



Report No: **329/2007** Public Agenda Item: **Yes**

Title: **Torquay Harbour Structures – Princess and Haldon Piers**

Wards Affected: **Tormohun Ward**

To: **Harbour Committee** On: **3 December 2007**

Key Decision: **No**

Change to Budget: **No** Change to Policy Framework: **No**

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1. What we are trying to achieve

- 1.1 In November 2006 the Council identified significant structural defects on Princess Pier resulting in the closure of a section of the pier known as the banjo. Since then detailed structural surveys have been undertaken on both Princess and Haldon Piers and these surveys have identified structural defects with both piers that need urgent attention.
- 1.2 This report outlines the structural problems with each pier together with the options available to the Council to repair these structures utilising a phased programme over the next six years.
- 1.3 Failure to implement these repair works will result in the ongoing structural deterioration of both the piers. Eventually they will need to be closed to the public and ultimate failure of the structures would leave the harbour area exposed to coastal flooding.

2. Recommendation(s) for decision

- 2.1 **That the Harbour Committee notes the serious structural condition of both Princess and Haldon Piers and the level of investment required to address the issues identified in the Report.**
- 2.2 **That, the Mayor and Cabinet are asked to consider the funding options available to enable the major repairs to be undertaken, alongside other Council priorities for investment, during the annual review of the 4-year**

Capital Plan Budget.

- 2.3 Subject to the budget review, the Council is asked to approve a Capital Budget of £2.1m to enable the most critical repairs to be undertaken to both Princess and Haldon Piers to be carried out during 2008/09.**
- 2.4 That the Harbours Committee approve the principle of allocating funding from the Torquay/Paignton Harbour Account to support £1.2million of Prudential Borrowing towards the cost of the first phase of works.**
- 2.5 That subject to funding being approved by Council for Phase 1, a further report be presented to the Harbour Committee in autumn 2008 reporting on the works undertaken to-date and identifying the required budget for implementing the remainder of the repair works between financial years 2009/10 and 2013/14,.**

3. Key points and reasons for recommendations

- 3.1 Following detailed structural surveys of both Princess and Haldon Piers major structural defects have been identified within each structure. At present these structures have been assessed as having a limited useful life expectancy unless further remedial works are undertaken. The main structural defects identified include: widespread scour below sea level, many voids within the piers below sea level, structural steelwork corroding, incomplete rock armour, voids within the central core of the piers and deterioration to the timber decking.
- 3.2 Both of these piers are an important part of Torbay's infrastructure and are well used by both residents and visitors. However, the structural assessment that has recently been undertaken indicates that the structures are in poor condition in many places and as a result pedestrian access to the area known as the banjo on Princess Pier has already had to be closed to pedestrians.
- 3.3 In order to address these defects various options have been investigated for carrying out repair works to both structures. The estimated cost for the full repair works ranges between £4.2m and £4.9m for Princess Pier and £6m for Haldon Pier.
- 3.4 Princess Pier is managed by two different departments within the Council. Cultural Services are responsible for the steel frame and timber decked walkway, banjo and promenade. Marine Services manage the entire stone and concrete element of the pier, including the undecked surface and the five sets of stone landing steps. The costs above do include works to the areas under the control of Cultural Services but this work will be subject to a separate demand for capital funding as such work is not included within Phase 1.
- 3.4 Due to the excessive costs for these repairs a phased approach over the next six years has been proposed with the critical structural repairs being carried out in year 1. The expenditure required to carry out these critical repairs in year 1 is estimated as approximately £2.1million. All of this cost is associated with those parts of the assets managed by Marine Services through the Harbour Committee.
- 3.5 The recommended proposals would allow a level of pedestrian access to be

maintained to both piers during remedial works and following completion of the works both piers would have a minimum life expectancy of 25 years.

For more detailed information on this proposal please refer to the supporting information attached.

