

Kohimarama Yacht Club

Marama Project 2023-2024





Background

- Marama is KYC Committee boat, it was launched in 1978. Over the 45 years of service the boat has been the starting boat at thousands of club, regional and national events. She is a landmark of the Auckland centerboard scene.
- Marama is currently powered by an ageing Volvo Penta MD2040 39HP diesel engine. The engine and fuel system leaks diesel and oil into the bilge which mixes with the bilge water and ends up in the sea.
- The boat is in need of a major overhaul. Over the 45 yrs of use there has not been much maintenance of the vessel. The boat needs painting, new windows, new anchor winch, a toilet, and new wiring. The club has started this work with labour from its membership and support from the local marine industry.
- **As part of the refit the club will repower the vessel with an 10kW electric motor.**
- Marama is kept at OBC and needs to motor (at 5-6 kns) for about 45 mins to get to the clubs start region. At OBC it is kept on a marina and is fully exposed to the sun.
- Marama is not used during the week (only weekends) so the batteries can fully recharge during the week by the solar panels. No shore power will be required, **we will get all our required energy from the sun.**

Haul out at Orams yard Auckland – 9TH June 2023



Remove cabin top to fit into KYC shed 10 June 2023



Haul out at Orams yard Auckland – 9TH June 2023



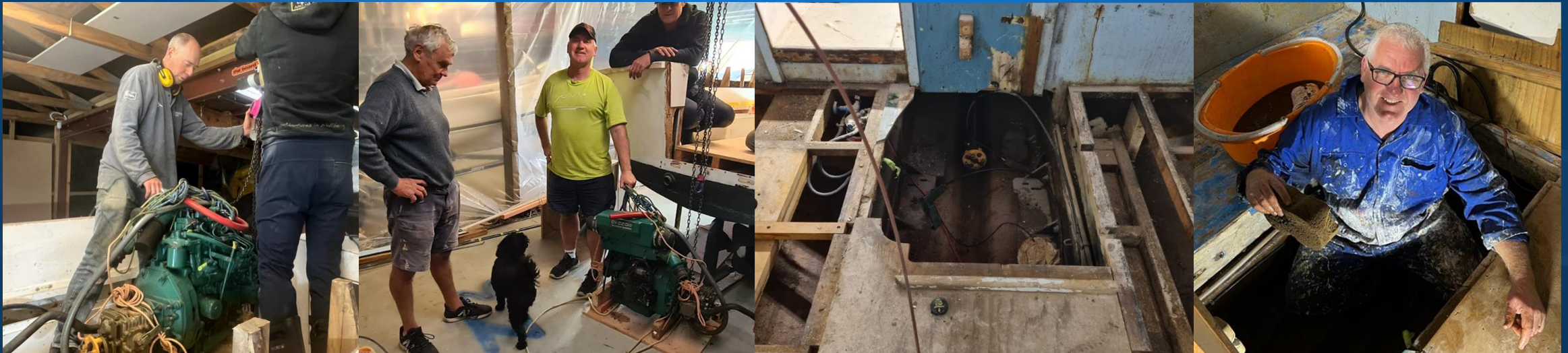
Refitting cabin top with flange June 2023



