

**BMT Lymington Ferry Operations Report – Phase1, March 2008:**

**Relevance to Assessment of Environmental Impact of Ferries on the Lymington River**

**SUMMARY**

While the BMT Phase 1 Report contains limited discussion of some of the hydraulic effects of the C-Class and W-Class ferries, there is little information in either the analysis or the measurements which will be of value in an assessment of the environmental impact of the W-Class ferries.

The Report specification excludes explicit consideration of the environmental impact of the ferries. However it anticipates that the Report will contain material which will be of value to any assessment of environmental impact. As noted above, this material is of little value.

Detailed comments have been prepared on the safety and risk contexts of the Report by both of the sailing clubs in the river, these are available on the club websites<sup>1</sup>.

The Report appears to significantly underestimate important differences between the existing C-Class ferries and the proposed W-Class ferries when it refers to the estimated hydraulic effects of the W class ferries.

1. Ferry characteristics which are relevant to their impact on the river bed and banks are discussed.
2. Measurements taken at specific river posts are limited to tidal flows and to waves due to ferries and other vessels over a 2 day period only, some natural (wind driven) waves were also measured.
3. The analysis of flows around the ferry hulls and due to thrusters is superficial and incomplete.
4. No reference is made to the contribution of the ferries to the need for maintenance dredging carried out by LHC and the marinas.
5. No measurements that will contribute data for environmental impact and sediment transport studies have been carried out for the C-Class ferries.
6. No reference is made to the historic recognition of the C-Class contribution in keeping the river channel clear.
7. BMT have declined to carry out any theoretical or practical modelling but do not explain how measurement data obtained will be analysed to ensure that the full range of operating impacts can be assessed.
8. Notwithstanding the points above, the conclusions and recommendations do not reflect the limited analysis in the report. One interpretation of the estimates presented in the detail of the report is that the proposed W class are too big for the navigation

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<sup>1</sup> [http://www.rlymyc.org.uk/Upload/ferries/documents/Comments\\_BMT\\_Phase\\_1\\_Report\\_V7.pdf](http://www.rlymyc.org.uk/Upload/ferries/documents/Comments_BMT_Phase_1_Report_V7.pdf) and <http://www.ltsc.co.uk> (New Ferries).

channel on safety and environmental management grounds. The report avoids this, choosing a predetermined view.

Appendix A provides an analysis of the relevant parts of the BMT Report. Appendix B is an extract from a book which describes the river channel dredging effect of the C-Class ferries.

## **CONCLUSION**

Overall we believe that the BMT Report makes little or no contribution to any new assessment of the environmental impact of the C-Class or the W-Class ferries on the Lymington River or its surroundings. It is a matter of concern that others who have not examined the Report in detail may incorrectly believe that it makes a contribution of some substance.

SJA & KAH

## **Appendix A - Examination of the BMT Report for its Relevance to the Assessment of Environmental Impact**

### **Introduction**

The report which has been prepared by BMT Seatech (BMT) for Lymington Harbour Commissioners (LHC) is the first part of a Risk Assessment programme to assess the safety and risk issues surrounding the proposed introduction of Wightlink's new ferries into the Lymington River. The Terms of Reference of the assessment excludes the assessment of environmental impact, however it states that "hydrodynamic data captured to help inform this study will be available to help inform environmental considerations".

These comments have been prepared to indicate the extent to which the programme will offer data which will be useful for any assessment of environmental impact which is carried out.

### **Items of Potential Value for Environmental Assessment**

The environmental impact of the ferries falls under two broad headings, the effect of the ferries on the river and its surrounding banks and salt marshes and the environmental impact of the increased traffic. The latter falls outside the scope of both the BMT Report and these comments.

The Report provides a largely qualitative description of many of the factors which are relevant to the effect of the ferries on the hydraulic flows in the river taking some account of the effect of wind strength. It also describes the measurements which have been carried out on two days in January with C-class ferries and in March on natural waves.

