HAMPSHIRE COUNTY COUNCIL

Report

Committee	River Hamble Harbour Management Committee
Date:	14 March 2014
Title:	Marine Director's Current Issues
Reference:	5648
Report From:	Director of Culture, Communities and Business Services

Contact name: David Evans

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1. Summary

1.1. This report covers the issues currently under consideration by the Marine Director.

2. Light Trial

2.1 The ten navigational piles which mark the River entrance channel are lit at night with solar-powered navigation lights. Each has its own flash characteristic (either red or green, flashing once every second (Q) or once every four seconds (Fl4s). The one exception is the east cardinal (No 2 pile) which flashes once per second for three seconds and then nothing for 7 seconds (Q(3), 10s). The precise time when each light flashes relative to the others cannot be controlled, so the overall impression at night is somewhat random, which can be confusing, especially for those unfamiliar with the River. Recent advances mean that solar-powered lights are now available with a GPS time input, such that they can be programmed to flash at precise times relative to nearby lights. In principle, this means that the lights can be programmed to flash in a specific, non-random, order.

2.2 With the help of the suppliers of lights to the Harbour Authority (Hydrosphere) a trial was conducted in February 2014, using lights set up on the Warsash Boardwalk to replicate those at the River entrance. Harbour Office staff and a number of local River users were invited to witness the trial. Several sequencing options were demonstrated, with the most effective being a ripple of green lights moving upstream, starting at No 1 pile and rippling to No 9 pile, combined with a ripple of red lights moving downstream starting at No 10 pile and rippling to No 4 pile. The light representing the east cardinal pile (No 2) remained as it is. Within the constraints of the trial, the improvement of clarity in terms of being able to follow the channel accurately and safely was significant.

2.3 Lights with GPS time input are about 40% more expensive then those currently in use. To replace the nine existing red and green lights with the new type would cost approximately £4500. Solar-powered lights have a life expectancy of 6 – 10 years, so the existing lights would be re-programmed for use elsewhere in the River, representing a saving on the current light replacement budget. Thus, the effective cost of the project in Year 1 would be about £1500, with an average annual running cost of about £500 (expected to be lower in the early years, increasing in years 6 to 10).

2.4 The lights are fully programmable so, once installed, further trials would be undertaken, in order to establish the optimum flashing sequence. This would not involve changing the characteristics of any lights, so existing charts would remain valid. Trinity House would be kept informed throughout.

3. River Hamble Games 2014

3.1 The inaugural River Hamble Games were held in 2012, with generous financial support from the Harbour Authority (amounting to some £2000). The Games were a great success so the organising committee has agreed to regular repeats, in alternate years. The Games will next take place on Saturday 12th July 2014. A request for a funding contribution from the Harbour Authority is attached at Appendix 1 for Members' consideration.

4. Visitor Guide

4.1 The Harbour Office staff deal with a great many enquiries each year, many of which ask substantially similar questions. In order to capture all this information in a single document which will be helpful for River users, both local and visiting, a Visitor Guide has been produced, containing a digest of the information most commonly asked for. The result has now been printed (5000 copies) and will be distributed during the season. The Guide has been produced without adverts or any temporal or price information which might cause it to be quickly out of date, so it can be used (and reprinted if necessary) for many years to come.

5. Hamble Jetty Extension

5.1 The Harbour Authority has made an application to Eastleigh Borough Council for planning permission to extend the public jetty at Hamble, as previously agreed as part of the Asset Enhancement programme. Subject to the outcome of this process, an application for Harbour Works Consent and funding approval will be presented to the Management Committee and Harbour Board in June and July 2014 respectively. Consents will also be required from the Marine Management Organisation (MMO), The Crown Estate, the Environment Agency and Trinity House.

6. PhD proposal - Sacrificial Anodes

6.1 At Appendix 2 is a proposal document for a PhD entitled 'An evaluation of spatial variation in the dissolution of sacrificial anodes in the Solent and implications for management'. The proposal is self explanatory and the PhD will be supervised by Dr Anthony Gallagher, current Chairman of the Hamble Estuary Partnership.

