



Case Study

Bulk Fuel Cart RAN Mine Hunter Coastal Fleet – HMAS Waterhen

Customer Name

Royal Australian Navy

Location

HMAS Waterhen
North Sydney, NSW

Customer Business

Commissioned in 1962, HMAS Waterhen is the base for the RAN's minesweeping forces.

HMAS Waterhen is the home port to Australia's Mine Hunter Coastal (MHC) class of vessels. It provides porting, maintenance, and fuel to HMAS Huon, HMAS Gascoyne, HMAS Diamantina, HMAS Yarra, visiting war vessels and support craft.

Each of the Huon-class minehunter ships is 53 metres long, has a beam of 10 metres, and carries sufficient diesel to perform its role on the water for a period of 19 days. Propulsion includes a Fincantieri GMT BL230-BN diesel motor (1,985 bhp / 1,480 kW) plus four smaller props and thrusters. Each vessel carries crew and passengers of up to 49 sailors and officers.

The Defence Fuel Installation (DFI) at HMAS Waterhen is required to conduct ship-to-shore refuelling, sometimes several times per day. The Mine Hunter vessels usually receive around 25,000 litres of diesel, but larger craft using the facility may require up to 150,000 litres of diesel to be loaded. The base has on-site storage for 500,000 litres of fuel.



The Engagement

HMAS Waterhen had a situation where the Bulk Fuel Cart (BFC), the primary means of refuelling vessels serviced by the base, was in a poor state of repair. The BFC was condemned due safety, environmental, and compliance concerns, which left the facility unable to self-sufficiently refuel the fleet.

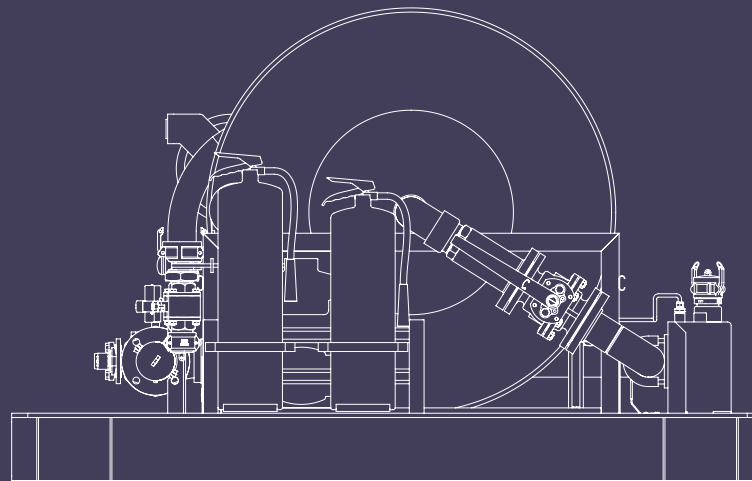
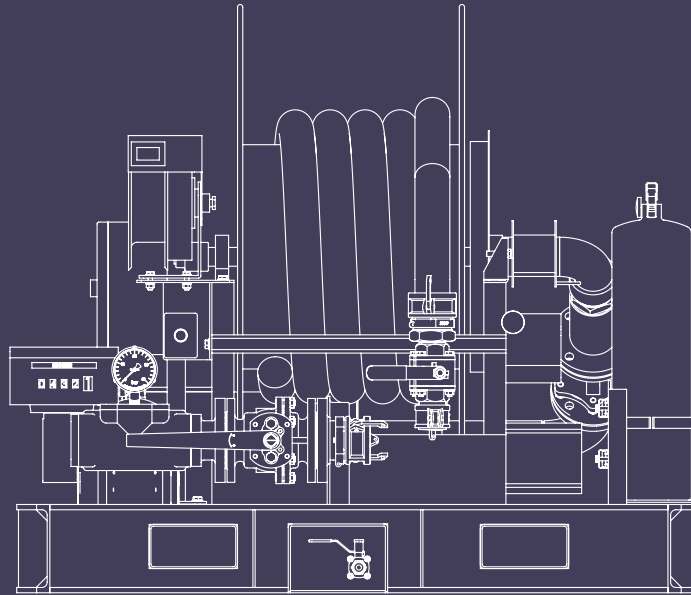
HMAS Waterhen required a vendor with specialist skills in the design, manufacture and commissioning of fuel infrastructure, along with the ability to meet stringent quality controls and a tight project schedule. After reviewing the capabilities of multiple organisations, the Department of Defence chose Banlaw as the refuelling specialists to deliver the project.

