Pre Purchase Survey Report No: [redacted]

Name of Vessel: [redacted]

Survey Commissioned by:
[redacted]

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[redacted]

Widebeam Narrowboat

Length Overall	40ft
Beam	8ft 10ins
Built	1982
Builder	Not known
Fitted Out	Owner
Engine	BMC 1.5

All particulars were compiled according to available information and they have not been confirmed unless stated.

CONTENTS

1. About the Survey and this Report

This survey was carried out by Hugh Ellacott at the request of [redacted] who is a prospective buyer of the vessel.

Scope of Survey

This is a pre-purchase survey and its purpose is to establish the structural and general condition of the vessel. Where items of equipment have been tested this is stated in the text.

Conditions of Survey

The survey took place on 4th October 2012 while [redacted] was lying ashore at the Terrace Gardens Boatyard, Hampton.

The weather on the day of the survey was bright and sunny.

Limitations

- This report has been prepared for the use of the commissioning client and no liability is extended to others who may read or rely on it.
- In some cases it was not possible to detect latent and hidden defects without destructive testing which was not possible without owner's consent.
- The hull could not be inspected where the vessel lay on shores or under the trolley that prevented access to the bottom in the middle of the narrowboat.
- A general inspection of the engine and its installation was be made, but this was a visual inspection only without running the engine. It should be appreciated that some components may appear serviceable but may be defective when the engine is run / given a thorough service.
- Electrical and electronic equipment was not examined or tested.
- Access to equipment under the aft deck was poor and visual inspection was only possible at a distance.

Recommendations

A list of all recommendations and advice is reproduced at the end of the conclusions.

Recommendations
Recommendations are limited to those defects that should be rectified before the vessel is used (or within a given time span if specified). The associated defects may affect the insurability of the vessel.

Advice
Advice is given concerning defects that do not restrict the use of the vessel or her safe use. These defects may be cosmetic or concern actions that will prevent more serious defects developing in the future. Although these defects may be considered minor, do not assume repair costs are low.

2. Description of Narrowboat

[redacted] is a 40ft widebeam narrowboat with a timber cabin constructed on a mild steel hull. The builder of the hull is unknown. There is a well deck forward of the accommodation and a traditional style deck aft.

The livery of the cabin was green with red on the top strake of the hull and on trim below the coachroof.

3. Hull

The shell is constructed of mild steel. The mid section has parallel hull walls with a flat bottom. The near vertical side shell is fold twice; once to form the side decks and once at the waterline where there is a soft chine. The bow is raked and straight not rounded. Unusually the uxter plate[1] is not parallel to the bottom plate but rises towards the transom. There bottom plate exhibits rocker at the bow.

There is one full length D-section rubbing band and additional partial rubbing bands, one at the bow more or less on the waterline and a second around the counter at deck level. The rubbing bands are fully welded on their upper edge and stitch welded below.

No repairs were noted, though it was reported that when the vessel was last dry docked in 2010 a minor repair was made to the port bow above the waterline.

Above the rubbing band the top strake was painted in red gloss enamel. The paint was in good condition, but crazing could be seen in the underlying coating which could cause breakdown of the enamel in the longer term.

Below the top strake, the topside and bottom were painted with an epoxy coating that was in good condition; four layers were discernible, two grey and two black. The following defects to the coating were noted: a "holiday" on the bottom plate where the boat must have been supported by shores when the coating was applied, rubs due to fenders, a very minor chip to the sacrificial chine to port and failure of the coating on the rubbing band at the stern.

The shell was hammer sounded and no defects were detected. Particular attention was paid to areas were corrosion is most likely to occur, e.g. by way of the internal framing between the accommodation and the engine compartment.

Ultrasonic thickness measurements were taken as described in Appendix A. Readings were taken every 1.5m on both sides of the hull. Sketch 1 in Appendix B shows the results of gauging the thickness of the hull plating. Measurements were taken at the waterline, the foot and midway between the two points where appropriate. Measurements on the bottom plate were taken approximately 50mm from the chine, where most severe external abrasion and internal corrosion is likely to occur, and along the centre line where access was not prevented by the trolley. At the stern additional readings were taken on the uxter plate and swim plates.

[1] Sometimes called the counter bottom plate as it forms the bottom of the counter stern which is above the propeller.

The nominal thickness of the plates (including bottom, uxter, swim and side plates) when constructed is assumed to be 6.0mm

The ultrasonic thickness measurements revealed that there has been only limited corrosion affecting the hull. Internal corrosion was noted to the side shell by way of the toilet compartment where the lowest thickness measured was 5.1mm. Diminution was also noted to the uxter plate, see Section 4. The lowest measurement taken was 4.9mm on the bottom plate by way of the engine compartment. No remedial work was required.

Visual examination revealed no evidence of pit corrosion. No weld defects were noted.

