Hikitia

Conservation Plan

June 2008

Maritime Heritage Trust of Wellington

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Prepared by Michael Kelly, Heritage Consultant

for the Maritime Heritage Trust of Wellington

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Cover: *Hikitia* on Wellington Harbour, January 2006. (Photo: Captain John Hermans, Maritime Heritage Trust of Wellington)

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1.0 Introduction

1.1 Purpose

The purpose of this plan is two-fold. The first is to prepare policies and outline a programme of works to assist in the conservation of the historic ship *Hikitia*, so that its meaning and importance is conserved for present and future generations. The second is to establish an appropriate level of intervention that will allow the ship to continue to operate as a working vessel, and demonstrate the purpose for which it was built, while retaining its significant heritage values.

1.2 Management status

The *Hikitia* is owned by the Maritime Heritage Trust of Wellington (MHT), which bought the vessel from the privately-owned *Hikitia* Heavy Lift Ltd on 16 March 2006. The vessel is berthed at Taranaki Street Wharf in Wellington, with the permission of Wellington Waterfront Ltd.

1.3 Executive summary

Hikitia is a floating crane that has been operating in Wellington all its working life. *Hikitia* was built by Fleming and Ferguson of Paisley, Scotland, in 1926 for the Wellington Harbour Board (WHB). The crane was built by Sir William Arrol and Co. of Glasgow. On 26 September 1926, after successfully completing its trials, the ship left on its delivery voyage, crewed by Scottish seamen. It was the only substantial journey the ship has ever made. It arrived in Wellington Harbour, after a largely uneventful voyage, on 21 December 1926. This may have been the longest voyage ever made by a floating crane with its jib up.

Following more trials, the ship was soon pressed into action, becoming a familiar sight on the harbour, lifting goods to and from ships, salvaging wrecks, assisting the construction of lighthouses, maritime markers, wharves and many other projects. Possibly the most significant and intensive period of the ship's use was during World War II, when American forces were stationed in Wellington and there was heavy movement of military equipment and personnel in and out of the harbour.

Between the ordinary work, there were other major events that *Hikitia* was associated with. These included attempting to salvage the RNZAF flying boat *Catalina* in Evans Bay in February 1950, lifting New Zealand Railways' first diesel-electric locomotives onto the waterfront in 1951, salvaging parts of the capsized inter-island ferry *Wahine* in 1968 and many other similar tasks.

Use of the *Hikitia* slowed considerably during the 1960s and with the arrival of the first container ship in 1972, wharf work changed irrevocably. Twin boilers were installed in the ship in 1980 to maintain its life but by the mid-1980s the WHB was preparing the ship for sale. After rejecting offers that would have seen the crane removed or the ship sold for scrap, the WHB finally sold the ship, on 12 April 1990, to maritime enthusiasts Bob and Mary Box and John and Joy Ackrill. They formed

Hikitia Heavy Lifting Limited to keep the ship in working order and help it pay its way.

The ship gained its heavy lifting certificate in 1992 and since then has been available for commercial lifts up to 80 tonnes. In the period since then it has undertaken over 300 lifts. In 2006, the *Hikitia* was sold to the MHT and it continues on the work started by the Ackrills and Boxes.

The ship is constructed almost entirely of steel, mostly riveted together. It measures 160.1 feet (48.58m) in overall length with a beam of 52.35 feet (15.88m) and a depth of 11.35 feet (3.44m). Its original coal fired Scotch boiler was replaced by an oil-fired boiler in 1963. This in turn was replaced by the current two, small, modern 14.9HP package boilers in 1980. The crane was designed to lift 80 tons at 50' radius but bettered this on test by 25%. The crane can lift 60 tons at 65' and 15 tons at 75'. The speed of the lift is 80 tons at 4' per minute, 40 tons at 8' per minute, 25 tons at 12' per minute and 15 tons at 24' per minute. The crane weighs 310 tons and at a radius of 65' the maximum height of the hook above the water is 95'.

Hikitia is a vessel of outstanding heritage value, not only nationally but internationally. Although it is not definitively confirmed, *Hikitia* may well be the world's oldest working steam powered floating crane ship still in use. It retains much of its original fabric and machinery, with the only major change being the replacement of its original boiler. It is a ship of great importance to Wellington, where it has worked all its life and provided almost continuous service. It has been involved in many significant events in the harbour's history, including harbour-related construction, salvage and its day-to-day lifting work. Perhaps its most important historical role was during World War II when it assisted with the movement of American troops and materiel for the war in the Pacific. The *Hikitia* is also significant for the continued traditions of ship craft that are fostered and taught on the ship.

Hikitia remains in remarkably good order considering its age and the deferred maintenance it carries. The ship has some areas of major corrosion, particularly parts of the hull and crane, but these are relatively modest in extent and can be repaired. Repairing the ship and maintaining its condition are major priorities for the MHT. It has commissioned reports on the condition and stability of the vessel preparatory to planned major remedial work, using mostly volunteer and donated professional time. It plans some $1.3 million of remedial work on the *Hikitia* to bring the vessel back to full running order and restore its appearance and viability. The equivalent of some $230,000 has been spent on the ship already, $612,000 is needed for the repairs as part of the liftout in Lyttelton, and a further $463,000 is required for post-liftout work.

1.4 Assessing values

There are no criteria that specifically assess the values of moveable cultural heritage, such as vessels, but a variety of heritage criteria are in use throughout New Zealand, and internationally, to assess historic places. The Historic Places Trust (HPT) has a statutory role under the Historic Places Act 1993 to assess heritage significance, and as the country's leading heritage agency, it can be regarded as the New Zealand

authority in this matter. It is appropriate to use the HPT's criteria to assess a vessel such at the *Hikitia*.

The HPT's assessment criteria (as per Section 21 (a) of the Historic Places Act are as follows:

> *Historical, cultural, aesthetic, archaeological, architectural, scientific, social, spiritual, technological and traditional significance or value.*

For the purposes of this document these criteria are assessed under three broad categories:

> Historical
>
> Physical (archaeological, architectural, scientific, technological)
>
> Cultural (aesthetic, social, spiritual, traditional)

1.5 Commission details and acknowledgements

This plan was commissioned by Malcolm McGregor, manager and trustee of the MHT.

The plan was written and compiled by Michael Kelly, heritage consultant, in association with Kerryn Pollock, historian, who wrote the history of the vessel.

The input of the following is gratefully acknowledged:

Malcolm McGregor, who gave so much of his time and energy to assisting the completion of the plan and whose working knowledge of the ship's repairs and restoration was invaluable.

John Ackrill, former part-owner of the *Hikitia* and currently Chief Engineer and member of the MHT, whose volumes of historical information formed the basis of the history and who generously provided his time towards the completion of this plan.

Bruce Askew, whose encyclopaedic knowledge of ships and boats as a distinguished New Zealand boat designer has provided the Trust with much of its technical knowledge of the *Hikitia* and the future plans for the ship.

Nick Undrill, structural engineer, who has climbed and crawled over most accessible parts of the ship to determine the structural viability of the ship and to provide a future action plan.

1.6 Site visits

The *Hikitia* was visited on 28 January 2008 by Michael Kelly and Kerryn Pollock, accompanied by Malcolm McGregor and John Ackrill. The ship was subsequently visited by Michael Kelly, with Malcolm McGregor, on 7 February and 13 February 2008.

2.0 Description

2.1 History

Origins, design and construction

The floating crane *Hikitia* – 'to lift', in Maori – was commissioned by the Wellington Harbour Board (WHB) in 1925 to meet the demands of a technologically expanding global shipping industry. Ships were getting bigger and large tankers were beginning to appear.[1] To respond to these new developments the WHB began to expand the port's facilities from the early 1920s. The *Hikitia* was part of this project.

Negotiations with Scottish ship-builders Fleming & Ferguson (F&F) commenced early in 1925. It is not known how the WHB came to select F&F for the work but they were one of Clyde's biggest ship builders, with a proven record. (See 2.2, Designers and builders). In March of that year F&F, in conjunction with crane builders Sir William Arrol & Co., offered to build and deliver a floating crane for £44,000. The WHB quickly accepted, while specifying certain conditions, including payment of 20% in four instalments prior to the crane's departure for New Zealand, payment of 15% on arrival, with payment of the final 5% after the vessel had been trialed in Wellington.[2]

Hikitia was not the first floating crane in New Zealand built by F&F. The *Rapaki*, made from the same set of drawings as *Hikitia*, was completed some months earlier for the Lyttelton Harbour Board and operated at Lyttelton until 1988. It is now an exhibit at the National Maritime Museum in Auckland. When the Wellington Harbour Board learned that the *Rapaki* was under construction it ordered its own crane using the same drawings.

Throughout the remainder of 1925 and well into 1926, the WHB continued to correspond with its agents in London and F&F over various aspects of the *Hikitia's* construction and details of payments to be rendered. In due course the vessel was completed and launched. (See Physical Description for its specifications).

It was put through its tests and when these were over, it set off from Clyde on 29 September 1926.[3] Parts of the long voyage to New Zealand proved to be an additional test of the *Hikitia's* construction and capabilities.

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[1] Johnson D. 1996, *Wellington Harbour*, Wellington Maritime Museum Trust, Wellington, p.284; *Wellington Harbour Board Annual Report* 1924, p.8.

[2] Unknown to Richardson McCabe & Co, 24/3/1925; Cable to F&F 23 & 24/3/1925. Terms of payment were later altered to three installments of 25%, 20% after trails in England and 5% after trials in Wellington. Outward Letters, Wellington Harbour Board. Wellington City Archives

[3] '80 Ton Floating Crane - "*Hikitia*" Supplied by Messers Fleming & Ferguson Ltd, Paisley. Report of Inspection and Tests' (photocopy in in Maritime Heritage Trust of Wellington *Hikitia* folder volume 1); General Manager and Chief Engineer's Annual Report, Wellington Harbour Board, 1926.

The journey to New Zealand

The vessel left Scotland captained by James Fullerton with 14 crewmen aboard. That crew was as follows:

Port of embarkation	Name	Age	Description	Country of birth
Greenock	James Fullerton	53	Master	Scotland
"	A. Georgeson	53	Bosun	"
"	W.E. McIver	56	Sailor	"
"	William Aikman	24	"	"
"	A. McRae	26	"	"
"	W.B. Inglis	40	1st Engineer	"
"	D. Robertson	24	2nd Engineer	"
"	P. Shand	30	3rd Engineer	"
"	G.Harvey	44	Fireman	"
"	G. Richardson	34	Sailor	"
"	J. McMillan	41	"	"
"	John Lanney (?)	40	"	"
"	William Sinclair	19	"	"
"	D. Duffy	36	"	"
"	J. Robertson	50	1st mate	"

The jib was erected for the journey because, it has been suggested, there was no crane big enough in New Zealand to lift the crane rig into place once it arrived.[4] After the voyage, Captain Fullerton commented that the vessel would have rolled more in high seas with the crane down[5], though whether this factor was considered prior to leaving is unknown. By contrast, the *Rapaki* steamed to New Zealand with its jib dismantled in two parts and strapped to the deck.

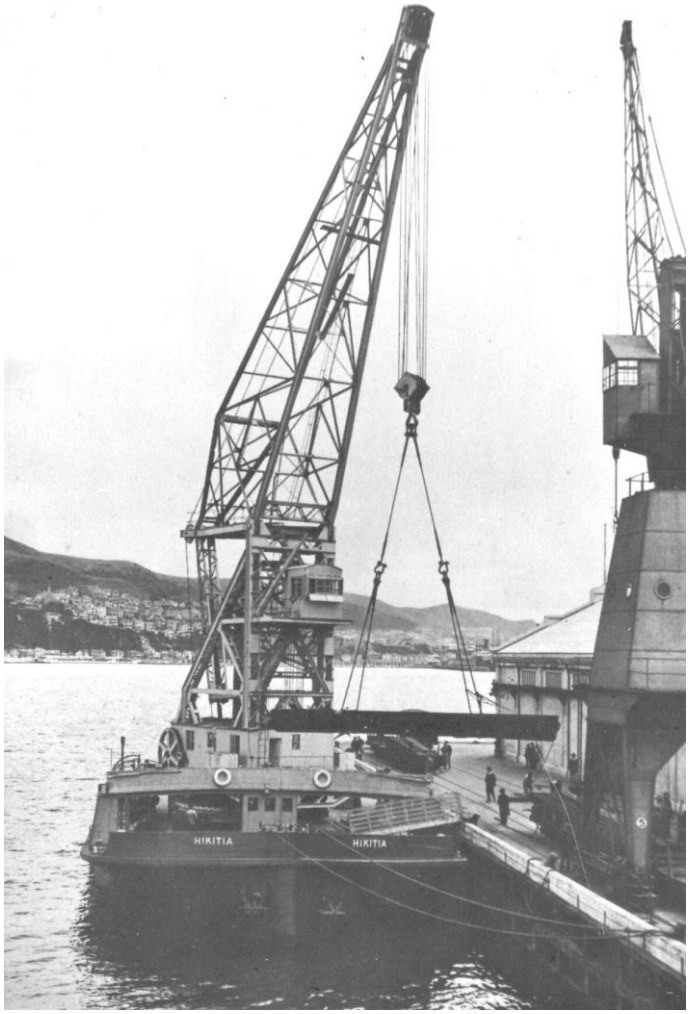
The *Hikitia* was not unduly tested by the weather between Scotland and its first port of call in the Azores, which was reached on 9 October.[6] After bunkering, the vessel left in fine weather the next day, and docked in Colon, Panama, on 1 November where she proceeded to make her way through the Panama Canal towards Tahiti. It was during this leg that the vessel was truly contested by adverse weather conditions. The ship's log notes moderate wind but choppy and "confused" seas on 4 November, with rain added to the mix the next day. Conditions deteriorated further, and the log records the "crane structure working and straining, putting heavy weight on supports and deck plates"[7] over a number of days. As a result, on 8 November the *Hikitia* sustained some damage:

> Today discovered that Deck plates underneath Forward Port and Star. Crane supports were cracked. Full extent of damage cannot be ascertained until removal of supports. Cracks have been caused by vessel labouring and straining in heavy weather encountered since leaving Baulboa.[8]

[4] *The Dominion Post*, 23/7/03.
[5] *The Evening Post*, 21/12/1926.
[6] 'Chief Officer's Log Book of the Steamship *Hikitia* of Wellington, N.Z', 9/10/1926. LOCATION?
[7] Log Book, 6/11/1926.
[8] Ibid, 8/11/1926.

By this time, however, conditions were beginning to improve and the vessel sailed in generally fine weather until Tahiti was reached on 1 December 1926. Like the previous stops this one was brief, and the vessel left the island the next day bound for Wellington.

The weather on this leg was no better than on the previous one. On 3 December chocks holding the lifeboats in place were damaged or washed away, and were repaired and replaced. Four days later, due to the constant rolling and straining of the vessel, the navigation bridge began to leak all over. Then, on 13 December, the vessel struck an unidentified submerged object in fair conditions. No damage was reported, though the wheelhouse started to leak three days later.[9] From there to Wellington weather conditions ranged from moderate to rough, and it must have been with some relief that the Captain and crew sailed past Pencarrow Head and entered Wellington Harbour with no more incidents or reported damage on 21 December 1926, 82 days after it left Scotland.[10]



Hikitia undergoing trials in Wellington Harbour, 1927.
(John Ackrill Collection)

[9] Ibid. 16/12/1926

[10] Based on current knowledge, this is the longest voyage ever made by a crane with the jib erected.

At work in Wellington

Testing of the vessel by the WHB commenced in January 1927, with various lifts on different radii.[11] The results were satisfactory, and the *Hikitia* was put to work in February.

The vessel commenced its working life lifting and transporting various items, such as moving piles to Miramar Wharf, lifting fenders on and off the *HMS Renown*, which was carrying the Duke and Duchess of York on a tour to New Zealand and Australia, and working on the breastwork of the Thorndon wharf.[12] The work log does not record a particularly busy schedule for much of the first year or so, though some big lifts were made, including the 40 ton WHB pilot launch *Uta* and the 60 tons worth of piles at Evans Bay.[13] The vessel proved particularly useful when a large slip blocked the Hutt Road in August 1927. In one hour it transported to the site a large steam digger that would have taken days to get there under its own power.[14]

As this task demonstrates, the *Hikitia* was available for non-WHB work. Another important role the vessel performed was salvaging stricken or sunken boats and ships. Its first job came in August 1927 when the fishing launch *Norna* sunk off Barrett's Reef at the entrance to the harbour. After the craft had been located and prepared for lifting, the *Hikitia* headed out to the site, easily lifted the wreck, and transported it to King's Wharf.[15] The Wellington Harbour Master reported, that "if it had not been for the service of the crane "Hikitia" the "Norna" would have become a total loss."[16] The *Hikitia* performed a number of salvaging operations over subsequent years, though no all were as successful.

Other notable jobs, in addition to the everyday tasks of lifting and transporting cargo to and from ships, in the first decade of so of its working life include lifts for Admiral Richard Byrd's expeditions to Antarctica in 1928 and 1933,[17] transporting the concrete base of the new Point Jerningham beacon in 1929,[18] and a substantial amount of work in the late 1930s lifting rail units from supply ships.[19] By this time one of the major events of the 20th century, and one in which the *Hikitia* would play its part, was just around the corner – World War II.

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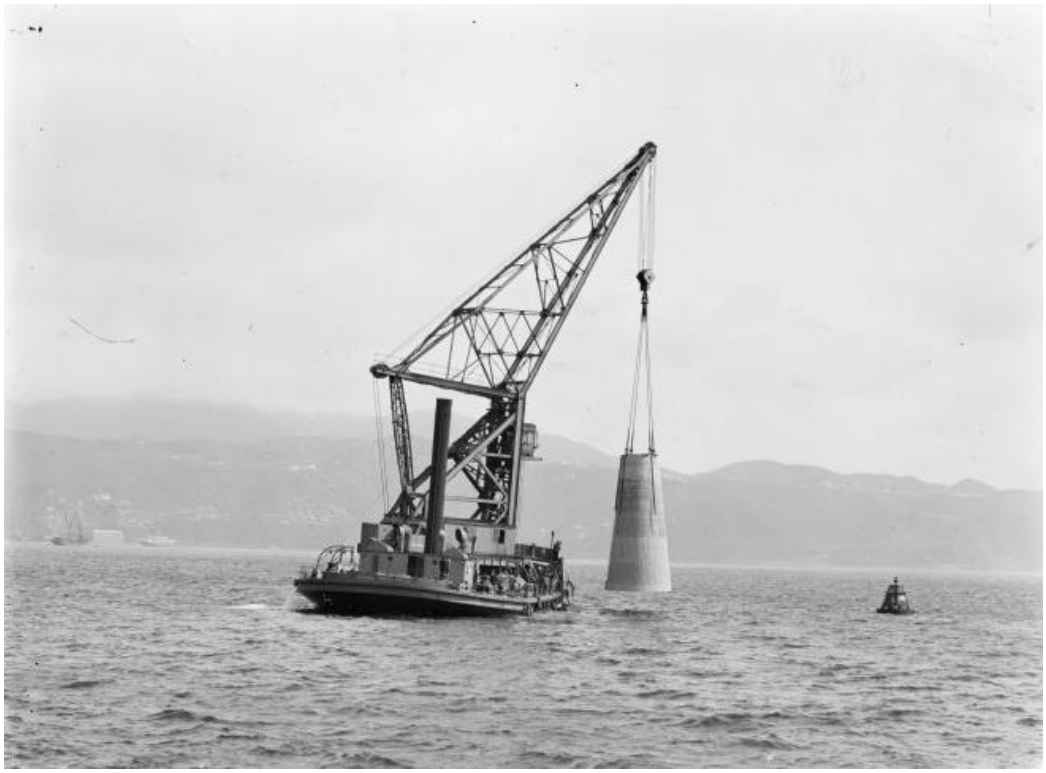
[11] *The Dominion*, 15/1/1927.
[12] *Hikitia* Work Log, 8/2/27 forward (photocopy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 2)
[13] Work Log, 18/8/2927 & 27/9/1927.
[14] *The Dominion*, 16/8/1927.
[15] *The Dominion*, 31/8/1927.
[16] 'Harbour Master's Report 1927', Wellington Harbour Board Annual Report 1927.
[17] Work Log 23/11/1928 and 6/12/1933.
[18] *The Dominion*, 18/1/1929, Work Log, 17/1/1929 and 18/2/1929.
[19] Work Log 24/2/1938 forward through 1939.



The *Hikitia* lifting the base of the Steeple Rock lighthouse. (ATL EP-0779-12-G)

World War II

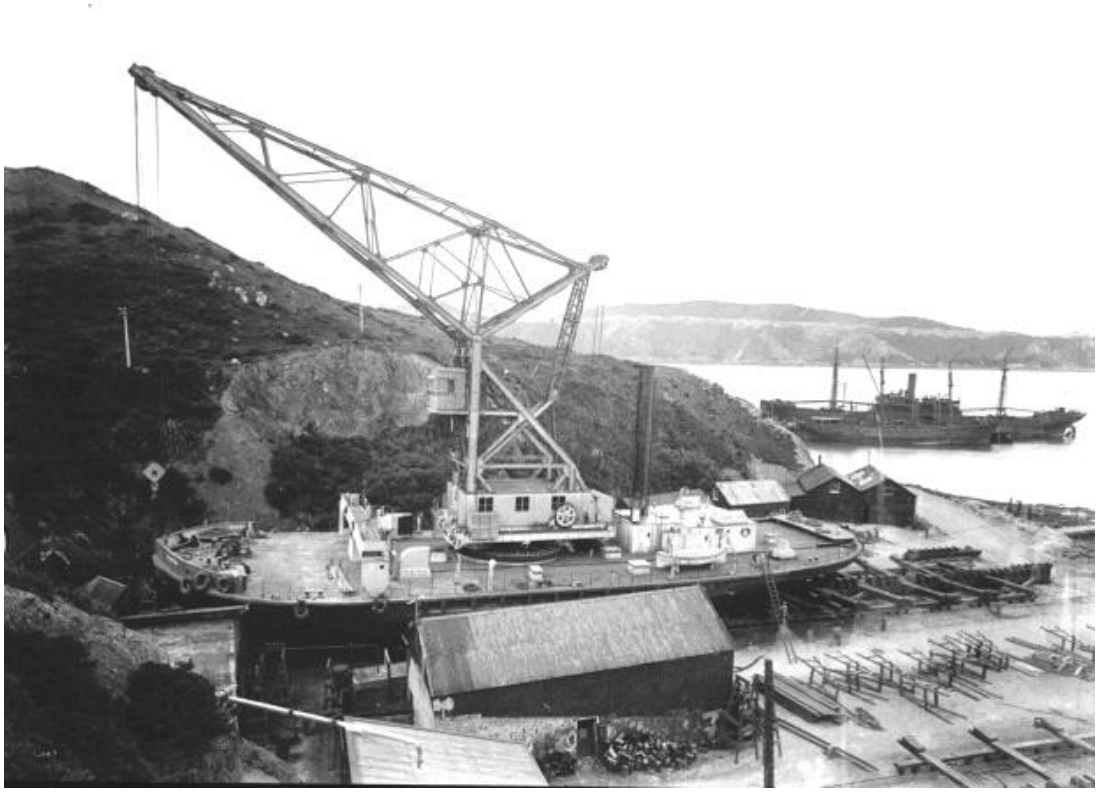
The outbreak of war near the end of 1939 disrupted the shipping trade in Wellington for a few years as cargoes were commandeered, vessels requisitioned and sea routes disrupted.[20] The tonnage of goods handled by the port declined accordingly. However, the extension of warfare into the Pacific reversed this trend.

