

**Address to 2015 Pilotage and Port Logistics Conference
Sydney 6 October 2015**

Port Concepts - Looking to the future

In looking to the future, we must first understand the past.

The Great Barrier Reef (GBR) was well named. Queensland's coastline is over 5,000 km long, further than the distance from London to Newfoundland. For approximately half of the Queensland coastline, the GBR provides a barrier not only to the dreaded tsunamis, but to invasion - one of the decisive events of WW II was fought and won outside the GBR in the Battle of the Coral Sea.

But the GBR doesn't provide total protection from huge ocean waves - these can be generated inside the reef by severe tropical cyclones - and the current selection of offshore ports is not only ill-prepared for future storms, but totally inadequate for future shipping demands. As for defence, while we spend billions on submarines in Adelaide to defend the country from iceberg attack, there is no naval base on the north-east coast of the continent to service and maintain a naval fleet where it could be best deployed.

Port sites were originally selected to suit the needs of wooden sailing ships, but the speed at which steel-hulled steam ships transformed shipping in the 19th century was quite remarkable (see Illustration). In that century, British seaborne merchant carrying capacity via sailing ships grew from 2 million tons to 3 million tons, but that of steam ships grew from zero to 6 million tons. The speed at which shipping was transformed in the 20th century with diesel and nuclear powered vessels is even more remarkable, with shortcuts the Panama and Suez Canals currently being deepened and widened, allowing bigger and better ships to ply the merchant and military routes of the world.

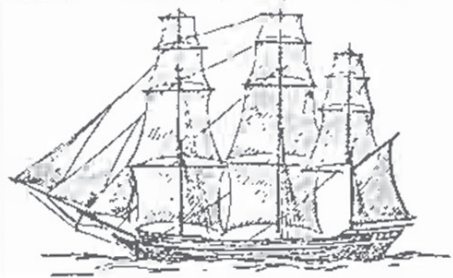
Australia had and has enormous resources, most of which are buried and still remain unknown, and the markets of the world were and are far distant, so only high-value, high-density items were initially shipped from our shores (gold and wool), to the European markets. Then came refrigeration, and beef, notably chilled beef could be safely shipped from Australia and South America to Europe, but still in relatively small vessels which could access the river channels and land-backed upstream berths. In 1963, I was assigned to assess and direct repairs to a large multi-storey abattoir at Cannon Hill in Brisbane. It had been built by the British company Swifts in 1915, and the plans were the mirror image of plans they had used to build an earlier abattoir on the banks of the River Plate in Argentina - it was truly a mirror image as the Brisbane River abattoir was on the right bank of the river and the River Plate abattoir was on the left bank. They just turned the plan



MERCHANT NAVY OF THE UNITED KINGDOM, 1801-1896.

N.B.—The figures in proportion to *their length* represent the relative carrying capacity of the mercantile marine in 1801 (all sail) and in 1896 (sail and steam).

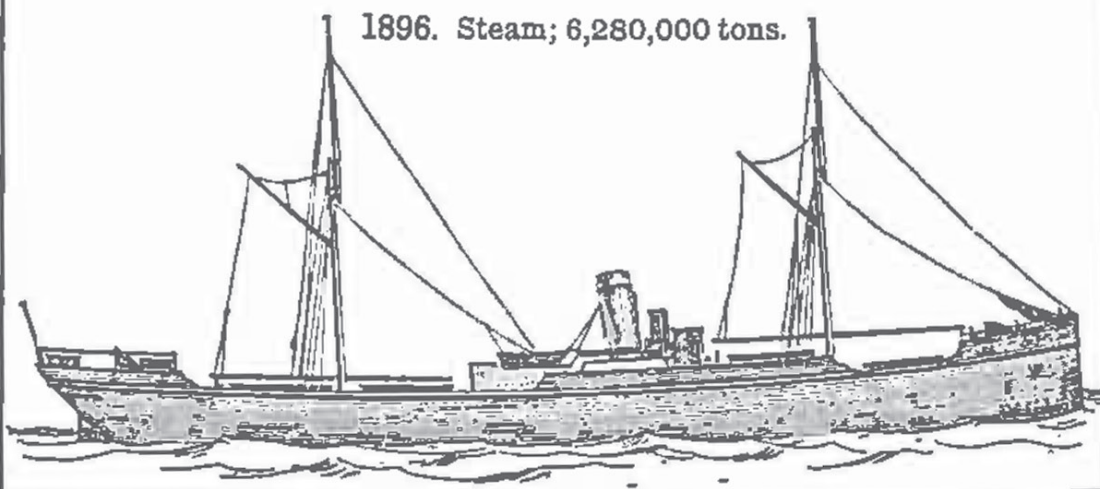
1801. Sail; 1,980,000 tons.



