The Kate Project for Waiheke Working Sail

Review of financial projections to restore cutter *Kate* to a seaworthy condition undertaken in January, 2015, by David Waters. Inevitably such a review involved examination of the vessel to provide objective observations on which assumptions could be based and forms the framework of this report. It should be noted that my opinion is not based on formal qualifications but a long experience of owning and repairing wooden boats, more keeping them going than restoring them. This experience ranges from building small craft to repairing mullet boats and small keelers, working for nearly a year in a UK boatyard specialising in the repair of older wooden boats, working for a similar period in Australia working on refits of prawn trawlers and working as a shipwright on the wooden square rigger *Soren Larsen* on several refits. I also owned the 1886 cutter *Rewa* for 11 years, undertaking repairs and improvements.

Overview:

1. The sailing cutter *Kate* is unquestionably worth saving and the work to date (January, 2015) has hopefully ensured this. The *Kate* is extremely old, well over a century, and an artefact of her times, and repairs of varying quality reflect both her changing fortunes and the technology of the period. They range from square iron nails clenched on the inside of grown pohutukawa timbers with only the bark removed to modern epoxy glues. This 'warts and all' condition is important from a historical perspective.

2. There are only two known comparable vessels; the similar length *Rewa,* an inside exhibit out of the water at the Maritime Museum in Auckland and the centreboard cutter *Undine,* afloat and sailing in the Bay of Islands. The *Rewa* has both more beam and more (original) draft with both more deadrise and significantly hollow sections forward while the *Undine* hull is more comparable in shape but with windward ability provided by a centre board; again the forward sections appear finer than those of the *Kate*. The rebuilt *Kate*, as proposed by Bernard Rhodes, will be entirely in the style of these other remaining cutters, that is, a low gaff rig with a long boom, two headsails, the jib going to a long bowsprit, simple gear, a comparatively shallow hull with walk around decks and bulwarks, the latter hiding, as in the case of *Undine* and *Rewa* in her pleasure boat days, the substantial and non-original deck house.

3. The *Kate* was built as a Kaipara harbour cutter and her shallow draft and comparatively narrow beam reflect the requirements of an engineless working boat for that harbour towards the end of the 19th Century. Her original build still apparent inside also reflects the economics of the era for a small working vessel which had to pay her way. She was not expensively built, certainly not of yacht standard. She would have been manageable with sweeps or by polling up narrow creeks and could dry out somewhat upright. The later addition of a deep full length keel member has compromised the later situation, although much improving her sailing qualities and adding enormously to longitudinal strength.

4. Like many extremely old vessels, the *Kate* has gone through various transformations, having become a tow boat with engine rather than sails quite early in her career, later a fishing boat and then a pleasure craft. It is now proposed to use the vessel for youth development, teaching and developing traditional skills in boat building and seamanship as well as preserving our sailing heritage. While on the small side for sea training she is still larger than boats where many of an older generation learnt their skills and as long as safety and regulatory criteria can be met should be appropriate to perform this duty in a modest way.

The *Kate* project at January 2015:

1. Restoration of the Kate was proceeding at a good rate in a temporary shed at the Causeway, Waiheke Island, under the supervision of Bernard Rhodes who has two apprentices working full time with the objective of repairing and making the hull water tight and relaunching before the old planking completely dries out.

2. The stripped out hull has enabled all the areas of the structure to be examined and revealed some areas of rot and damage which is being attended to. The original stern planking has had to be cut back and new planking has been begun. A damaged or rotted area at the forefoot has been replaced with grown to shape pohutukawa bolted and glued in place.

3. At some time the stern post appears to have been replaced with a more substantial structure providing enough width for a propeller shaft and stern bearing and possibly this was done when the hull was 'double planked' with a one and a quarter inch layer doubling the original planking thickness to the unloaded water line and this unusual outer skin appears to be in good condition and is currently being repaired where necessary. The original planking appears mostly in good condition to the waterline except in the bow area on the port side where there is some distortion in the area at present being repaired.