The attack by the Japanese on the military base at Pearl Harbour in December 1941 drew the United States of America (US) into the war, and Wellington was used as a major staging post by US Marines corps. As a result, 1942-1944 was a boom time for the port,[21] and the *Hikitia* was consequently in demand. While there is evidence contained in the work log that demonstrates the *Hikitia* was doing some war work prior to 1942 – "10 military tanks from M.V. Dorset & shipping to King's Whf" on 18 October 1941 is an early example – there is no doubt that the use of Wellington as a staging post by the Americans, and active warfare against the Japanese in general, provided the vessel with a substantial and increased amount of work.

The work log shows activity picking up considerably from April 1942. Singapore had fallen to the Japanese in February, and Darwin in Australia was bombed a few days later.[22] This brought the war very close to home, and the increased workload of the *Hikitia* reflects this. From here and throughout 1943, the ship was employed on a

[20] Johnson, p.324.
[21] Ibid, p.325.
[22] 'The war against Japan – New Zealanders in the Pacific War', URL: http://www.nzhistory.net.nz/war/war-in-the-pacific/war-against-japan, (Ministry for Culture and Heritage), updated 27 June 2007.

daily basis, often with a number of jobs on one day. Much of the work was lifting and transporting military hardware such as guns, tanks and lorries from ship to ship, in preparation for fighting in the Pacific. Most of these lifts were not particularly heavy relative to what the vessel was capable of.



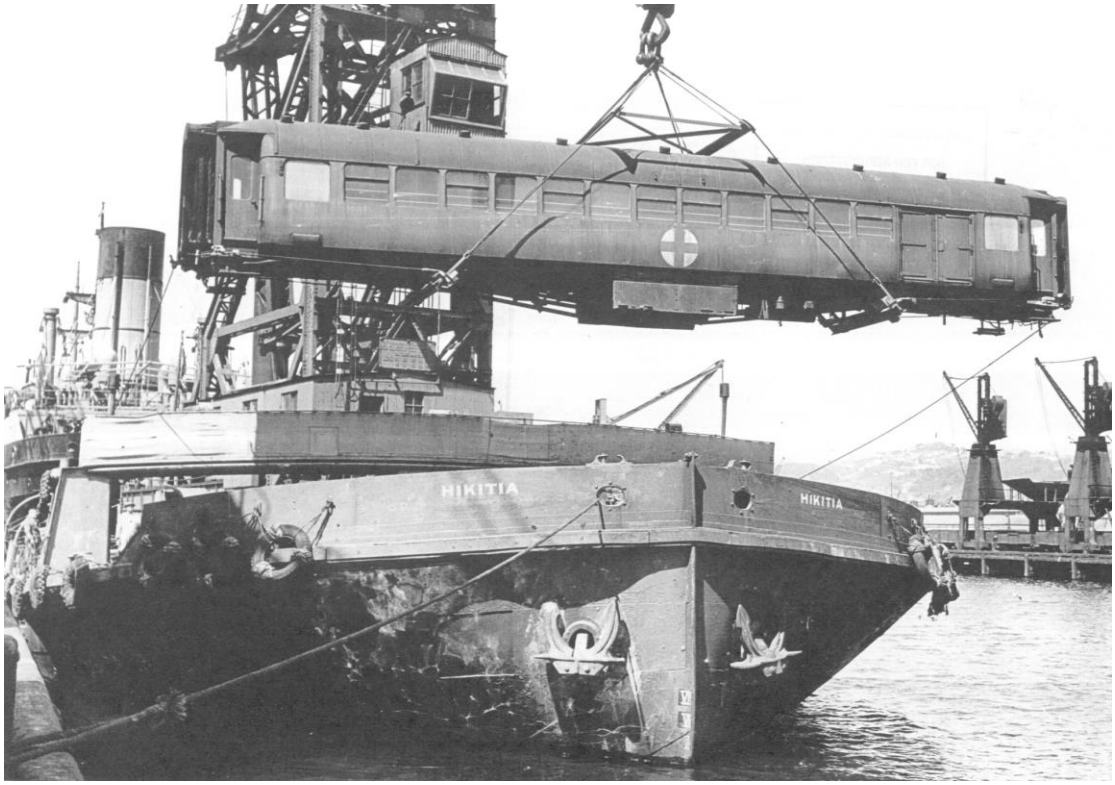
Hikitia hauled out at the Patent Slip, date unknown. (MHT)

Occasionally, the *Hikitia* was diverted from these now routine tasks to something more unusual. In December 1942 the naval vessel *HMNZS South Sea* collided with the inter-island steamer *Wahine* during a harbour patrol and sank.[23] The *Hikitia* attempted to salvage it two months later but was unsuccessful.[24] The vessel remains on the sea floor and is now a diving attraction. The *Hikitia's* most dramatic wartime job occurred in July 1943. US ship the *John Davenport* docked on Wellington on 3 July loaded with over 3000 tons of munitions, the largest single amount of explosives ever seen in the port.[25] For reasons unknown, fire broke out deep within one of the ship's holds on 7 July. The captain wanted to scuttle the vessel, but the Wellington Chief Fire Officer Charles Woolley decided it could be saved if the remaining cargo was removed and the fire then fought. Enter the *Hikitia*, which removed the obstacles in just over two hours.[26] The fire was then quenched and disaster averted.

Military work continued through 1944, though by this time the US Marines had by and large left Wellington for good. Home defences still had to be maintained, and to

[23] Emmanuel Makarios, 'Collision – The Sinking of *HMNZS South Sea*', Seafood New Zealand, May 1994, pp.80-83.
[24] Work Log, 26/2/1943.
[25] McLean G., *New Zealand Nautical Yarns* (excerpt reproduced in Maritime Heritage Trust of Wellington *Hikitia* folder volume 3).
[26] Work Log, 7/7/1943.

this end the *Hikitia* lifted the huge gun barrels destined for the Wright's Hill 9.2" battery in April 1944.[27] *Hikitia* was probably responsible for lifting the guns from the delivery ship to a barge that delivered them to the wharf.[28] The work log records a large amount of lifting from 'K' vessels, and later Landing Ship Tanks (amphibious vessels), from December 1944 to mid 1945. Extensive lifting from various vessels continued through 1946. By now the war was officially over, and life for the *Hikitia* began to return to normal.



Hikitia lifting railway rolling stock in 1953. (Archives New Zealand [ref. not known])

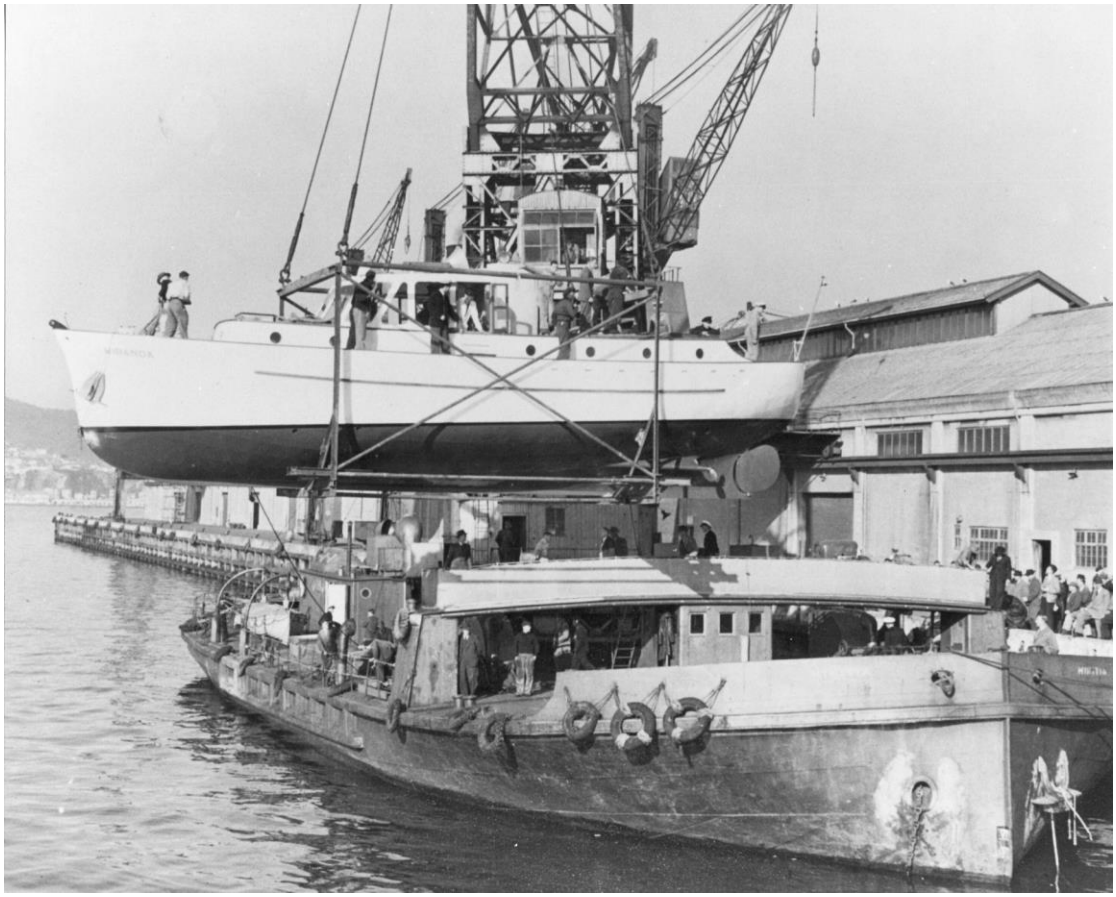
Later work

Post-war, the *Hikitia* continued to perform a range of tasks, combining the typical lifting and transporting work with less commonplace jobs. In February 1950 the RNZAF flying boat the *Catalina* was hit by a swell while trying to take off from the water in Evans Bay with 8 people aboard, all of whom escaped.[29] The *Hikitia* attempted to salvage the plane, which by this stage had completely sunk, but was unable to raise it clear of the water.[30] Harking back to its war work, the vessel lifted a 45-ton Centurion military tank destined for the New Zealand Army camp at Waiouru in the same year.[31] In 1951 the first diesel-electric locomotives acquired by the New Zealand Railways arrived in Wellington, and were lifted from the supply vessel onto temporary bogies on the waterfront.[32] Four years later, the *Hikitia* tackled what *The*

[27] Work Log, 17/4/1944.
[28] Kelly M. 1997, 'Wrights Hill Fortress Conservation Plan', WCC p.16
[29] *The Dominion*, 8/2/1950.
[30] Ibid, 9/2/1950.
[31] 'A Centurion Odyssey', *New Zealand Memories*, Apr/May 2005, no. 53, pp.44-45.
[32] *The New Zealand Railway Observer*, 1989, vol.46.

Evening Post described as its "heaviest lift" to date – a steel barge weighing between 70 and 80 tons.[33]

Though the *Hikitia* remained a useful asset, in 1960 the WHB reviewed its life expectancy and the estimated cost of future maintenance.[34] The question of its ability to undertake heavier lifts, which would invariably be required in the near future, was also raised.[35] An investigation showed the vessel was in good order, and that weak plates in the hull could be easily replaced. In any case, a replacement vessel would have been very expensive. A further investigation in 1961 found the *Hikitia* would be economical for another 12 years if the boiler was replaced.[36] A new oil-fired boiler was installed in October 1963,[37] and the power was changed from 110 volt DC to 240 volt AC power. The *Hikitia* performed the removal and installation work itself. A pipe between the crane and the boiler of the dredge *Kerimoana* powered the lift,[38] which would otherwise have been, naturally enough, impossible.



Hikitia assisting with the launch of the *Miranda*, 8 June 1953. (John Ackrill Collection)

[33] *The Evening Post*, 9/8/1956. Note that the vessel had lifted heavy loads during trials – this is most likely the heaviest load lifting during its working life to date.
[34] Ibid, 25/10/1960.
[35] Ibid, 24/11/1960.
[36] Ibid, 15/12/1961.
[37] '*Hikitia* Repairs Etc' (copy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 3).
[38] Trevor Phillips, '*Hikitia*', *Greater Wellington Marine Model Club Newsletter*, July 2005, p.6.

Despite this investment, the *Hikitia* had less work to do from 1964. That year the WHB acquired a mobile pile driver with a crane attached, and this machine took over the lighter lifts, leaving the *Hikitia* with those over 25 tons.[39] Given that heavier lifts were anticipated in 1960, this should not have left the vessel sitting idle. The *Hikitia* still came in useful in the late 1960s and 70s, most notably for salvaging parts of the inter-island ferry *Wahine*, which capsized during a severe storm in 1968 with much loss of life.[40] It was used to salvage parts of the fishing trawler *Hautapu*, which sunk in 1966 when a hole was blown in its side in mysterious circumstances.[41]

Ultimately, the biggest impact on the *Hikitia*'s fortunes was the advent of containerisation. Planning began in the mid-1960s, and major reclamation took place to build a container wharf later that decade. While larger cranes had already been operating on the wharves before, the cranes required to lift containers were that much bigger and spelt the end of the *Hikitia*'s useful life for the WHB. The first container ship arrived in 1972 and by the end of the 1970s the *Hikitia* was in little use. Her work declined even further during the 1980s, meaning that less and less maintenance was undertaken. It was during this period that water began to enter the ship and sit in the bilges.

The vessel lay idle throughout 1980, possibly because of ongoing problems with the boilers.[42] The last significant job was assisting with maintenance of the Barrett's Reef buoy in 1984.[43] After languishing unused the ship was offered for sale in 1985 or 1986.[44] Various parties expressed their interest; some viewed it as a source of scrap metal or a potential diving attraction. However, the Wellington Port Company felt reluctant to let a working vessel end its days in either fashion, so the sale did not proceed. It was not until 1990 that a satisfactory tender was received. Marine heritage enthusiasts Bob and Mary Box and John and Joy Ackrill formed a company called *Hikitia* Heavy Lift Limited (HHLL), and paid $20,000 – its scrap metal value – for the vessel.[45]

HHLL wanted to keep the *Hikitia* as a working vessel and began a slow and careful restoration project. In 1992 it received a survey certificate after lifting 88 tons and was therefore available for commercial work.[46] This provided HHLL with enough income to cover the vessel's operating costs, although this in no way covered deferred maintenance. The *Hikitia* embarked on a wide range of lifting work, acted as a platform for the municipal fireworks display on Guy Fawkes night, and undertook some salvage work. In 1997 the Marine Archaeological Association of New Zealand

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[39] *The Evening Post*, 20/5/1964.
[40] 'Wahine Salvage Jobs' (transcribed copy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 4).
[41] Diggle L. 'Hautapu Sinking may be Solved', *Professional Skipper*, Sept/Oct 2007, p.25. In 2007 a relative of a Wellington fisherman claimed he had committed the deed with some companions.
[42] *Hikitia* Survey 1981 (Maritime Transport Division). ABPL 7458 w5011 19: *Hikitia* Repairs Memos 1945-1985.Archives NZ. Surveys from 1976-1981 record grooving in the fabric of the boiler. The survey notes the vessel was "idle" in 1980 in the same section of the survey where the replacement of the boiler is recorded.
[43] Johnson, p.502.
[44] Emmanuel Makarios, 'A Good and Faithful Servant', *Seafood New Zealand*, Mar 1997, p.74.
[45] Ibid; pers. comm. John Ackrill 21/1/08.
[46] Maritime Heritage Trust of Wellington, '*Hikitia* – Wellington's Floating Crane – A Brief History' (2007).

began work on establishing a conservation laboratory in the vessel to house metal artifacts retrieved from the sea.[47] The laboratory remains in regular use.

Hikitia lifting a yacht competing in the Global Challenge, 2005. (John Ackrill Collection)

In 1998, following the introduction of Safe Ship Management, *Hikitia* was brought into SSM by Survey Nelson. However, in November 2005, following a reappraisal of the requirements of Maritime Rule Part 21 (Safe Ship Management) it was revealed that *Hikitia*, as an unpowered barge, did not need to be in Safe Ship Management. This was indicated to Maritime New Zealand in a letter dated 6 November 2005. This was accepted and it remains the ship's status at the time of writing.

With the Boxes wanting to reduce their involvement in the vessel and the two couples keen to see it come under the care of a Trust, negotiations began with the MHT to take over the vessel. The transaction for the sale of the ship took place on 25 January 2006.[48] On 16 March that same year, the Wellington Museums Trust, which had ownership of a number of items on the *Hikitia*, transferred these to the MHT.[49]

The restoration project begun by HHLL continues on. The MHT has a core group of volunteers that put much time into the ship. It has completed a comprehensive assessment of the Hull and crane, has maintained the ship's lifting capacity with 7 lifts carried since March 2006 and is slowly repairing and restoring the vessel.

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[47] *The Dominion Post*, 14/8/2003.

[48] Sale and Purchase Agreement between *Hikitia* Heavy Lift Limited and Maritime Heritage Trust of Wellington, 25/1/2006 (copy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 4).

[49] Brett Mason, Museum of Wellington City & Sea, to Malcolm McGregor, Maritime Heritage Trust of Wellington, 10/5/2006 (copy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 4).

Positioned on the corner of Taranaki Street Wharf, the ship is passed daily by thousands of people and many come to stop and read about the ship at the quayside information boards. It remains one of the best-known features of the waterfront.

2.2 Designers / builders

Fleming and Ferguson

Fleming & Ferguson Ltd. was a shipbuilding company established in Paisley, Renfrewshire, Scotland when they took over the business and yard of H McIntyre & Co. They operated from 1885 to 1903, at which point the Ferguson part of the business – a group of brothers – broke away and set up their own shipyard at Port Glasgow. Fleming and Ferguson was incorporated as a limited liability company in 1895, being reconstituted as a company with the same name in 1898.[50] The company specialised in smaller working vessels, such as light tenders, minesweeper, dredges, ferries, tugs and of course floating cranes, as well as yachts and corvettes. The company was still operating as late as 1982.

Sir William Arrol and Co.

Sir William Arrol and Co. was the builder of many of Britain's largest bridges. Primarily known as bridge and crane builders, the company was founded by Sir William Arrol (1839–1913), a civil engineer, bridge builder, and Liberal Party politician. One brief biography of Arrol describes him as follows:

Gazatteer of Scotland

> Arrol was born in Houston, Renfrewshire, Scotland and began working in a cotton mill at nine years of age. He started training as a blacksmith by age 13, and went on to learn mechanics and hydraulics at night school. In 1863 he joined a company of bridge manufacturers in Glasgow, but by 1872 had established his own business, the Dalmarnock Iron Works, in the east end of the city.
>
> In 1878, he secured the contract for the Caledonian Railway Bridge over the Clyde, and in 1882 he was awarded the reconstruction contract for the Tay Rail Bridge, which had collapsed in 1879. His company went on to construct the Forth Bridge that was completed in 1890. At the time, the Tay and Forth bridges were the largest of their type in the world. Other notable bridges followed, including: Tower Bridge in London, completed in 1894, the Nile Bridge in Egypt and the Hawkesbury Bridge in Australia. He also constructed Bankside Power Station in London, now the Tate Modern Art Gallery.
>
> Arrol was knighted in 1890, and elected as the Liberal Member of Parliament (MP) for South Ayrshire at the 1895 general election, serving the constituency until 1906.

[50] http://en.wikipedia.org/wiki/Fleming_&_Ferguson

> His company was contracted by Harland and Wolff Shipyard, Belfast, to construct a large Gantry (known as the Arrol Gantry) for the construction of three new super-liners, one of which was the *Titanic*.
>
> He spent the latter years of his life on his estate at Seafield, near Ayr, where he died in 1913.[51]

Of the many cranes the company built, the huge Titan Crane at Clydebank, Scotland (once part of the John Brown shipyard) is one of the best known. One of five such cranes that the company built, it was completed in 1907 and its size can be demonstrated by the fact that the wheelhouse itself is over 45 metres above the ground. It was recently reopened as a tourist attraction.

The company Arrol founded continued on well into the 20th century. In the period since his death, the firm has built or participated in the construction of many great structures, including the Wearmouth Bridge (1929), Tsoelike Suspension Bridge (1930), Battersea Power Station (1933), Craigellachie Bridge (1970), Deptford Railroad Bridge (1964), Forth Road Bridge (1964), Severn Bridge (1966), Tay Road Bridge, Firth of (1966) and the Humber Bridge (1981).

2.3 Physical description

This is a general description of the ship. A more detailed description of each space or element can be found in 3.4 Heritage Inventory. In general terms, the ship is not greatly altered from its original state, although some substantial changes have been made. These changes are outlined in 2.3 Modifications (below) and, where relevant, in 3.4.

