Tasmania
DEPARTMENT of INFRASTRUCTURE, ENERGY and RESOURCES

Mineral Resources Tasmania
Archaeological Survey Report
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# An archaeological reconnaissance survey of the alluvial tin mining workings at Melaleuca, South West Tasmania

## (with a special emphasis on the sites associated with the late Deny King)

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## Introduction

As a result of plans to rehabilitate degraded areas in the historic alluvial tin workings at Melaleuca, southwest Tasmania, a brief survey was commissioned to identify significant features of the site that would require preservation. The tin mine workings are associated with the life and work of Charles Denison ('Deny') King, a notable resident of this isolated area for over 50 years.

The lifestyle that Deny King and his family pursued in the area was reminiscent of the pioneering lifestyles of the 19th Century and the remains of his alluvial tin mining enterprise (and the small companies that preceded he and his father's tenure) are of interest for this reason. The workings and remaining features are also of interest because of their representation of a style of alluvial tin mining that has virtually disappeared from Tasmania.

Barbara and Peter Willson, who have worked the tin deposits of the Moth Creek tin field for over 27 years, and who are the current lessee's of the entire area, carry on much of this tradition, and some comment is made about aspects of their operations. Their story of small but highly professional mine operators is yet to be written.

### *Focus of this survey*

The features recorded during this survey are mostly contained within ML 20M/1992 of 175 ha. Particular reference was made to specific sites contained within the former mine workings and mining infrastructure elements that are associated with the late C. D. King. Site elements that may be threatened by planned rehabilitation works, and by the re-use of structures that were previously associated with his tin mining operation, were recorded in some detail.

Wherever relevant, extracts from the recent biography of Deny King are included in the descriptive sections (Mattingley, 2001). The excerpts bring the site to life and give details about how the site was worked by King.

### *Time allocated to the survey*

The survey was carried out over two days. We flew into the Melaleuca airstrip by light plane on the morning of Wednesday 5 December 2001 and flew out on the afternoon of Thursday 6 December.

The first day was spent inspecting the site with P. and B. Willson, D. Burgess, Wendy Basire (DPIWE; TPWS) and Albert Thomson (DPIWE, TPWS). This inspection involved a general reconnaissance of the lease area. The second day was spent recording key features of the site, with particular emphasis on those sites associated with the late Charles Denison ('Deny') King.

Key areas examined were:

- King's engine shed area;
- King's treatment plant;
- Small alluvial tin workings to south of main mining area (briefly visited).

Several periods of writing and figure preparation were allocated to the report phase when time was available between more normal duties. Writing, figure drafting and report preparation took approximately four working days.

Weather was clear and sunny with occasional cloudy periods for the duration of the survey.

### *Previous work*

Noble (1992) completed an archaeological survey of the Visitor Services Site and surrounding hinterland. He identified several historic sites in the area but failed to identify any Aboriginal sites within his project area.

Historic site features were entered into the Tasmanian Historic Sites index (THASC). Tin mine workings 800 m to the west of Melaleuca settlement and known

as the 'Ludbrooks' (or Quintex) workings were catalogued as THASC 8111-034 by Noble (1992) (see fig. 1). Tin mine workings 700 m west of the Melaleuca settlement and known as the 'Dickers' workings were catalogued as THASC 8111-034 by Noble (see fig. 1).

Tassell and Wishart (1992) recorded key historic elements of the Melaleuca mining settlement. This comprehensive survey encompassed the key structural features of both the mining and residential areas associated with Deny King. They did not record the outlying workings.

The National Parks and Wildlife Service) discussed management issues related to historic infrastructure of the Melaleuca Visitors Services Site in the 1995 Melaleuca Site Plan. Key features identified by Tassell and Wishart (1992) and Noble (1992) were incorporated into this plan.

Rallinga Mines Pty Ltd (1992) has carried out the most comprehensive environmental management and heritage feature identification program at Melaleuca, focussed on the area of the mining lease, as a part of their EMP study.

### *Acknowledgements*

Thanks to Peter and Barbara Willson for the detailed tour of the mine lease, for accommodation, a great meal and toasted cheese and chutney on toast. Many thanks are offered to the Department of Primary Industries, Water and Environment for organising the charter flight and Wendy Basire and Albert Thomson of that department for discussions on site. Albert is also thanked for pointing out a couple of subtle features.