**Section 5.5:** The bathymetric survey data given appears to imply that there will be about 1 metre below the ferries at LAT, this is in contradiction with comments informally from Harbour staff and ferry skippers that the ferries ground at low spring tides. The Report does not comment on this, but it is reasonable to assume that there is uncertainty about the depth of the river channel. LHC and Wightlink have channel data going back for many years which has not been considered by BMT.

**Section 7.2** compares the C- and W- Class ferries:

Laden profiles (Fig 12), this diagram is incorrect, the HGVs shown on the C-Class ferry would need to be about 1 metre above the deck, also a mezzanine deck on the W-Class is omitted. The diagram has been provided by Hart Fenton. This and the comparisons in Tables 3 & 4 disregard the Wightlink statement that this route is not intended for significant use by HGVs. This error effects the windage and sidethrust assessments and underestimates the difference between the two designs.
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Drawdown and squat (Figs 13 & 14) based on form coefficients, it does not appear to consider the more stepped shape of the W-class (cf Figs 7 & 9) and does not comment on whether this will be expected to increase the expected drawdown and squat.
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Windage, see comment above, also the Report ignores the effect of windshear which will lead to an increased wind force due to the much higher and longer W-Class superstructure. The increase in lateral area was underestimated and windshear was ignored. Tables 3 & 4 give 80% more wind force, taking account of windshear increases this to +144% <sup>2</sup>
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<sup>2</sup> <http://www.lymingtonriver.co.uk/FERRYDIMENSIONS1.1a.pdf>

Installed power (Fig 15), the increase of 195% (nearly x3) for the new ferries is consistent with the increased windage, but is not properly identified in the report

### Section 7.3:

Direct slipstream effects – (Table 3) the jet velocity fails to take account of windshear and also does not point out that the 5-bladed W-Class thrusters are considerably larger than the 4-bladed C-Class ones (the cross section is 61% greater) with the attendant very substantial increase in energy transferred into the slipstream. The Report refers to 10% increased velocity on the flow from the W-class thrusters. The W-class ferries appear to have two speed thrusters<sup>3</sup> but does not discuss which speed condition this refers to; it is probably the lower speed (and power) in which case the effect of the higher power condition will be much greater. The use of this 10% figure is therefore significantly misleading.

The deeper positioned W-Class thrusters which reach the full draft of the ferry will interact much more strongly with the river bed and banks than those on the C-Class with the thruster tips about 0.4 metre above the draft. This will have a significant effect on the erosive impact on the river bed and is not considered in the Report.

The C-class thrusters are located on the port forward and aft starboard quarters and the flow will tend to be along either side of the hull, probably less damaging than the in-line deeper arrangement on the W-Class. Also see note below for a significant situation not included in the Report.

The indirect slipstream effects are a particular problem when the ferry slows, this leads to a recommendation for this to be avoided, currently waiting in the river is the norm rather than the exception. (It is noted that both sailing clubs are strongly opposed to the ferries passing in the river at all for significant safety reasons).

Wash and drawdown data for the C-Class ferries from the Phase 1 measurements are given in the report (Fig 18 & Appendix 2). Unfortunately there is little comment on how this compares with what BMT would predict at the measurement locations which are at posts at the side of the channel, it is therefore not possible to judge what contribution the measurements will make to the overall assessment of hydraulic flows.

Note for W-Class ferries:

1. The thrusters are much closer to the bottom in relation to the maximum draft.
2. The forward thruster will be directing its thrust between the hull and the river bed rather than along the sides of the vessel, creating far greater sea bed velocities and erosion.
3. Because the hulls are wide and flat these velocities will be sustained over a far greater distance from the thruster and scour a far wider area.
4. The rear thruster will have to accelerate the turbulent and already high inlet velocity from the forward thruster to generate any thrust at all. This will suck in the efflux of the forward thruster preventing its diffusion and sustaining under-hull velocities over a far wider area, which is important in predicting the amount of sediment dispersion and erosion.
5. The aft thruster will have an intake carrying far more sediment and because its efflux velocity will have to be so much higher for the same thrust, the inlet sediment will be diffused over a far wider depth. This increased depth is important as it is directly related to the distance over which it will be dispersed.