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Supporting information to Report 329/2007

A1. Introduction and history

- A1.1 Both Princess and Haldon Piers were constructed during the 1860's and comprise a limestone facing wall on both the harbour and seaward side with a rock and gravel infill core between forming the pier. In the late 1950's Princess Pier has had the boardwalk built over part of the original pier and the pavilion was constructed in the area known as the banjo. The pavilion burned down during the 1970's and the banjo section was strengthened and turned into a widened section of boardwalk. During 1984 Haldon Pier was extended.
- A1.2 In 2006 a preliminary inspection of Princess Pier, including an underwater survey was undertaken and this survey identified numerous structural defects and resulted in the fencing off of a section of the boardwalk at the banjo. As a result of the serious nature of these defects a detailed structural survey of both Princess and Haldon Piers was commissioned in late 2006.
- A1.3 Two local consulting structural engineers were employed to undertake the detailed structural assessment of these piers and the final reports were received in June 2007. The final reports have identified significant structural defects with both piers. In addition the reports outline various options available to the Council to repair these structures utilising a phased programme of works.
- A1.4 At present both the structures have been assessed as having a limited life expectancy unless major remedial works are undertaken. A summary of the main structural defects located at each pier are identified below:

Princess Pier

1. Underwater defects to the original pier structure including widespread scour at the seabed to approximately 1.5m high on both sides of the pier. In addition many voids above and below the low tide level have been located with a few as large as 2m wide x 2m high x 2m deep.
2. The two sections of seaward stone steps are in a very dangerous condition.
3. The top surface of the old pier has numerous cracks and is in need of repair and the existing balustrade is in a poor condition.
4. The steelwork supporting the boardwalk is galvanised and the galvanising has now reached the end of its life resulting in accelerated corrosion taking place. In addition one of the columns supporting the boardwalk has failed. This area falls outside the harbour estate.
5. The diving survey of the piled columns supporting the boardwalk and banjo found that several of the columns showed evidence of accelerated low water corrosion. This is rapid corrosion of steelwork at a typical rate of 1mm per side per year, which occurs in the low tide region of structures. This area falls outside the harbour estate.

6. The banjo section of the pier has reached the end of its life and it is not possible to save the banjo. Similarly the landing stage has also reached the end of its life. This area falls outside the harbour estate.

Haldon Pier

1. There is a lack of rock armour on the seaward side of the pier for a length of 120m resulting in the pier being damaged by the effects of wave action.
 2. An underwater survey of the pier has identified widespread scour of the harbour face of the old section of pier, which has resulted in partial washout of the core material behind the wall.
 3. Boreholes have been sunk into the central core of the pier and these have identified general voids within the fill material due to wash out and storm damage. In addition voids have been identified below the concrete slabs forming the pier hardstanding. As a result a weight limit has been implemented for large plant on the pier.
- A1.5 Various options for repair works to these piers are identified within section 3 of this report. Failure to implement these repair works will result in both piers being closed to the public on health and safety grounds. Eventually this will lead to failure of the structures resulting in the marina being unsustainable and an increased risk of coastal flooding to the highway and properties in the vicinity of Torquay Harbour.

A2 Risk assessment of preferred option

A2.1 Outline of significant key risks

- A2.1.1 A very significant health and safety risk would have arisen if the Council had not taken action to restrict access to the banjo area of the boardwalk at Princess Pier and to implement a weight limit on Haldon Pier. Having taken such action the main risks that now apply are associated with ongoing deterioration leading to structural failure, coastal flooding and Torbay's image with the perception of residents and visitors alike. Additionally, there is a significant risk both in terms of the role that the piers play in supporting the tourism industry and also in the "opportunity cost" of any expenditure that is undertaken to repair or replace the structures.
- A2.1.2 Failure to carry out repair works to both Princess and Haldon Piers would result in further sections of the piers being fenced off and eventually being closed permanently to the public. Delays to the repair works would result in the continued deterioration of the structure, hence increasing costs for any future repair works. There is a risk that any long term delay in the repairs, could result in the deterioration of the structure, to such an extent that repair works become uneconomic and the structures may have to be demolished. Providing the repair works are undertaken within the next six years the risk of severe deterioration in the structure has been assessed at the intermediate level as shown in the table below.