Hikitia is a floating crane and its appearance and shape are derived from the requirements for that specific use. Although having all the usual attributes of a fully equipped seagoing 1920s ship, it is almost barge-like in its appearance, with its broad deck, counter stern and shallow keel.

Its specifications are as follows:

Length: 160 ft (48.7 m)
Breadth: 52.35 ft (15.88 m)
Depth: 11.35 ft (3.46 m).
Gross tonnage: 746.21 (758.18 tonnes)
Crane tonnage: 310 (314.97 tonnes)
Displacement: 926 [by calculation from measurement of freeboards and review of lines drawings

The crane was designed to lift 80 tons (81.28 tonnes) at 50 ft (15.24 m) radius, but bettered this on test by 25%. The crane can lift 60 tons at 65 degrees and 15 tons at 75 degrees. The speed of the lift is 80 tons at 4 degrees per minute, 40 tons at 8 degrees per minute, 25 tons at 12 degrees per minute and 15 tons at 24 degrees per minute. At a radius of 65 degrees the maximum height of the crane hook above the water is 95 ft.

[51] http://en.wikipedia.org/wiki/William_Arrol [viewed 29 February 2008]

The ship is overwhelmingly built of steel, mostly fixed in place by rivets. The crane, hull, frames and ribs are riveted and the only exceptions to this are where nuts and bolts are used or repairs have been welded in place.

The ship's major features above decks – from fore to aft, above decks – are the bridge, crane and fiddley. The bridge has two wheelhouses (upper and lower) and a deck that runs from one side of the bridge to the other. The crane is by far the dominant feature of the ship, with main jib and counter jib sitting atop the crane tower, which incorporates the machine room and is in turn supported by the platform that sits on the turntable. The fiddley is the structure above the boiler room and engine room. It incorporates two separate rooms accessed from the deck, while its roof is given over to numerous structures, half of which are additions.

Below decks the ship is arranged in a logical fashion. From fore to aft, the fore peak occupies the bow of the ship. Behind that is the hold, with the an accommodation spaces on either side of that (and void spaces beneath them). The middle of the ship was originally void space, with three separate cavities accessed from above and linked by hatches. One of those spaces (on the starboard side) is now occupied by the MAANZ laboratory. Behind this space once given over to the three coal bunkers (port, central and starboard), which surround the boiler room on three sides. The coal bunkers have had new uses since 1963 when an oil boiler was installed. Just behind the boiler room is the engine room, which occupies the entire width of the ship. At the rear of the ship is the aft peak, a largely void space occupying the stern of the vessel.

Of particular note are the watertight bulkheads, which intersect the ship at four intervals. The bilge pump, now temporarily disconnected, removed water from each watertight segment of the ship via interconnected piping that ran the length of the ship The longitudinal bulkheads are not watertight. There are drainage holes between these spaces to allow water to move between the bilges. This is presumably so that if the ship is holed on either side, the movement of water across the ship will prevent it listing badly and will allow it to be removed by the aforementioned pump.

The hull plates were originally, as noted above, fixed by rivets to the frames. In the years since the ship's construction, some parts of the hull corroded or even developed leaks. In the period before slipping ended, these areas of corrosion were dealt with by welding on new panels. These make up a small fraction of the hull's surface area.

2.4 Modifications

There have been a great many changes to the vessel over its life, but most are relatively minor. Only major changes are noted here, in chronological order where known.

Date	Alteration
1962	Upper wheelhouse constructed on bridge.[52]

[52] '*Hikitia* Repairs Etc', 16/11/1962.

1963	Coal-fired boiler replaced with oil-fired boiler.[53] Coal bunkers cleared and oil tanks installed in former port side coal bunker. Ballast (concrete blocks) installed in former central coal bunker to compensate for loss of heavy steam boiler.
1969	Four deck plates replaced; eight ventilator cowls replaced; some belting (timber plates) replaced.[54]
1971	Class C lifeboat replaced with 18 ft boat.[55]
1972	New platform constructed on crane.[56]
	New condenser circulating pump built from a steam unit installed.[57]
1976	Wooden deck sheathing renewed.[58]
1981	Oiled-fired boiler replaced with two automatic package boilers.[59]
c.1981/82	Installation of windlass from *Kerimoana*.[60]
Early 1990s	Doors cut in timber bulkhead forward end of port and starboard accommodation. Platform and steps built in hold to allow access to each space.
2000s	Addition of spare crane wire storage box on fiddley roof
	Corrugated iron cladding added to roof and walls of driver's cab .[61]
Date unknown	Change from DC to AC electrical power.
	Addition of water tanks on scuttle roofs
	Addition of water tank on fiddley roof
	Removal of canvas cover around bridge stanchions and rails
	Various hull and deck repairs (mainly welded pieces)

2.5 Timeline of significant events

Year	Event
Early 1920s	WHB responds to increase in shipping and ship size by expanding port facilities. A floating crane is planned as part of this expansion.
1925	*Hikitia* commissioned from Fleming and Ferguson of Paisley, Scotland. Crane to be constructed by Sir William Arrol and Co.
1926	*Hikitia* launched and trialed in Scotland. Leaves on delivery voyage 1 September. Arrives in Wellington 21 December after 82 days.

[53] Ibid, 1/10/1963.
[54] *Dominion* 1 December 1969
[55] '*Hikitia* Survey 1971.
[56] *Hikitia* Survey 1972. Ibid.
[57] Ibid.
[58] *Hikitia* Survey 1976. Ibid.
[59] *Hikitia* Survey 1981. Ibid.
[60] Pers. Comm. John Ackrill to Kerryn Pollock, 15/2/2008.
[61] Pers. comm. Malcolm McGregor to Michael Kelly, 7 February 2008

1927	Ship is trialed again and put to work. Early work includes reclamation and wharf construction, ship repairs and salvage.
1928	Lifts items for Admiral Byrd's Antarctic expedition (and again in 1933).
1942-44	America's entry into World War II and subsequent stationing of troops in Wellington gives *Hikitia* its busiest and possibly most important period of use.
1943	Fire breaks out on US ship *John Davenport* docked at Wellington and to save ship the *Hikitia* is enlisted to remove cargo to allow fire to be fought. Ship saved.
1944	*Hikitia* lifts 9.2" battery guns from delivery ship to wharf.
1946	*Hikitia* still lifting military-related loads but thereafter normal work resumes.
1950	Attempted salvage of RNZAF flying boat *Catalina* after it was submerged by a swell while taking off in Evans Bay.
1960	Review by WHB of *Hikitia*'s condition and future viability finds ship in good order and useful.
1961	Further review recommends replacement of boiler to give ship 12 more years of economic life.
1963	Use of coal ends with installation of new oil-fired boiler. *Hikitia* undertakes installation herself, by use of the boiler of the dredge *Kerimoana* to power the lift. Power changed from 110 volt DC to 240 volt AC.
1964	Despite *Hikitia*'s new boiler, WHB acquires new mobile pile driver which leaves the former with less work to do.
1968	*Wahine* capsizes and *Hikitia* does much of the salvage work.
1972	First container ship arrives in Wellington. *Hikitia* goes into decline and receives relatively little maintenance.
1980	After problems with the boiler, two smaller oil-fired boilers installed.
1984	*Hikitia* undertakes last job – maintenance of Barrett's Reef buoy – for WHB.
c.1985-86	WHB first calls for tenders for disposal of *Hikitia*. Tenders rejected.
1990	WHB finally sells *Hikitia* to private owners, who form *Hikitia* Heavy Lift Ltd. Work begins on restoration of ship.
1992	*Hikitia* gains survey certificate after lifting 80 tons in trial.
2006	*Hikitia* Heavy Lifting sells ship to MHT.

3.0 Significance assessment

3.1 Historical significance

As Wellington's only operating floating crane, the *Hikitia* has very great historical significance. It has been a part of port life since it arrived in 1926. The commissioning of a large, floating crane was a major investment by the WHB, which clearly foresaw its long-term value for lifting large items from ship to shore and vice-versa.

From the time of its arrival, and particularly while it was owned and managed by the WHB, it undertook a wide variety of port-related lifting work. At a time when Wellington simply did not have large wharf cranes exist, it performed a role that no other facility could. Its work ranged from the prosaic – unloading and loading – to the unusual and dramatic. It worked on wharf and reclamation construction, installation of lighthouse and maritime markers, the rescue of stricken vessels and the lifting of sunken vessels, ship repairs and a large variety of work. It all made the *Hikitia* a fixture in the harbour and it remains that way to this day.

The *Hikitia* was busy throughout its working life for the WHB until the arrival of containers, but the period of most intense use was during World War II and particularly when American forces were stationed in New Zealand. That period of use is testimony to the huge contribution the *Hikitia* made to the war effort and remains the ship's most important historical role.

3.2 Physical significance

The *Hikitia* has very great technological interest, and for several key reasons.

It is one of only two examples of floating cranes surviving in New Zealand and the only one still in active service. It may well be the oldest surviving working floating steam crane in the world. Research done by the MHT has, thus far, not revealed any working ship that is older.

It retains a very large amount of its original fabric, having had relatively few changes over its life. Accompanying the ship are its many fittings, fixtures and chattels, including machinery and equipment. Much of its early 20th century machinery is of great technological interest for its survival in working order. This includes the crane, turntable, haulage mechanism and engines, as well as deck fixtures like the capstans.

It is an important and rare example of the work of Fleming and Ferguson of Paisley, Scotland, a long-standing ship building firm that undertook a huge variety of work at the lighter end of the ship building spectrum. The crane manufacturer, Sir William Arrol and Co., was the most successful of Scotland's bridge and crane manufacturers.

3.3 Cultural significance

The *Hikitia* is a vessel of great cultural and social significance. It has been in service in Wellington harbour virtually all its existence. Today it something of a Wellington

icon, helped in no small measure by its current prominent berth at the Taranaki Street Wharf. It is passed, literally, by thousands of people every day, a number of whom stop and inspect it from the shore. The MHT draws many of its volunteers from the passing foot traffic. As a working museum, its prominence is enhanced by the extraordinary height of its jib and the entire ensemble adds considerably to the colour and ambience of Wellington's harbour scene.

The work that takes place on the *Hikitia* is of specific cultural importance for two reasons. Firstly, the trades and skills practised on the ship, e.g. rope and strop work, are rapidly disappearing from modern shipcraft. By its very nature, the *Hikitia* requires an understanding of 20th century ship practices because it is a working ship cum museum. The *Hikitia* is keeping these skills alive through the work of older, skilled practitioners teaching a younger generation. The second is that in recent years MAANZ's conservation laboratory has been operating from what was once a void space on the starboard side of the vessel. This facility, the only one of its kind in New Zealand, gives the *Hikitia* a wider connection with the country's maritime history and makes it a focal point of efforts to preserve maritime artifacts. There seems little reason to believe that the laboratory will not be a feature of the ship for a long time.

The importance of the *Hikitia's* dual role was highlighted by Professor Shelley Wachsmann of the Institute of Nautical Archaeology in Texas, USA, who, in 2008, described the *Hikitia* as being of 'crucial importance to ongoing efforts to preserve New Zealand's nautical archaeology by MAANZ and the Maritime Heritage Trust of Wellington.'[62] This assessment has been echoed by Robert Hohlfelder, Professor of Ancient History, University of Colorado, Boulder, who described the *Hikitia* as 'deserving national recognition both as a nautical treasure and as an important conservation facility vital for expanding the knowledge of [New Zealand's] maritime patrimony.'[63]

3.4 Heritage inventory

3.4.1 Degree of significance

For the purposes of this plan it is considered that three degrees of significance are sufficient to delineate the status of the fabric of the *Hikitia*. Most of the ship is of sufficient age and integrity that it can be regarded as of very great significance. In general, changes to the vessel, particularly those made to ensure the continued use of the ship, can be regarded as being of at least some significance. All other items are regarded as of little or nil significance.

2 Very great significance.
1 Some significance.
0 Little or nil significance.

These categories are used in the tabulation of Cultural Heritage Values.

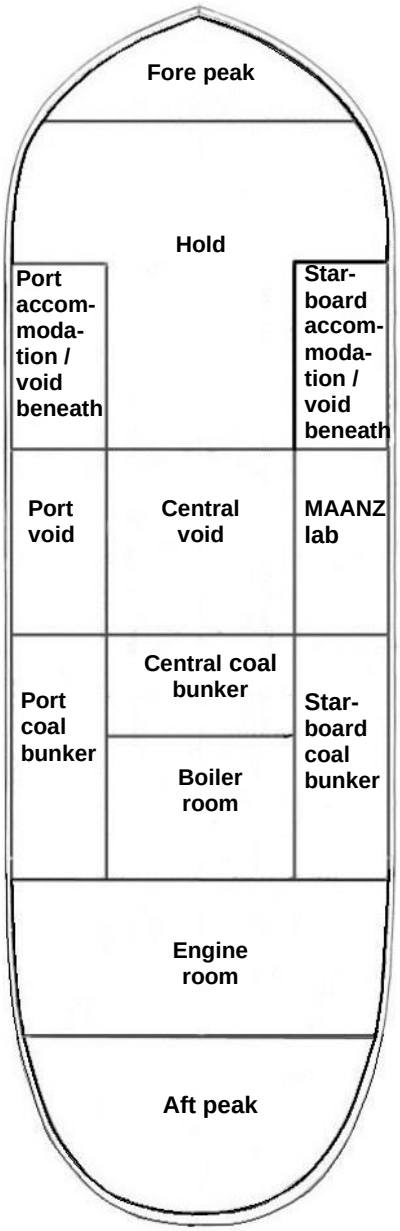
[62] Pers. comm. (open letter) Prof. Shelley Wachsmann, 20 February 2008
[63] Pers. comm. (open letter) Robert L. Hohlfelder, Professor of Ancient History, University of Colorado, 21 February 2008

3.4.2 Tabulation of cultural heritage value

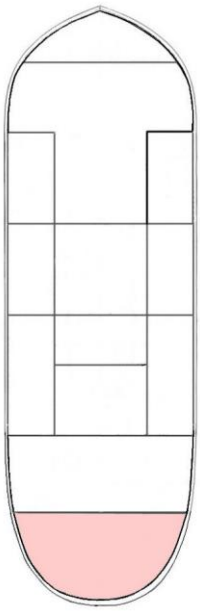
The following section is a description and assessment of each space or element and the fabric, fixtures and chattels in each. The delineation of those spaces beneath the deck is shown in the plan below. Each space or element has its own overall heritage value, with a description of its fabric, along with an inventory of the relevant fabric, fixture or chattel and a numerical assessment of their respective heritage values. Note that it is possible to have fabric, fixture or chattels ranked 2 in spaces that are only ranked 1, and vice versa of course.

3.4.3 Division of spaces below decks

Note that, above decks, the three features included in the inventory are the bridge, crane and fiddley.



Space / element: Aft Peak **Overall ranking: 1**

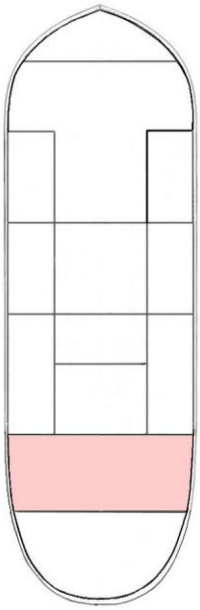


Description

This is one open space occupying the rear of the vessel and accessed solely from a hatch. Pillars support the deck above. Visible are the frames and shell of the hull and deck, all steel. The floor of the space is [in 2008] covered by ropes.

Fabric	*Ranking*
Steel frames, deck plates, hull plates, bulkhead plates, intercostals, posts	2
Fixtures	
Steel access ladder	2
Chattels	
Coils of ropes – metal, non-metallic and synthetic (some are in use at present; some are antique but not necessarily related to the *Hikitia*)	1/0
Oars and steering oar (belonging to *Hikitia* lifeboat)	2
One steering oar (original unknown, but old)	1
One rope ladder (origin unknown, but old)	1

Space / element: Engine room **Overall ranking: 2**



Description

The engine room is accessed via a door in the fiddley. The latter is responsible for the loftiness of this space, the deepest on the ship. Situated amidships, and forward of the aft peak, the engine room is dominated by the ship's two compound engines, which share the space with a condenser, two pumps and one (currently redundant) electrical generator. There is also a decayed mounting that used to house the bilge pump, which sits unused and awaiting repair at the moment. The trunking for two large vents (now not in use) extends down to a point a little above head height on the fore end of the room. There is a small hoist on a beam on both the port and starboard sides.

The steel ceiling and walls are painted white, while the bilges, which were originally lined in timber planks, are now covered in painted steel tread. There are work benches on the port (1) and starboard (2) sides of the room, along with timber lockers.

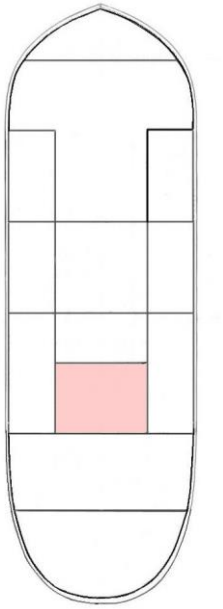
Fabric	*Ranking*
Steel frames, deck plates, bulkhead plates, intercostals, tread	2
Fixtures	
Compound engines – 2	2
Condenser	2
Pumps (2)	2
Lifting beam and hoist	2
Generator	2
Pipes and services	1
Lighting and conduit	0
Vent trunking	2

Gangway and balustrade	2
Main ladder	2
Other ladders	1

Chattels

Clock	2
Ship telegraph (port and starboard)	2
Work benches	0
Tools	0
Ropes	0
Lockers	0

Space / element: Boiler room **Overall ranking: 2**

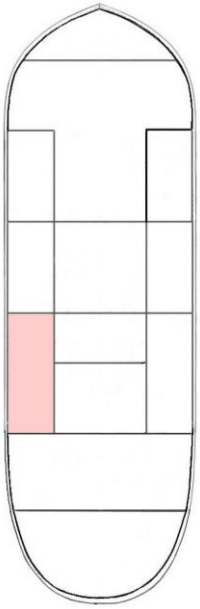


Description

The boiler room is a rectangular space, amidships, and for obvious reasons directly adjoins the engine room. Steel lined with steel plate floors, the boiler room used to house the single coal–fired, steam boiler, but today it is occupied by the smaller, twin boilers made by W.B. Easton of Dannevirke in 1980. The boilers dominate the room, but there are other minor features of the space, including lockers, vent trunking, piping and a workbench.

Fabric	*Ranking*
Steel frames, bulkhead plates, intercostals, tread, beams	2
Fixtures	
Ladder	1
Boilers	1
Vent trunking	2
Work bench	0
Sand box	1
Timber cupboard	0
Chattels	
Lockers – steel	0
Bin	0

Space / element: Port coal bunker **Overall ranking: 1**

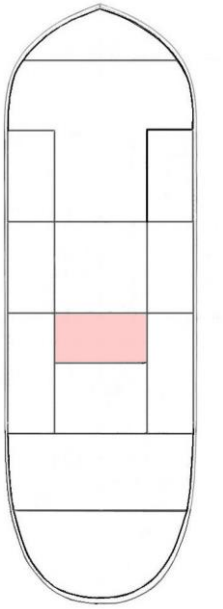


Description

The port coal bunker is accessed through a door from the boiler room. One of the three coal bunkers used to feed the steam boiler, in 1963 it was cleared to house the oil storage tanks for the new boilers. A second tank was added later and there is also a header tank. The space, which is rectangular and somewhat narrow, is shared with a working bench and tool storage. It is unlined but retains its original boards over the bilges.

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates, intercostals	2
Timber floor	2
Fixtures	
Oil tanks (2)	1
Header tank	1
Chattels	
Tools	0
Drawers (with spare nuts, bolts etc.)	0

Space / element: Central coal bunker **Overall ranking: 1**



Description

One of three coal bunkers that surround the boiler room, the central bunker sits directly behind the boiler room and is accessed by two small vertical hatches. It is unlined and contains its original timbers over the bilges. The bunker ceased its original use in 1963 when the coal-fired boiler was replaced. Today it is occupied by a variety of items, the most important being 20 concrete blocks of three tons each which were installed in 1963 as ballast to replace some of the weight lost when the huge steam boiler was removed. The blocks are just narrow enough to fit through the deck hatch.

The bunker also contains a number of chattels, including the cowls that once sat over the engine room and boiler room vents, various sheaves, drums and assorted gear.

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates, intercostals	2

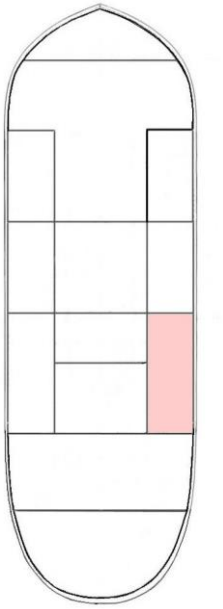
Fixtures

None.

Chattels

Cowls	2
Concrete blocks	1
Drums	0
Sheaves	1
Frames	0
Assorted gear	0

Space / element: Starboard coal bunker **Overall ranking: 1**

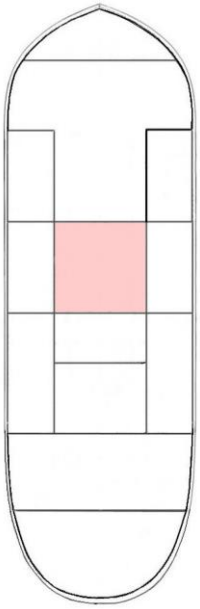


Description

The starboard coal bunker is accessed through a door from the boiler room. One of the three coal bunkers used to feed the steam boiler, it was converted in 1963 for use as the home of the electrical generator, compressor, transformer and as a part workshop / part storage area. An unpainted area, it retains its original boards over the bilges.