The sacrificial chine, which is formed by the bottom plate where it extends beyond the width of the hull sides, was examined. Along the sides of the narrowboat the chine extended between 4mm and 8mm but the chine fillet weld was not affected. At the bow and the swim the chine was between 10-12mm. The chine at the uxter plate and around the transom was between 7-10mm. No feathering (loss of thickness) of the wearing edge was noted and none of the epoxy coating had been worn away. This indicates that width of chine recorded during the survey is more or less as built. It should also be noted that the vessel has spent most of its life on the Thames where wear to the sacrificial chine will be minimal. It is not considered necessary for the wearing edge to be enlarged; however the chine should be examined each time the vessel is taken ashore.

Advice
Monitor width of sacrificial chines each time the vessel is taken ashore and restore chines to full width should further wear affect the chine fillet weld.

Access to the weed hatch was poor. It was hammer tested and no defects were detected. It was noted from outside the boat that a timber cavitation plate was fitted in the weed hatch tunnel.

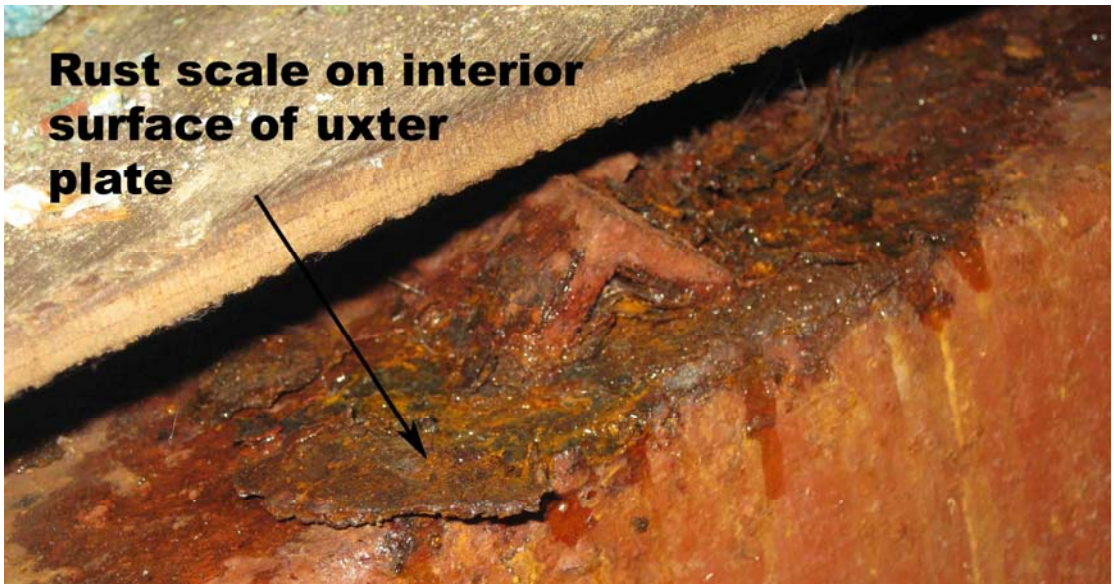
4. Interior of Hull and Structural Stiffening

Access to the interior of the hull was reasonably good for a narrowboat; there were central hatches in the flooring through much of accommodation. Only two transverse frames were noted, one forward of the engine compartment and second approximately 500mm forward of that. There are three longitudinal, a 25mm L-section frame running along the centreline and two 50mm box-section frames approximately 700mm either side of the centreline.

Ballast was present at all location where access was obtained to the bilge, except in the toilet compartment and engine compartment. Ballast included paving slabs and scrap steel. Ballast prevented examination of all but a small part of the interior steelwork. Where visible a black coating was seen. Bilges were dry apart from under the toilet compartment where rust scale (2-4mm thick) was noted.

The side shell was seen in a locker, no coating was noted and surface rusting was present. In the engine compartment the steelwork was coated with red paint, probably red oxide primer. The uxter plate was lined with ply but at the linings' edge scale and moisture was noted (see photo). The presence of scale and external ultrasonic

thickness measurements suggest corrosion is affecting the uxter plate and it would be prudent to remove the lining in order to treat the steel beneath to prevent further corrosion occurring.



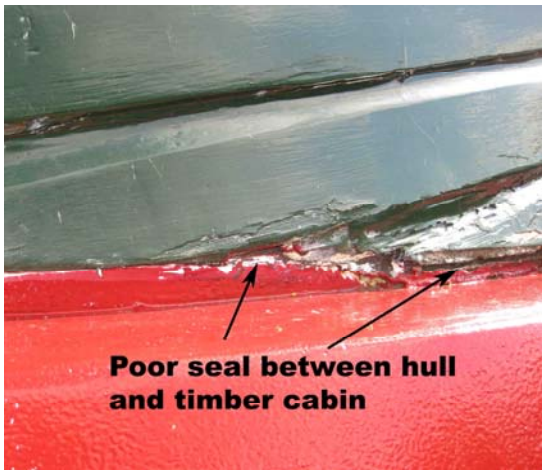
Advice
Remove lining from uxter plate to inspect for corrosion. Where present, prepare steelwork for painting by removing all scale, rust and loose paint, treated with rust inhibitor and coat with a primer and bilge paint.