Stripping hardware and paint re-glassing deck 9 June - July 2023



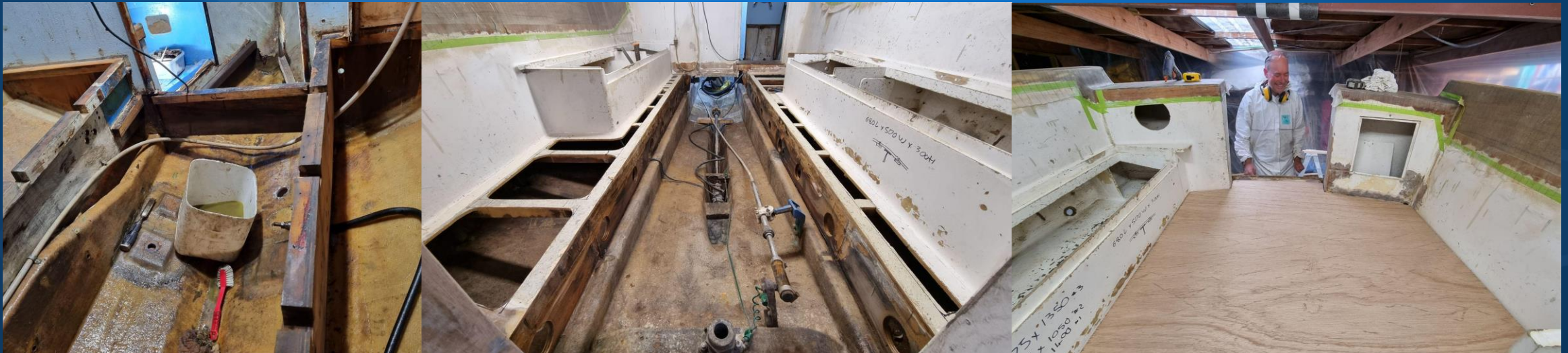
Engine removal and cleaning the bilge July 2023



Soda blast bottom & weigh hull and measure hull lines September 2023



Remove existing interior and build new August - October 2023



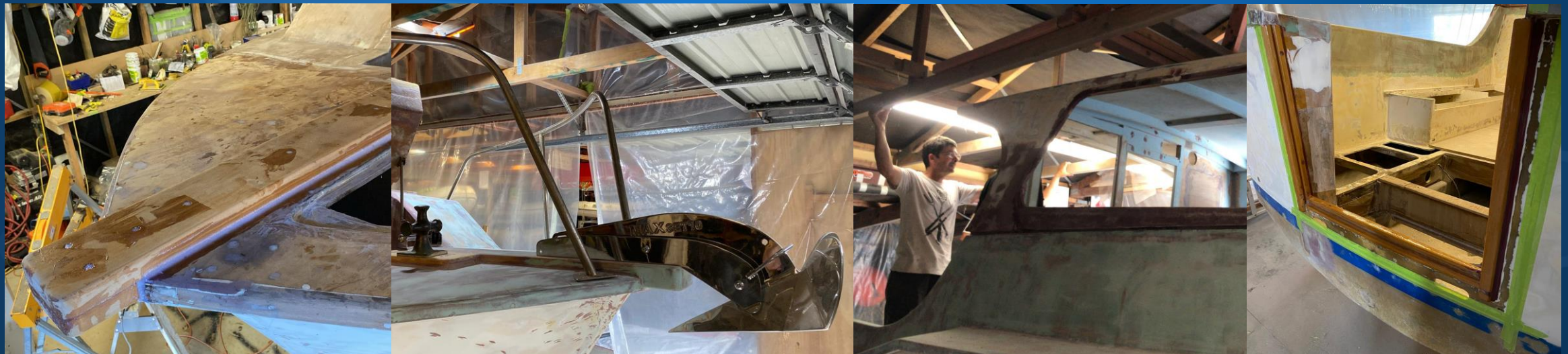
Remove existing interior and build new August - October 2023



Remove existing shaft housing and propeller from shaft October 2023



The build continues...



Cruising Speed and Autonomy study by LOMOcean Marine

Determining the cruising speed and autonomy of EV Marama using the ePropulsion i10kW electric motor and battery was critical to the success of the refit of this historic vessel.

To gain this valuable information accurate hull resistance and powering data was required.