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates, intercostals	2
Timber floor	2
Fixtures	
Electrical generator, air compressor, transformer, battery charger	1
Chattels	
Various items in storage	-

Space / element: Central void (aka 'the cathedral') **Overall ranking: 2**

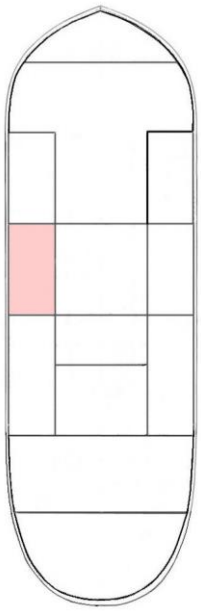


Description

The central portion of the ship is one of three void spaces across the breadth of the vessel. The central cavity, roughly square in plan, is the largest of the three. It is unlined but for some recent customwood decking above the bilges. Some loose items are stored in this area but otherwise it is unused. It is distinguished by the arches in the four corners of the space, which form parts of an octagon supporting the slew ring of the crane turntable.

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates, intercostals	2
Customwood floor	0
Fixtures	
Services – piping etc.	1
Wire for ship's whistle	2
Chattels	
Strops	0

Space / element: Port void space **Overall ranking: 1**



Description

The central portion of the ship contains three void spaces across the breadth of the vessel. The port void, identical in size to that on the starboard side, is used occasionally for storage. It is unlined but for some floor planking.

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates, intercostals	2
Timber floor	0

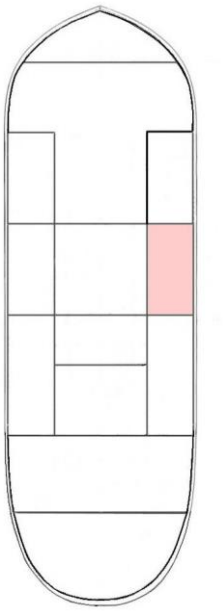
Fixtures

None.

Chattels

Ladder	0

Space / element: MAANZ conservation laboratory **Overall ranking: 1**



Description

The central portion of the ship contains what were three void spaces across the breadth of the vessel from the time of its construction. The starboard void, identical in size to that on the port, has been used as a conservation laboratory by the Maritime Archaeological Association of New Zealand (MAANZ) since 1997. Work on converting the space to a laboratory began in 1997 with completion in 2001. It allows MAANZ to conserve objects recovered from the sea. It is painted and contains considerable specialist equipment. (A full inventory of equipment can be found in Appendix 5).

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates	2
Floor (lining not known)	0
Wall lining	0

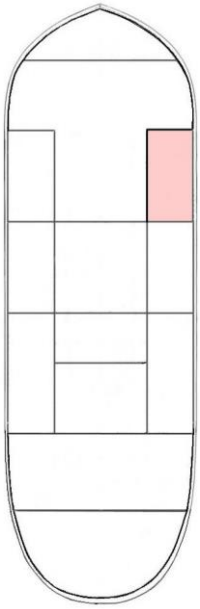
Fixtures

None.

Chattels

MAANZ has literally hundreds of individual items in the lab. These are not listed here for two reasons. One is that there are too many. The second is that there are no items of any particular heritage significance among the chattels, although at any one time, MAANZ may be holding items of heritage value for conservation. The full inventory can be found in Appendix 5.

Space / element: Starboard accommodation **Overall ranking: 2**



Description

The starboard accommodation or mess is one of two 'living areas' on the ships, the other being the mess that sits symmetrically opposite. The area is composed of a common room and two cabins that sit elevated above the bottom of the ship by means of a timber tongue and groove floor, similar to a mezzanine. This creates a more intimate living space.

The mess is now usually accessed from the hold via some steps and a platform, where a map cabinet is located. The original access, via the scuttle off the deck, is now used only on work days on the ship.

The space is presently used for interpretation and contains, among other things, boards and displays, along with the original steering wheels (stored for security reasons when the ship is not in use), benches, cabinets, sink, rigging gear and other ephemera. The timber bulkhead is composed of painted vertical tongue and groove boards, with skirting boards and a cornice. A door cut in the wall in the early 1990s gives access to the platform and hold.

Fabric	*Ranking*
Steel frames, hull, bulkhead and deck plates	2
Timber floor	2
Timber bulkhead	2
Timber platform and steps from Hold	0

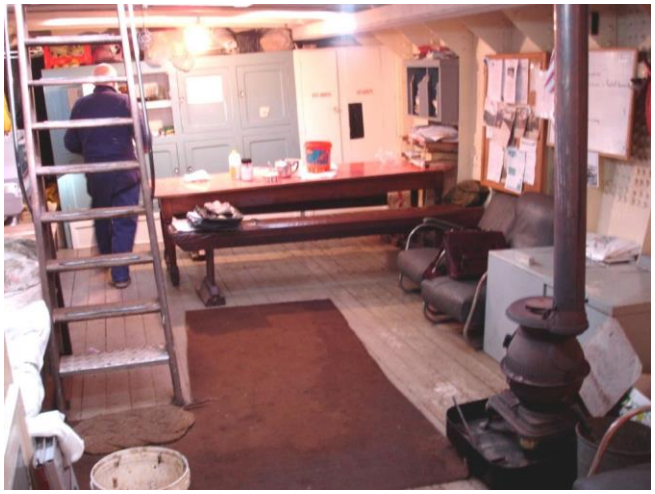
Fixtures

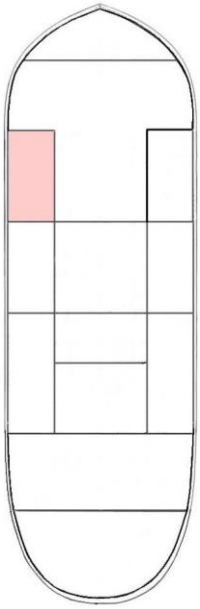
Sink and cupboard	0
Toilet discharge pipe	2
Book shelf	0
Stairs to scuttle	2
Cabinet	0
Shelves	0
Bench and cupboard	0

Chattels

Map cabinet	0
Plans of Hikitia (in map cabinet)	2
Chairs and long table	0
Riggers' gear	0
Original steering wheels – large for lower wheel house and small for upper wheel house	2

Space / element: Port accommodation (mess) **Overall ranking: 2**





Description

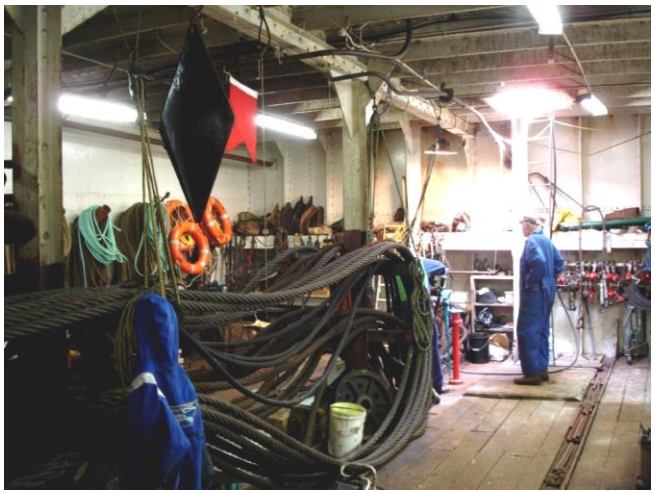
The port accommodation is one of two 'living areas' on the ships, the other being the former officers' accommodation, which sits symmetrically opposite. A rectangular space, it is accessed from the scuttle, via some steps, and also from the hold. The walls are formed by the hull and bulkheads while the ceiling is the underside of the deck. A timber floor covers the bilges. The timber bulkhead at the fore end has painted vertical tongue and groove boards, with skirting boards and cornice. A door has been cut in the wall (a later modification) to provide access to the hold. On the other side of the door, a platform leads to stairs that give access to the hold.

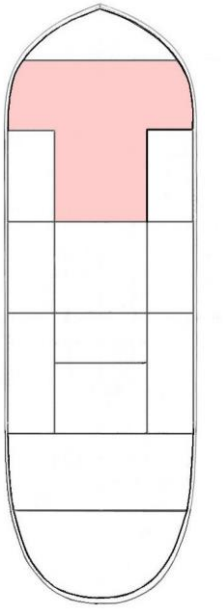
The cabin contains numerous cupboards and benches fixed against the hull. There are cupboards lining the aft wall. Along the starboard wall are a combined bench and cupboard, a couch, a stand containing a microwave, and a fixed rack of coat hooks. On the port wall – from fore to aft – is the bench and sink, pot belly stove, table (fixed to the wall) and, above, a purpose designed timber plate holder. More cupboards and a bench are arranged along the starboard wall. Most of these fixtures are additions.

Fabric	*Ranking*
Steel frames; hull, bulkhead and deck plates	2
Timber floor	2
Timber bulkhead	2
Timber platform and steps from Hold	0

Fixtures	*Ranking*
Cupboards (aft)	1
Combined bench and cupboard (starboard)	1
Bench (starboard)	0
Rack of coast hooks (starboard)	0
Bench and sink, pot belly stove (port)	1
Purpose designed timber plate holder (port)	1
Table	1
Chattels	
Couch	0
Microwave	0
Hot water cylinder	0

Space / element: Hold **Overall ranking: 2**





Description

An impressive T-shaped space, large by the standards of the *Hikitia*, the hold is made to look somewhat smaller by the sheer amount of material and equipment stored in the area and by the various platforms built to assist in that storage.

The hold is accessed via the port and starboard accommodation, as well as the original hatch. The hold occupies the full depth of the ship below decks, with timber boards covering the bilges. Otherwise the space is unlined. The extra width of the space is made possible by the line of steel posts down its middle that support the deck above. Alongside the port platform is a steel frame that offers more storage.

The area is primarily set aside for the storage and maintenance of strops and ropes (metal and fibre), but the area contains may other fittings and items, including assorted tools and spare parts, a work bench, drums, lockers, a large vintage sewing machine and tools and equipment associated with rope work.

Fabric	*Ranking*
Steel frames; hull, bulkhead and deck plates; intercostals; posts	2
Timber floor	2

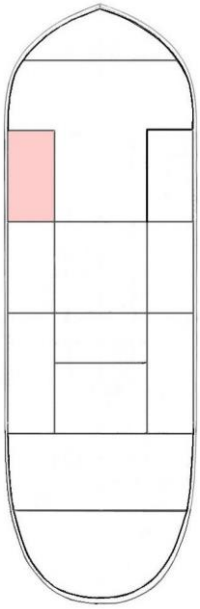
Fixtures

Steel frames for rope storage	0
Hooks for gear storage	0
Steel ladder to hatch	2
Built-in shelf [part of the very large internal crossbracing of the ship]	2

Chattels

Ropes and strops	1
Sheaves	1
Pulley blocks	1
Rigging equipment (various)	1
Spare parts (valves, wire rope etc.)	1
Industrial sewing machine	1
Rigging vice	1
Work bench	0
Table	0
Drum (grease)	0
Loose timber	0
Buzzer	0
Lockers	0
Lights	0

Space / element: Void under port accommodation **Overall ranking: 1**



Description

The living quarters on both sides of the ship are elevated above the floor of the ship (i.e. the hold sits on the floor of the ship, while the accommodation sits about a metre higher). The void space so created has no particular use, although some timbers have been stored in one or other space from time to time.

Fabric	*Ranking*
Steel frames; hull, bulkhead and deck plates; intercostals; hatch	2

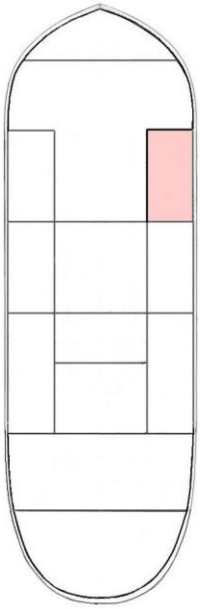
Fixtures

None

Chattels

None

Space / element: Void under starboard accommodation **Overall ranking: 1**



Description

The living quarters on both sides of the ship are elevated above the floor of the ship (i.e. the hold sits on the floor of the ship, while the accommodation sits about a metre higher). The void space so created has no particular use at this point, although some loose timbers are stored there.

Fabric	*Ranking*
Frames; hull, bulkhead and deck plates; intercostals; hatch (all steel)	2

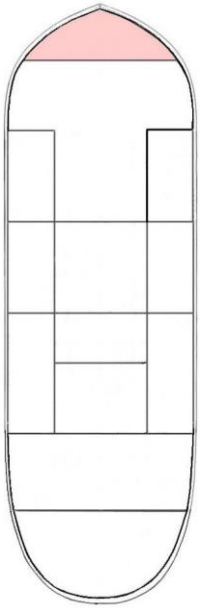
Fixtures

None

Chattels

None

Space / element: Fore peak **Overall ranking: 2**



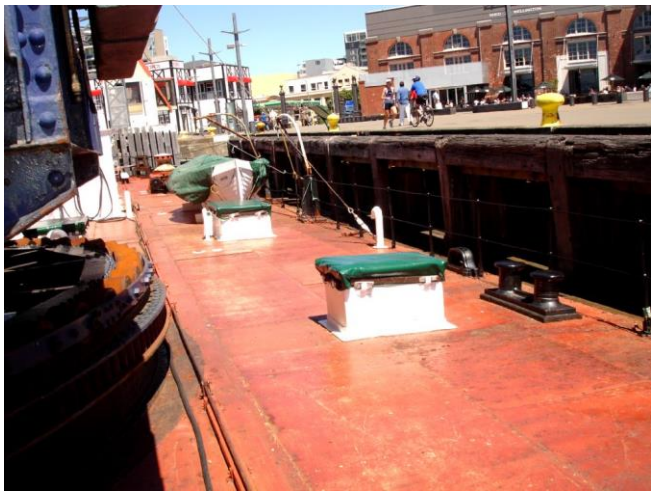
Description

The fore peak – the cavity at the very front of the ship – is a narrow and confined triangular space, used for the storing of the ship's cable (anchor chains). The two cable chain systems for raising and lowering the anchors are stored in two substantial timber boxes that stand about two metres high. These are located hard up against the aft bulkhead and just above the bilges.

There is considerable steel framing used to reinforce the bow, a stressful point for any ship on the move. A walking platform sits above the bilges, alongside the cable storage boxes.

Fabric	*Ranking*
Frames; hull, bulkhead and deck plates; reinforcing; intercostals; hatch (all steel)	2
Fixtures	
Cables (steel)	2
Cable storage boxes (timber)	2
Platform with balustrade (steel)	2
Steel ladder	2
Chattels	
Cable repair tool (which allows individual links of the cable to be removed, repaired or replaced)	2

Space / element: Deck **Overall ranking: 2**



Description

The deck is predominately riveted steel plates sheets fixed to deck beams. Some repairs have been welded into place. In addition, there are two sections of timber planking laid over steel directly above the port and starboard accommodation. This has the effect of dramatically reducing the impact of the heat of the sun on the steel, which makes some parts of the ship – below decks – very hot on sunny, summer days and conversely conserves heat in winter.

The deck is festooned with a great variety of fittings and fixtures, most of which are related to activities taking place below decks, such as vents, or are used for mooring the ship. A full and extensive list of these items can be found immediately below, but the major items, in no particular order, are the wheelhouse and bridge, crane, the two scuttles and the fiddley. All these features are dealt with separately.

Fabric	*Ranking*
Steel deck	2

Fixtures

Port side – fore to aft	
Stanchions and rails – full length	2
Stored hardwood timbers for lifting dunnage	0
Hatch (with combings, hatch wedges and bars)	2
Vent	2
Bits (2)	2
Fairlead	2
Gangway (not fixed)	1
Storage box	1
Scuttle, with cabin door, water tank above and deck lights	2

Vents (2)	2
Flue for stove	0
Woodbox (addition for firewood for small stove below)	0
Bits (2)	2
Fairlead	2
Guy rope to funnel	1
Hatch (plus valves (2) valve cover (1), vent)	2
Lifeboat / davits (not original)	2/0
Vent (coal bunker)	2
Pipe	1
Capstan	2
Bits (2)	2
Vent	2
Fairlead	2

Centre – fore to aft

Chain winch with 2 sets of bits either side	2
Wheelhouse (supporting bridge)	2
Crane	2
Miscellaneous gear (underneath crane)	0
Hatch	2
Vent	2
Fiddley (above-deck structure)*	2
Keremoana winch (addition)	1
Platform with stack of timber (addition)	0
Steering quadrants (beneath platform and linked to rudder rods running fore and aft)	2
Flagstaff	0

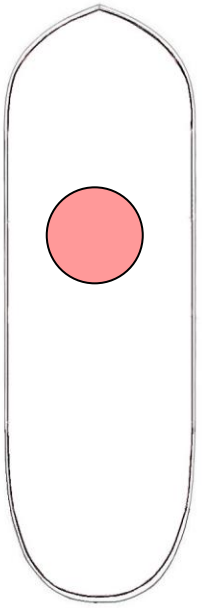
Starboard – fore to aft

Stanchions and rails – full length	2
Vent	2
Bits (2)	2
Toilet	2
Scuttle, with cabin door, water tank above	2
Officers' mess range funnel – cut-off, base only remains	1
Gang way (not fixed)	2
Vents (2)	2
Bits (2)	2
Hatch (to MAANZ lab) plus tank stand base	2
Bit (possibly)	2
Vent	2
Guy rope to funnel	1
Hatch (plus valves (2) valve cover (1), vent)	2
Lifeboat base plus davits (original)	2
Capstan	2
Bits	2
Vent	2
Fairlead	2

Chattels

Although most of the items on the deck are fixed, there are a few loose items that could be regarded as chattels, although they are not of any great significance. These include the loose stacks of timber.

Space / element: Crane **Overall ranking: 2**



Description

The crane is made up of a number of different components, which are described as follows, from the deck up.

At the bottom is a *turntable*, including the *slew ring* (the large cogged ring). Above that is the *platform*. On either side of this sit 15 tonne steel *counterweights* that move fore and aft depending on the circumstances of the load. To the rear is the main counterweight of 97 tonnes. Just behind the counterweight is the *luffing screw* used in luffing or amending the angle of the jib. Above the platform is the *machine* or *gear room*, which contains the cogs and levers and winding gear. Above the engine room the *tower* rises to the *driver's cab*. Above this is the platform from which access to the *jib* can be gained. The *main* or *forward jib* is balanced by the aft *counter jib*. The tip of the jib is known as the *jib head*.

The turntable and platform are riveted steel, while the tower and jibs are made out of steel lattice work, all riveted. The machine room has a steel frame but the walls are clad with vertical tongue and groove timber boards (with four-pane windows) and flat steel roof, although the present roof is the second one. (The first, heavily rusted roof still exists beneath).

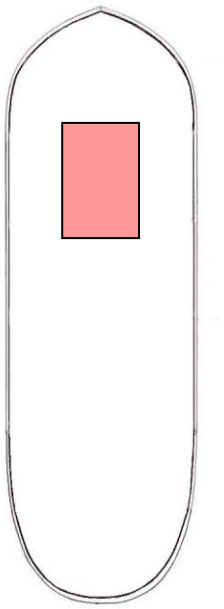
The driver's cab is a small space approximately 4/5ths of the way up the tower. Recently reclad with corrugated iron, it contains the driver-based controls for moving and managing the crane during operation. (The remainder of the crane controls are in the engine room). A steel ladder gives access to all parts of the crane, including the outer extremities of the crane.

Fabric	*Ranking*
Turntable	2
Platform	2
Counterweights (3)	2
Machine room	2
Walls – timber	2
Walls – iron	1
Floor	2
Door	2
Roof – original	2
Roof – replacement	1
Machinery, levers, instrumentation	2
Tower	2
Driver's cab	2
Roof / walls	1
Timber match lining	2
Windows	2
Floor tread	2
Door	2
Levers	2
Tilt indicator	2
Jib (main and counter)	2
Strops and sheaves	1

Fixtures and chattels

See *Fabric* above

Space / element: Fiddley **Overall ranking: 2**



Description

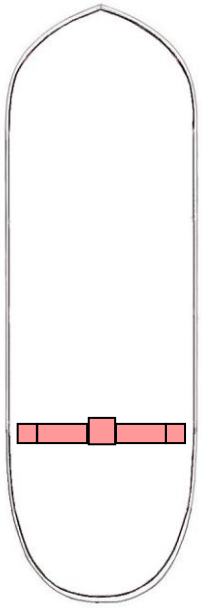
The fiddley ('the space above the boiler'[64]) sits aft of the crane and above the engine room and boiler room. The only major structure above the deck other than the bridge, wheelhouses and crane, the fiddley is clad with steel plates and includes two outside rooms, one of which (now the paint locker) was an original part of the vessel, the other (the wash room) was a later addition (date unknown).

The fiddley emits light into the engine room via skylights on its roof. The housing for the lights is just one of a number of structures on the flat roof. There are the bases of four cowled vents (minus their cowls and now covered), the boiler funnel, water tank (addition), storage box for spare crane wire, and a hatch to the boiler room vent .

Fabric	*Ranking*
Exterior cladding (steel)	2
Skylights (housing and lights)	2
Fixtures	
Funnel	2
Vents (without cowls)	2
Water tank	0
Storage box (for crane wire)	0
Hatch to boiler room	2
Chattels	
Spare crane wire	1

[64] www.m-i-link.com/dictionary/default.asp?term=fiddley [viewed 18 February 2008]

Space / element: Bridge **Overall ranking: 2**



Description

The bridge is located forward of the crane and is composed of two steel wheelhouses (one on top of the other) and a platform that spans the width of the ship and is sited just in front of the upper wheelhouse (added in 1958). It is supported at either end by toilets (originally officers' to starboard and other crew to port). The platform is accessed by stairs that are located on the starboard of the lower wheelhouse. The deck of the platform is caulked timber planking, while there are stanchions and rails on either side. There are two intact ship telegraphs, connected to the engine room, at either end of the bridge. They are wrapped in canvas, but remain in working condition with the bells still functioning.

Fabric	*Ranking*
Steel walls, roof (wheelhouses)	2
Timber floors (deck, wheelhouses)	2
Stanchions and rails	2
Fixtures	
Steering mechanism (lower wheelhouse)	2
Telegraphs	2
Life buoy holder (2)	1
Chattels	
Communication equipment, telephones	0
Port & Starboard oil lamp holders	2
Port & Starboard forward and aft and mast head original oil lamps	2
Original Hikitia bell stamped with Hikitia	2

4.0 Influences on conservation policy

4.1 Terms of acquisition

The purchase of the *Hikitia* by the MHT reflected its aims and aspirations, as outlined below in 4.2. Among a variety of objects, the Trust was established to manage, promote and develop maritime heritage projects. The conservation of the *Hikitia* and its ongoing role as a working museum is in accordance with that object.