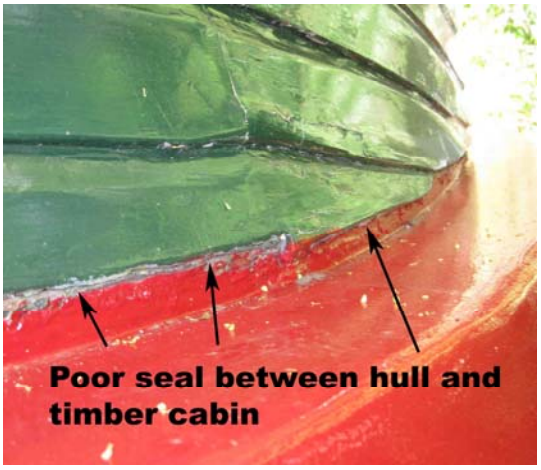
5. Decks

There was a well deck forward of the accommodation. The side shell was painted in red gloss enamel that was in good condition. The deck was painted with a black coating which was in good condition, though pitting was noted to the steel. Side decks and the aft deck were painted in red gloss enamel that was in good condition, apart from one area failure on the aft deck. No non-slip surfaces were identified.

6. Cabin

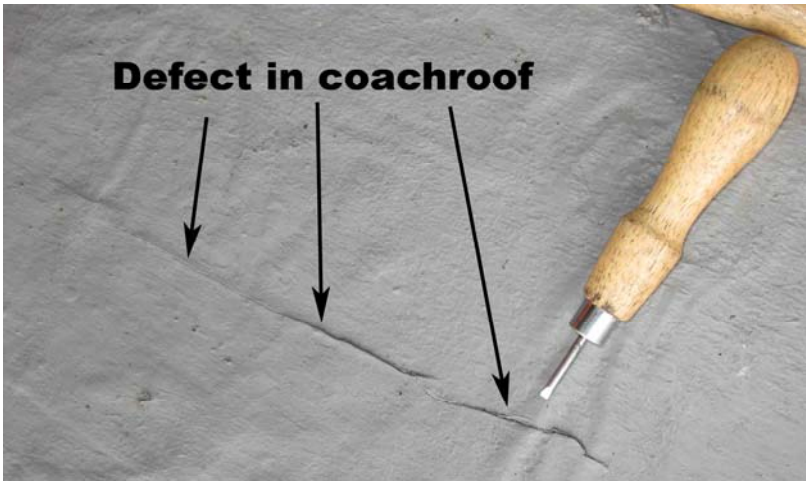
The cabin was constructed from timber; external skin was soft wood tongue and groove fastened parallel to the deck. The timber was finished in green gloss paint that was in good condition. The lower edge of the bottom edge was carefully examined for fungal rot, none found. However, in places the lower edge did not take paint well indicating the timber has weathered. Mastic had been used to seal the joint between the hull and the timber cabin. It had failed particularly on curved sections. Leaks were possible, though this cannot be established by visual examination (see photos below). No evidence of leaks was seen inside the cabin.





Maintaining the seal will require routine on-going maintenance using good quality materials.

The coachroof was covered with a grey coating that had incorporated a fibre. The underlying weather protection was not identified. The roof was hammer sounded and only two small areas where the coating had delaminated were found. Visual inspection revealed some cracks in the covering/coating but it was not apparent whether these would result in leaks (see photo below). No evidence of leaks was seen inside the accommodation.



Handrails consisted of L-shaped angle securely fastened to the outer edge of the coachroof that provided serviceable handholds.

7. Rudder and Steering

The rudder was made from mild steel. Stops were welded to the uxter plate to limit the movement of the rudder. The rudderstock was supported on a skeg; bottom bearing had minimal play (1-2mm). The upper bearing had excessive play and appeared to be missing a bush.

Recommendation
Service upper bearing of rudderstock. Complete within six months.

Steering was by means of a swan neck, as there was not room to fit a tiller bar without it hitting the cabin. Without a tiller bar steering may be heavy.

8. Stern Gear

The propeller was right-handed and appeared to be made of manganese bronze. It was scraped and the bright metal showed no visually discernible evidence of dezincification. The propeller turned freely through 360° and there was no discernible play in the outboard bearing.

The propeller shaft appeared to be made from stainless steel and was non magnetic (marine grade stainless steel is non magnetic). There was no visual evidence of corrosion. The propeller was fastened to the shaft by means of a stainless steel nut secured with a split pin.

There was a traditional stuffing box on the inboard side of the stern tube. The gland was secured by means of studding and nuts. A locking nut was missing and the other was loose.

Recommendation
Replace missing locking nut and tighten nuts so stern gland is secure. Complete before narrowboat is used for navigation.