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Banlaw mechanical engineers visited the naval base to inspect the old fuel cart and to gain insight into the process imperatives for the new solution. It would have been possible to modernise the old BFC, but significant opportunities were identified to make the solution more mobile, reliable, safe, efficient, and to reduce the risk of spills.

Banlaw recommended features and components to meet the project scope, leverage current best practice, and to allow certification against Australian Standards and Military Standards for the management of fuels.

Bulk Fuel Cart Specification



Compact mobile solution; designed to be carried on the back of a ute/pickup for easy manoeuvring, and rapid deployment

1.5m x 2.1m footprint
(less than 1/3 the size of the BFCs predecessor)

Can be loaded onto small trailers and vehicles using a forklift

Galvanised skid base with bunded floor to capture any drips or spills

Catch points for every connection, both on and off the skid

Retractable 30 metre transfer hose with low voltage electric rewind

Earth leakage and other electrical safety features built in

Calibrated Flow Meter with mechanical register and simple reset

Calibrated stainless steel Pressure Indicator Gauge

Fuel sample point with spring return valve (automatically leaves itself in a safe condition)

Waste fluid storage tank with a quick coupling, to easily and cleanly drain the reservoir

Dual fire extinguishers

Stainless steel Camlock connections with caps and manual ball valves to further reduce spill risk, and also simplify the process of using the BFC

Draft general arrangement drawings followed by detailed designs were created by Banlaw's engineering team, and collaboration and approvals were coordinated between the Navy, and specialist 3rd party engineers who could certify the solution against standards specific to Defence and Road Transport.

After design signoff, Banlaw sourced components from around the globe to meet the stringent quality requirements and the 20-year design life for the new BFC. Fabrication and assembly of the skid, pipework, electrical and mechanical components was then conducted.

Testing and quality assurance activities were conducted at Banlaw's manufacturing facility in Newcastle, NSW. With a focus on continuous improvement; the Bulk Fuel Cart was repeatedly tested to its maximum operating pressure, and also underwent full wet-testing with diesel. Identified improvement opportunities were integrated into the design prior to final testing, ensuring a guaranteed leak-free and optimised solution.

Final flow and pressure testing of the solution was attended and witnessed by naval personnel, and Banlaw coordinated certification to all appropriate standards. A dossier was created including material certificates, pressure certifications, engineering signoffs, documentation of manufacture, and an instructional guide.

The new BFC was handed over at the HMAS Waterhen facility following hands-on operator training, and a full Mine Hunter ship-to-shore refuelling exercise.



Banlaw products and services used

Site Audits	Fabrication & Assembly (electrical and mechanical)	Commissioning
Fuel System Design	Quality Assurance & Certification	Inspection & Calibration

Business Risks & Challenges

Operational self-sufficiency

- ▶ The 30-year-old BFC (Bulk Fuel Cart) had been condemned due to safety, environmental, and compliance concerns. It did not meet current Australian or Defence Standards.
- ▶ As soon as the old BFC was retired, there was no refuelling capability for ships docked at the base. The BFC had previously been used up to 2-3 times per day, and instead road tankers full of diesel had to be ordered-in as the interim primary means of filling ships.
- ▶ The job of the Mine Hunter class ships is to mitigate naval threats to Australia. As soon as there is a heightened level of security threat the base is locked down. Civilian vehicles, including semi-trailers full of diesel would no longer be allowed on site. To ensure the Mine Hunter fleet readiness, this project needed to be completed in weeks rather than months.

All equipment had to be leak-free, and proven to be so prior to project completion.