4.2 Requirements of owner

The MHT was established in 2003 with a range of aims and objects. As per the Trust's Deed, they are:

- to advance maritime heritage within the Wellington Region;
- to raise and enhance community and public understanding of maritime heritage;
- to manage, promote and develop maritime heritage projects;
- to contribute, compliment and add to the wellbeing of the Wellington Region communities by providing members of these communities with the opportunity to learn about and participate in maritime heritage;
- generally to do all acts, matters and things that the Trustees consider may advance the objects of the Trust as set out above.

The Deed states that the MHT's objects shall only be carried out in or to benefit people in the Wellington region. The Trustees may carry out activities outside the Wellington region to promote the Trust or the Trust activities but only if they believe that such activities will be for the ultimate benefit of people of the Wellington region.

To one extent or another, care and management of the *Hikitia* fulfils all the above aims and objects.

The MHT has some specific requirements for the future conservation and operation of the *Hikitia*. They are:

1. The vessel should be brought up to full survey, so that it can move under its own motive power. This will involve major hull work in a graving dock (in Lyttelton). The full details of the likely work involved can be found in Appendix III.

2. The vessel is to be kept in full working order. This means that, at the very least, the crane is always operable and, if possible, the ship is able to move under its own power (subject to meeting survey requirements, as per 1.).

3. The ship can be adapted to fit another boiler so that it has enough horsepower to operate safely in difficult seas.

4. The ship remains a working museum so that volunteer labour and the visiting public get an opportunity to experience or view the ship as it is intended to be used.

4.3 Compliance with Maritime New Zealand requirements

The *Hikitia* is presently operating as a lift-only vessel under an exemption certificate issued by MNZ. This is partly a response to *Hikitia*'s unique role and circumstances, but the exemption comes with conditions. Those conditions include:

> That the ship remains Fit for Purpose.
>
> That the ownership of the ship remains with the MHT.
>
> That the ship operates within Wellington Enclosed Waters as defined in Maritime Rule Part 20.
>
> That the requirements for maintenance and safe operation mentioned in the Safety Case[65] dated 12 January 2006 are maintained.

The Trust's ultimate aim is to get the ship into full survey, which will require a more exacting compliance. This is briefly outlined in 4.1 above and is explained in more detail in Appendix 2 – Remedial work.

4.4 Threats

Hikitia is at risk from a variety of threats and much of the work undertaken by the MHT is engaged in addressing those threats. It is also undertaking careful planning to ensure that future threats are countered before they manifest themselves.

4.4.1 Loss of purpose

The sustained loss of use or purpose for this historic ship poses a significant threat, as it is vital that the *Hikitia* has both a defined use and a defined purpose, as identified in article 7 of the ICOMOS New Zealand Charter (see Appendix I).

Hikitia is an unusual vessel in that its traditional use as a floating crane is a specific, specialist use subject to sporadic demand. It has wider uses - as a working museum, floating workshop, and a preservation laboratory.

If the ship lost its other uses and the volunteer input that keeps it going also ended, the ship would also face a serious threat to its future. The ship is unlikely to earn enough income to cover all its costs so it needs volunteer input to partly cover the shortfall in its funding.

The combination of the loss of its primary purpose and its associated uses would inevitably lead to a loss of income and the loss of the use of the ship's defining features. This would lead to lack of support and the loss of income from other sources, allowing other threats to manifest. The ships continued survival is dependent on maintaining a compatible and sustainable use.

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[65] The Safety Case was argued in a letter by John Ackrill on behalf of *Hikitia* Heavy Lift on 12 January 2006. This letter remains the Maritime Heritage Trust's Safety Case.

4.4.2 Natural processes

The *Hikitia* is under constant threat of decay, most particularly in its iron and timber components. Some of this is caused by the exposure of much of the vessel's deck, housings and crane to rain, seawater and salt laden air. The vessel has also been sitting in seawater almost constantly since it was built and this has had inevitable consequences for the vessel's riveted iron hull. Past leaks that allowed rain water into the bilges continue to have consequences for the hull, although the leaks as such have been stopped.

4.4.3 Disaster

The ship is vulnerable to a variety of potentially disastrous events, including capsizing, wrecking or sinking, as well as fire. While good ship practice should ensure, as far as possible, that the vessel is not left vulnerable to disaster while at sea, the threat of vandalism (see below) has the potential to lead to a major event such as a fire.

4.4.4 Use impacts

General use of the vessel leads inevitably to wear and tear. Extensive visitor use could also have an impact on the vessel's fabric, although this is not likely to be a significant factor unless visitor numbers increase dramatically.

4.4.5 Vandalism

The *Hikitia* occupies a prominent position on Taranaki Street Wharf and is easily accessible from shore. It has suffered from vandalism, although mainly minor, but in its present position it remains vulnerable to wanton acts that could damage the vessel. A security system has been quoted for and is intended to be installed after repair of the hull.

4.4.6 Management impacts

Inadequate quality of management of the ship may constitute a threat. This includes poor planning and research, delays in commencing work, undertaking inappropriate remedial work or maintenance; the installation of inappropriate new fittings, and the failure to act on known threats.

4.4.7 Information loss

The destruction of important archival sources such as old documents and photographs, and the loss of unrecorded oral history sources, constitute a threat.

5.0 Conservation policies

5.1 Principal statement

Hikitia is intended to be used as both a working ship and a museum. As a result, conservation standards will have to be married to the ship's likely future uses. Some effort will be made to return the ship to an earlier state, but by and large the ship will be maintained in its present state. This is partly because some accommodation must be made for the kinds of changes that have been made to keep the ship viable and useable throughout its life to this point. There must also be some upgrading to ensure the ship's future viability, particularly with regard to meeting survey requirements. None of this should imperil the ship's integrity and heritage values.

5.2 Conservation standards

All work carried out on this ship should meet conservation standards, and in particular should follow the conservation principles set out in the *ICOMOS Charter for the Conservation of Places of Cultural Heritage Value.* In summary, this means:

Repairing the ship with original or matching materials, **retaining as much as possible of the original fabric**. (Repairs to a technically higher standard than the original are allowable where the life expectancy of the element is enhanced.)

Restoring lost features where there is clear evidence of the original form and detail.

Maintaining the ship to a high standard so that it is always weatherproof, tidy and functional. Maintenance should be carried out regularly and according to a plan.

Modifying the ship with alterations or additions only where such change is essential to continued use, where the change is the minimum necessary, and where there is no loss of heritage value. Reversible change is preferable to irreversible change.

Identifying new materials used in maintenance, repair and new work to distinguish them from the old.

Keeping records of all work.

For a more detailed explanation of conservation standards, see Appendix I, *ICOMOS New Zealand Charter*.

5.3 Extent of intervention

Appropriate conservation processes for the assigned cultural heritage values are as follows:

Cultural Heritage Value 2

This means the element or space is of considerable cultural heritage value. Modification should be allowed only for the purpose of safeguarding the ship,

or to meet MNZ requirements. Any such modification should be carried out only if no other reasonable option is available; it should be as discreet as possible and the minimum necessary.

Allowable processes of change include **maintenance**, **stabilisation**, **repair** and **restoration.**

Cultural Heritage Value 1

This means the element or space is of some cultural heritage value. Adaptation, or removal and reuse may be allowed for the reasons given above and to effect distinct functional improvement.

Allowable processes of change include **maintenance, stabilisation, repair, restoration** and **adaptation.**

Little or No Cultural Heritage Value

For spaces or elements of little or no cultural heritage value, the adaptation of the spaces, and modification of the fabric, may be carried out to effect any improvement. However, wherever work is undertaken in these spaces, consideration should be given to reinstating original finishes or other fabric where these are known and where appropriate.

See Appendix 1, *ICOMOS New Zealand Charter* for the definition of maintenance, stabilisation, repair, restoration and adaptation.

5.4 Fixtures and chattels

Hikitia has a major collection of fixtures and chattels, most of which relate to the operation of the vessel. They range from on-deck items such as capstans, hatches and vents, to the items that fit-out the main cabin. There are other items that have been collected in more recent years to maintain the ship and keep the various workshops running and these include objects such as an industrial sewing machine (to stitch canvas covers) or a huge collection of nuts, bolts, screws etc. The majority (but by no means all) of the fittings and chattels are an integral part of the ship's heritage fabric and historic record and should be kept with the ship as far as is practicably possible. They should also be cared for as the ship itself is.

A list of known and visible fittings and chattels is included with each space or element and these can be found in 3.4, Heritage Inventory.

5.5 Disaster provisions

The ship should be fitted with the necessary equipment to reduce the chance of a disaster taking place. These should include the following: Bilge alarms, smoke detector systems, security alarms, pumps and fire extinguisher(s). The ship already carries many of these items but any new equipment should be installed with the minimum of interference to the historic fabric of the vessel.

5.6 Future developments

The MHT would like to undertake several initiatives to better secure the ship's future. Among these are; to achieve full survey for the vessel, and to install a third boiler to get the ship's capacity up to the level it was when it had the single boiler (pre-1980). It envisages putting this third boiler in the former coal bunker forward of the existing oil fired boilers.

5.7 Interpretation

Interpretation is an important component of short and long-term efforts to conserve the *Hikitia*. It gives an opportunity for the MHT to publicise, firstly, the importance of the ship (and maritime heritage in general), secondly, the conservation work undertaken on the ship, and, thirdly, the kind of work the ship can undertake for clients.

Interpretation can take many forms and the possibilities are myriad. The most obvious way is via panels, both on-shore and on the vessel. The interpretation offered by the MHT at its berth (and to a lesser extent the Maritime Heritage Trail panel nearby) draw many visitors' attention to the ship. Visitors to the ship can see some interpretation inside the ship and more can be done with this. The other means are via the ship's website [hikitia.com], which is very much in its nascent form at present.

6.0 Summary of work recommendations

6.1 Repair

THAT the structure, machinery and fittings of the *Hikitia* should be repaired so that they are in very good condition and deterioration is minimised. The condition of the ship's fabric and recommended repair work is included in Appendix II, Condition and Appendix III, Recommended Repair Work.

6.2 Maintenance

THAT the *Hikitia* should be maintained regularly and according to a plan that meets the principles of best conservation practice. A maintenance plan should be prepared following the completion of remedial works.

6.3 Adaptation

THAT any works of adaptation, to enable the better use and management of the *Hikitia*, should be carefully assessed before being carried out.

6.4 Chattels

THAT significant chattels should be conserved in a fashion consistent with the treatment of the rest of the ship.

6.5 Public involvement

THAT public involvement be provided for through the volunteer programme run by the MHT and that guided tours of the ship continue to be undertaken.

6.6 Threats

THAT appropriate action be taken to eliminate or minimise the threats to the *Hikitia* as set out in Section 4.4 of this Plan.

6.7 Conservation policy

THAT appropriate action be taken to comply with all Conservation Policy statements as set out in Section 5.0 of this Plan.

6.8 Review

THAT this Conservation Plan be reviewed at 10-yearly intervals.

7.0 Sources

Secondary sources

Published

‘A Centurion Odyssey’, *New Zealand Memories*, Apr/May 2005, no. 53

Diggle L. ‘Hautapu Sinking may be Solved’, *Professional Skipper*, Sept/Oct 2007

Johnson D. 1996, *Wellington Harbour*, Wellington Maritime Museum Trust, Wellington

McLean G., *New Zealand Nautical Yarns* (excerpt reproduced in Maritime Heritage Trust of Wellington *Hikitia* folder volume 3)

Makarios E., ‘Collision – The Sinking of *HMNZS South Sea*’, Seafood New Zealand, May 1994

Makarios E., ‘A Good and Faithful Servant’, *Seafood New Zealand*, Mar 1997

Philips T., ‘*Hikitia*’, *Greater Wellington Marine Model Club Newsletter*, July 2005

The New Zealand Railway Observer, 1989, vol.46.

Unpublished

Kelly M. 1997, 'Wrights Hill Fortress Conservation Plan', WCC

Maritime Heritage Trust of Wellington, ‘*Hikitia* – Wellington’s Floating Crane – A Brief History’ (2007)

Primary sources

Outward Letters, Wellington Harbour Board, Wellington City Archives

Wellington Harbour Board Annual Report 1924, 1926, 1927

’80 Ton Floating Crane - “*Hikitia*” Supplied by Messrs Fleming & Ferguson Ltd, Paisley. Report of Inspection and Tests’ (photocopy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 1)

Hikitia Survey 1981 (Maritime Transport Division). ABPL 7458 w5011 19: *Hikitia* Repairs Memos 1945-1985,. Archives New Zealand

‘Chief Officer’s Log Book of the Steamship *Hikitia* of Wellington, N.Z’, 1926- [primary location not known, but copy held in Wellington Maritime Trust folders]

Sale and Purchase Agreement between *Hikitia* Heavy Lift Limited and Maritime Heritage Trust of Wellington, 25/1/2006 (copy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 4).

'Wahine Salvage Jobs' (transcribed copy in Maritime Heritage Trust of Wellington *Hikitia* folder volume 4).

Newspapers

Dominion, 15/1/1927, 16/8/1927, 31/8/1927, 18/1/1929, 8/2/1950

Dominion Post, 23/7/03, 14/8/2003

Evening Post, 21/12/1926, 20/5/1964, 9/8/1956

Web sources

'The war against Japan – New Zealanders in the Pacific War', URL: http://www.nzhistory.net.nz/war/war-in-the-pacific/war-against-japan, (Ministry for Culture and Heritage), [updated 27 June 2007]

http://en.wikipedia.org/wiki/Fleming_&_Ferguson [viewed 20 February 2008]

http://en.wikipedia.org/wiki/William_Arrol [viewed 20 February 2008]

www.m-i-link.com/dictionary/default.asp?term=fiddley [viewed 18 February 2008]

Other

Four volumes of archives, newspaper and magazine clippings, images, correspondence, ephemera etc., compiled by *Hikitia* Heavy Lifting and held by John Ackrill on behalf of Maritime Heritage Trust of Wellington

Pers. comm. John Ackrill to Kerryn Pollock

Pers. comm. Malcolm McGregor to Michael Kelly

Plans

An almost complete set of original drawings of the Hikitia is held on the vessel itself. Another almost complete set is held in Wellington City Council Archives and it is believed that the two sets can be aligned to produce two complete sets of plans. Some of these plans are reproduced in Appendix IV.

Appendix I: ICOMOS New Zealand Charter

ICOMOS NEW ZEALAND

Charter for the Conservation of Places of Cultural Heritage Value

Preamble

New Zealand retains a unique assemblage of places of cultural heritage value relating to its indigenous and its more recent peoples. These areas, landscapes and features, buildings, structures and gardens, archaeological and traditional sites, and sacred places and monuments are treasures of distinctive value. New Zealand shares a general responsibility with the rest of humanity to safeguard its cultural heritage for present and future generations. More specifically, New Zealand peoples have particular ways of perceiving, conserving and relating to their cultural heritage.

Following the spirit of the International Charter for the Conservation and Restoration of Monuments and Sites (the Venice Charter 1966), this charter sets our principles to guide the conservation of places of cultural heritage value in New Zealand. It is intended as a frame of reference for all those who, as owners, territorial authorities, tradespersons or professionals, are involved in the different aspects of such work. It aims to provide guidelines for community leaders, organisations and individuals concerned with conservation issues. It is a statement of professional practice for members of ICOMOS New Zealand.

Each section of the charter should be read in the light of all the others. Definitions of terms used are provided in section 22.

Accordingly this charter has been adopted by the New Zealand National Committee of the International Council on Monuments and Sites at its Annual General Meeting on 4 October 1992.

1. The Purpose of Conservation

The purpose of conservation is to care for places of cultural heritage value, their structures, materials and cultural meaning. In general, such places:

i. have lasting values and can be appreciated in their own right;
ii. teach us about the past and the culture of those who came before us;
iii. provide the context for community identity whereby people relate to the land and to those who have gone before;
iv. provide variety and contrast in the modern world and a measure against which we can compare the achievements of today; and
v. provide visible evidence of the continuity between past, present and future.

2. Indigenous Cultural Heritage

The indigenous heritage of Maori and Moriori relates to family, local and tribal groups and associations. It is inseparable from identity and well-being and has particular cultural meanings.

The Treaty of Waitangi is the historical basis for indigenous guardianship. It recognises the indigenous people as exercising responsibility for their treasures, monuments and sacred places. This interest extends beyond current legal ownership wherever such heritage exists. Particular knowledge of heritage values is entrusted to chosen guardians. The conservation of places of indigenous cultural heritage value therefore is conditional on decisions made in the indigenous community, and should proceed only in this context. Indigenous conservation precepts are fluid and take account of the continuity of life and the needs of the present as well as the responsibilities of guardianship and association with those who have gone before. In particular, protocols of access, authority and ritual are handled at a local level. General principles of ethics and social respect affirm that such protocols should be observed.

3. Conservation Practice

Appropriate conservation professionals should be involved in all aspects of conservation work. Indigenous methodologies should be applied as appropriate and may vary from place to place. Conservation results should be in keeping with their cultural content. All necessary consents and permits should be obtained.

Conservation projects should include the following:

i. definition of the cultural heritage value of the place, which requires prior researching of any documentary and oral history, a detailed examination of the place, and the recording of its physical condition;

ii. community consultation, continuing throughout a project as appropriate;
iii. preparation of a plan which meets the conservation principles of this charter;
iv. the implementation of any planned work; and
v. the documentation of any research, recording and conservation work, as it proceeds.

General Principles

4. Conservation Method

Conservation should:

i. make use of all relevant conservation values, knowledge, disciplines, arts and crafts;
ii. show the greatest respect for, and involve the least possible loss of, material of cultural heritage value;

iii. involve the least degree of intervention consistent with long term care and the principles of this charter;
iv. take into account the needs, abilities and resources of the particular communities; and
v. be fully documented and recorded.

5. Respect for existing evidence

The evidence of time and the contributions of all periods should be respected in conservation. The material of a particular period may be obscured or removed if assessment shows that this would not diminish the cultural heritage value of the place. In these circumstances such material should be documented before it is obscured or removed.

6. Setting

The historical setting of a place should be conserved with the place itself. If the historical setting no longer exists, construction of a setting based on physical and documentary evidence should be the aim. The extent of the appropriate setting may be affected by constraints other than heritage value.

7. Risk Mitigation

All places of cultural heritage value should be assessed as to their potential risk from any natural process or event. Where a significant risk is determined, appropriate action to minimise the risk should be undertaken. Where appropriate, a risk mitigation plan should be prepared.

8. Relocation

The site of an historic structure is usually an integral part of its cultural heritage value. Relocation, however, can be a legitimate part of the conservation process where assessment shows that:

i. the site is not of associated value (an exceptional circumstance); or
ii. relocation is the only means of saving the structure; or
iii. relocation provides continuity of cultural heritage value.

A new site should provide a setting compatible with cultural heritage value.

9. Invasive Investigation

Invasive investigation of a place can provide knowledge that is not likely to be gained from any other source. Archaeological or structural investigation can be justified where such evidence is about to be lost, or where knowledge may be significantly extended, or where it is necessary to establish the existence of material of cultural heritage value, or where it is necessary for conservation work. The examination should be carried out according to accepted scientific standards. Such investigation should leave the maximum amount of material undisturbed for study by future generations.

10. Contents

Where the contents of a place contribute to its cultural heritage value, they should be regarded as an integral part of the place and be conserved with it.

11. Works of Art and Special Fabric

Carving, painting, weaving, stained glass and other arts associated with a place should be considered integral with a place. Where it is necessary to carry out maintenance and repair of any such material, specialist conservation advice appropriate to the material should be sought.

12. Records

Records of the research and conservation of places of cultural heritage value should be placed in an appropriate archive. Some knowledge of place of indigenous heritage value is not a matter of public record, but is entrusted to guardians within the indigenous community.

Conservation Processes

13. Degrees of Intervention

Conservation may involve, in increasing extent of intervention: non-intervention, maintenance, stabilisation, repair, restoration, reconstruction or adaptation. Where appropriate, conservation processes may be applied to parts or components of a structure or site.

Re-creation, meaning the conjectural reconstruction of a place, and replication, meaning to make a copy of an existing place, are outside the scope of this charter.

14. Non-intervention

In some circumstances, assessment may show that any intervention is undesirable. In particular, undisturbed constancy of spiritual association may be more important than the physical aspects of some places of indigenous heritage value.

15. Maintenance

A place of cultural heritage value should be maintained regularly and according to a plan, except in circumstances where it may be appropriate for places to remain without intervention.

16. Stabilisation

Places of cultural heritage value should be protected from processes of decay, except where decay is appropriate to their value. Although deterioration cannot be totally prevented, it should be slowed by providing stabilisation or support.

17. Repair

Repair of material or of a site should be with original or similar materials. Repair of a technically higher standard than the original workmanship or materials may be justified where the life expectancy of the site or material is increased, the new

material is compatible with the old and the cultural heritage value is not diminished. New material should be identifiable.

18. Restoration

Restoration should be based on respect for existing material and on the logical interpretation of all available evidence, so that the place is consistent with its earlier form and meaning. It should only be carried out if the cultural heritage value of the place is recovered or revealed by the process. The restoration process typically involves reassembly and reinstatement and may involve the removal of accretions.

19. Reconstruction

Reconstruction is distinguished from restoration by the introduction of additional materials where loss has occurred. Reconstruction may be appropriate if it is essential to the function or understanding of a place, if sufficient physical and documentary evidence exists to minimise conjecture, and if surviving heritage valued are preserved. Reconstruction should not normally constitute the majority of a place. Generalised representations of typical features or structures should be avoided.

20. Adaptation

The conservation of a place of cultural heritage value is usually facilitated by it serving a socially, culturally or economically useful purpose. In some cases, alterations and additions may be acceptable where they are essential to continued use, or where they are culturally desirable, or where the conservation of the place cannot otherwise be achieved. Any change, however, should be the minimum necessary and should not detract from the cultural heritage value of the place. Any conditions and alterations should be compatible with original fabric but should be sufficiently distinct that they can be read as new work.