Likelihood	6	6	12	18	24
	5	5	10	15	20
	4	4	8	12	16
	3	3	6	9X	12
	2	2	4	6	8
	1	1	2	3	4
		1	2	3	4

Low risk
 Intermediate risk
 High risk

The "x" in the above matrix denotes where the author has assessed the level of final risk to fall

A2.1.3 Although detailed surveys have been undertaken on both Princess and Haldon piers to identify the repair works required there is a risk with works of this nature that whilst repair works are being carried out further deterioration of the structure may be encountered. This may be as a result of further scour to the walls below sea level. Similarly, additional voids may be located within the wall, which would result in additional works having to be undertaken. The estimated cost for the first year's work of £2.1million has been prepared following detailed discussions with various contractors and suppliers. In addition a 15% contingency has been included within the estimate to cover the risk of additional works being required due to hidden defects. As a result of the detailed estimates and the inclusion of the contingency element the financial risk has been assessed as 6 in the table below.

Likelihood	6	6	12	18	24
	5	5	10	15	20
	4	4	8	12	16
	3	3	6X	9	12
	2	2	4	6	8
	1	1	2	3	4
		1	2	3	4

Low risk
 Intermediate risk
 High risk

The "x" in the above matrix denotes where the author has assessed the level of final risk to fall

A2.2 Remaining risks

A2.2.1 Following completion of the works the piers will have a minimum life expectancy of 25 years. However, there will always be a risk of damage to the pier due to severe storm events together with the risk of accidental damage as a result of impact from coastal vessels. The risk of storm damage following the repair works is initially minimal however these risks will increase over time. The risk of damage due to impact from vessels is again minimal however should this occur emergency repair works would have to be carried out and the cost for these repairs would be recoverable from the vessels insurance's.

A3. Other Options

A3.1.1 As part of the structural reports, outline design works have been undertaken for the repair works to both piers. Budget costs for all of these options have been estimated assuming a life expectancy of 25 years with the exception of the resin injection in Option 1 for Haldon Pier, which only has a life expectancy of 10 years. Details of the various options together with there estimated costs are identified in the table below:

Princess Pier		
Option	Details	Estimated Cost
1	Carry out repair works to pier and boardwalk. Demolish landing stage and banjo. Rebuild banjo as original design	£4.9m
2	Carry out repair works to pier and boardwalk. Demolish landing stage and banjo. Rebuild banjo to width of existing boardwalk.	£4.7m
3	Carry out repair works to pier and boardwalk. Demolish landing stage and banjo. Replace banjo with new disabled ramp between boardwalk and old pier.	£4.2m
Haldon Pier		
Option	Details	Estimated Cost
1	Carry out repair works to pier and install rock armour. Resin inject to infill voids and reinstate the support to the underside of the concrete slabs.	£6m
2	Carry out repair works to pier and install rock armour. Replace existing concrete slabs and infill voids.	£6m

A3.1.2 Following evaluation of the structural Engineer's reports and based on the usage of both piers it is recommended that Option 2 be implemented for both piers. This option will provide a boardwalk for Princess Pier having the same length as currently and provision of a disabled ramp will be included from the boardwalk to the old section of pier. At Haldon Pier Option 2 has been recommended as it provides the better value for money having a life expectancy of 25 years compared to the 10 years in Option 1.

A3.1.3 As the total capital cost of carrying out both Option 2's is in the sum of £10.7m a phased approach to these repairs has been investigated where the most critical repairs are carried out in year 1 with the remaining repairs carried out between years 2 and 6. An approach of this nature will allow the capital costs to be spread over a six year period as identified in the table below.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total Cost
	£m	£m	£m	£m	£m	£m	£m
Princess Pier	0.50	0.83	0.87	0.93	0.78	0.79	4.70
Haldon Pier	1.55	0.85	0.89	1.00	0.85	0.86	6.00
Total Annual Cost	2.05	1.68	1.76	1.93	1.63	1.65	10.70

A3.1.4 The costs shown in the table above have been produced based on the structural inspection works carried out to date. Obviously, as works are undertaken to repair the most critical elements of the piers further investigations can be undertaken and a more detailed estimate prepared for the remainder of the works. Depending on the outcome of these additional investigations there is a possibility that the situation may not be as bad as first thought. However, there is also the risk that the estimated costs identified for years 2 to 6 may increase. This situation will be further exacerbated by inflation, which has not been included for in the above table.

A3.1.5 In order to update the Council on the works carried out and identify the budget required for years 2 to 6 a further report will be presented to the Harbour Committee and Council in the autumn of 2008.