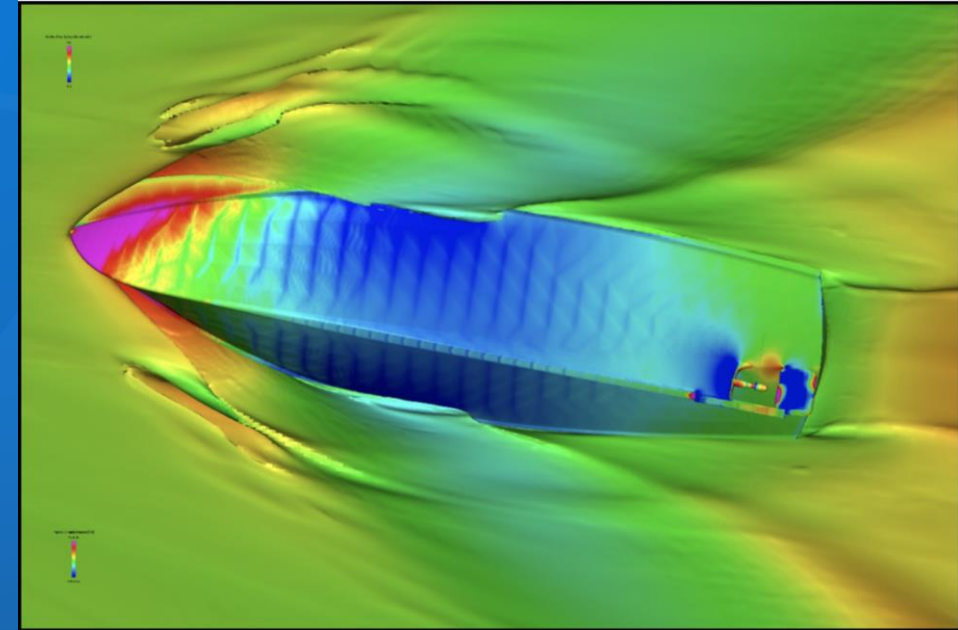
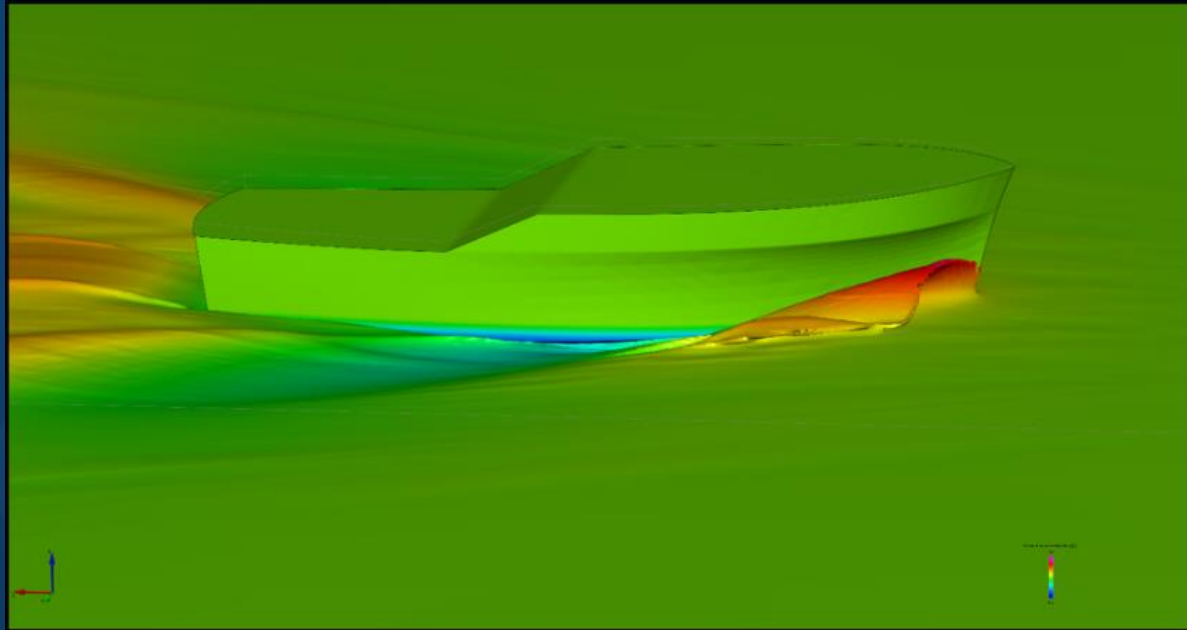
Due to the age of the vessel hull geometry information was unavailable.