6.2 Since the vast majority of the vessels moored or berthed in the River Hamble use sacrificial anodes, the results of this research have potential value to all boat owners with regard to ways of improving the protection of underwater metals. The research will also provide valuable data concerning the environmental impact of dissolved zinc in the River, particularly if the Environmental Quality Standard (EQS) for zinc is lowered as anticipated.

6.3 The overall cost of a PhD of this nature is about £75,000 spread over a three year period. The Harbour Authority has been asked to consider whether it would fund part of this cost from the Asset Enhancement Reserve. It is recommended that a contribution of at least £3,000 per annum for three years would be appropriate.

7. Integrated Business Centre and Harbour Management System

7.1 Hampshire County Council's Integrated Business Centre (IBC) is due to go 'live' on 1 April 2014. This will have significant impacts for the Harbour Authority, in terms of Human Resources management, financial management and reporting, and procurement. The Harbour Authority is also in the process of upgrading its current Harbour Management System, with the aim that this will be fully compatible with the IBC. The updated Harbour Management System will enable electronic billing, on-line credit/debit card payments (including Crown Estate invoices), on-line management of customer details and electronic point of sale transactions on the water.

8. Annual Forum

8.1 Members are reminded that the Annual Forum will take place on Tuesday 26th March 2014, 1900 for 1930, at Warsash Sailing Club.

9. Recommendation

9.1 It is recommended that the River Hamble Harbour Management Committee:

a. advises the River Hamble Harbour Board of its support for a grant to the River Hamble Games 2014, and;

b. advises the River Hamble Harbour Board of its support for part-funding the proposed sacrificial anodes PhD project, and;

c. notes the remainder of this report.

CORPORATE OR LEGAL INFORMATION:

Links to the Corporate Strategy

Hampshire safer and more secure for all:	yes
Corporate Improvement plan link number (if appropriate):	
Maximising well-being:	yes
Corporate Improvement plan link number (if appropriate):	
Enhancing our quality of place:	yes
Corporate Improvement plan link number (if appropriate):	

Section 100 D - Local Government Act 1972 - background documents

The following documents discuss facts or matters on which this report, or an important part of it, is based and have been relied upon to a material extent in the preparation of this report. (NB: the list excludes published works and any documents which disclose exempt or confidential information as defined in the Act.)

Document	Location
None	

IMPACT ASSESSMENTS:

1. Equalities Impact Assessment:

1.1. A full Equalities Impact Assessment for the River Hamble Harbour Authority's compliance with the Port Marine Safety Code (including environmental responsibilities) has been carried out and this report does not raise any issues not previously covered by that Assessment.

2. Impact on Crime and Disorder:

2.1. This report does not deal with any issues relating to crime and disorder.

3. Climate Change:

3.1. How does what is being proposed impact on our carbon footprint / energy consumption? The contents of this report have no impact on carbon footprint or energy consumption

3.2. How does what is being proposed consider the need to adapt to climate change, and be resilient to its longer term impacts? Not applicable to this report.

Appendix 1

Chairman
River Hamble Harbour Authority
Hampshire County Council
The Castle
Winchester
Hampshire
SO23 8UJ

Dear Cllr Evans,

The Hamble River Games Committee would like to thank the River Hamble Harbour Authority for its support with hosting the River Hamble Games 2012. I am writing to formally inform you of our intention to hold the River Hamble Games 2014 on Saturday 12th July 2014. The event will follow a similar format to the 2012 version with the inclusion of the additional sport of paddle boarding. The same group of volunteers, with some new additions, has agreed once again to form a committee to organise and manage the Games.

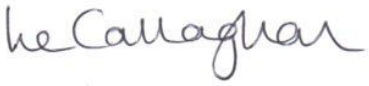
We have been busy working with individual event coordinators to establish a day of sporting action on the River to include sailing, swimming, kayaking, rowing, running and paddle boarding. At the River Hamble Games 2012, 300 people entered the event and we hope that this will increase for the 2014 Games, which could result in up to 500 competitors taking part. The Events will be split between Hamble and Warsash and we will encourage, and are arranging, transportation across the River. We are hoping that all the different sports clubs around the River will promote the event to their members and ensure we have a great mix of participants as well as encouraging others to offer their help and support on the day. Our website http://www.riverhamblegames.com/ is now open for registration for this years event and the first press releases have been sent out.