A4 Summary of resource implications

A4.1 The poor condition of some of Torbay's key infrastructure assets has been highlighted in recent Reports to Members on the Council's Asset Management Plan, Corporate Capital Strategy and Backlog Repairs & Maintenance.

A4.2 The repairs to Princess and Haldon Pier are two of many such items identified on the Council's Capital Projects Reserve List for which funding will be considered during the annual review of the Capital Plan Budget currently being undertaken. The Reserve List totals over £50million including the £10.7million identified above in respect of the two piers.

A4.3 The Council's Corporate Asset Management Team consider that Princess and Haldon piers are of the highest priority for major repair alongside other sea front issues such as Rock Walk and the Illuminations (Festoon Lighting), the Multi Storey Car Parks and Torre Abbey.

A4.4 The forthcoming Report to the Cabinet on the Capital Budget highlights that resources available for new schemes will be very limited and that until capital receipts from the current Asset Rationalisation Project can safely be predicted the only likely source to fund such projects as this will be Prudential Borrowing.

A4.5 The first Phase of repairs to the piers of £2.1million would cost approx. £140,000 p.a. if funded from borrowing and repaid over 25 years (the estimated life of the repairs). If the Torquay/Paignton Harbour Account were able to contribute towards this cost then some of the Phase 1 repairs could be commenced in 2008/09.

A4.6 The Director of Marine Services has identified an annual contribution of £80,000 from the Harbour Account which would fund around £1.2million at current interest rates. This amount represents the projected net income stream from the Town Dock facility when fully operational. The Harbour Account is unable to fund the full costs of Phase 1 without excessive increases in future year's charges which would breach existing policy and create disparity between the different harbours. Furthermore any operational surpluses in the short term have been earmarked to restore the balance on the Harbour Reserve Fund which is currently below the recommended minimum level. It is recognised, however, that should the Council be unable to find the additional resources to fund the first

phase of these works then such an increase may be necessary.

- A4.7 If the Harbour Committee were able to commit to this sum following the completion of their Revenue Budget review, this would reduce the demand upon any corporate resources and may enable the Council to approve the commencement of Phase 1 of the works next financial year. The Committee would need to ensure suitable revenue provision is provided from 2009/2010 onwards to fund this contribution over a 25 year period.

A5 What impact will there be on equalities, environmental sustainability and crime and disorder?

- A5.1 Both Princess and Haldon Piers are a key element of Torbay's tourism service with particularly strong links to the Community Plan themes of Pride in the Bay (valuing our environment and developing Torbay's culture) together with The New Economy (improving Torbay's economy – towards a prosperous Torbay). In addition within the Community Plans top ten for Torbay is identified a Wonderful Waterfront – Improvements to our harbours and waterfront.
- A5.2 These piers area an important part of Torbay's infrastructure and they are well used by both residents and visitors. However, the structural assessments that have been carried out recently indicate that the structures are in very poor condition in many places. As a result pedestrian access to the area known as the banjo on Princess Pier has already been closed to pedestrians in the interests of health and safety.
- A5.3 Failure to implement these repair works will result in both the piers being closed and eventual failure of the structures, which may result in coastal flooding of properties in the vicinity of the harbour together with the closure of the marina and future town dock. The loss of these amenities would result in an environmental and economic disaster for Torbay.

A6 Consultation and Customer Focus

- A6.1 No specific consultation has taken place regarding the structural condition of these piers however both Cabinet and Council were made aware of the structural defects located at Princess Pier which resulted in the closure of the banjo area to pedestrians in November 2006.
- A6.2 Following approval for the critical repair works to proceed, and detailed design has been completed, consultation will be carried out with all harbour users that will be affected by the works.

A7 Are there any implications for other Business Units?

- A7.1 The only business units affected by these recommendations are Marine Services (TDA), who are responsible for the original concrete/stone elements of the pier structures and Cultural Services who are responsible for the Princess Pier boardwalk and banjo.

Appendices

None

Documents available in members' rooms

None

Background Papers:

The following documents/files were used to compile this report:

Princess Pier, Torquay, Options and Budget Cost Report

Phase 1 Structural Condition Survey and Assessment Report for Haldon Pier, Torquay