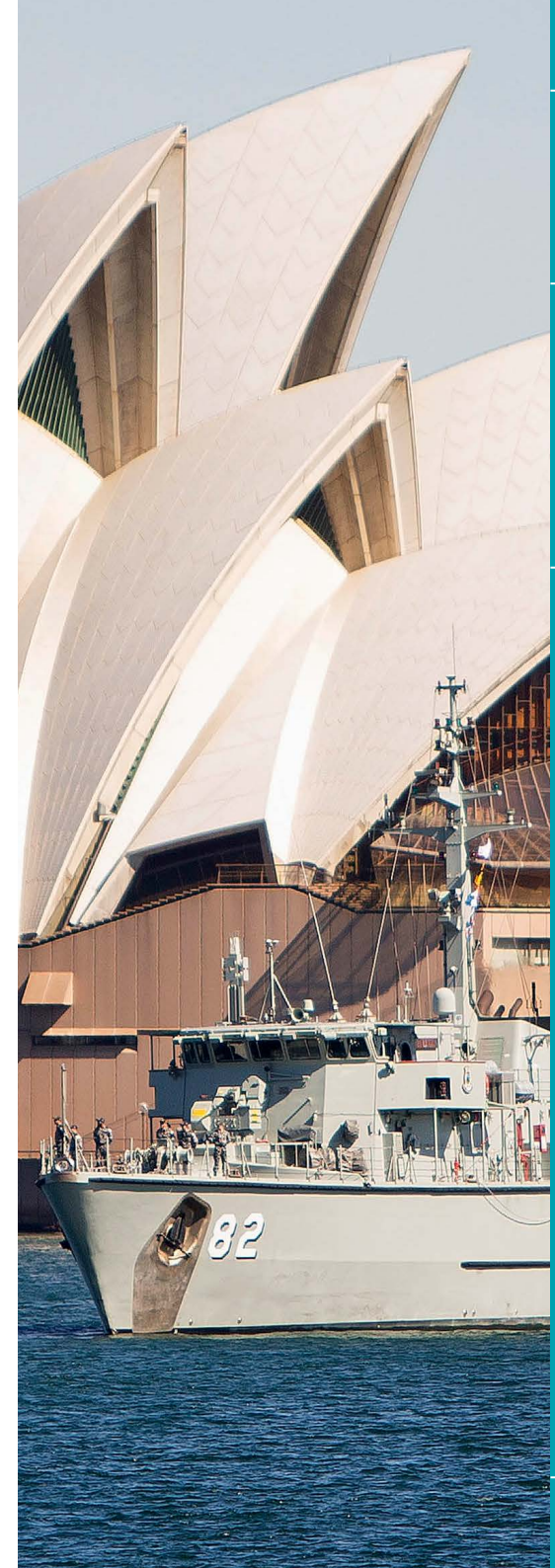
It doesn't take much; a few drops of diesel can cover an area of water the size of an Olympic swimming pool, and 1 litre can contaminate over a million times its own volume.

Environmental and safety concerns

- ▶ It is imperative that no diesel is released into Sydney Harbour. The very nature of ship-to-shore refuelling requires heightened controls regarding the potential for spills, and the new solution needed to totally account for this.
- ▶ The old BFC had components that were not rated to the working pressures required for fuelling Australia's current fleet of naval vessels, representing the risk of spills, tank rupture, overfill, and injury to personnel. It simply could not longer be used.
- ▶ Pressure and flow rate need to be closely monitored and controlled when large ships are refuelled, especially because differing craft cannot all handle the same pressure, and a high-speed refuelling failure would be an environmental catastrophe. HMAS Waterhen needs to maintain the capability to fuel much larger craft than the Mine Hunters, and so robust processes around flow rate and pressure are critical to safe refuelling at the base.
- ▶ Moving the old BFC, sometimes several times per day was a manual process. A team of sailors pushed the heavy 5.0m x 2.0m trailer around the dock by hand, a resource-intensive and hazardous activity.

Cost and cumbersome process

- ▶ The process of filling 4 Mine Hunters along with other craft from a semi-trailer was administratively painful. It required numerous staff to be involved, to safely manage the constant comings and goings of road tankers, and the non-standard refuelling process itself.
- ▶ There is additional cost involved in bringing semi-trailers of diesel onto the base every day, reversing them down onto the dock, and then making them wait to refuel individual ships. It is much more cost-efficient for diesel deliveries, to simply replenish the bulk fuel stores on a less frequent basis.
- ▶ The backup option for refuelling ships based at HMAS Waterhen is to send them to another naval facility in Sydney. During the period when there was no Bulk Fuel Cart available, this backup option was used as the secondary rather than primary means of refuelling ships. Refuelling the fleet at another base, required sending ships and crew to perform this task, but also wasted a great deal of time for sailors at both locations.





"I can only give Banlaw really high recommendation. They are a good supplier. Banlaw's design, manufacture, delivery and post delivery services were all excellent."

- Lieutenant Commander Lucas Skoufa
Royal Australian Navy
Infrastructure Engineer

Project Outcomes

- ▶ Enabled HMAS Waterhen to once again self-sufficiently refuel the Mine Hunter class of vessels, within a 6-week time frame – operational risk, resolved.
- ▶ Minimised the environmental risk of fuel leaks and spills, whilst also improving operator safety.
- ▶ Enabled fast, 1200lpm ship-to-shore diesel refuelling.
- ▶ Provided active and accurate monitoring of flow and pressure, so naval vessels of varying size can be refuelled safely.
- ▶ Met all relevant Australian and Military Standards, and certified the solution.
- ▶ Delivered a mobile, compact, reliable, and easy to use retractable pipeline, with a 20-year design life.