## Location

Melaleuca and the Moth Creek tin field (Stefanski, 1957) are located in southwest Tasmania, between Bathurst Harbour and Cox Bight. The field is located on the southern shore of Melaleuca Lagoon which forms the terminus of Melaleuca Inlet, a southern extension of Bathurst Harbour. The Moth Creek tin field is surrounded by, but excluded from, the South West Conservation Area.

### *Moth Creek tin field*

The Moth Creek tin field consists of a linear belt of alluvial (or detrital) tin located within coarse gravel to cobble-sized sediments and lying under a thick coverage of peat. The field is bounded by Moth Creek to the east, Melaleuca Lagoon to the north and Melaleuca Creek to the northwest. The belt is about 2.5 km long and varies in width from about 800 m in the north to 400 m at the southern end (Stefanski, 1957).

The tin occurs in the form of cassiterite and is associated with fine monazite. Chalcopyrite was found in association with tin in a shaft in Kings mine. The cassiterite crystals are angular to sub angular and are therefore considered to be close to their origin. Cassiterite (sometimes with monazite)-quartz veins are found in the metasedimentary rocks underlying the gravel.

Primary tin was found in small veinlets but no tin lodes were found. A lode reportedly found in 1938 and investigated by Henderson (1938) proved to be cemented detrital tin and fragmentary material.

## Site history

### *Discovery and the New Harbour Tin Development Company NL*

The Moth Creek tin field (Stefanski, 1957) was discovered by Bill Adams and A ('Harry') Evendon in 1934–35. Adams moored his boat *Navaho* in Melaleuca Creek and with Evendon discovered cassiterite in the banks of the creek, near where the northwestern end of the airstrip is at present (Rallinga Mines Pty Ltd, 1992). The site of the original tin discovery was probably in the low sediment terraces adjacent to the southern shores of Melaleuca Lagoon (P. Willson, pers. comm., 2001). Test pits and trenches excavated into the terrace bank are still evident. The tin yields were probably very low in this area (P. Willson, pers. comm., 2001) and the main centre of interest moved to the south, to the west of Moth Creek.

In 1935 a company was floated. There are various versions of the name of this company recorded, including the New Harbour Tin Company (Stefanski, 1957); New Harbour TD Co/New Harbour Tin Development NL (diagram of lease survey dated 1936); the New Harbour (Development) No Liability Company (Henderson, 1938); and the New Harbour Tin Development NL (G. Dickens, pers. comm., 1995). Whatever the name or names, this company only operated for two years before the leases were transferred to H. E. Brock, who only held them for a short time before they were surrendered. The initial lease was charted in the name of New Harbour Tin Development NL, and this is presumably the official name.

There is a hand written note on the mineral lease survey chart (dated 1936) of the New Harbour TD Co. lease that states "This is the first instance in Tasmania when a surveyor was carried to and from his work in an aeroplane". So it would appear that Moth Creek was the location of an important development in the use of aircraft in mineral surveys in the 1930s. The association between aircraft and this remote region continues to the present.

The New Harbour company employed 19 men, built a series of small huts (where Deny King's garden now lies) and some of these huts still survive. The company put down several shafts and pits to test the tin-bearing ground and defined an area with tin-bearing potential measuring six chains wide by a mile long (approximately 120 metres wide, 1600 metres long). According to Henderson (1938), the New Harbour Co. undertook sluicing operations in an area about 10 chains (200 m) west of Moth Creek. Fair prospects were