The River Hamble Games cannot run without the support, both financial and in-kind, of our sponsors and we very much hope that the Harbour Authority will once again be able to fund some of our requirements. In 2012 the River Hamble Harbour Authority provided us with £2203.64, which enabled us to supply Gold, Silver and Bronze medals to all event winners, give all of our volunteers and juniors an event t-shirt, provide additional toilet facilities on the Hamble foreshore and arrange for St John's ambulance to be in attendance. I have set out below details of how a similar sum could be spent this year should the River Hamble Harbour Authority be able to

continue their funding of our event and have attached specific quotes where available.

We will continue to keep everyone informed of the plans but hope that we can count on your support for what should be a great fun day. Should you have any questions please do not hesitate to contact me on admin@riverhamblegames.com or on 07905609330.

Yours sincerely,



Laurie Callaghan
Event Coordinator, River Hamble Games 2014

Item	Supplier 2012	Cost 2012	Supplier 2014	Cost 2014 (Quotes or estimates)
Race Result Timing System			Sports Timing Services Ltd Unit 9 Lymedale Enterprise Court Dalewood Road Lymedale Business Park Newcastle ST5 9QH	£600
River Transport	Blue Star Boats High Street Hamble Southampton SO31 4HA	£700	Hamble Warsash Ferry Green Lane Hamble SO31 4JB	£900
Sailing expenses	Warsash Sailing Club Shore House Shore Rd Southampton SO31 9FS	£246	Warsash Sailing Club Shore House Shore Rd Southampton SO31 9FS	£250
Volunteer T-shirts	Coast Graphics Unit 6	£630 (140 at	Printing Crazy Mitchell Point Ensign	£700

	Hamble Court Business Park Hamble Lane Hamble SO31 4QJ	£4.30)	Way Hamble SO31 4RF	
Plastic tokens			Plastictokens.co.uk Leigh Street Sheffield S. Yorks S9 2PR	£158 (1000 printed and delivered)

Agenda Item: 7

Appendix 2

PROPOSAL DOCUMENT

An evaluation of spatial variation in the dissolution of sacrificial anodes in the Solent and implications for management

February 2014

ENVIRONMENTAL SCIENCE WITH PLYMOUTH UNIVERSITY

Southampton SOLENT University

CONTENTS

1.0 INTRODUCTION

Sacrificial anodes are used on boats to protect submerged metals such as propellers, hull valves and engines from corrosion. The electrochemical process involved is referred to as cathodic protection, and this requires an electrical connection to be established between the submerged metal 'at risk' and a block of another metal, which is also immersed in the water. With the choice of an appropriate second metal, an electrochemical cell is established in which the 'at risk' metal forms the cathode and the other metal the anode. The flow of electric current in this cell results in accelerated corrosion - dissolution - of the anode and a reduction of corrosion at the cathode. Thus the anode provides 'sacrificial' protection for the cathode. In order that the process continues to be effective, the corroded anode has to be replaced at intervals with fresh material. The principal metal used in sacrificial anodes in the marine environment is Zinc, and the dissolution of zinc anodes therefore represents an input of the metal to coastal waters. Although the quantity of zinc used on yachts and in marinas might be small in relation to that applied to larger ships, leisure applications of zinc anodes could be important localised sources of zinc contamination, particularly in areas where there are high concentrations of boats.

Zinc is an essential element involved in many metabolic activities. However it also been shown to be toxic to marine organisms at elevated levels (EC, 2007). As a consequence, zinc has been included by the UK as a specific pollutant under the Water Framework Directive (WFD) and as such requires an environmental quality standard (EQS) for fresh and marine waters. The existing EQS for saline waters set under the Dangerous Substances Directive is 40 µg/l; however a value of 7.9 µg/l (including a background concentration of 1.1 µg/l) has been set for the UK (UKTAG, 2013). Previously measured concentrations have rarely exceeded the old EQS, but it is evident that estuaries influenced by marina activities could lead to the exceedance of the potential new EQS (Bird et al., 1996), particularly in marinas with restricted flows such as those with lock gates, or in areas of high boat density such as the Hamble (Franklin *et al*., 2000).