9. Cathodic Protection

There were six anodes welded to the shell; two at the bow, two on the side shell and two at the swim. They were approximately 10% and at the time of the survey and not in need of replacement.

10. Through Hull Apertures

There were two below waterline through hull apertures. These were an intake for engine cooling (swim to port) and black water tank discharge (swim to starboard). No skin fittings or valves were dismantled as part of this survey, but the following tests were carried out on below waterline skin fittings and valves.

- Examination from outside and inside the boat.
- All valves open and closed to their full extent where possible.
- Any fixing bolts hammer tested where accessible.

- Bodies of metal valves or seacocks tested with a hammer inside the boat and external parts hammer tested outside the boat.
- Fittings aggressively tested inside the boat for security in the hull.
- Hose clips inspected and hoses aggressively tested for security.

No defects were detected, but see recommendations concerning the raw water hoses in Section 17. The black water valve was marked as made of brass which is acceptable for freshwater application.

The above waterline apertures listed in the tables below were identified.

To Bow*	Height Above WL*	Function
PORT		
1.6m	160mm	Well deck scupper
STARBOARD		
1.6m	160mm	Well deck scupper
8.2m	200mm	Sink and basin discharge
8.3m	250mm	Shower discharge
TRANSOM		
	350mm	Freshwater tank breather
	120mm	Plastic skin fitting, black water tank breather
	120mm	Pipe, engine exhaust

*Estimated

The pipe serving the engine exhaust was secured by a flexible sealant which was failing. The exhaust discharge should use either a metal skin fitting or welded steel pipe.

Recommendation
Fit secure through hull fitting for engine exhaust through hull. Complete within three months.

In addition to the above listed through hulls there were two vents for a gas fridge in the top strakes; one to port (in use) and one to starboard (disused).

11. Access to Accommodation

Double doors provide access to the accommodation from the well deck. The upper door panels were double glazed units. Paint and timber were in good condition. The doors could be securely locked.

A hatch and double doors provided access from the aft deck. The hatch was of light timber construction and slid (not smoothly) on runners. It was in poor to moderate condition, see photo below.

The hatch and doors were secured by an external padlock and hasp and internal bolts. The internal bolts did not adequately secure the hatch. If padlocked externally emergency exit is prevented; the Boat Safety Scheme (BSS) requires two means of exit from a vessel.

Recommendation
Provide an internal means of securing the aft hatch and remove external padlock and hasp. Undertake immediately.

12. Windows, Ports and Hatches

There were four double windows, two on each side of the cabin. Units were commercially made with two double glazed opening windows. All windows that were not locked were found to open easily. However, the catch on the forward port window was broken. Timber frames covering the plastic frames on the outside of the cabin were in good condition. No evidence of window leaks was seen inside the vessel.

There were two opening hatches in the coachroof. They had clear plastic covers and were in good condition; no evidence of leaks was noted.

13. Mooring Arrangements

There were three mooring "Tees", one on the bow and one on the each quarter of the aft deck. There was no anchor on board. Navigation on the Thames in not recommended without an anchor. For [redacted] a 15kg Danforth (or similar anchor) with 30m of 12mm nylon rope would be sufficient for use on the non-tidal Thames. Other anchor designs would be suitable, but the Danforth has the advantage of stowing flat and holding quickly once deployed.

Recommendation
Carry a 15kg anchor with 30m of 12mm nylon rope, before the vessel is used for navigation.

14. Navigation Lights

The horn was tested and heard to sound. Navigation lights were tested; the port side light only came on when the holder was tapped. The configuration of the navigation lights was incorrect for a vessel over 12m. There should be a masthead light, a stern light and side lights. [redacted] is fitted with an all round light (used as an anchor light) rather than a masthead light.

Recommendation
Repair intermittent fault affecting port side light before vessel is used for navigation.

Recommendation
Fit masthead light on forward part of coach roof before vessel is used for navigation.

There was no tunnel light. A tunnel light should be fitted before undertaking any cruises on the canal system where navigation of a tunnel would be necessary.

15. Bilge Pumping Arrangements

No electric bilge pump was fitted in the vessel. Access to the engine compartment is poor and it is difficult to monitor the present of water in the engine bilge; the traditional stern gland is designed to seep water when under way. An electric bilge pump should be fitted in the bilge compartment beneath the stern tube gland. The pump should have an automatic switch with a manual override. A pump rated at 500 gallons per hour would be sufficient for [redacted]

Recommendation
Fit an automatic bilge pump in bilge compartment beneath stern tube gland. Complete before the vessel is used for navigation.

16. Fire Fighting and Emergency Equipment

Fire fighting equipment was insufficient on the vessel; the two extinguishers on board were old and I recommend complete replacement. The boat safety scheme (BSS) requires three fire extinguishers with a minimum fire fighting capacity of 21A/144B on board a vessel greater than 36 feet in length. There was no fire blanket in the galley.