The hull was set up level so the labourious task of manually measuring the shape could be undertaken.

Using these hull measurements, a facsimile of the Marama's hull was created in 3d computer space, this was in the form of a closed NURBS surface model.

The 3d computer model was used to perform self propelled Computational Fluid Dynamics (CFD) analysis to determine the necessary hull resistance and effective power.

EV Marama CFD simulation images at 6.5 knots boat speed indicating dynamic pressure distribution



Cruising Speed and Autonomy study by LOMOcean Marine



Motor

EPROPULSION I-10 electric inboard

SPECS

Model	I-10
Input power	10 kW
Input voltage	86 to 115 VDC
Weight	45kg
Dimensions (L x W x H)	565 x 295 x 380 mm
Cooling method	Air cooling
Rated rotational speed	1500 rpm
Operation and interaction	Throttle & display (standard)
Connectivity service	Support



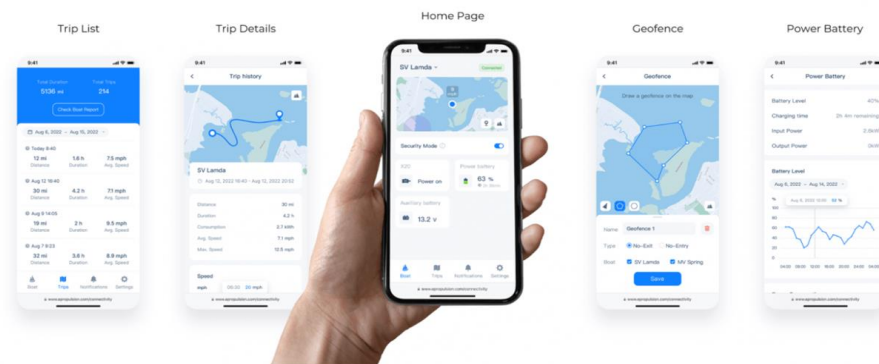
Motor Controls



Integrated with boating IoT

ePropulsion Connectivity Service is a value-added service enabling boat owners and fleet managers to communicate with their boats securely and reliably. It allows users to access cloud-based connectivity services without the need for additional accessories.

ePropulsion Connectivity Service



• Remote data access

You can check all real-time data, such as location, speed, battery level, remaining charging time, etc.

• Trip tracking

Automatically create boating trips with route playback and trip log.

• Guest authorization

Remotely authorize guests to power on and operate ePropulsion system with limited permissions.

• Remote monitoring

Notify users when boats break geofences, exceed speed limits and have suspicious location changes.

• Shared accounts

Invite other people to share access to real-time status, past activities and reports.

• Report generation

Automatically create boat reports and fleet reports to summarise all boating activities.



New Generation Controls under eSSA

The Smart Throttle and Smart Display 5" provide excellent user experience in controlling and monitoring. The Smart Throttle supports 3 mounting options for flexible installation. You could always find a best fit for your boat.

- ✓ Top or Side
- ✓ Single or Dual
- ✓ Portside or Starboard

* More control methods are coming...

Battery Epropulsion

G102-100 Lithium Iron Phosphate (LiFePO4)

SPECS

Chemistry	Lithium Iron Phosphate (LiFePO4)
Rated Voltage	102.4 V
Capacity	10240 Wh / 100 Ah
Battery Life	3,000 cycles at 80% DOD
Weight	100 kg
Dimensions	680 x 500 x 300 mm (26.8 x 19.7 x 11.8 in)
Cut-off Voltage	83.2 V
Final Charging Voltage	115.2 V
Max Continuous Discharging Current	100 A
Serial Connection	N/A
Parallel Connection	Up to 4 in 1 cluster. Multiple clusters are possible in the system
Cell Configuration	32S1P
Charging Temperature	0 to 55°C
Discharging Temperature	-10 to 60°C
Communication	One CAN for ePropulsion motors / One CAN (Two ports) for parallel batteries / One CAN for charger
Shipping Classification	UN3480, Class 9, UN38.3 Certified
Approvals	CE, UKCA, FCC
Warranty (Non-Commercial Use)	2 years

