Trust, Howden Marsh, East Riding of Yorkshire

Howden Town Council is working with the local community to manage and develop Howden Marsh. The site consists of 6.5 hectares of land that is leased to the Town Council by the East Riding of Yorkshire Council. The Marsh is a registered common and has a fauna characteristic of old fenland. The land has never been completely drained and the meadows flood annually. The site was designated a local nature reserve in 2002 and is frequently visited by local people who use the paths running throughout to access the pond and meadows. Links have also been established with local schools and colleges to encourage regular education use.

Visitor access

Approximately 500 metres of boardwalk run through the wetland area to provide access to the meadows and pond. The main section of boardwalk was constructed from timber materials that have now been in place for about 10 years, although some 20-year old sections made from railway sleepers are still in use. Both types of boardwalk are becoming rotten and unsafe and require regular repair work and maintenance to replace sections and to prevent the wire mesh, placed on top of the decking, from becoming a trip hazard.

Howden Marsh – railway sleeper boardwalk encroached by vegetation

Howden Marsh – wooden boardwalk with wire mesh

Howden Marsh – railway sleepers boardwalk with wire mesh

The oldest sections of boardwalk, constructed from railway sleepers, are in a particularly poor state. These sections are also too narrow for disabled access. The Ponds Conservation Trust was aware that the boardwalk needed replacement and was also hoping to extend the raised pathway in order to provide better access to the pond and prevent further bank erosion.

The product

Hugh Roberts of the Ponds Conservation Trust had already gained some knowledge and experience of using recycled plastic materials from his previous work with local authorities and had experimented with different dimensions for the decks and bearers. He was keen to introduce the use of recycled materials at Howden Marsh and selected an appropriate supplier.

The site was awarded grant aid from Wildspace and the Landfill Tax Credit Scheme, which provided funding for the replacement of 350 metres of boardwalk with recycled plastic materials, including the creation of a dipping platform at the side of a pond. The recycled plastic boardwalk was laid during winter 2002/03 and links up to the remaining timber boardwalk where necessary. Dark brown plastic material was chosen in order to be visually comparable with timber.

Product and supplier details

Date of installation: Winter 2002/03
Product Manufacturer & Supplier: Centriforce Ltd
Installation: Volunteers

Howden Marsh – recycled plastic boardwalk

Installation

The raised plastic boardwalk was constructed on site by volunteers and installed using similar methods to those employed for timber materials. The recycled plastic materials selected by the Trust were produced using an extrusion process that removes the air pockets from the plastic, which ensures the materials are robust and easy to secure together. Hugh selected a maximum distance of 1.5 metre spacing between posts with 140mm wide bearers, in order to prevent the decking from sagging, rather than using thinner bearers which could lack stability. Flat-ended posts were used for the site, as the ground is relatively soft and clay-based. These posts were supplied in 3m pre-cut lengths and cut to 1m on site, although Hugh believes the posts might not always need to be so long, depending on the ground conditions. Three bearers were used to support the 1.5m wide decking. Decking was then laid on the top and five screws per decking plank were used to secure each in place.

Performance benefits

The following benefits have been identified:

- The non-slip decking has a 'grain' included in the mould that provides a roughness that ensures good grip and reduces health and safety concerns related to slipping.
- The chosen materials are considered to be visually in keeping with timber alternatives and positive feedback had been received from the public using the pathways, many of whom did not realise it was plastic.
- The materials will not rot as they are not biodegradable, which is particularly important for the posts and bearers that are frequently water logged or flooded.
- The risks associated with using treated timber, such as leaching, are avoided altogether as plastic is inert. Previously, the timber was treated to prevent it rotting and to extend its life span.
- The risk of the boardwalk being set alight by vandals is reduced, as the plastic materials used are less flammable than timber alternatives. However, at a nearby site, an 18-metre section of recycled plastic boardwalk was ignited by using an accelerant, causing the section to melt.
- The robust properties of the plastic mean that the risk of damaging the boardwalk during construction or in situ, for example through the use of a strimmer, is reduced. The plastic does not split or splinter as timber can.
- There is no need to fit chicken wire over the top of the decking, as the rough surface provides adequate friction to prevent visitors slipping. Damaged chicken wire can pose a serious trip hazard.
- The plastic materials are easy to install, and can be drilled and sawn in a similar manner to timber materials.
- The plastic posts and sections do not crack or split during on-site handling and driving into the ground, making them safe to use and avoiding wastage.
- Minimal maintenance or repairs are anticipated and the boardwalk is predicted to have a life span four or five times as long as a wooden walkway.

Disadvantages

The following disadvantages have been identified for plastic materials:

- The materials are slightly heavier than similar timber alternatives, although this did not prove a problem as there is vehicular access onto the site at Howden Marsh.
- Some of the boardwalk expands in warmer temperatures, particularly the thinner materials (edges), causing an uneven surface where this occurs.
- Issues in relation to production quality were raised, such as the precise cutting of planks, straightness and uneven edges etc. Timber is easier to cut to precise measurements.
- There is generally a three-week order time (i.e. three weeks between placing the order and delivery to site), compared to one or two days for timber.