1896. Sail; 2,730,000 tons.



1896. Steam; 6,280,000 tons.



(Diagram VII from "The British Empire in the Nineteenth Century")

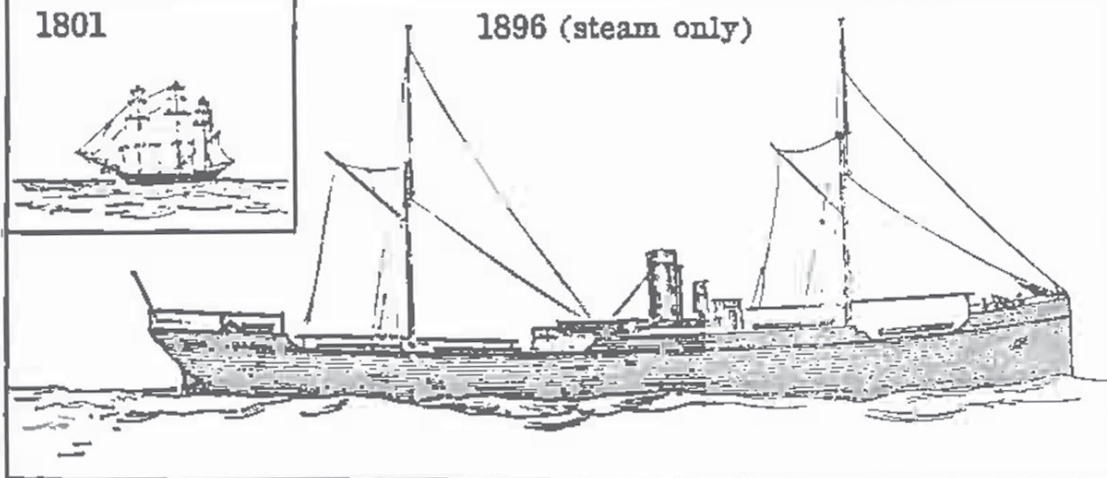
SHIPPING ENTERED AND CLEARED INTO AND OUT OF PORTS OF THE UNITED KINGDOM.

N.B.—The figures in rough proportion to the *size of their hulls* represent the aggregate tonnage entered and cleared.

1801



1896 (steam only)



(Diagram VIII from "The British Empire in the Nineteenth Century")

transparencies upside down to print the construction drawings - the wording was also back to front. But I digress, earlier ports were land-backed in harbours or rivers easily accessible to vessels which were small by today's standards.