Recommendation
Install three new fire extinguishers with combined rating of 21A/144B and fit fire blanket in galley. Undertake immediately.

A smoke detector and carbon monoxide monitor were noted in the accommodation. The smoke detector did not work when tested, the CO monitor did not have a test button, but a flashing diode indicated it had battery power.

Advice
Replace battery in smoke detector and replace detector if it does not operate when tested.

17. Engine and Installation

The engine was a 1.5 litre BMC. The engine number was indistinct but appeared to be 5V/4605/D6455

I was informed the PRM gearbox was new and it appeared so (no documentation was provided). The identification plated showed the following numbers; top line 1207319 and 000724, bottom line; 12002.

The engine is mounted on strong fore and aft girders welded to the shell. The engine bolts were hammer tested and found to be secure.

The following checks were made.

- Oil checked under filler cap for dirt and emulsion; none found
- Oil dipstick checked to reveal correct oil level; no untoward odour, colour or emulsion seen in oil.
- Coolant in heat exchanger clean and at correct level.
- Belt tension on 12v alternator was slightly loose.

Engine cooling was achieved by a raw water intake. There were blanked off hoses in the system which in the unlikely event of their failure would cause flooding of the engine compartment. They are not required and should be removed.

Recommendation
Simplify raw water system by installing a single hose between seacock and raw water filter, thereby removing blanked off hose ends. Complete within six months.

The plastic water filter for the raw water intake is fitted on or below the waterline. Filters made of this material are much more fragile than those of metal. It would be prudent to replace the filter with a metal one or move it to a location well above the waterline.

A remote header tank ensured that the coolant level was maintained. The coolant level was low in the header tank. Where seen hose clamps were in serviceable condition.

Raw water is drawn through the system by a water pump mounted on the port side of the engine. The mounting was not secure. The pump is belt driven from the crank shaft. The pulley wheel on the crank shaft was loose and as a consequence the belt was loose.

Advice
Service drive for engine raw water pump and secure its mounting.

The engine was not started. The engine controls were a bespoke arrangement fitted to the aft bulkhead. The throttle and gear levers were operated and found to be stiff but serviceable. A hatch on the inside of the bulkhead allowed access to the mechanism.

Exhaust is expelled via a proprietary plastic muffler. The hose from the muffler to the discharge point at the transom was not exhaust hose and the hose from the heat exchanger to the exhaust water injection point at the engine were not to the correct specification.

Recommendation
Replace incorrectly specified hoses in cooling/exhaust system. Replace before the vessel is used for navigation.

Engine compartment ventilation was poor. In order to run efficiently engines require a good supply of clean air.

Advice
Ensure adequate ventilation of engine compartment.

18. Fuel System

A labelled fuel filler was located on the starboard quarter of the aft deck. It delivered fuel to plastic tank beneath the deck. A breather with flame-arresting gauze was fitted in the transom. It was orientated incorrectly with one of the gauze apertures able to catch rainwater.

Advice
Orientate flame arrestor so that gauze apertures point downwards.

A primary fuel filter was mounted aft of the engine. A shut off valve in the supply line was downstream of the primary fuel filter; it opened and closed freely. One would normally expect the shut off valve to be adjacent to the tank, however, given there is such poor access to the tank, the valves location is acceptable. The fuel leak off was returned to the fuel tank. Most fuel lines throughout the fuel system were made from copper pipe or hose specified to ISO 7840; however the leak off line did not appear to be specified for fuel use.

Recommendation
Replace any fuel lines that are not specified to ISO 7840. Replace within three months.

19. General Accommodation

This report does not describe the interior accommodation in detail. The general impression was that the bespoke fit out was to a good standard and fixtures and fittings had been well maintained.

20. Gas Installation

The gas system was examined with the aim of finding visually identifiable deficiencies in the gas system. There may be other defects in the system that cannot be found by visual examination. The visual examination does not constitute any kind of gas safety certificate, which is only obtainable in the UK after comprehensive pressure testing and assessment by a qualified person registered by Gas Safe (www.gassaferegister.co.uk).

There was no gas locker; a single 6kg propane gas cylinder was located on the aft deck. The cylinder is stored within 1m of a vent into the cabin which is not permitted by the BSS. The vent should be blocked and relocated more than 1m from the gas cylinder. The internal side of the vent was not seen inside the accommodation and it may not be in use.

Recommendation
Seal vent in aft bulkhead and relocate (if necessary) more than 1m from gas cylinder. Undertake immediately.

The gas hose between the regulator and the bubble tester was in good condition and correctly specified to BS3231/2. The bubble tester was operated and no downstream gas leak was detected.

Gas inside the vessel was delivered via copper pipe. There were three gas appliances.

- Morco Eco plus instantaneous hot water heater
- Electrolux fridge (can also be operated by AC mains or 12v electricity)
- Vanette 4000/2 four ring hob.