Whole-life costs

The Ponds Conservation Trust is planning to replace the remaining 150m of timber boardwalk with recycled materials. The total cost of materials and hire costs for machinery required to push the posts into the ground is estimated at

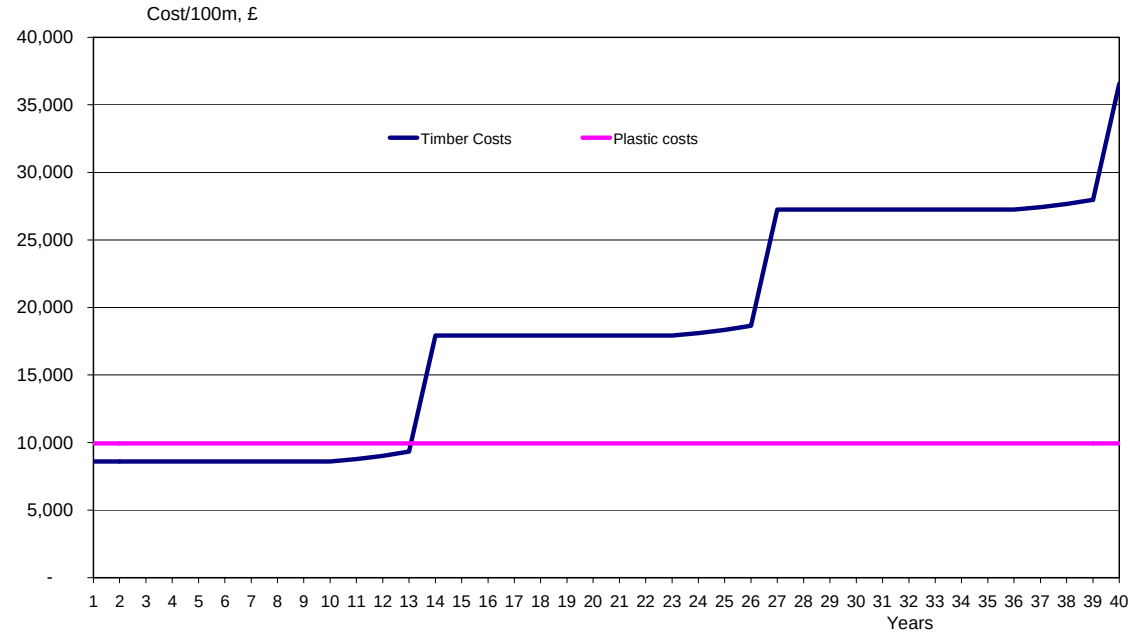
£8,500. This figure excludes labour costs associated with assembly and installation. It is anticipated that it will take around twelve man-days to install the posts and bearers, and a further fifteen man-days to secure the decking and complete the construction.

Repairs to the wooden boardwalk for the whole site previously took 2 man-days a year, the majority of which was spent repairing the chicken wire. However, deterioration of the boardwalk in the past few years has resulted in greater maintenance requirements, with 2 man-days being spent on repairs to the remaining 150m section in the first five months of 2004.

Whole-life costs for replacing the remaining timber boardwalk with recycled plastic or timber are compared below. Where costs have not been provided, assumptions have been made based on extrapolations from other similar installations. Costs vary significantly depending on the nature of the installation and the buying power of the organisation.

While costs of plastic are initially higher, the whole-life costs of plastic are substantially lower. The graph below shows that the break-even point between a timber and recycled plastic walkway is reached as soon as the timber walkway is replaced for the first time.

Costs comparison per 100m of walkway (timber and plastic)



Cost assumptions are set out in the Table below. The estimated average cost per annum of the 100m section of timber walkway over its life is £717, almost three times greater than the recycled plastic walkway at £249 per 100m.

Howden Marsh – costs comparison per 100m of walkway (timber and plastic)

		Timber costs	Plastic costs
Materials		£4,600	£5,900
Installation		£4,000	£4,000
Maintenance -	year 11	£176	
	year 12	£241	
	year 13	£306	
Average cost per annum of walkway over its lifespan		***£717***	***£249***

Assumptions:

- The timber walkway must be replaced every 13 years.
- The plastic walkway must be replaced every 40 years.

- Maintenance is required on the timber walkway after 10 years. This is calculated at 2 days every year per 100m of boardwalk in year 11, 3 days every year in year 12 and 4 days in year 13. Materials costs of £46 per annum are included in the final 3 years, equivalent to 1% of the cost of the total timber materials.

Other applications

The Ponds Conservation Trust continues to look for other applications in the area that may benefit from using plastic materials, as opposed to traditional timber materials. The material has been used on four separate sites, including a school pond. A recent project has used recycled plastic materials for the construction of fishing pegs, improving access and providing a non-slip surface from which people can access the pond directly.

Rawcliffe Bridge – recycled plastic fishing pegs

Howden Centre – recycled plastic bench