4. With the addition of a number of new floor timbers extending across the centre line and effectively fastened to the planking the *Kate* should be robust and watertight at least to the turn of the bilge. This is the area where the hull appears weak and will require strengthening, either by carefully fitted grown timbers, work which is under way in some areas, or laminated members to ensure continuity of strength between the bottom and topsides. The challenge with this rebuild is to marry strong and rigid repairs with epoxy glue, etc, to the older more flexible structure, most particularly the single skin topsides. I would anticipate that it is in the area of topside planking, particularly on the port side where there have been numerous repairs, that there will be problems if the vessel is hard used.

5. The stern beyond the rudder post is currently being rebuilt to conform to the vessel's original style to replace an unfortunate previous modification and this, along with a metal tube and rudder stock in place of what would have been a wooden trunk and stock, will improve the vessel's appearance and will recreate her original look. The completion of this work is planned for after the *Kate* returns to a drying berth at the Causeway and should cause no problem as long as precautions are taken to prevent the hull from flooding once the existing transom

is demolished. The simple wheel steering and the rudder as proposed should be effective and adequately strong although the more the aperture can be filled in the better she is likely to sail.

6. The beam shelf, of somewhat recent installation, is substantial and in good repair although some bolts lack blocking between it and the hull planking and this situation may be best rectified by bolting through existing or additional frames into the topsides. The vessel lacks structural ties between deck and hull and could benefit from strategically placed hanging knees through the central section. The shelves lack an apron at the forward end but some athwartships stiffness is supplied by the plywood deck, probably installed at the same time, which seems in good enough condition with current steps to eliminate leaking on the butts. The current deckhouse appears sound but requires some hanging knees and possibly more fastenings between the plywood skin and the carlings to ensure integrity.

7. The proposed rig seems eminently suitable for the programme envisaged and can also be constructed cheaply. It should provide lots of strings to pull making sailing a team effort in line with the proposed deployment.

8. The proposal to provide stability with lead moulded each side of the keel and bolted upward through additional floors as well as cross bolting through the wooden keel appears logical and not unprecedented, if a little unusual. It will require sufficiently sized floors to take vertical bolts to relieve the wood keel of any twisting action and will have to be sufficiently faired not to destroy the sailing performance. Proper stability calculations will have to confirm the weight required on the short lever that the comparatively light draft provides and my off the cuff guess would be around two tonnes to give an adequate safety factor. (Cf. 1936 26 foot mullet boat *Carona* with the same beam and 900 square feet sail in a similar rig and depth of hull with two and a half tonnes of, admittedly inside, ballast.) If this weight is required it may require a rethink on the 4 foot 3in draft and the level at which the double planking stops. Otherwise the flat floors and hard turn to the bilge will give plenty of stiffness at normal sailing angles of heel.

A recommendation:

I would suggest that an engine of at least 40 horsepower be fitted for the proposed deployment of the vessel. The existing engine beds appear adequate and there is no problem fitting a sufficient shaft through the after deadwood and stern post. The engine should be installed with an Aquadrive or similar flexible drive and a separate thrust bearing to eliminate alignment problems. An adequate engine can enable the vessel to be treated as a power craft in extreme conditions or when crew skills are insufficient for the task and also to maintain schedules or in situations of medical emergency.

The question of costs:

1. What becomes immediately apparent is that it is impossible to estimate with any accuracy although it is clear that labour rather than materials is the main factor. Much may depend on the attitude of approval authorities towards the vessel and in

this connection it should be noted that Bernard Rhodes is a highly esteemed ambassador for the project.

2. Taking Bernard's schedule of work (in bold type below) I make the following comments:

Hull – frames, keelson, planking, belting, refastening 1.00 unit

This extensive work is well advanced but with much still to do may be short by 0.25 of a unit.

Rebuild stern - bulwarks and taffrail 1.00 unit

This should be adequate as it is now mostly new work with less complications although materials might mount up.