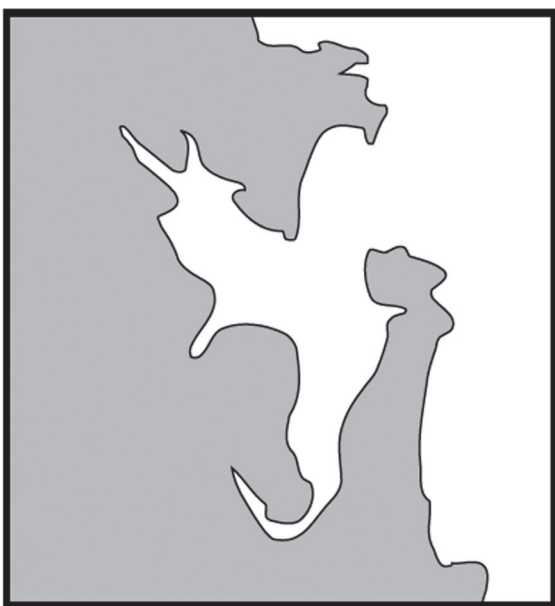
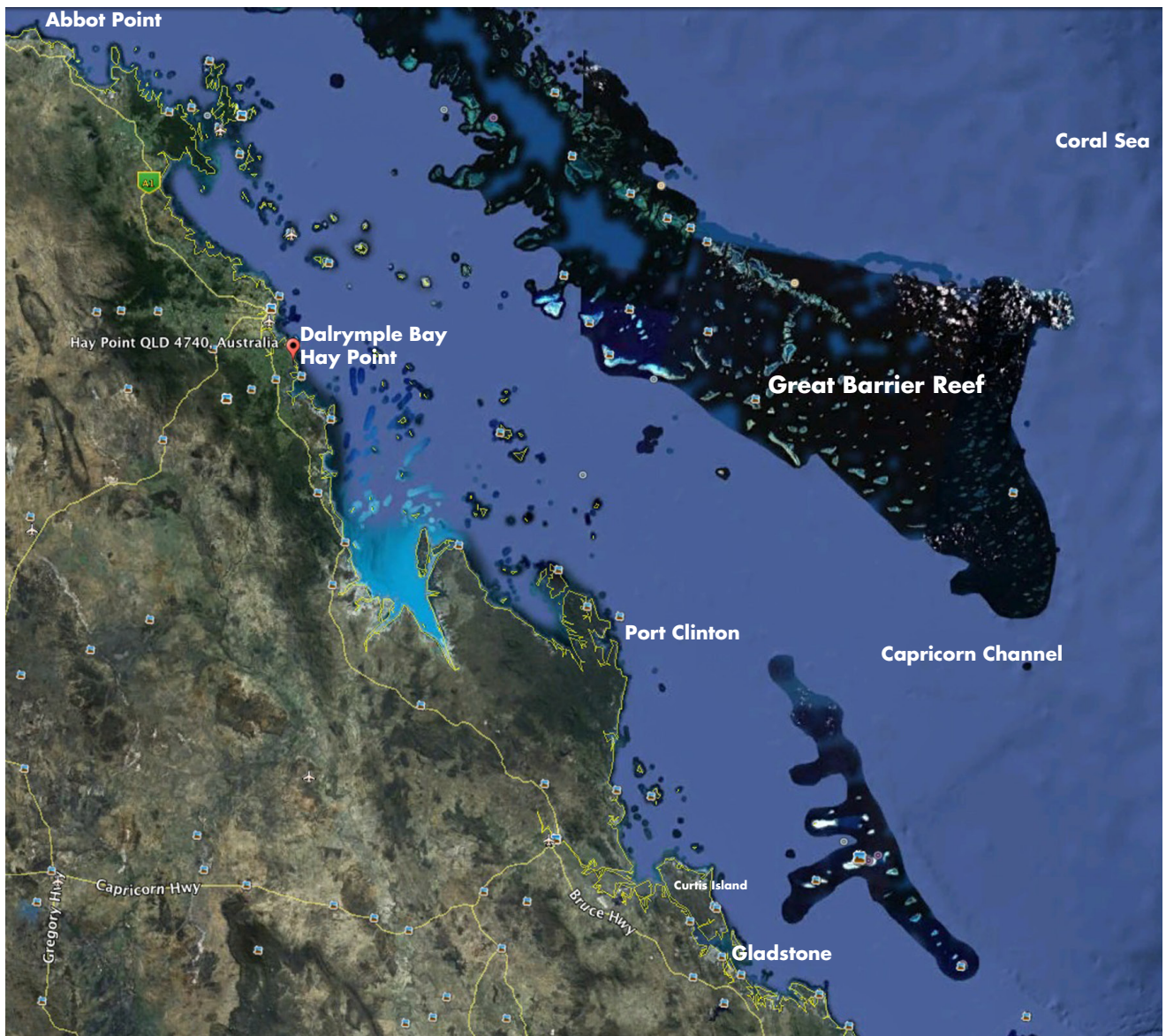
WW II spawned a huge fleet of mass-produced 'Liberty ships' which after the war became the tramp ships of commerce, plying for trade wherever they could. In 1953 the first permit was granted for the export of coal from Central Queensland - 30,000 tons - shipped from Gladstone in three shipments of 10,000 tons, loaded into ships so inadequate that even the toilets were filled with unwashed coal - phosphorous and sulphur also went along for the ride. The first shipload from Callide mine to a Hong Kong Power station spontaneously caught fire en route. Fortunately the fire was extinguished with some risky use of water instead of suffocating the blaze. Coal from Moura, also in Central Queensland, was the next cab off the rank, again shipped through Gladstone from a new purpose-built land-backed terminal at Barney Point. I was the resident engineer on the Moura Rail Project. Ship sizes were still only nominal. As I recall, only 60,000 dwt ships could be accommodated.