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<sup>3</sup> See footnote 2, which takes information from Voith Schneider; it is also consistent with the much higher engine power of the W-Class ferries.

6. Water jets carrying sediment burdens are much more damaging to the bed and banks than a “clean” water jet, whether under the hull or for direct or indirect side slipstreams. The presence of these sediment burdens is readily evident from aerial photographs and from the observations made by the response of echo sounders on other craft.

**Appendix 2** describes the field measurements which have been taken on the C-Class ferries. These are wave heights at a number of river posts which are on the edge of or outside the main channel due to ferries and other vessels and for natural waves. The results indicate what is reasonably obvious to the casual observer that the waves (with the probable exception of very low tides when the wash on the banks will be substantial) are of little significance. The only other measurements are of the tidal flow, the locations appear to have been away from the maximum flow in the channel but whether the measurements significantly underestimate the channel flows does not appear to have been investigated.

No serious effort was made to measure any local water flows. This means that no data has been obtained, at any water depth and in any wind condition, for the C-Class ferries of direct or indirect thruster slipstream flows, of backflow, or of any interactions with other vessels.

### **Modelling**

It should be noted that BMT have indicated that they do not consider that modelling (mathematical, computational or physical) will make any useful contribution to the Risk Assessment study, relying on live sea trials with the existing C-Class ferries and with the new W-Class ferries when they arrive. No attempt has been made to justify this position, which appears to be untenable since the range of actual measurements which can be made must be quite limited and extrapolation of these to obtain useful assessment data cannot be achieved without adequate models. They do not indicate how they will take into account conditions which are unlikely to be experienced during a specific programme of trials of limited scope and duration (for example in very strong winds at low spring tide conditions) or how they will derive data for locations where no measurements are carried out.

### **What Has Not Been Investigated.**

No measurements of any of the significant water flows around the C-Class ferries have been carried out. While the content of the testing which is planned for the W-Class ferries is not known, without modelling for both ferry designs together with extensive and detailed water flow measurements, it is difficult to see how the trials can significantly contribute to any comparative or absolute assessment of the likely environmental impact.

Investigation of the causes and sources of the 30,000m<sup>3</sup> per annum of sediments dredged by LHC and the marinas was not included in the work scope. The potential dredging impact of the W-Class ferries has not been considered, as well as the impact on river users. It appears probable that the introduction of the C-Class ferries removed the need for regular dredging of the main river channel<sup>4</sup>, this is not referred to in the Report.

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<sup>4</sup> Jean Chitty, "The River is within Us", 1983, pp 66-8; see Appendix B.

## **Appendix B – Effect of C-Class Ferries on Lymington River Dredging**

The following is taken from Jean Chitty's "The River is within Us" published in 1983, pp 66-8

Mr. P. W. Penny, Manager of Sealink ferries, gave me an account of the present-day running of the ferry service and its future prospects, when I visited him in his office on 9th June 1981. The extract below describes the introduction of the C-Class ferries (Caedmon from the Portsmouth service replaced Freshwater in 1980).

"We have got three ships on this service, which is a combined passenger and car ferry service. The Cenwulf and the Cenred are sister ships and are absolutely identical and there is also the smaller Freshwater. They all have this Swiss Voith Schneider propulsion, with a unique type of propeller which can be feathered as in an aircraft. There is one propeller at each end and you can literally run the ship round on the spot and also crab her sideways. So these are ideal for this type of work in the river, which is very restricted and where there are many yachts. Another advantage is that in the river, where there is a lot of silting, the propellers skim and scour the bottom. Whereas before 1965 we had to have a regular dredging programme every four or five years, we have not needed to dredge since then."