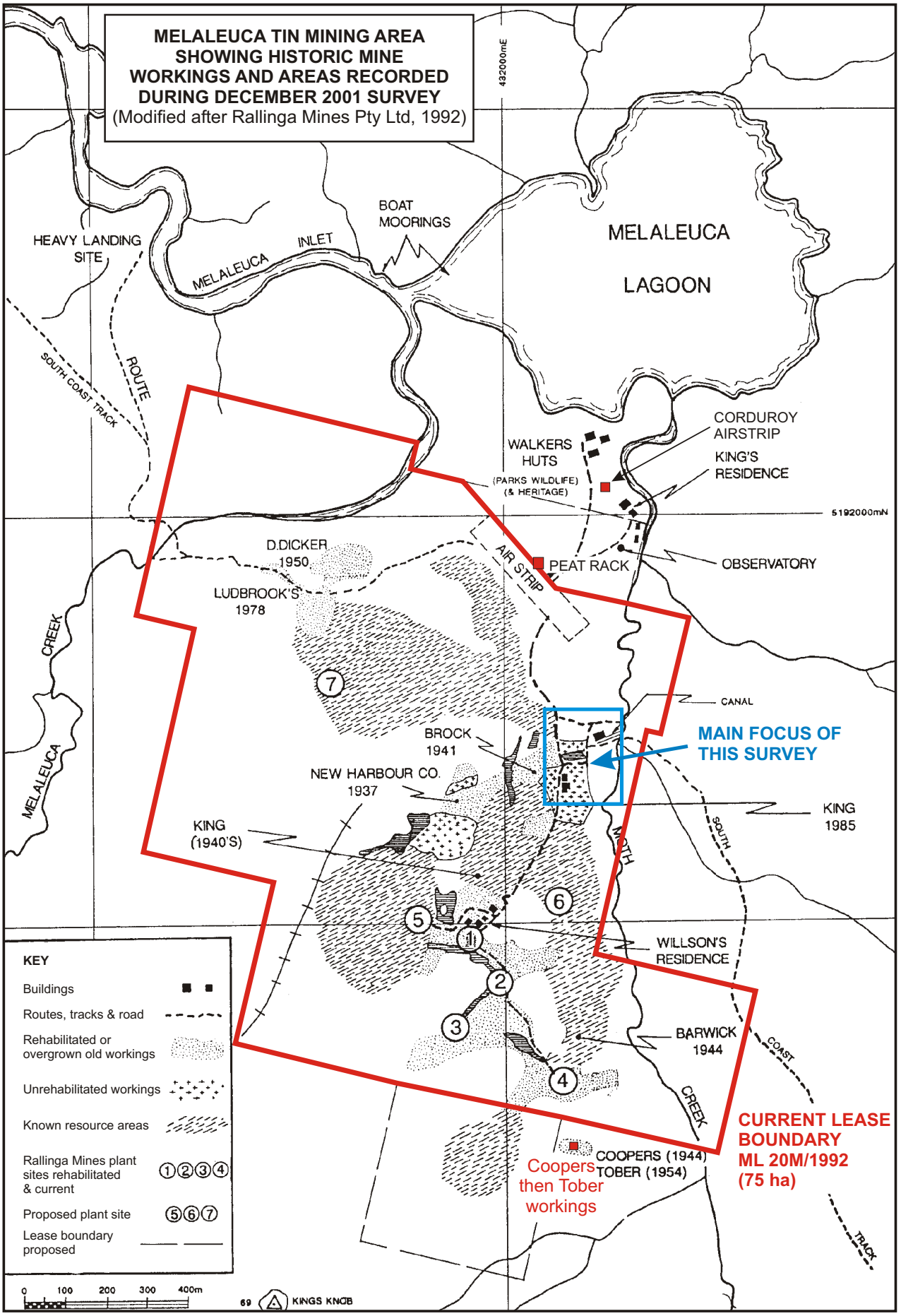


**Figure 1**

*Plan showing the location of the boundary of the current mining lease at Melaleuca held by Rallinga Mines Pty Ltd. This lease incorporates the leases formerly mined by C. D. King and was the focus of this survey.*

obtained from the shafts but the material defined did not exceed one foot (300 mm) in depth.