The largest ships of the time were the so-called Panamax class of approx 70,000 dwt - the maximum size which could negotiate the Panama Canal.

Then in the 1960s, a Japanese businessman with connections to a modestly sized San Francisco-based company, Utah Construction and Mining, advised them that Japan was going to expand its steel industry and needed raw materials. Utah sent geologists to Australia, a relatively politically stable country (then only having a new Prime Minister every 10 years or so and enjoying low sovereign risk) to find workable deposits of high quality iron ore and coking coal within 200-300 km of the coast, and to locate port sites suitable to handle 120,000 dwt vessels. This was resisted by some as being too excessive, but on the basis that most of the trade was to be with the Japanese steel mills, the Panama Canal was only important in that it could facilitate smaller shipping for spot trading. Enough 120,000 dwt ships existed to cater for the initial volumes proposed. As it turned out and as you all know, 120,000 dwt ships were grossly underestimated for the rapidly developing trade.

Utah commenced exporting coking coal from the Blackwater mine west of Rockhampton, using Gladstone as the port, and utilising existing road, rail and port infrastructure. But their teams of exploration parties had discovered huge, high quality coking coal deposits further north, and a series of mines was planned, commencing with Goonyella west of Mackay. This is highly relevant to my talk today. **In 1967 the port of Hay Point did not exist, nor was it even planned.** In 1967 when I was a young engineer supervising a water supply project to a new coal-fired power station at Collinsville inland from Mackay and Bowen a leading firm of British consultants, Maunsell, was commissioned to locate a suitable port site for the projected huge coking coal exports. Bowen was one option, but this port site was too far up inside the reef, and the railway from Collinsville to Bowen





Port Clinton (left) and Sydney Harbour (right) to the same scale



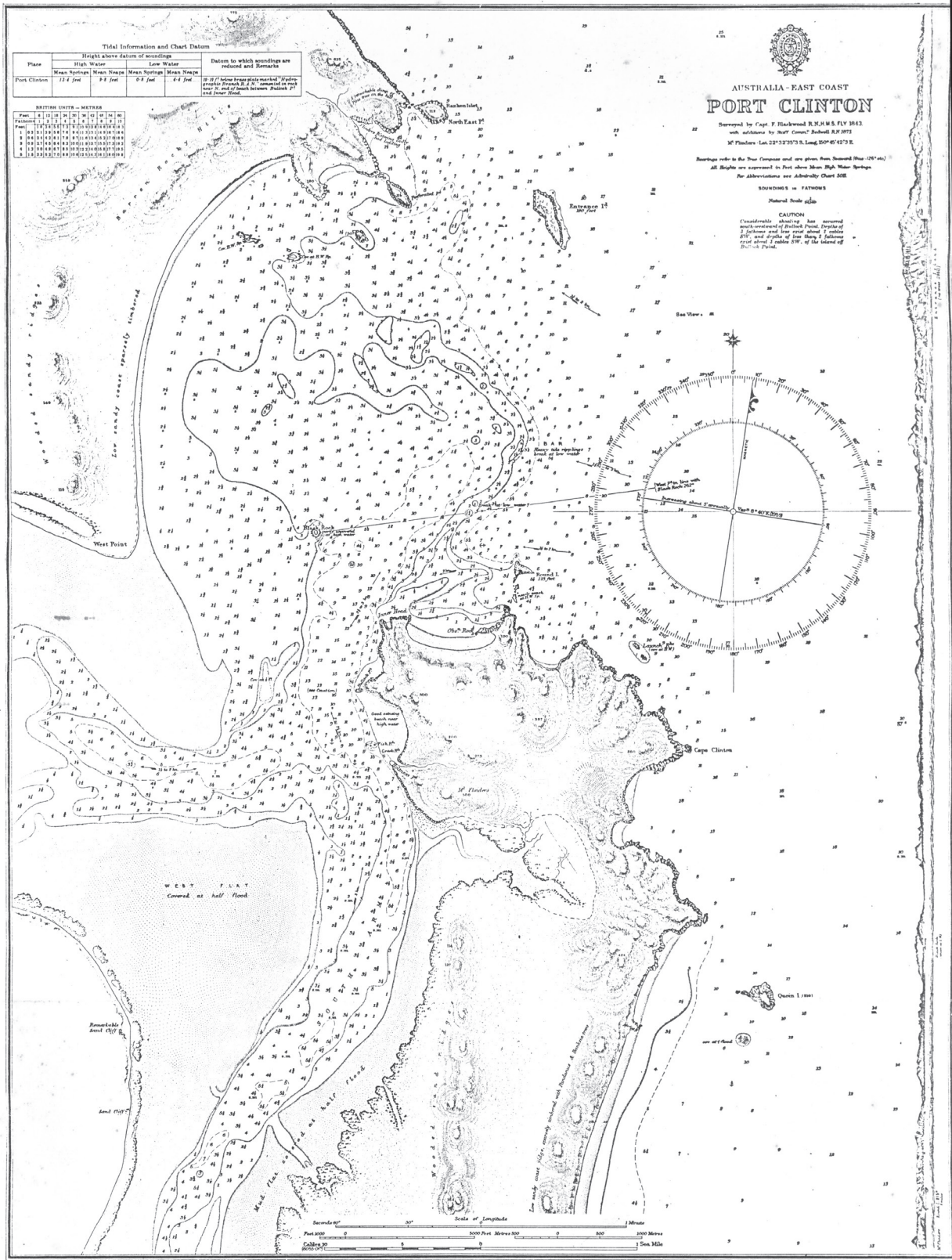
was antiquated - accommodating only small, wooden coal wagons over rickety wooden bridges. My advice to a geologist friend, Viv Forbes who was working on the then little-known Goonyella project was to forget upgrading the Collinsville-Bowen railway, and look elsewhere.