Previous measurements and modelling of zinc concentrations in the Hamble (Boxall *et al*., 2000; Comber *et al*, 2002) have shown zinc levels in excess of the new EQS (up to 10.4 µg/l in Swanwick Marina). Although zinc may also be derived from other sources such as antifoulant paints, sewage effluent, contaminated sediment and road runoff, zinc anodes used on boats have been identified as a significant contribution to observed levels in or around marinas and harbours.

Anecdotal evidence suggests that zinc anodes on boats moored in the Hamble dissolve at an accelerated rate compared with boats moored elsewhere in the Solent such as Lymington for example. In addition there are also anecdotal 'hot spots' within the Hamble estuary itself where decay is accelerated further. On this basis there is a need to determine the cause of this for the following reasons:

1) Concerns about elevated zinc concentrations dissolved in the water column causing potential toxic effects

2) The need to relate potential causal factors of accelerated anode decay with the carrying capacity of water bodies to achieve compliance under current and proposed EQS thresholds.
3) To inform management of potential issues associated with application of the polluter pays principle and the scope of Environmental Impact Assessments (EIAs) when licensing moorings and marina developments
4) To consider the appropriate carrying capacity of boats (based on zinc anode loadings) in high risk zones and to inform anode manufacturers of suitable guidance

To address this issue it proposed to undertake a collaborative PhD studentship between Southampton Solent University and Plymouth University.

2.0 RESEARCH AIMS AND OBJECTIVES

The aims of the study are as follows:

- To determine and evaluate the causes of spatial variations in the dissolution of zinc anodes in the Solent
- To ascertain whether there is a need to develop new management responses, particularly in the light of changes to the zinc EQS

To achieve this, the objectives are as follows:

- To undertake and map a survey of boat owners as to the rate of the decay of anodes in the study area
- To gather spatial data regarding water quality and identify possible environmental associations with accelerated dissolution (e.g. electricity cables running under the estuary enabling spatial circuits)
- To execute a monitoring programme to test associations including the measurement of anode dissolution *in situ* and under laboratory conditions
- To consider the alternatives to zinc anodes (e.g. aluminium) and if they are subject to the same degree of accelerated dissolution
- To review the results of the assessment in light of the current management regime
- To draw conclusions and recommend actions formulated for the continuing and enhanced protection of the estuarine environment

3.0 METHODOLOGY

In order to meet the aims and objectives of the research it is important to design and utilise a methodology that will deliver a comprehensive evaluation. In order to achieve this, and for the purposes of clarity, three tasks have been sub-divided into a series of specific actions, termed ‘work packages’.

This section details the work packages and their related methodology and is intended to represent a logical and sequential breakdown of the tasks. As such the studentship is proposed to undertake the following programme of work:

Task 1: Spatial determination of the dissolution of zinc anodes in the Solent and the regulatory regime

In order to complete this task the following work packages will be completed:

1. **Desk Study**

A literature review will be undertaken that incorporates the relevant studies published on the dissolution of anodes in the marine environment and the toxic nature of zinc in relation to marine ecosystems. The review will also document the anode manufacturer's technical performance notes as well as the current regulatory regime pertaining to zinc pollution.

2. **Survey of boat owners in the Solent**

A questionnaire survey of boat owners will be carried out in the study area aimed at identifying and mapping the spatial variation in the decay rates of anodes on boats based on anecdotal evidence. Specific data will also be ascertained on the particular anodes in use and their arrangement on a boat by boat basis.

GIS will be used to map this data from which specific 'hot spots' or high risk zones will be identified. This primary data collection will inform the research.

Task 2: A determination of the causes of the spatial variation in the rates of anode dissolution and an evaluation of significance

In order to complete this task the following work packages will be completed:

3. **Review the nature of available data**

The first requirement for determining the causes of spatial variation in the rates of anode dissolution within the study area is to identify the nature of the data available. This data will include existing sources of information relating to water quality as well as the mapping of possible reasons for accelerated dissolution such as the existence of submerged structures and electricity cables running under the estuary. These are theorised as having the capability to set up electrical circuits within the water column.