Partners – bulwarks - cap rail 0.50 unit

This should be sufficient. Tongue and grove planking gives a pleasing look to the bulwarks and is more self supporting than plywood. The bottom should be spaced off the deck except at the bow and stern to allow water egress and attention to caulking round the supporting vertical timbers. For safety reasons short stanchions and a top wire may be required above bulwark level.

Rudder – support deadwood – steering gear 0.25 unit

Just sufficient depending on cost of engineering. An alternative would be to scarf an extension on to the deadwood going to the heel of the rudder but there may be no opportunity for the vertical bolting required.

External keel – keel bolts – fairing 0.25 unit

I would expect this to be a more significant cost unless materials are donated, may be short by 0.25 of a unit.

Hardware – chainplates – deadeyes – standing rigging – windlass 0.25 unit

Assuming nothing fancy should be about right.

Mast – spars – running rigging – fittings – cleats 0.25 unit

O.K. with donated timber and fittings similar to build period.

Interior 1.00 unit

This can be adjusted to budget at time.

Plumbing 0.25 unit

Should adequately cover simple installation.

Electrics **1.00 unit**

This is a generous figure and could easily be cut in half for an appropriate level for a boat operating in coastal waters in a traditional manner; most expensive item a GPS or chartplotter for safety considerations.

Painting – anti-fouling – varnish **1.00 unit**

Hopefully generous allowance given that both unskilled labour and some materials may be donated and high tech finishes are inappropriate.

Safety gear – liferaft – life jackets – ERIRB – VHF radio – flares **1.00 unit**

This figure is more than enough given that it is largely for purchase of standard items with little labour involved. About half this unit could probably be allocated to the closely allied compliance with regulatory requirements.

Tender plus outboard **1.00 unit**

This figure could be halved but see note below re engine. It was planned to run the vessel entirely by sail which would have required a bigger outboard for using the tender as a tug.

Sails - $5.500 plus rigging up **0.35 unit**

This seems a bit light, would suggest 0.50 of a unit unless discount or donation can be arranged.

Jacking up – cradle – etc **0.50 unit**

I presume this refers to work already done to date.

Design work **0.25 unit**

This depends very much on which services are gratis

Unknowns **0.50 unit**

Because of the uncertain nature of the work this item should possibly be increased to 1.00 units

Total units as per Bernard Rhodes estimate in July 2013 **10.35 units**

Conclusions:

1. Working off the same list of work categories I would reach a very similar figure, i.e., 10.50 units as realistic but largely dependant on the cost of labour. While Bernard is able to supervise the two apprentices at present on the job this would

seem eminently achievable. Employing a suitably skilled shipwright at anything close to market rates would probably be prohibitive.

2. There may be scope for a sufficiently qualified retired or similar skilled person to work on the project for a reasonable rate given that some builders on the island are working for around $32 per hour before tax and a figure close to this may be possible and would speed up the work.

3. Engine: The one item not allowed for in these estimates is an engine. A suitable new 40hp diesel marine engine complete with gearbox is currently advertised for less than $13,000 and there may be cheaper options. Assuming the stern tube, propeller and flexible drive/ thrust bearing could be purchased for $2000 per item the cost of the machinery would be in the vicinity of 1.00 units, i.e., about $20,500, leaving the cost of installation, which I would estimate at 0.25 units.

4. The engine and associated costs plus the suggested additional 0.50 of a unit for unknowns would increase the project costs to $240,875.

5. This would indicate that the original estimate without an engine of about $212,000 in 2013 was acceptably accurate.

6. I note that there is not item for insurance although it may be in place. If not it should be considered as the vessel represents an increasingly valuable investment which should be covered against loss.

7. It should be noted that if this vessel were not to be used institutionally a lower standard could be set with consequent savings. It is also possible the project may advance ahead of expectations which are necessarily contingently on the high side but experience suggests that projects seldom come out under budget.