A short canal was dug from Moth Creek. A 30 hp (22 kW) Dorman Ricardo diesel engine and a pump was installed to pump water from the canal into a 25' (7.6 m) high water tower (the site of this tower is now marked by a large mature eucalypt tree at the site of Deny King's engine shed (see below). A pipeline carried the water 600 m west to supply a 70 hp (52 kW) diesel driven pump that alternately supplied two hydraulic nozzles. The high-pressure water from the nozzles disintegrated the peat and tin-bearing gravel and flushed all of the lighter material into previously excavated races. The heavier material, including the tin, was left behind. The mine closed in 1937 and the machinery was removed by the ketch *S.M.H.T* (Rallinga Mines Pty Ltd, 1992)

The shallowness of the tin-bearing material and the difficulty in cleaning the 'rough bottom' produced by the jagged edges of the upturned metasedimentary rocks forced the company to abandon the operations. These workings are still present, forming an area of approximately an acre, barren of vegetation, in which the clean pale grey to white, finely bedded and quartz-veined metasedimentary quartzite is exposed (Henderson, 1938). The jaggedness of the 'bottom' is obvious in this worked area to the present day, as vegetation has not regenerated on the barren rock exposures.

Following the demise of the New Harbour company, the ownership of leases on the Moth Creek tin field fluctuated. In 1938, the original 80 acre New Harbour lease 11654/M was transferred to the name of H. E. Brock as 27M/38. In 1938 Brock applied for leases immediately to the north (102M/39) and south (103M/39) of the original lease.

By 1939 the southern lease (103M/39) had passed back to H. E. Evenden, one of the original prospectors, then to H. Hollingsworth and then to Evenden once more. In 1938, Hollingsworth bought new machinery and worked his lease for nearly two years (Stefanski, 1957). Any success he had was short lived, as by 1941 he had handed over his lease to Charles King.

### *Consolidation of the field and the King family*

Charles King went to work at the Cox Bight tin field in 1934. His son, Charles Dennison (Deny) King worked with him a number of times over the next five years until called up for war service. In the early war years, Charles King became the caretaker of the New Harbour Co. (or Brock's?) equipment at Moth Creek, moving back and forth between his camp at Cox Bight and Melaleuca. By 1941, King had elected to work the leases himself and took over the former New Harbour Co. lease from Brock as 17M/41. In 1960, the main lease was transferred to Charles Denison King and his daughters as 30M/60.

In the immediate post-war years, Deny King returned from active service and convalescence. He and his sister Win moved to Melaleuca to help their father run the mine and the rapid consolidation of the field under the King family was completed. The southern lease 103M/39 became 120M/47 when it was taken up in the name of Winsome Sarah King (later Clayton). This lease eventually passed to Peter Willson in 1975. The northern lease passed to R. Young in 1942 as 12M/42 and to C. D. King in 1964 as 68M/64.

From the post-war years onwards, the greater part of the tin resources of the Moth Creek tin field was controlled and operated by the King family. The association of this family with tin mining in this area was to continue until the death of C. D. King in 1992. The family still retains ties to the area in the form of their residential lease over King's residence.

When C. D. King returned from active service in 1945, he joined his father at Melaleuca and they commenced a gravel pump operation, with little success. They reverted to ground sluicing with the aid of a D2 Caterpillar dozer. In 1968, King's mining operation was upgraded by the installation of the trommel, jig and conveyor, aided by a wheeled loader (this loader remains at the site but is stripped down and is awaiting disposal).

King's service vessel *Melaleuca* carried her last load of tin in mid August 1985. As a result of machinery troubles, a very low tin market, ever increasing costs, deteriorating plant, the closure of the Launceston tin smelters, worsening arthritis, gout, high blood pressure and his turning 76, Deny King decided in September 1985 not to mine tin again (Mattingley, 2001, p.303).

### *P. and B. Willson and Rallinga Mines Pty Ltd.*

Peter and Barbara Willson bought lease 120M/47 from Winsome Clayton (nee King) in 1974. This lease was later enlarged and consolidated with lease 16M/82. In 1981, P. and B. Willson formed Rallinga Mines Pty Ltd (Rallinga Mines Pty Ltd, 1992), the company that remains the sole operator of the field (February 2001).

After 27 years of continuous mining, the Willson's remain the sole leaseholders of the consolidated ML that now encompasses most of the former mining leases of the Moth Creek tin field. Peter Willson is a mining engineer and former fisherman and Barbara is a schoolteacher.

### *Other operators*

In 1954, over a period of three months, Dirk and Margot Tober, and an offsider, produced half a ton of tin from a continuation of the workings abandoned by the Cooper brothers in the 1940s. They worked by manual methods (Rallinga Mines Pty Ltd, 1992). The mounds of coarse gravel and working faces left by this enterprising couple were briefly recorded during the present survey and are shown in Figure 1.