Every possible site on the coast from Bowen to Gladstone was examined. But by then the best port site on the coast had been occupied - by the army three years earlier. The Shoalwater Bay Defence Area (SWBTA) training area of some 800 sq km encompassed, and sterilised, the finest deep-water, sheltered harbour on the Queensland coast, Port Clinton. (Pic Abbot Point to Gladstone). It is comparable to Sydney Harbour, and has depths of 20 fathoms or more. A glance at the Google Earth view indicates its strategic desirability. But a glance at the bathymetric map of Port Clinton circa 1843 shows why the sailing ship era gave it a miss. Port Clinton had been the mouth of the Fitzroy River until a cyclone caused the river to divert to its present mouth near the mud flats of Port Alma. A sand bar across the entry to Port Clinton made this magnificent site unattractive to the sailing vessels of the era.

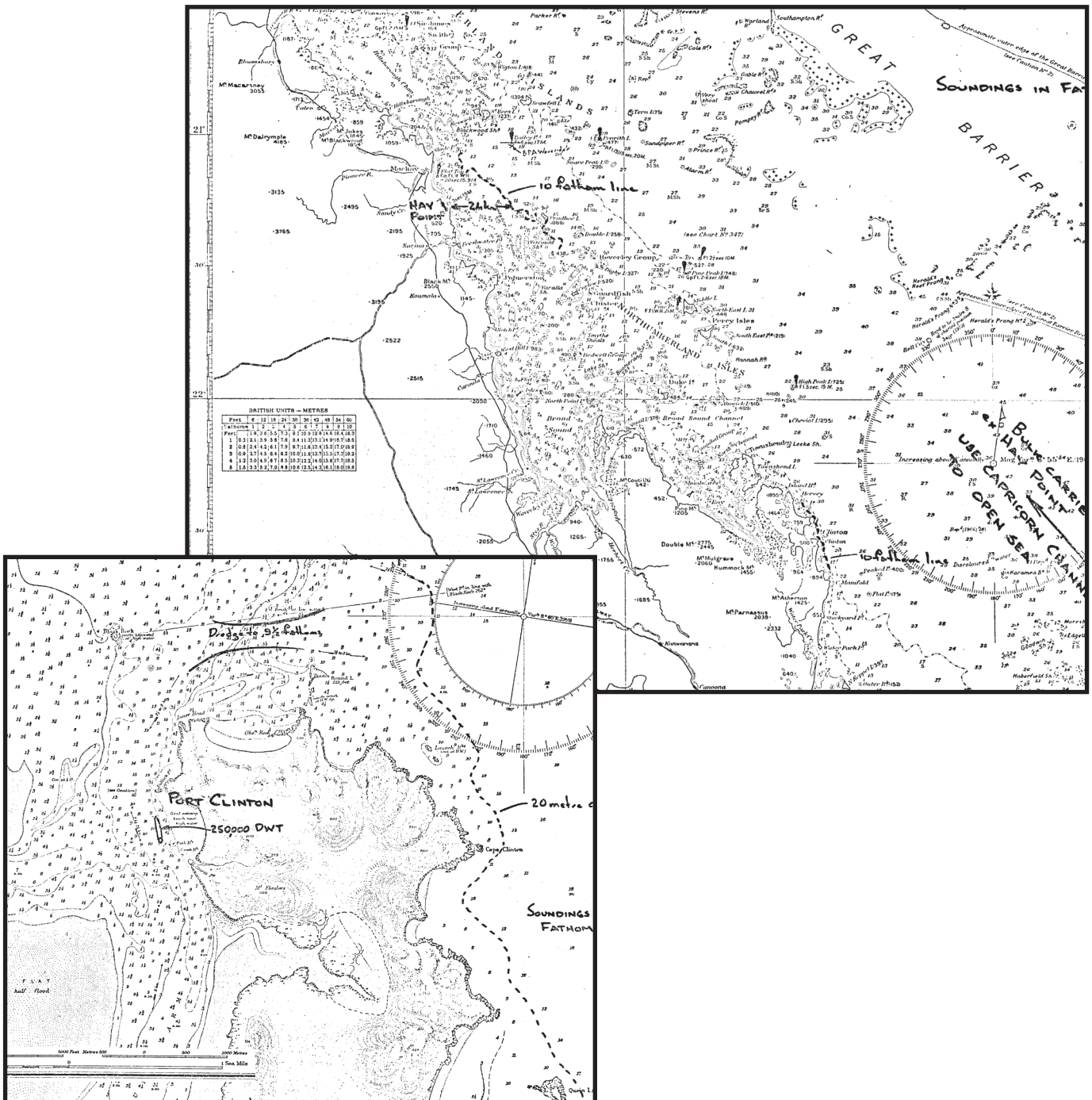
In the Maunsell Report, Port Clinton was dismissed in a paragraph stating in effect 'army area - forget'. A greenfields port site at Hay Point, about 20 km south of Mackay was selected, and the rest is history. I was the Utah Owners Representative on the construction of Berth Number 1, which had a 2 km approach trestle. To expedite construction, the marine facilities were built in two parts, the jetty as a piled offshore structure and the approach conveyor progressively built from the shoreline. The costs and problems of offshore construction were apparent as access to the jetty was constantly interrupted by weather and sea conditions, and the union situation was also difficult. To cut a long story short, Hay Point Number 1 was built as a piled structure. To get around problems with militant steelworkers unions, Hay Point Number 2 was a gravity caisson construction, a really long story. The result was an exposed port loading ships far beyond the design parameters of the loading facilities, with ships of up to 200,000 dwt being loaded at berths designed for 120,000 dwt vessels - but being dependent on the 6 metre tides, they usually departed light-loaded, with a lost opportunity of carrying capacity.

Then the State Government decided to build a State-owned port at Dalrymple Bay, beside Hay Point. However Lang Hancock invested a considerable amount of time and money in a detailed engineering study and submitted an alternative proposal for a privately operated port at the far superior location of Port Clinton, and the Defence Department acceded to this proposal. Lang's daughter, Gina, then in her 20s, prepared to move to Brisbane to supervise the project, a mark of her business acumen even then. But for political reasons the Port Clinton proposal was shelved. DalBay was built, and this country consequently lost billions of dollars in revenue (delays, demurrage and ships sailing light loaded to suit the tide) and suffered enormous costs in offshore construction extras. Hay Point Number 1 (opened 1971) cost \$15 million. Hay Point Number 2 (opened 1975) cost \$55 million.