21. Interpretation

Interpretation of a place may be appropriate if enhancement of public understanding is required. Relevant protocol should be complied with. Any interpretation should not compromise the values, appearance, structure or materials of a place, or intrude upon the experience of the place.

22. DEFINITIONS

For the purposes of this charter:

adaptation means modifying a place to suit it to a compatible use, involving the least possible loss of cultural heritage value

conservation means the processes of caring for a place so as to safeguard its cultural heritage value

cultural heritage value means possessing historical, archaeological, architectural, technological, aesthetic, scientific, spiritual, social, traditional or other special cultural significance, associated with human activity

maintenance means the protective care of a place

material means physical matter which is the product of human activity or has been modified by human activity

place means any land, including land covered by water, and the airspace forming the spatial context to such land, including any landscape, traditional site or sacred place, and anything fixed to the land including any archaeological site, garden, building or structure, and any body of water, whether fresh or seawater, that forms part of the historical and cultural heritage of New Zealand

preservation means maintaining a place with as little change as possible

reassembly (anastylosis) means putting existing but dismembered parts back together

reconstruction means to build again in the original form using old or new material

reinstatement means putting components of earlier material back in position

repair means making good decayed or damaged material

restoration means returning a place as nearly as possible to a known earlier state by reassembly, reinstatement and/or the removal of extraneous additions

stabilisation means the arrest of the processes of decay

structure means any building, equipment, device or other facility made by people and which is fixed to the land.

Appendix II: Condition report

1. General statement

Hikitia is in relatively good order, given its age and constant exposure to the elements over its life. The ship suffered from a lack of maintenance in the 1970s and 80s and during that period rainwater entered the bilges and accumulated there for some time. Allied to that, the ship has not been out of the water for a lengthy period. There is severe corrosion in some parts of the ship, but these are few in number and relatively limited in extent. Superficial rusting is widespread but not a major issue yet.

The most vulnerable parts of the ship are the hull and, to a lesser extent, the crane. Both these areas are dealt with in detail below.

2. Engineering assessment – corrosion and damage

The following is an extract from the engineering assessment undertaken by Nick Undrill and dated 21 February 2008.

Commentary

(a) Crane structures

The crane is in working condition and has been used in recent years. I have certified the crane structure as adequate on a case by case basis during the last two years.

Corrosion has reduced the strength of four members of the riveted trusses that make up the crane. The affected members are those that trap the salt spray and are not washed clean by rain. Replacement of about ten members out of the many hundreds in the crane would be sufficient to restore the required strength for full rated [80T] crane capacity, the remainder can be restored to good condition with a good life expectance by cleaning and corrosion protection [painting].

(b) Ship's hull

Detailed plate thickness assessment is presented elsewhere. My calculations lead to the conclusion that hull plating will be of adequate strength for [the] future use of the crane provided those areas of corrosion that may cause leaking are repaired. Future corrosion can be effectively controlled with cathode protection anodes.

(c) Other items

Corrosion has severely affected no critical items. Other items such as the Machine Room where roof and cladding replacement is needed is [sic] not critical to the structure. Restoration can be carried out without structural engineering expertise.

Conclusion

Only limited structural replacement work is required to restore the Hikitia.

Cleaning and painting of the complete vessel and especially the truss components is difficult, time consuming and expensive. It is however possible and can be spread over a number of years. Restoration is possible without danger to personnel other than that which would be normal on a new crane

3. Spaces and elements

3.1 Hull (bilges)

The hull is the part of the ship that has undergone the closest scrutiny. Its exterior and interior have been thoroughly inspected. The best measure of the state of the hull is via a thickness test, conducted internally.

The study was undertaken between January and December 2007 using an ultrasonic thickness tester provided by Stark Bros. of Lyttelton. Eight hundred and four tests were conducted in conjunction with comprehensive visual observations of the bilge spaces. In conjunction with the tests, advice and technical input was provided by Bruce Askew of Port Nicholson Design, Wellington, Ralph and Frank Stark of Stark Bros., and structural engineer Nick Undrill, of Lower Hutt.

Conclusions

Erosion of the hull seems to have occurred only in those areas affected by deck leaks; the anodic protection – an external sacrificial system of electrically connected aluminium anodes on the hull exterior – appears to be working correctly on the outer hull surface, whereas the breakdown of internal coatings and the presence of freshwater from deck leaks has led to internal corrosion. This was probably due to the period in the 1970s and 1980s, when maintenance was a low priority and some deck leaks were not repaired. This led to the pooling of water in some bilge areas.

Working off a minimum hull thickness of 5mm,[66] the tests revealed that 19m^2 of the hull requires repairs to plating, along with 14.1m^2 of associated angle at the bottom of floors, intercostals and bulkheads. Repairs are needed in 34 different locations with the bulk of these being in the "Hold" area. The remainder of the hull is above the minimum of 5mm.

A comprehensive assessment of the condition of each panel is provided below. See also work sheet "*Hikitia* Hull Tests 2007", a plan by Bruce Askew recording all previous tests, position of plates, intercostals, bulkheads, replacement plates, frame numbers and plate strake detail. This is reproduced at the end of this table.

Area	Ref.	Description	sqm	m
Fore Peak	**Port**			
	72C/L	Leak under port cable box concreted 18/8/07 500 by 600, angle corroded but probably OK for weld	0.3	
	75C/L	Leak Aug 07, one bucket of concrete – steep bow angle 200 by 600	0.12	
	Stbd			
	72C/L	Concreted 18/8/07 600 by 500	0.3	
		" 600 by 600	0.3	
Hold	**Port**			
	49C	Wet, very restricted access. Graving plate 600 by 900, angle appears OK	0.54	
	51B	Wet, small bubbles, close to area of "Big Leak" on June 07. Graving plate 600 by 1300, angle appears OK	0.78	
	53B	Dry but site of 1993 leak repair. Graving plate 600 by 400 angles appear OK		
	55A	2 failed tests with 56A appearing too thin to test indicate possible repair needed. Test on dock	0.24	
	55B	Dry but 4.8 in 2007. Forward angle corroded, needs inspection 600 by 400	0.24	
	56B	4.3 & 3.7 in Oct 07 Fwd angle badly corroded needs inspection	0.72	
	56A	Thin & wet, badly corroded floors and angles on both sides - 600 by 1200	0.72	3.5
	57A	Wet 600 by 300 some corrosion on aft angle	0.18	
	61C	Tested at 1.1 in 07 but that very close to 5.8 in Oct 07 so the 1.1 is very suspect & probable wrong reading. Suggest test when on dock. Possible repair area 300 by 300	0.9	
	61B	1.2 in 07 and then as above so possible incorrect reading 300 by 300	0.9	
	61A	Readings at 4.8, 4.1, & 1.1? in 07, angles OK see 62A below for possible common repair 1100 by 600	0.66	

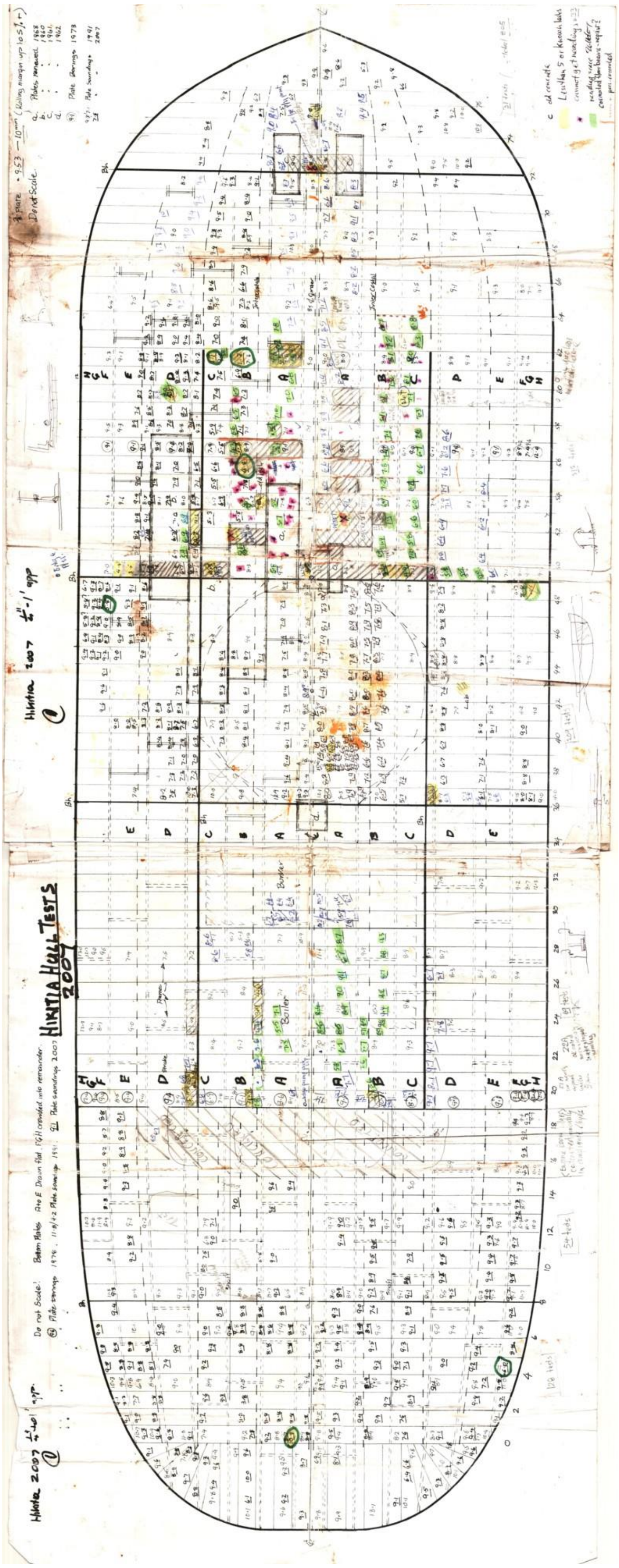
[66] As recommended by structural engineer Nick Undrill.

Area	Ref.	Description	sqm	m
	62A	Test at 4.9 at fwd end of plate. Aft angle appears OK so could fit graving plate that runs under the beam and connects with 61A. 62A area is 250 by 1000	0.25	
	Stbd			
	49C/L	Very restricted access – extensive rust <u>not</u> removed, was 11.2 in 1973. C/L 50-54 all heavy rust with 51 & 52 concreted in July 07 and other C/L tests showing a trend to below 5mm probably 49C/L needs a 600 by 600 graving plate. 600mm fwd angle is badly corroded	0.36	600
	49A	Looks bad with corroded fwd angle 600 by 500, and 500 angle	0.3	500
	50C/L & A	Total area of both C/l & A is 600 by 1000 plus 1000 bad fwd angle	0.6	1000
	51A	During heavy foot traffic on 14/7/07 in Big Leak fix plate appeared to be progressively weakening so concrete added. 600 by 2000, plus 2000 angle	1.2	2000
	52A	2nd Big Leak area on 12/7/07 – heavily concreted 600 by 2000	1.2	2000
	53A	Concreted in July 07 altho best of 51,52 & 53. 600 by 2000, angle probably OK NB 51,52 & 53 could be done with one plate	1.2	
	54A	No test done as plate looks too thin, 600 by 1000 and corroded fwd angle 1000	0.6	1000
	55A	No test, 600 by 1500, poss. Corroded angle 1500 No Test, 600 by 1000, angle good fwd	0.9	1500
	56A	Cannot get reading, looks OK	0.6	
	57A	Bubbles of wet over surface, no test tried as poss.		
	58A	Too thin 600 by 1000, angles OK. Test in dock as wet could be condensation only	0.6	
	59A	As 58A 600 by 1000, angles OK Test in Dock. 58A & 59A could be currently wet only from leak traced to below sink & toilet discharge valves on stbd H strake	0.6 0.162	
	61A	Wet area – could be flow thru from 61& 62 Port A, not tested, angles OK, 600 by 300	weld rivet	
	64A	Wet patch about rivet head on fwd angle. Limited problem, probably just weld up rivet		
	49B	Tested at 3.6 & 3.4 has been wet for a very long time with water from deck leaks, corroded angle. 600 by 800	0.48	
	50B	Good test at 6.4 Very localised wet area in fwd stbd corner of plate – a rivet? Weld up rivet?	weld	800
	52B	Wet, no test, adjacent to 52A where serious leak was fixed in 7/07. 150wide double riveted plate on aft side. 600 by 550	rivet? 0.33	
	53B	All have good test readings above 5mm on plate		

Area	Ref.	Description	sqm	m
	to 58B	with partly corroded fwd angles and traces of previous concrete		
	59B	5.1 Wet with salty water & long term salty condensation bubbles up to 200mm up sides of floors. Caused by stbd 59H		
	60B	Partly corroded fwd angle but plate OK. Inspect angle		
	49C	4.4 test, 600 by 1000 repair & 1200 corroded angle	0.6	1200
	59C	Wet with condensation ex 59H leak, plates test above 5mm		
	49D	No reading possible. Possible repair of 600 by 200, bottom of bulkhead and floors look weldable	0.12	
	59 D to F	Leak trail traced to 59H above, no repairs needed.		
	49E	1993 tests show 3.5 & 4.4 but cannot see any obvious heavy corrosion. Is site of long term deck leak from aft port quarter of Mess Room above 4.7 test repair 600 by 200 angle OK		
	51D	4.0 test repair 600 by 200 angle OK	0.12	
	52D	Note 50 to 52D are 5.9, 6.9 & 6.9	0.12	
	59D	A retest shows 8.8 NOT 4.2		
Mid-ship	**Stbd**			
	36D	4.9 test 600 by 200 repair, angle OK	0.12	
	38A	4.0 test, but only about a 100mm dia. Corrosion hollow – 100mm insert	0.01	
	39A	4.1 test, but only a 120mm dia hollow plus a no reading and a damp patch of 120 by 180 alongside an angle in good condition – a rivet?	0.012 weld rivet?	
	36C	In fwd Lab space 4.9 test 600 by 200 repair, angle OK	0.12	
	43D or 44D	Was a leak in 1997 that was repaired by 2pot resin. Cannot now locate the repair. Inspection on dock should reveal thin area		
	48G	Tested in 1993 at 4.5 but current test show 8.8 – suggest further inspection on dock		
Boiler Room	**Port**	<u>On port side of fore & aft bulkhead:</u>		
	19C	3.7 & 4.3 600 by 300, angle OK	0.18	
	20C	4.4 plus site of old leak fix 600 by 300, angle OK	0.18	
	23C	Tested in 1993 at 5.3, 3.7 and 4.2 no current test attempted 600 by 300, angle OK	0.18	
	24C	Tested in 1993 at 4.9, no current attempt 600 by 300, angle OK	0.18	
	19B	4.9 on port of intercostals 200 by 300, angle OK	0.12	
		<u>Between Intercostal and A strake:</u>		
	23B	4.4 600 by 300, angle OK	0.18	

Area	Ref.	Description	sqm	m
	24B	3.9 600 by 300, angle OK	0.18	
	25B	4.6 600 by 300, angle OK	0.18	
Engine Room	**Stbd** 19B	5.0 test 200 by 600, angle OK NB all other stbd shows no bad corrosion	0.12	
	Port			
	16D	Concreted bilge in good condition		
	17 D	Concreted bilge with breaks in concrete tested at 6.0 & 6.7		
	18D	Concreted with breaks, not tested		
		Note: Eng Room bilges all concreted probably in compliance with Lloyds requirement when built. All bilge concrete is smooth and in unbroken condition. D Strake bilge under the bilge pump is concreted some of which is cracked may have been added after extensive leaking of salt water from Bilge Pump above. Suggest test of bilges from outside in Dock to confirm above. Test at 0.8. Several tests were made with unsure results. Suggest test in Dock		
After Peak	**Port** 0A	**Estimate of Total Repairs**	**19 sqm**	**14.1m**

"*Hikitia* Hull Tests 2007" by Bruce Askew, is reproduced overleaf.


HIKITIA HULL TESTS 2007

3.2 Hull (external)

The Hikitia's *hull was inspected on 9 September 2006 by diver Rex Johnson. His report is provided here in full. Note that minor errata have been corrected for the purposes of this reproduction, but otherwise the report is as written. Note also that the images shown here are low resolution and were taken in difficult conditions.*

Background

At the request of *Hikitia* Trustee Malcolm McGregor of the Maritime Heritage Trust of Wellington a survey was made of *Hikitia*'s hull exterior to record its condition, the extent of marine growth and any significant corrosion evidence. The survey results were to be made available by the Trust to specialists to help them assess needs for cleaning and maintenance of the hull.

Situation

Hikitia is berthed at Taranaki Street Wharf, Wellington, tied up in approximately a north-south orientation with her bow to the north. This means her port side is against the wharf and her starboard side is open to the harbour. If she is moved to undertake any work, she is returned to this location and orientation. Picture DSC00630 shows *Hikitia's* bow.

Summary

Because of *Hikitia*'s orientation her port side is relatively dark where light is shielded by the wharf and her starboard side is open and exposed to daylight. This difference in light levels causes the most noticeable difference in marine growth on the hull. A thick forest of shellfish and weed cover the starboard side where it descends vertically from the water line for about 2 meters and for up to about 1 meter underneath her where that side curves under to become the bottom plates. By contrast, the port side has some shellfish growth but little weed. The bottom plates have light shellfish growth covering some 80% of the area, with bare patches of paint showing through.

No evidence of corrosion was found on the bottom plates, however there is noticeable corrosion in the splash zone above the water line and under the stern overhang. The names beneath the small pictures in this report are the names of the full size images which accompany the report on the original compact disk.

DSC00631.JPG

Survey

Picture DSC00631 shows the level of corrosion on the starboard bow increasing nearer the water line. This is fairly consistent around the vessel, though is more apparent on the starboard side because of its exposure to harbour wave action.

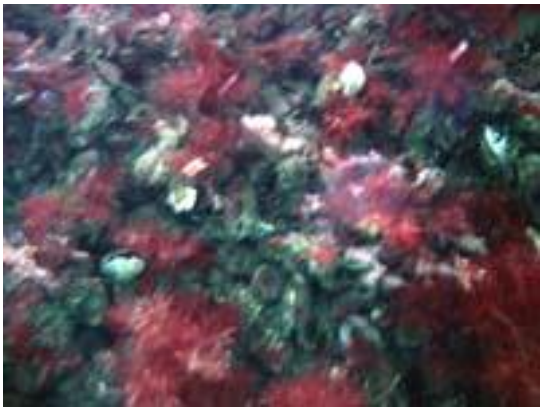
DSC00632.JPG

Picture DSC00632 shows the marine growth just below waterline on the bow. It consists of a thick encrustation of shellfish (approximately 100 mm thick) with red and green seaweeds.

DSC00633.JPG

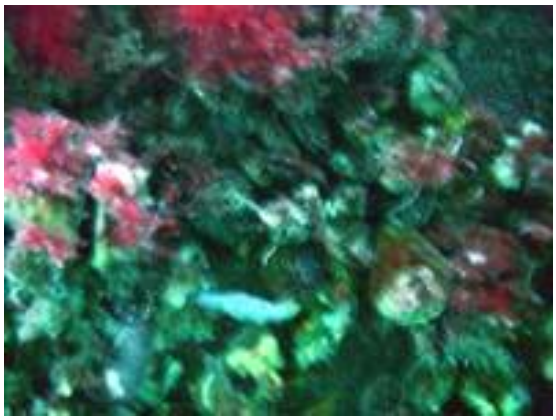
DSC00633.JPG

DSC00637.JPG



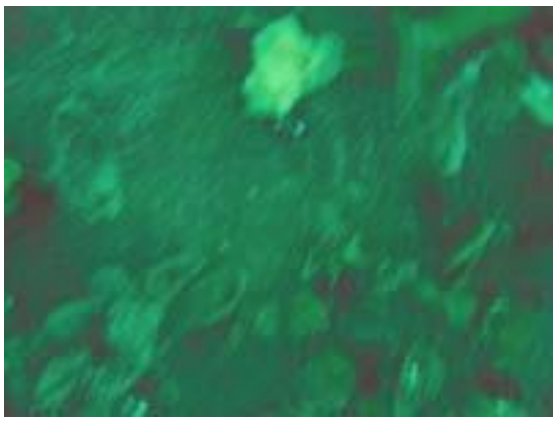
DSC00638.JPG

Pictures DSC00633, 634, 637 and 638 are taken between 1 and 2 meters below waterline on the starboard side and show the dense layer of shellfish that covers all this side to a depth of over 2 meters. Picture 638 is at the greater depth and shows a thinner layer of shellfish – about 50 – 100 mm thick - with less weed.



DSC00639.JPG

DSC00640.JPG



DSC00641.JPG

DSC00642.JPG

Pictures DSC00639 - 642 are taken below the 2 metre level. 639 is from the lower starboard side as it curves under the vessel, with 640 – 642 showing typical patches of hull plates showing through the approximately 80% coverage of light shellfish growth on the bottom plates.

DSC00643.JPG

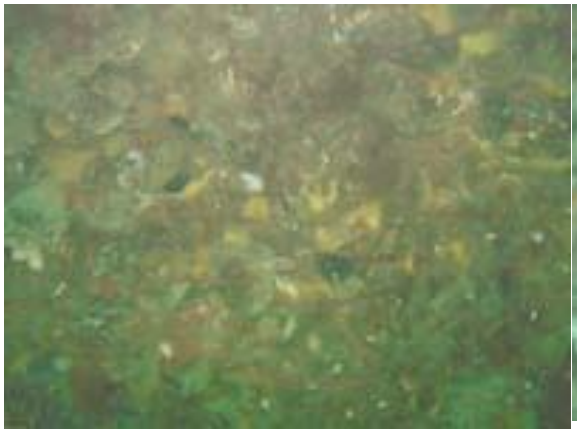
Picture DSC00643 is taken about 2 metres below waterline on the port side. Because of the low light levels on this side there is virtually no weed growth until very shallow depths, though there is still a thick encrustation of shellfish.

DSC00644.JPG

Picture DSC00644 is taken about 2.5 metres below waterline on the port side. It shows a wooden rail about 200 mm wide projecting from the side of the vessel, and which extends for about 60% of the length of the vessel. It has a very low level of growth on it, but has collected some silt from a nearby storm water outlet.