All appliances had isolation valves that were tested. It was noted that the hob and the fridge were connected using flexible hoses downstream of their isolation valves. There was no access to examine the specification or condition of the hoses. All rings on the hob and burner in the heater were lit and seen to burn with a good flame picture. All appliances had flame failure devices.

The Morco water heater was flued through the coachroof.

21. Freshwater and Sanitation

The filler for the freshwater tank was marked an on the aft deck. The plastic tank was in the engine compartment to port; a breather was present. An electric pump with a pressure switch supplies water to the freshwater system; taps in the shower, basin and galley were tested and operated. The mixer tap serving the basin was loose and needed tightening

Advice
Secure basin tap.

The shower tray was drained by means of a dedicated pump, not tested. It is a proprietary installation consisting of a submersible pump in a container controlled by a float switch. These pumps are prone to blockages and evidence of water in the bilge at this location indicates this particular pump had caused problems in the past. I suggest the pump should be replaced by a gulper-type pump that is less prone to blockage.

There is a lavatory with integral macerator in the toilet compartment. The electric flush was tested and seen to operate. Waste is piped to a black water tank located in the engine compartment. The tank has a breather pipe that was fastened to a skin fitting in the transom. The discharge pipe was connected to a two way valve that enabled waste to be discharge into the water course via a pump and a skin fitting on

the starboard side of the swim. Alternatively waste could be directed to a pumpout discharge point on the aft deck.

A washing machine, located to port of the forward door, was plumbed into the water system.

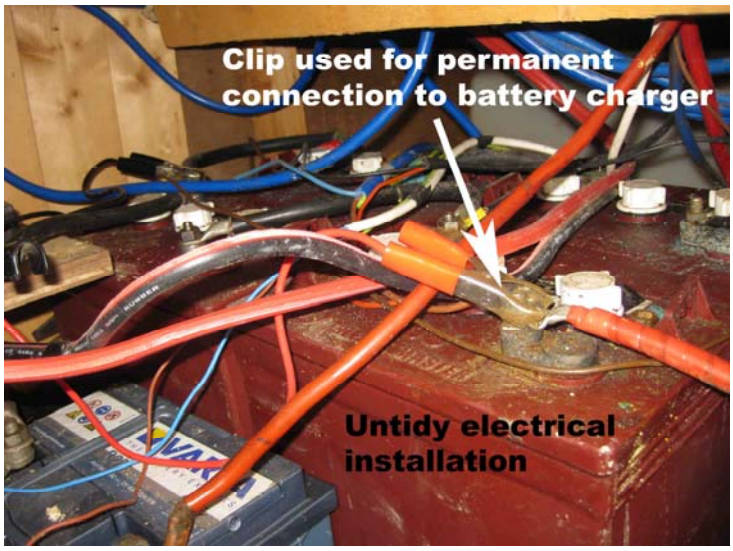
22. Electrical Installation

12volt DC

There are two battery banks (engine and domestic) located in the engine compartment to starboard. Batteries were not in battery boxes and were not securely retained in position.

Recommendation
Securely retain batteries in battery boxes. Undertake within three months.

Wiring was untidy in the vicinity of the battery banks indicating the poor quality installation. A battery charger was permanently connected to the battery bank. It would be prudent to investigate whether the charge is designed to be permanently connected to a battery bank. It was noted that clips were used to connect the charger to the battery bank – permanent connectors should be used.



Advice
Commission a marine electrician to examine electrical systems.

12v circuits were protected by MCBs rated at 6 amps in the domestic consumer unit. It would be prudent to check whether the Wylex MCBs are suitable for use in 12v DC circuits. Various lights were tested throughout the accommodation and seen to illuminate.

230/240 volt AC

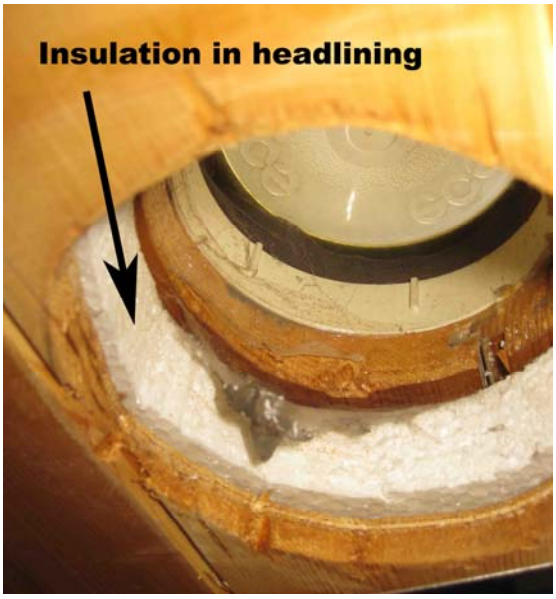
A shoreline can be connected to a 16 amp weather proof plug mounted on the aft bulkhead. It was loose and no longer securely mounted to the bulkhead.

Recommendation
Secure bulkhead plug for shoreline to aft bulkhead. Undertake immediately.