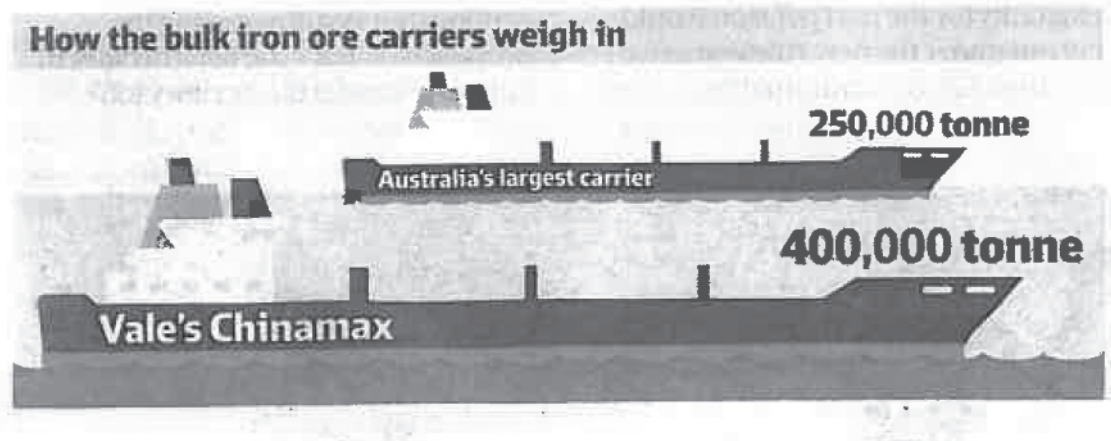




Hay Point Number 3 recently completed cost \$1.5 billion and involved a large dredging operation in rock (Hay Point 1 and 2 having secured the premium positions). These berths have a relatively short approach trestle of 2 km which suffered a major bingle when hit by a runaway barge. DalBay has a 4 km approach trestle. None of these berths can fully load 200,000 dwt ships at all stages of the tide. Long approach trestles are exposed not only to wind and wave damage, but vulnerable to accident and are inefficient to operate. Details of inefficiency with increased length are available. Long dredged channels for relatively squib sized vessels are costly to dredge and maintain. Port Clinton requires only a 3 km channel to accommodate the world's largest vessels and is where the 10 fathom line is closest to the coast.



Now major new offshore port sites are planned for Abbot Point (too far up inside the GBR) and Dudgeon Point next to Hay Point and DalBay. None can handle the new bulk ships of 400,000 dwt being built by Vale (reportedly 34 of the behemoths).



But more importantly new ship types and systems are being developed which will come on stream faster than the developments of the past 2 centuries. Container ships needing security checks of cargo need to come to a secure hub for checking and re-distribution around the country by road, rail and coastal vessels. Cruise ships will be plying the reef in increasing numbers and will need maintenance which could be provided at a combined defence and commerce facility such as at Hampton Roads in Virginia USA where the Navy and coal industry have operated in harmony since steam engines were invented.

Offshore ports as currently planned for Queensland have numerous disadvantages which I could detail if time allows, but a new port at Port Clinton is well overdue to cater for the



new breed of shipping, rapid changes in Australia's maritime needs, and importantly to lead decentralisation and development of the north of Australia, a concept actively being promoted by Gina Rinehart through her ANDEV group and commercial activities.

A company, or a country can be made or broken by a port. A large port development at Sines in Portugal was nearing completion in 1978, when a storm with waves approximating the design height (11 m) struck and so damaged the facility, that the entire Portuguese economy was crippled. Repairs were not completed until December 1992.

In 2009 Cyclone Hamish spun close to the coast and reached Category 5 status as it passed Bowen and Mackay. Fortunately it stayed offshore, but still generated 9 m waves at Hay Point - the original port was designed for 7 m waves (although it has been significantly upgraded since). About 40 bulk carriers which had been queuing upped anchor and did a derby down the coast to escape via the open Capricorn Channel. Had Hamish crossed the coast near any of the coal berths, disruption to our coal exports would have been significant. A relatively minor accident involving a shiploader boom in December a few years ago, took until the following April to repair, being dependent on weather conditions.

We need Port Clinton and we need it now.

John McRobert BE (Civ)