DSC00648.JPG

DSC00649.JPG



DSC00650.JPG

DSC00651.JPG

Pictures DSC00648 - 650 are taken below the 2 meter level and are of the bottom plates towards about two-thirds of the way down the vessel crossing from port to starboard. 651 shows increasing shellfish growth approaching the starboard side closer to the stern. Low light levels beneath the vessel meant no colours were observed during the dive. However, flash photographs 649 and 650 show red paint beneath the thin layer of shellfish.

DSC00654.JPG

DSC00655.JPG

DSC00656.JPG

Pictures DSC00654 – 656 are of the starboard propeller shaft and its support brace, the upper blade of that propeller, and of the propeller support brace where it joins the hull. There is a medium level of shellfish encrustation in this relatively dim area, and little evidence of weed growth.

DSC00657.JPG

DSC00658.JPG

DSC00659.JPG

DSC00660.JPG

Pictures DSC00657 and 658 are general views of the rudder and underneath of the stern overhang. 659 and 660 are close-up views of two points of significant corrosion in the same area. They both show distinct edges of the original paint layer.

DSC00661.JPG

DSC00662.JPG

Pictures DSC00661 and 662 are of the upper splash-zone on the starboard side showing significant corrosion up to the wooden buffer rail that runs around the edge of the vessel.

Movies

Two movies on the CD provide an indication of the variation of shellfish and weed growth on the different parts of the hull. They are:

*Hikitia*1.avi: Starting near the starboard bow moving towards the starboard amidships area, starting at about 2 metres below the waterline and following the approximate line of the curve from vessel side to bottom plate, ending at about the 3 metre level. The prime indication is of thickly crusted shellfish and weed in the lighter areas near the surface, to a thinner encrustation where there is little light.

*Hikitia*2.avi: Starting from near the keel moving laterally across the bottom and up the starboard side, breaking through the surface near the forward part of the starboard side. Shows the relatively sparse encrustation near the keel, gradually becoming denser and more weedy at the shallower depths. Shows the deterioration of the hull in the splash zone at that point.

(Note that these clips are held by the MHT).

4. Below decks spaces

Fore peak

Some deterioration in the hull has led to leaks (one significant) that required considerable attention. Concrete has been used to maintain the viability of the hull in this place, particularly under the cable storage boxes. Otherwise all other steel is in good condition.

Concrete repairs in floor of fore peak.

Hold

A considerable part of the hull has required attention, with water ingress or leaks. The area is now mostly dry but corrosion will continue until coatings are re-established. Otherwise all other steel is in good condition, as is the rest of the space.

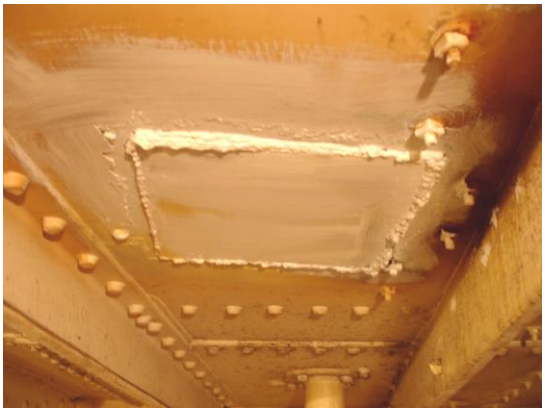
Corroded floor against water tight bulkhead.

Accommodation – port

In very good condition. No sign of corrosion or deterioration.

Accommodation – starboard

A leak in the starboard cabin has now been fixed. This area has had issues with a leaking deck and surface corrosion and there is one noticeable patch on the ceiling.



Patched portion of deck above starboard accommodation.

Void space under port side accommodation

With the poor light and cramped conditions, it was very difficult to ascertain the condition of this space, but it appears in an excellent state.

Void space under starboard accommodation

With the poor light and cramped conditions, it was very difficult to ascertain the condition of this space, but it appears in an excellent state.

Void space – port

Apart from corrosion of the bilges, it is in excellent condition.

MAANZ lab

Now lined, this space has no apparent issues. Considerable rust was removed from the bilge spaces during construction of the lab and the bilges were then coated with an epoxy tar solution. Recent inspection shows that this remains stable, with no obvious further corrosion apparent.

Central void ('Cathedral')

Considerable settlement of water in the bilges has left its mark not only with corrosion of the hull, but also the effects of condensation on the walls and roof of this space. The rusted bilges have been cleaned out but corrosion continues while it awaits further remedial work.

Dry but corroded hull plate with thicknesses of plate marked in chalk.

Coal bunker - port

The hull was under floorboards and not greatly visible but there has been some corrosion of the hull in the bilges. The curved wall of the hull shows signs of corrosion around joints and rivets. But otherwise, it is in excellent condition.

Port side hull interior – former coal bunker.

Coal bunker – starboard

Apart from some corrosion of the hull, it is in excellent condition.

Central coal bunker

There has been some corrosion of the hull, and some superficial rust on the walls and ceiling, but otherwise it is in excellent condition.

An exposed damp hull plate.

Boiler room

In excellent condition. There was no sign of surface or deep seated rust. However, the bilges were not inspected. (For details on this area, refer to Boiler Room in Hikitia Hull Test report (p.68)

Engine room

The area is generally in excellent condition and it is understood that the bilges had been concreted in at the time the ship was built, so it can be assumed that they are in good condition. (Tread covers most of the floor). However, at the point where the bilge pump has been removed, the floor was in poor condition, possibly where a leak has penetrated the concrete floor It is possible that the brightly painted interior is disguising some surface corrosion, but there was none immediately evident. Ultrasound tests were carried out after painting with no readings below 5mm noted

Bilge pump stand to the right, above a badly corroded part of the engine room floor.

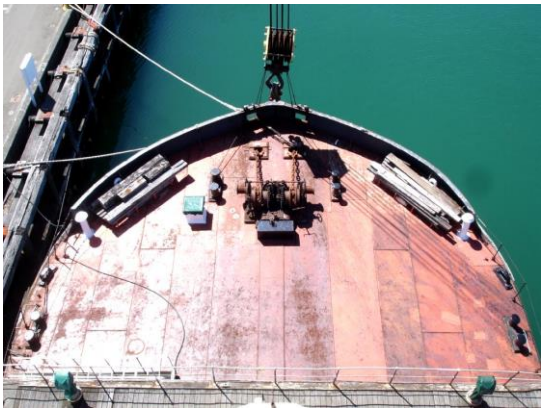
Aft peak

The floor of this space was obscured so it is not possible to comment on the state of the bilges. There is some evidence of corrosion on walls, ceilings and posts, but only superficial.

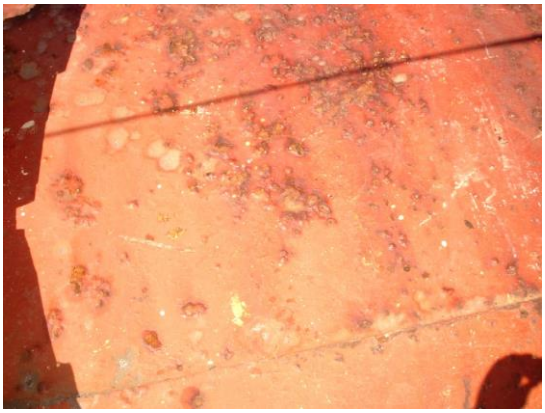
5. Above decks

Deck

The deck plates are, overall, in good condition. There are large sections that are predominantly rust free, with a good coating of paint and in no danger of corroding without a considerable lack of attention.



The biggest concern lies near either edge of the deck and particularly on the starboard side. This area is most exposed to the sea and corrosion here is deep seated in some places. Nevertheless there appears to be enough integrity in the remaining steel that spot repairs and treatment will suffice for a considerable period.



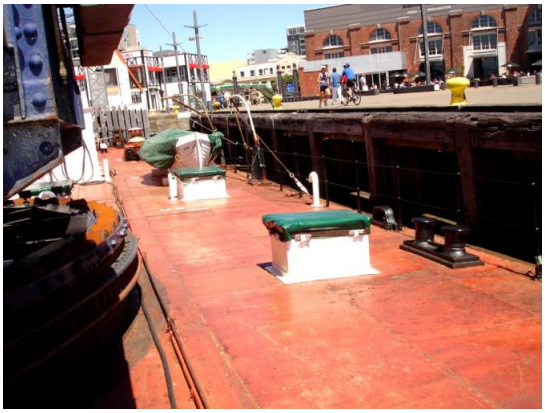
The timber decks are in relatively poor condition and will either require recaulking or replacement.

The timbers around the deck lights have already been renewed.

Deck fixtures

Most of the deck fixtures are in an excellent state. The machinery, e.g. capstans and windlasses, are all in working order and in good condition.

The hatches, stanchions and rails, vents, bits, scuttles and fairleads are also in good condition with the exception of the two fairleads at the stern, which are badly rusted. Considerable attention has been paid to keeping the various fixtures in good order, with regular rust removal and painting.



Bridge

The bridge is generally in very good order, with much recent painting and repair work bringing it up to a high standard of repair. The only obvious deterioration has been in the bridge deck, where the timbers are starting to show signs of decline.

Fiddley

Recent surface preparation and painting, inside and out, has left the fiddley in fine order.

Crane – enclosed spaces

The exterior of the machine room is in poor condition. The steel cladding on the starboard side is deteriorating badly. This was itself an addition, as exposure to the elements had rotted the previous timber cladding (which matched that still on the fore and port sides.

The timber walls remain intact on the fore and port sides of the room but some of these timbers are also in poor condition and will require replacing.

The roof of the machine room is badly corroded in places. It sits over the first roof, which is still partly intact. However, with both roofs unable to protect the machine room effectively, they will have to be replaced.

The machinery itself is understood to be in good order despite the poor state of the exterior cladding.

The only exception to that is the big cog on the starboard side of the room, which is exposed to the elements. Although showing some surface rust, it retains its operating integrity.

The driver's cab has recently been reclad and refloored and it is in good order.

Crane superstructure, including turntable, platform, counterweights, tower, jib

The crane has corrosion in many parts, but the extent of that corrosion is the issue. Much of the rust is superficial and can partly be attributed to deferred maintenance.

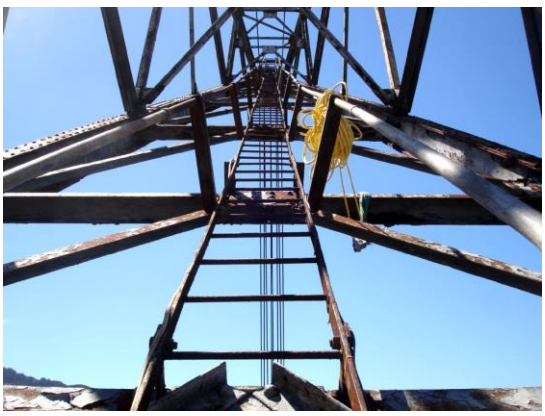
The turntable appears to be in good condition, although it is difficult to be certain of the state of some of the more concealed portions.

The platform is overall in good condition but has patches of deep rust and much superficial rust. None of this is a major problem and does not affect the viability of the crane.

The counterweights are in fine condition, although there is some question over the condition of the steel supporting the weights to the rear. This has been passed as fit for use but will have to be revisited in 2012 .

The crane tower has pockets of rust, particularly where water can settle, but most of the rust is superficial, if widespread.

The jib, like the crane, has superficial rust over most of it. This is mostly worse than it looks but there are definitely places where the rust has weakened parts of the structure.



A fault in the placement of at least two of the cross beams – the tray beam is open so that it collects water – means the rusted portion will have to be cut out. Other rust will have to be treated before it becomes a bigger problem.

Appendix III: Remedial work programme

Remedial work can be broken into two parts. One is the ongoing remedial work that MHT, like HHLL before it, has been managing for those parts of the ship other than the exterior of the hull. The latter requires the ship to be out of the water and that can only be done at a dry dock. All other work required can be done in Wellington.

The list below is a general one at this stage and does not include specifications, which will be completed by the MHT and their contractors closer to time. Any specifications should adhere to the principles outlined in this plan.

1. External hull repairs

It is planned that the work on the exterior of the hull will take place at Lyttelton, the nearest port with a dock. The graving dock there has more than enough capacity to cater for a ship of the size of the *Hikitia*. There will be work required both prior to and post the repairs undertaken in the dock. This is summarised below in the general order in which it will be done. Note that some of the more prosaic items have been left out of this list.

Preparation

Task	**Notes**
Clean bilges	This is the completion of work already on-going
Completion of the ultrasonic assessment of the hull (internal)	See the table in Part 2 of Appendix II, Condition Report.
Check watertight bulkheads	The bulkheads should be checked to ensure that each remains watertight.
Clean hull exterior	The sea life clinging to the hull will have to removed before the work can take place at Lyttelton

Lift out at Lyttelton

Task	**Notes**
Tow to Lyttelton	This is required because *Hikitia* is not surveyed for sea travel under its own power.
Lift out	
Clean hull	Final clean up of hull prior to work.
Inspect and determine extent of repairs required	
Remove rust	Areas that are not so badly corroded can be treated in situ.
Undertake plate repairs	Badly corroded areas will be cut out and new

	sections welded in.
Paint hull	The hull will be coated with a specialist rust inhibiting paint.
Remove propellers and tail shafts for inspection and repair	
Repair propellers and tail shafts	
Refit propellers and tail shafts	
Tow back to Wellington	

2. Work to be undertaken in Wellington

Task	**Notes**
Painting of deck machinery	
Completing rust repairs of deck plate and painting	At present, rust is removed by various hand tools and then painting. High pressure water is likely to be applied by a contractor. It may also be possible to fill holes left by the rust removal.
Replace timber planking on deck and bridge where necessary	
New roof and side cladding for crane machine roof	Where possible fabric that is not decayed or is in reasonable condition should be retained.
Repair tension and compression struts on jib	Important members badly affected by rust must be repaired.
Procure and fit new boiler	This is earmarked for the former coal bunker behind the boiler

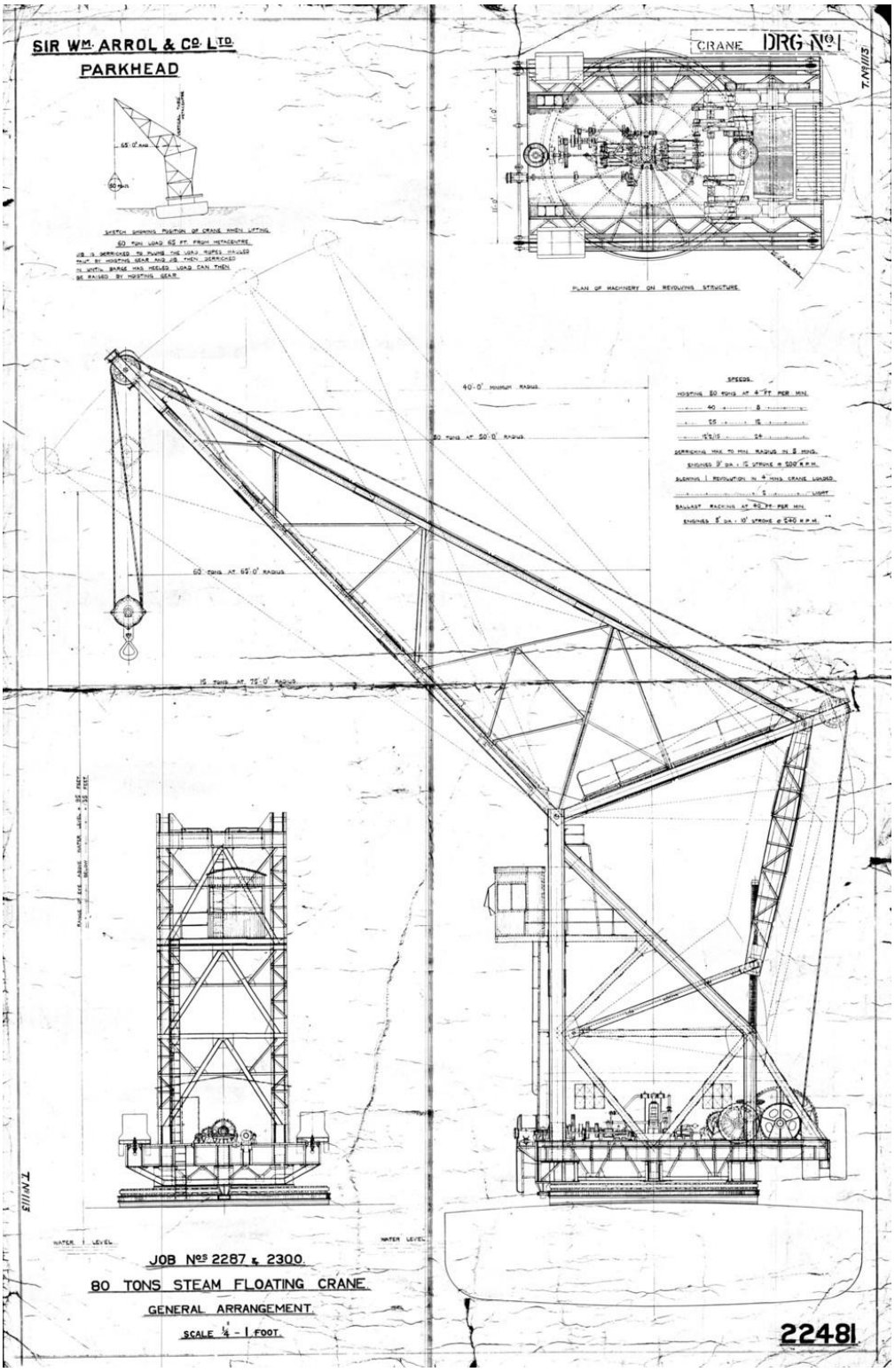
Appendix IV: Historic plans

The original drawings, plus later modifications, are held on board *Hikitia*. A partly completed list of those drawings is as follows:

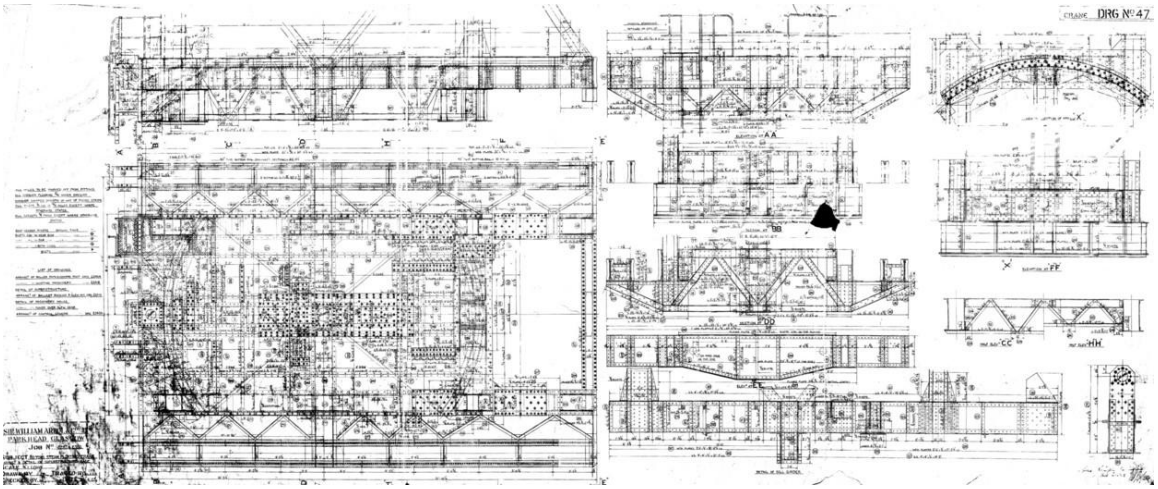
Hikitia - Drawings Register

		Description	Date			Location
787	18	Stability diagram - Sir William Arrol and Co	1925	QA19	MP	WCC
788	18	Arrangement levers drivers cabin - Sir William Arrol and Co	1925	QA19	MP	WCC
789	18	Drawing No 1 General Arrangement Main Deck	1926	QA19	MP	WCC
795	18	Drawing No 2 Steel Plating	1926	QA19	MP	WCC
796	18	Drawing No 7 Cylinders for engines 13 & 26 inch diameter x 15 inch stroke	1926	QA19	MP	WCC
797	18	Drawing No 8 Pistons and covers for engines	1926	QA19	MP	WCC
798	18	Drawing No 9 Valves and spindles for engines	1926	QA19	MP	WCC
799	18	Drawing No 10 Columns for engines	1926	QA19	MP	WCC
800	18	Drawing No 11 Crank shaft, piston and connecting rod	1926	QA19	MP	WCC
801	18	Drawing No 12 Arrangement of compound engine	1926	QA19	MP	WCC
802	18	Drawing No 13 Sole plate and turning gear	1926	QA19	MP	WCC
803	18	Drawing No 14 Reversing Engine	1926	QA19	MP	WCC
804	18	Drawing No 15 Return tube boiler	1926	QA19	MP	WCC
805	18	Drawing No 16 Lines plan	1926	QA19	MP	WCC
806	18	Drawing No 17 Valve gear	1926	QA19	MP	WCC
807	18	Drawing No 18 Smoke uptake, funnel and furnace mountings	1926	QA19	MP	WCC
808	18	Drawing No 19 Valve Gear	1926	QA19	MP	WCC
809	18	Drawing No 20 Long bulkhead, keelsons & girders	1926	QA19	MP	WCC
810	18	Drawing No 21 & 28 Screen & Coal bunker and hawse pipes	1926	QA19	MP	WCC
811	18	Drawing No 22 Engine & Boiler casing, deckhouses & Navigating Bridge	1926	QA19	MP	WCC
812	18	Drawing No 24 Condenser	1926	QA19	MP	WCC
813	18	Drawing No 26 Capstan and Windlass	1926	QA19	MP	WCC
814	18	Drawing No 29 Stern tube, thrust and plummer blocks	1926	QA19	MP	WCC
815	18	Drawing No 30 Propeller	1926	QA19	MP	WCC
816	18	Drawing No 31 After body and propeller brackets	1926	QA19	MP	WCC
817	18	Drawing No 32 Pipe arrangement	1926	QA19	MP	WCC
818	18	Drawing No 32A Pipe arrangement	1926	QA19	MP	WCC
819	18	Drawing Plumber Work	1926	QA19	MP	WCC
820	18	Electric Lighting	1926	QA19	MP	WCC
		Drawing No 39 Detail of Jib structure	30-3-25			Hikitia
		Drawing No 42 Detail of superstructure [crane tower]	22-5-25			Hikitia