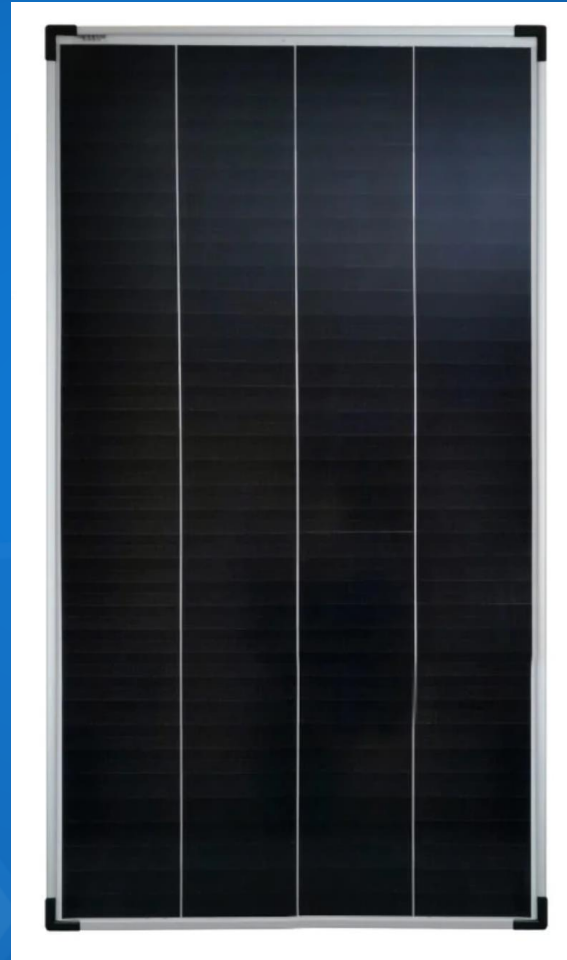


Solar Panels

195W SOLAR PV PANEL-SHINGLED PERC MONO

SPECS

- Peak Power (Pmax): 195.00W
- Max Power Voltage (Vmp): 21.76V
- Max Power Current (Imp): 9.04A
- Open Circuit Voltage (Voc): 31.34V
- Short Circuit Current (Isc): 7.95A
- Module Efficiency: 19.75%
- Max Systems Voltage (V): 1000V
- Pmax Temperature Coefficient (W/°C): - 0.41%
- Voc Temperature Coefficient (V/°C): - 0.31
- Isc Temperature Coefficient (A/°C): 0.05%
- Nominal Operating Cell Temp (NOCT): 48±2
- Operating Temp: -40 to +85C
- Cell Type: PERC Shingled MONO
- Cell Quantity: 188 CELL
- Weight: 12Kg
- Front Glass: 3.2mm High Transmission, Low Iron, Tempered Glass
- Surface Load: 5400Pa
- Junction Box: IP65 Rated
- Output Cables: MC4, 2.5mm² 900mm



Marama Specification

- 1 x I10 EPROPULSION ELECTRIC MOTOR
- 2 x G102-100 Lithium Iron Phosphate (LiFePO4) Batteries (10240 Wh)
- 5 x 195W SOLAR PV PANEL-SHINGLED PERC MONO (giving total of 975 W)
The panels will be mounted on the existing cabin top and a bimini to be built over the cockpit.
- System will be supplied and fitted by Beacon Marine, Auckland
- LOMOcean Marine has carried out calculations of the hulls resistance and matched this to the power output of the motor and the energy capacity of the batteries.
- LOMOcean has designed a new propeller to match the rpm and torque of the motor.
- Expected cruising speed 6kn
- Expected range 10.4 nautical miles (to 65% battery discharge).
See separate document for summary.
- Expected diesel use **ZERO**