4. **Develop and execute a targeted monitoring programme**

Based on available evidence, a monitoring programme will be planned and executed. This will include the following:

a. A measurement of Zn anode dissolution both in situ 'high risk areas', at identifiable 'control' sites within the wider study area and in laboratory based artificial waters.
b. A measurement of key parameters (zinc concentrations, conductivity, salinity, temperature, electrode potential) within 'high risk' and 'control' sites.
c. A measurement of the bioavailability of Zn in the estuary using voltammetry
d. Assessment of Al alternative to Zn as an anode material

5. Analyse the data and test for associations

The results of the programme will be reviewed and analysed in order to determine confidence in possible identifiable associations.

Task 3: Review of current management regime and implications for the future

In order to complete this task the following work packages will be completed:

6. Review zinc concentration in light of the old and new Zn EQS

Zinc concentrations will be mapped in the study area and compared with both the old and new EQS thresholds from which areas of potential management problems can be identified.

7. Implications for future management

The implications of the findings will be reviewed in terms of the management regime and how this feeds in to the development of possible mitigation measures. This would include two specific aspects of work

1) Engineering options for reducing the rate of zinc anode dissolution, based on existing infrastructure with estimates of costs based on available information
2) Consideration of alternatives to zinc, for example the use of aluminium, whether its dissolution is likely to be impacted in the same way as zinc and potential environmental implications.
3) An Environmental Impact Assessment, to assess the carrying capacity of the estuary, as well as affecting identifiable targeted mitigation. In order to support this aspect of the research it is proposed to employ available modelling software to assess the extent of the contribution of zinc to the estuary from this source. Possible models may include an existing environmental modelling program (Regulatory Environmental Modelling of Antifoulants - REMA[1]) developed for the Health and Safety Directorate to

[1] http://www.oecd.org/chemicalsafety/pesticides-biocides/34707347.pdf

predict consequences of leaching of antifoulants from boats into estuaries, marinas and harbours. The model can be adapted for use with sacrificial anodes and is freely available..

4.0 COLLABORATORS

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Expertise in:

- Chair of Hamble Estuary Partnership (HEP)
- Environmental impact and risk assessment
- Marine governance and spatial management

Dr Sean Comber, Associate Professor (Senior Lecturer) in Environmental Sciences, B525 Portland Square, Plymouth University
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Expertise in:

- Zinc determination in saline waters, total, dissolved and bioavailable
- Estuarine modeling
- Source apportionment of zinc in the environment
- Zinc bioavailability and toxicity

REFERENCES

Bird P., Comber S.D.W., Gardner M.J. & Ravenscroft J. (1996) Zinc inputs to coastal waters from sacrificial anodes. *Science of the Total Environment*, 181, 257-264.

Boxall A.B.A, Comber S.D.W., Conrad A.U.A, Howcroft J. and Zaman N. (2000) Inputs, monitoring and fate modelling of antifouling biocides in UK estuaries. Marine Pollution Bulletin, 40, 11, 898-905.

Comber S.D.W., Franklin G., Gardner M.J., Watts C.D., Boxall A.B.A. and Howcroft J. (2002) Partitioning of marine antifoulants in the aquatic environment. *The Science of the Total Environment*, 286, 61-71

European Commission (2007) Risk Assessment Report on Zinc: Environmental Part.
Scientific Committee on Health and Environmental Risks (SCHER)

Franklin, G S, Comber, S, Watts, C D, Munro D, Boxall, A B A, Mackay, D, and Patrick, N, (2000) Environmental Modelling Of Antifoulants, ENSUS 2000, University of Newcastle Upon Tyne, 4-6 September 2000

Maycock, D., Peters, A., Merrington, G., and Crane, M. (2012) *Proposed EQS for Water Framework Directive Annex VIII substances: zinc (For consultation).* Water Framework Directive - United Kingdom Technical Advisory Group (WFD-UKTAG). SNIFFER / ENVIRONMENT AGENCY