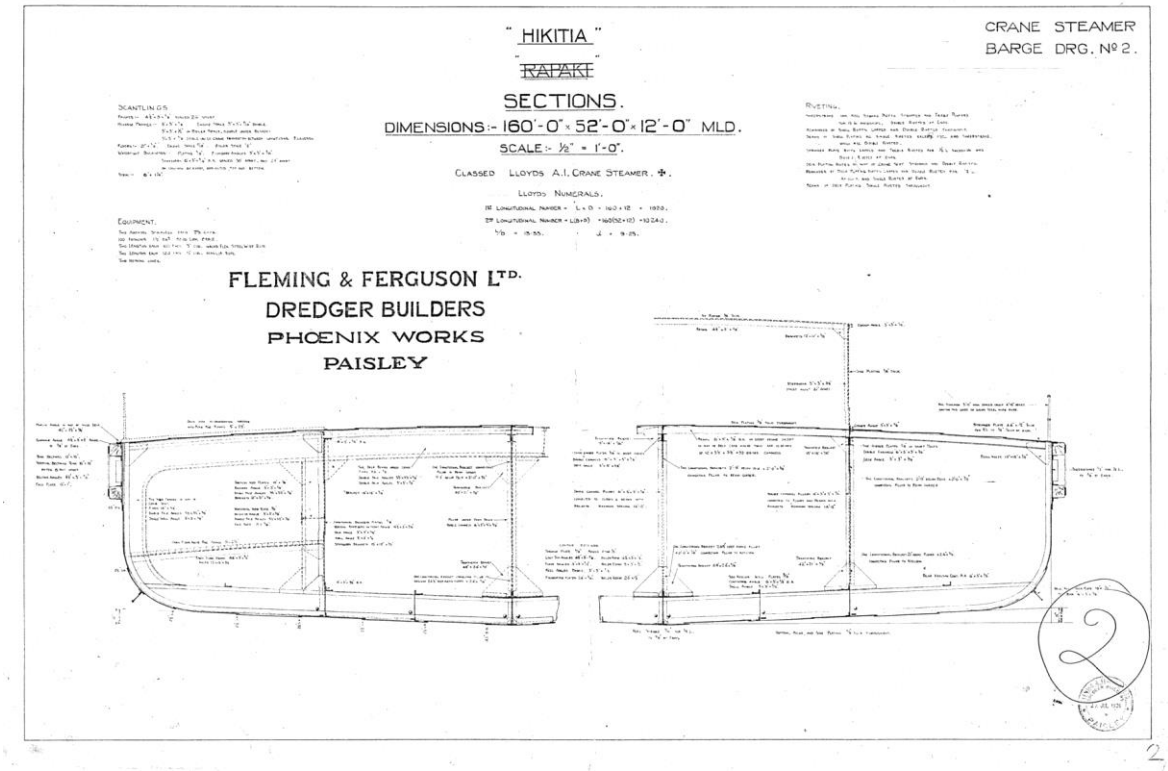
A selection of plans is reproduced below and on the following pages



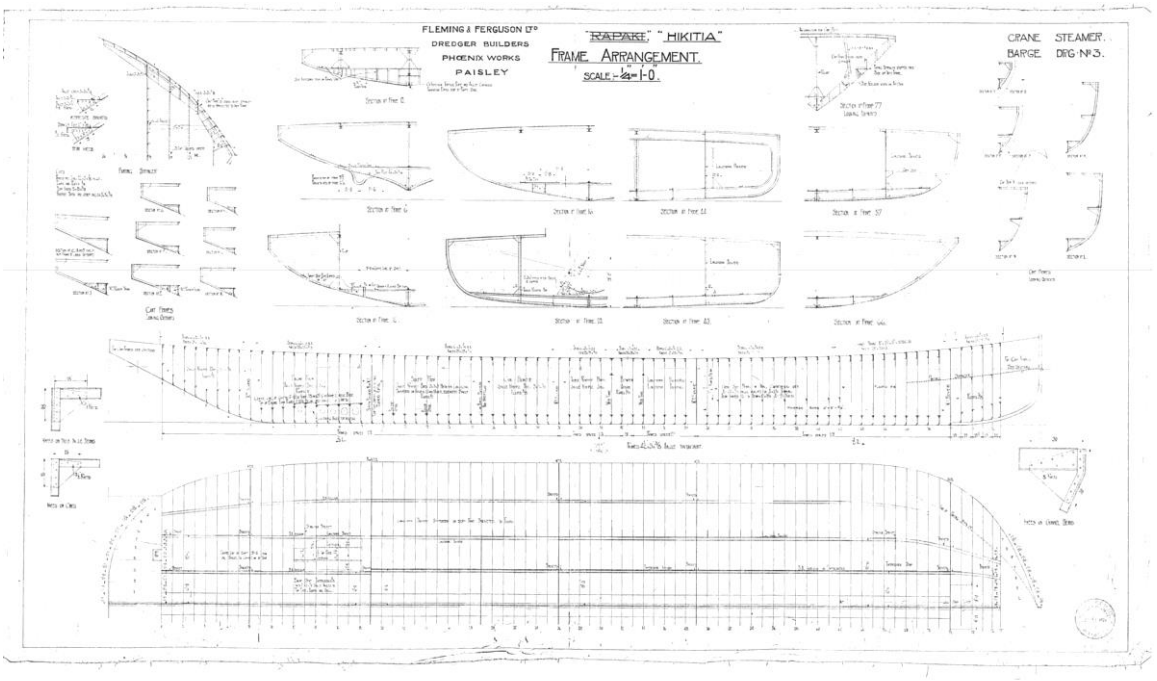
General arrangement, crane.



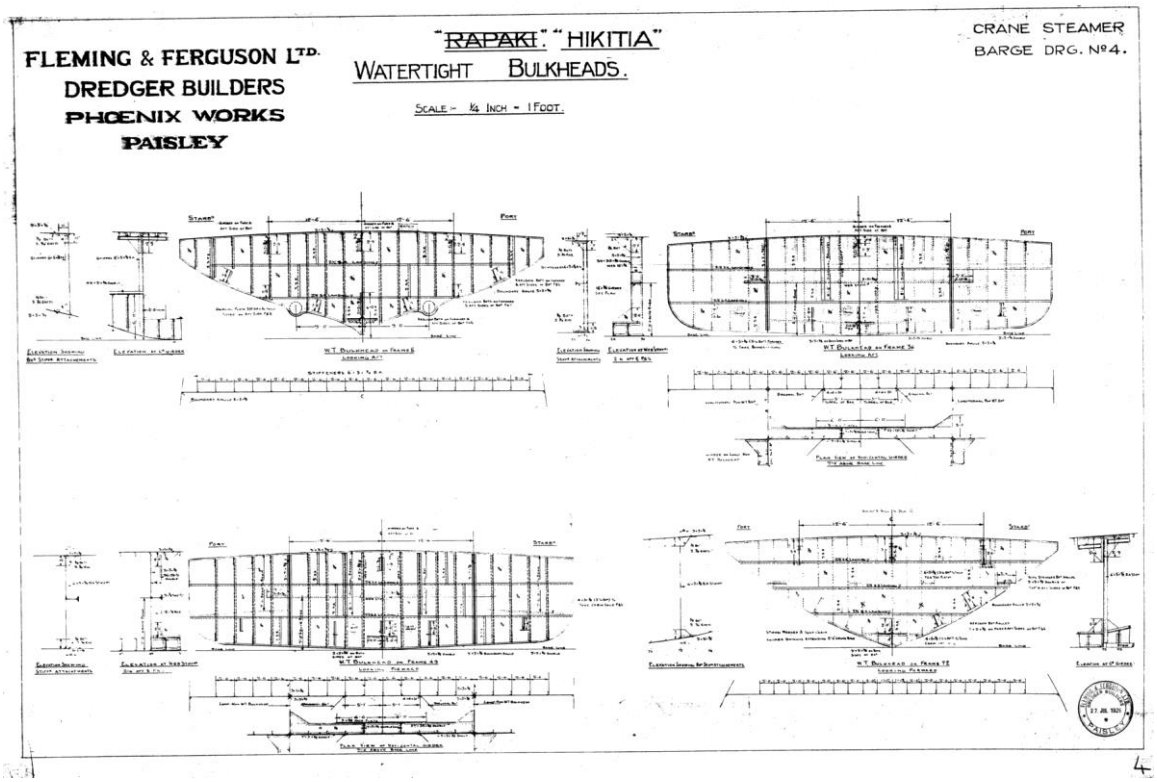
Crane base – detail



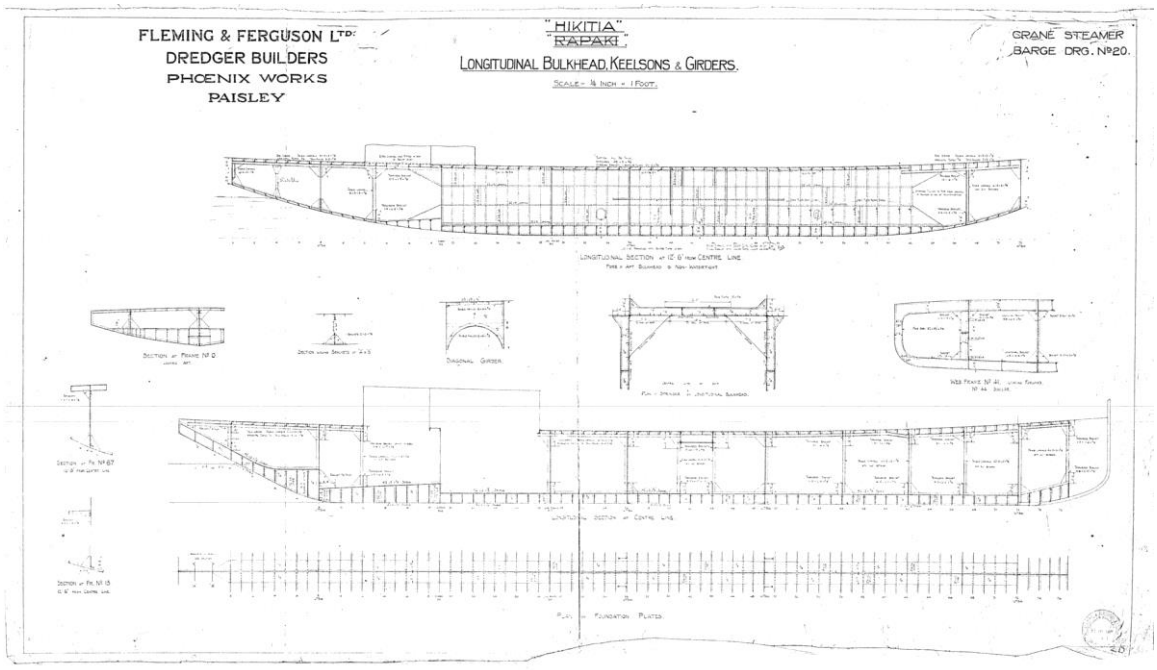
Sections and frames



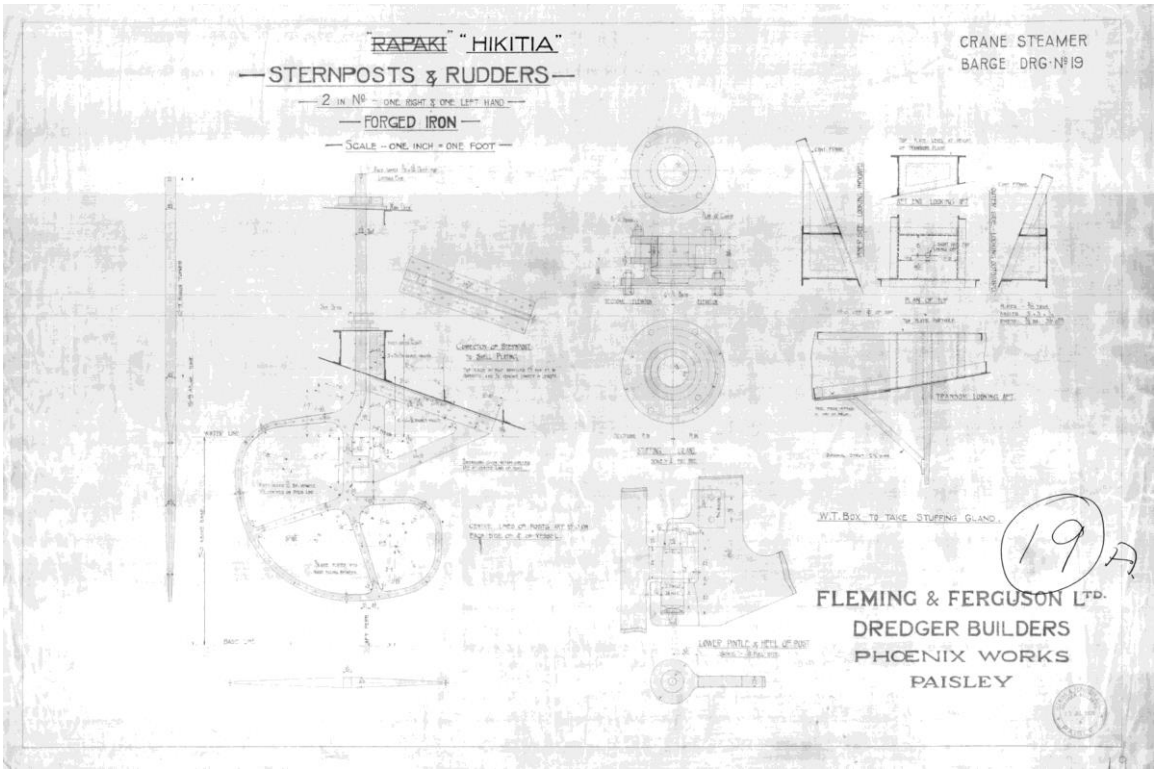
Frame arrangement



Watertight bulkheads



Longitudinal bulkheads



Sternpost and rudders

Appendix V: MAANZ laboratory - fixed asset register

As at April 2003. (Note that this register has had some changes since then).

Item	Description	Qty
1	Fume Cabinet (1.6mx1.2mx1.3m)	
2	Plastic Cabinet (1.6mx1.2mx1.3m)	1
3	Extractor Fan	1
4	Flexible Ducting	3m
5	Conductor bars and associated wiring	5
6	Power Supply (Powertech MP3084)	1
7	Litestore 10amp power supply & battery charger	1
8	Spare power supply (Westinghouse BC48/5, 4.7amp, 230V, S/no.A4868	1
9	Rectifier (Zenith 020200075)	1
10	Power supply/battery charger	1
11	Various stainless steel electrodes and associated wiring	
12	Steel stand (75x50 hollow tube steel) (1.2mx1.6mx0.6m)	1
13	Swimming Pool Pump	1
14	100 litre plastic waste tank	1
15	40mm waste pipe	6m
16	Non-return valve	1
17	Stainless Steel Kitchen Bench (1.8mx0.5m)	1
18	Chrome taps to accompany bench	2
19	Kitchen Cabinetry (4 cupboard and 2 draws)	1
20	Glass Beaker Drier (Gallenkamp, 230V, 12 drier probes)	1
21	Stirrer (Thermolyne Cimraec 2, Model SP46920, Serial No.: 1069001181923)	1
22	Zip Water Heater (13 litres, 20724)	1
23	First Aid Wall Cabinet (0.4mx0.56mX0.14m)	1
24	Assorted Materials - brushes, cloths, bungs, lids etc	
25	Scales (Kearn MH5K5, Max 5kg)	1
26	20li water holding tank (wall mounted)	1
27	20mm plastic tube	6m
28	De-ionised Water Filter (Barnstead/Thermolyne, Cat Number D8902)	1
29	Waste Container holder and lid	1
30	Safety Face Shield Visor (model FC28, orange)	2
31	White Coats (no straightjackets)	3
32	White plastic safety aprons	2
33	3M Powersorb P-SK20, chemical spill response kit	1
34	Squeegee Mop	1
35	10li plastic bucket	8
36	20li plastic buckets	5
37	Emergency Eye Wash Station (Sciencewear)	1
38	0.5hp electric motor (enclosed and flame proof) 3phase	1
39	400mm dia extractor fan unit	1
40	Tellus Vacuum Cleaner & Accessories	1
41	Arc Welder (Young, Model Number: A , 230V, 10amp)	1
42	Plastic Domestic Bath	1
43	Stainless Steel Shower Tray	1
44	Stainless Steel double sink unit	1
45	Stainless Steel Sink & Stand (660mmx460mmx280mm)	1
46	Fitted Cupboard and Shelf Units (1.0mx1.3mx0.5m)	4

47	5 Step Stepladder	1
	Contents of Sink Unit	
48	Stainless Steel Stirrer	1
49	Electric Jug	1
50	30li Stainless Steel Container & lid	1
51	Cups/Mugs	10
52	Bottle Brush	5
53	Box of Latex Medical Examination Gloves (large)	1
54	Box of 50 Face Masks	1
55	Pairs of Rubber Gloves (medium size)	3
56	Ear Muffs	5
57	Filter Masks	3
58	Labelling machine	1
59	ASUS Lap Top Computer & software	1
60	Pentium 2 desktop CPU	1
61	Computer (80386-dx-40, 8x CD, plus 14" Unisys Monitor	1
62	Printer (Epson Stylus 300)	1
63	4 Draw Steel Filing Cabinet	1
64	Step Ladder (2 steps)	2
65	Whiteboard (600mm x 600mm)	1
66	Paper Towel Rack	1
67	Chloride Meter (Consort, P903, Serial Number: 58137, Made in Belgium)	1
68	Ph Meter (Genway, 3051)	1
69	Stirrer (Ikamag, Type RH, Serial Number: 637748, 200V to 250V)	1
70	Burette Stand	2
71	Burrette Stand Clamps	5
72	Perspex Clamps	4
73	Test Tube Rack	2
74	Test Tubes (150mm long)	18
75	Burette (50ml)	1
76	Pipette (25ml)	1
77	Pipette (10ml)	2
78	Pump	1
79	Rotary Tumbler (Lortone, Model 33b/3-1.5)	1
80	Alcohol Thermometer Wall Mounted	1
81	Immersion Thermometer (Zeal, 0 to 100), Serial Number: STM100)	1
82	Immersion Thermometer (-6 to 50C)	1
83	Test Bottles 1L	23
84	Tong Clamps (stainless steel)	2
85	Rubber Bulb (F-37888)	1
86	Assorted Kitchen Strainers	3
87	Orbeco-Hellige Analysis ? Black Box	1
88	Silver Nitrate Chloride Test Kit	1
89	Suzy Kitchen Scales	1
90	Underwater Camera and Flash Unit	1
91	Universal Nicam Battery Charger (NW2398)	1
92	3.2m copper wire	500g
93	Electrode clamps and associated wiring	10
94	Metal Detector Amphibious (Whites Amphibian Water/Land)	1
95	100m Measuring Tape Reel	1
96	30m Measuring Tape Reel	2
97	Marked 6mm Cord	100m
98	8mm Rope	300m

99	3mm string	500m
	Cupboard 1 [from bow to aft]	
100	Assorted Small Containers of Chemicals	
	Cupboard 2	
101	Microscope Kyowa serial no 605894	1
102	Plastic Measuring Flasks (assorted sizes)	4
103	Glass Measuring Flasks	2
104	Glass Beakers	8
105	Glass Bowl	1
106	4li Large Glass Beaker	1
107	1li Closed Flask	1
108	Plastic Funnels (assorted sizes)	8
109	Test tube rack	1
110	100ml test tubes	10
111	White cap test jars	10
112	10cm Laboratory Sealing Film	40m
113	Stirring Rods	5
114	6 hole sample racks	4
115	150ml glass test tubes	60
	Cupboard 3	
116	Assorted chemicals	
	Cupboard 4	
117	200 assorted plastic and glass containers	
	Chemicals	
118	Strong Ammonia Solution	500ml
119	Buffer Solution (ph = 10.00)	1li
120	Buffer Solution (ph = 7.00)	1li
121	Buffer Solution (ph = 4.00)	1li
122	Packs of Litmus Paper (1 ph of 0-14, 1ph of 0-6)	2
123	Humidity Strips (0 to 100)	1
124	NaCO3	1500ml
125	Pearl Caustic Soda (25kg bags)	5.5
126	Methylated Spirits	20li
127	Fire Extinguishers (Wormald, 0.9kg dry power)	1
128	Fire Extinguishers (BCF, 0,9kg dry power)	1
129	Fire Extinguishers (Wormald, 5kg dry power)	1
130	10% Sodium Hydroxide Solution	20li
131	Caustic Soda Solution	20li
	Tools	
132	Hacksaw	1
133	Ruler (1m)	1
134	Tape Measure	1
135	Stanley Knives	2
136	Pliers	3
137	Wire Brush	1
138	Assorted Files	3
139	Crescent Spanner	1

140	4" Vice (Woden)	1
141	Callipers	2
142	Steel Hammer	1
143	Power Hand Drill (B&D sak30, 10mm)	1
144	Extension Cords (6m)	3
145	Power Hand Drill 650W B&D SR910 RT	1
146	Splitter Boxes	3
147	Heat Gun (Ryobi PS1600VK)	1
148	Digital Multimeter (Dick Smith Q1427)	1
149	8" Benchgrinder (Black & Decker)	1
	Books	
150	Ingram 1795-1982	1
151	The Wreck of the General Grant, Keith Eunson	1
152	Underwater Diving Manual, G F Brooks and A V	1
153	Various pamphlets & Manuals	
	Lab Locker	
154	Bead Blast Cabinet	1
155	Miscellaneous Paints	30li
156	Boxes of Miscellaneous Fasteners	10