## King's engine shed area (former New Harbour workshop area)

A site plan of the area is shown in Figure 6. Site records for features of this area are also included in Tassell and Wishart (1992).

### SITE ELEMENTS

- Old sluice nozzle and nozzling site (not shown in Figure 6);
- Gravel pump and engine bed;
- Southern Cross engine shed and precinct;
- Moth Creek jetty.

Noble (1992) catalogued the 'canal', wooden derrick, wooden jetty and 'Heathcotes Hut' as THASC 8111-015.

### Sluice Nozzle

*Site description*

The nozzle is located in a gravel pan immediately adjacent to (east of) the road from the airstrip to the Willson's residence (432 127 mE; 5 191 487 mN). The nozzle consists of a heavy cast iron tapered pipe with a brass end fitting, counterweight, base and the remains of rusted pop-rivetted feed pipe (fig. 4). The nozzle points towards the west to a low face in the peat-covered gravels (fig. 3 and 5). A shallow ditch (tail race?) leads away from the eastern side of the workings to the north (fig. 3). It is marked with a cast iron makers plate showing it was manufactured at the Salisbury Foundry, Launceston.

The surrounding gravel pan is a low area of exposed gravel in which water has accumulated in the lowest places.

> "After digging and testing a series of holes, Deny and Charlie would decide where to mine, marking out a ' paddock', a rectangle of about half a hectare.
>
> Deny would then commence stripping, removing the peat overburden of button grass and low scrub with pick and mattock to expose the tin bearing gravel on the bedrock beneath the mud. This pay dirt then had to be shovelled into barrows and wheeled to a heap for nozzling. Stripping was best done in fine weather when the ground was relatively dry. But nozzling and sluicing required much water, so depended on rain having filled storage ponds, previous excavations dammed with peat sods and connected by ditches or races.
>
> Working the sluice box involved constant shovelling, raking and forking to assist the water, which was controlled by a gate. A powerful jet from a large nozzle squirted the pay dirt down a nine metre timber box to wash the mullock along a race to the tailings heap.
>
> Deny made shovel like implements with large blades of coarse metal mesh fixed to long tea tree pole handles. These were used for stirring up the wash in the sluice box, to separate sand, silt, gravel, clods and stones from the heavier tin bearing material, cassiterite.
>
> Cassiterite, $SnO_2$, is a very high-density material, three times heavier than other common minerals. The winnowing allowed the tin to sink to the bottom. Even hoes and an extra hose might be used against the flow to stir up the lighter sediments and stop the sand from setting hard. Then with a pitchfork Deny would toss out the stones. After sluicing, the tin would be 'picked up' by hand from the bottom of the race, often gravel or jagged bedrock. So 'picking up' was not as easy as the name implied, hard both on shovel and wielder.
>
> When enough tin had been sluiced, it was streamed in the wooden sluice box, cleaned with more running water. The tin would then be carried or barrowed to a wooden box built further down the race for its final cleaning, which required judgement and skill. It flowed over a shallow wire tray into a wooden streaming box some forty five centimetres wide.
>
> Corduroy material was nailed in the bottom to catch any gold particles, while tin and sand would be washed further down a fifteen centimetre fall. There Deny, back braced, would stand in the water with his square mouthed shovel, working solids slowly and rhythmically against the water to keep the sand flowing out and the tin up the box. The rate of water flow was critical, requiring constant monitoring. It was governed by the sluice gate at the dam, and by valves and riffles or wooden bars across the base of the sluice box at intervals.
>
> The lighter particles would be carried away leaving the cassiterite residue, shiny black grains, to be scooped out with a shovel into storage drums to dry before bagging.
>
> Streaming required great care to ensure the best price, as tin with impurities incurred penalty rates, and Deny took a pride in the purity of his product. Mines Department inspector David Jennings regarded Deny as a very skilful operator. [Mattingley, 2001].

*Condition and management issues*

The nozzle is covered in a surface patina of corrosion but is apparently stable. The pop rivetted pipe is badly corroded and will soon separate from the main body of the nozzle. Corrosion will continue but the castings are relatively robust and significant deterioration will only occur in the long-term.