The shoreline supplies a domestic consumer unit that has a residual current device (RCD). There are 13 amp domestic sockets located throughout the accommodation. A Skytronic DC to AC inverter was beneath the consumer unit. Crocodile clips were used to connect it to the domestic battery bank and it was normally left unconnected. There was no mechanism to ensure that the inverter was not connected when the shoreline was also connected. It would be prudent to install a changeover switch to ensure this cannot happen.

23. Heating, Ventilation and Refrigeration

A solid fuel stove was located in the saloon. It was secure, the hearth provided good insulation and flued through the coachroof. A fire brick was noted as missing from the back of the fire box. It would be prudent to replace the missing brick as it will prolong the life of the stove. Polystyrene insulation was seen in the headlining and the cabin sides (port side forward locker).



Air flow through vents into the accommodation was restricted. The five flat top vents in the coachroof had their air flow restricted by louvred vents screwed to the headlining. The low level vent in the forward bulkhead opened into a locker where clothing restricted air flow. Adequate ventilation can be restored by ensuring the low level vent in the forward bulkhead is not in a locker (this vent could be replaced by a vent cut in a bottom panel of one of the forward doors) and removing the louvred covers over vents in the headlining. The covers could be replaced by an alternative design that does not restrict air flow. It should also be noted that the fly screens in the flat top vents also restrict air flow and should be removed.

Recommendation
Remove restrictions to air vents so that ventilation meets BSS requirement. Undertake immediately.

There were electric extraction vents in the galley and toilet compartment. The vent in the toilet was not working.

An Electrolux fridge was located in the galley. It could be operated using electricity (240v AC and 12v DC) and gas. It was not tested. A second worktop fridge was located in the saloon. It was operating at the time of the survey.

24. Conclusions and Recommendations

Conclusions

[redacted] is a well-appointed widebeam narrowboat set up as a comfortable liveaboard. The hull has been epoxied below the waterline and there is minimal external corrosion. Internal corrosion is affecting the shell, but no remedial work was required at the time to the survey.

The value of the vessel will be affected by the timber cabin which will require on-going routine maintenance to maintain it in its present good condition. There are a number of modifications to engine and systems that should be undertaken. None are particularly onerous or expensive on their own, but taken together they represent significant cost and work.

Hugh Ellacott, 6/10/12

List of Recommendations

Recommendations are limited to those defects which should be rectified before the vessel is used or within a given time span where specified. Associated defects may affect the insurability of the vessel.

1. *Service upper bearing of rudderstock. Complete within six months.*
2. *Replace missing locking nut and tighten nuts so stern gland is secure. Complete before narrowboat is used for navigation.*
3. *Fit secure through hull fitting for engine exhaust through hull. Complete within three months.*
4. *Provide an internal means of securing the aft hatch and remove external padlock and hasp. Undertake immediately.*
5. *Carry a 15kg anchor with 30m of 12mm nylon rope, before the vessel is used for navigation.*
6. *Repair intermittent fault affecting port side light before vessel is used for navigation.*
7. *Fit masthead light on forward part of coach roof before vessel is used for navigation.*
8. *Fit an automatic bilge pump in bilge compartment beneath stern tube gland. Complete before the vessel is used for navigation.*
9. *Install three new fire extinguishers with combined rating of 21A/144B and fit fire blanket in galley. Undertake immediately.*

10. *Simplify raw water system by installing a single hose between seacock and raw water filter, thereby removing blanked off hose ends. Complete within six months.*
11. *Replace incorrectly specified hoses in cooling/exhaust system. Replace before the vessel is used for navigation.*
12. *Replace any fuel lines that are not specified to ISO 7840. Replace within three months.*
13. *Seal vent in aft bulkhead and relocate (if necessary) more than 1m from gas cylinder. Undertake immediately.*
14. *Securely retain batteries in battery boxes. Undertake within three months.*
15. *Secure bulkhead plug for shoreline to aft bulkhead. Undertake immediately.*
16. *Remove restrictions to air vents so that ventilation meets BSS requirement. Undertake immediately.*

List of Advice

Advice is given concerning defects that do not restrict the use of the vessel or her safe use. These defects may be cosmetic or concern actions that will prevent more serious defects developing in the future. Although these defects may be considered minor, do not assume repair costs are low.

1. *Monitor width of sacrificial chines each time the vessel is taken ashore and restore chines to full width should further wear affect the chine fillet weld.*
2. *Remove lining from uxter plate to inspect for corrosion. Where present, prepare steelwork for painting by removing all scale, rust and loose paint, treated with rust inhibitor and coat with a primer and bilge paint.*
3. *Replace battery in smoke detector and replace detector if it does not operate when tested.*
4. *Service drive for engine raw water pump and secure its mounting.*
5. *Ensure adequate ventilation of engine compartment.*
6. *Orientate flame arrestor so that gauze apertures point downwards.*
7. *Secure basin tap.*
8. *Commission a marine electrician to examine electrical systems.*

APPENDIX A: Methods

Thickness Gauging

The thickness of the steel hull was measured using a Cygnus 3 multiple echo ultrasonic gauge. The use of multiple echoes provide readings which are accurate and reliable without the need for grinding. Protective coatings such as paint and resin need not be removed as the gauge will measure through such layers but not include their thickness in the reading. The calibration of the gauge was checked against a test piece at the start of the survey.

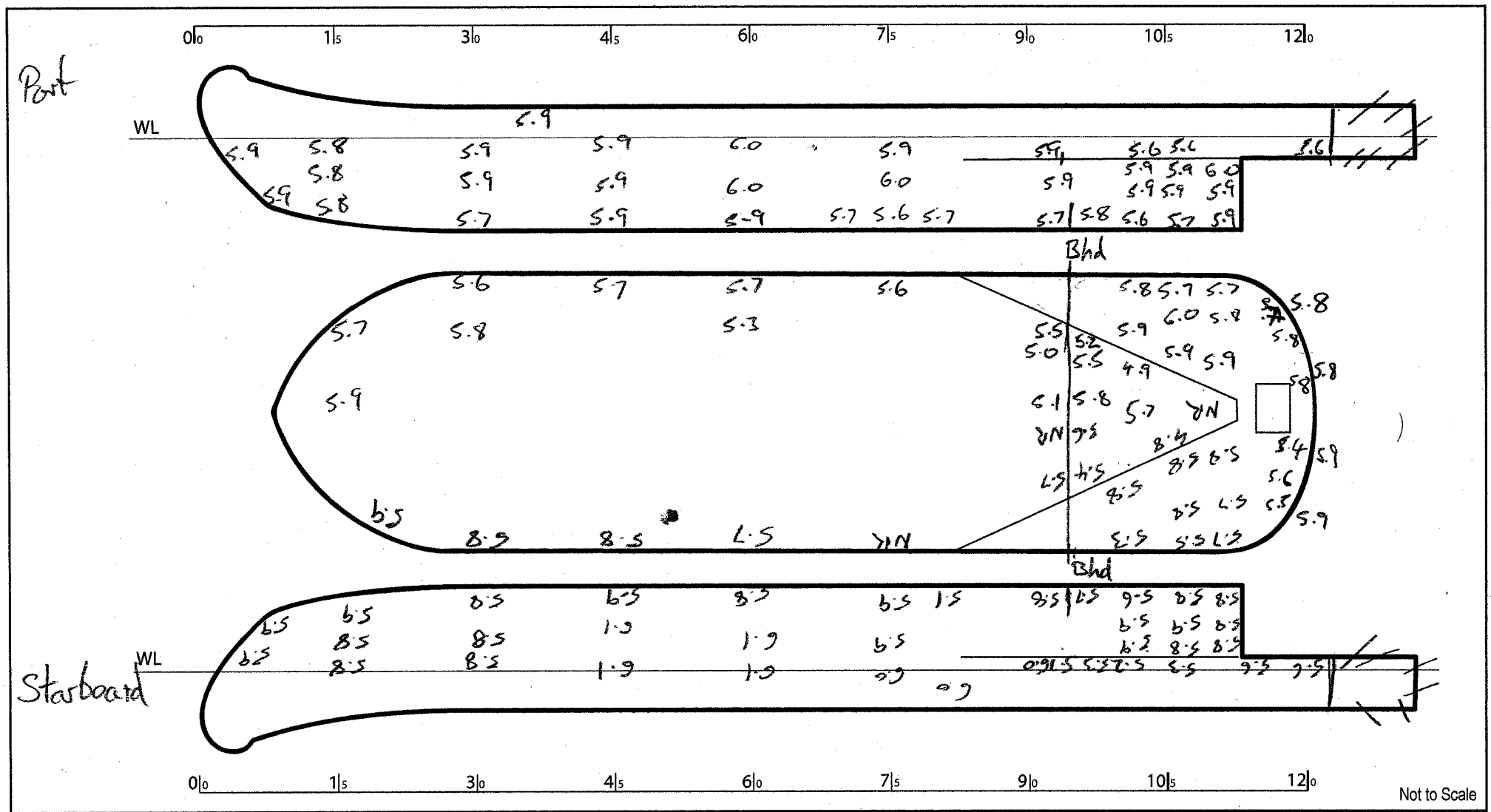
One probe was used in taking the measurements:

- 2.25 MHz, half inch standard probe

Where scale, dirt, weed or loose coatings were present, they were removed using a scraper. The vessel was jet washed prior by the boat yard prior to the survey.

APPENDIX B: Sketch of Ultrasonic Thickness Measurements

Bhd 9.5m



Not to Scale

Vessel [redacted]	Sketch 1: Results of ultrasonic thickness measurement	**ISIS MARINE**
Survey Date: 4th Oct 2012	~~Pit depths shown in red~~ (all measurements in millimetres, NR = no reading)	www.isis-marine.co.uk