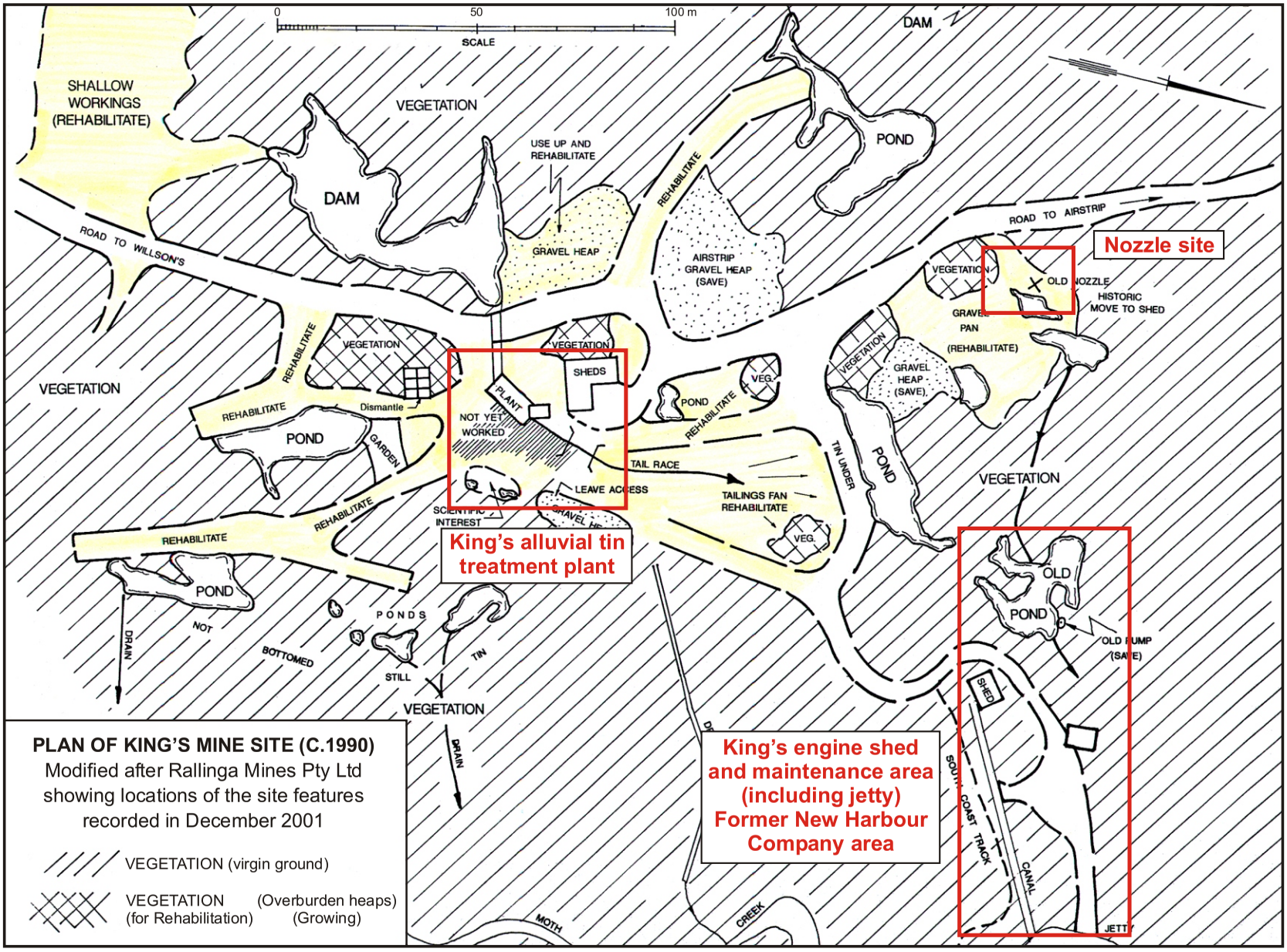


**Figure 2.**

*Plan of C. D. King's mine site showing the locations of the detailed site plans produced during this survey (outlined in red). Modified after Rallinga Mines Pty Ltd (1992).*

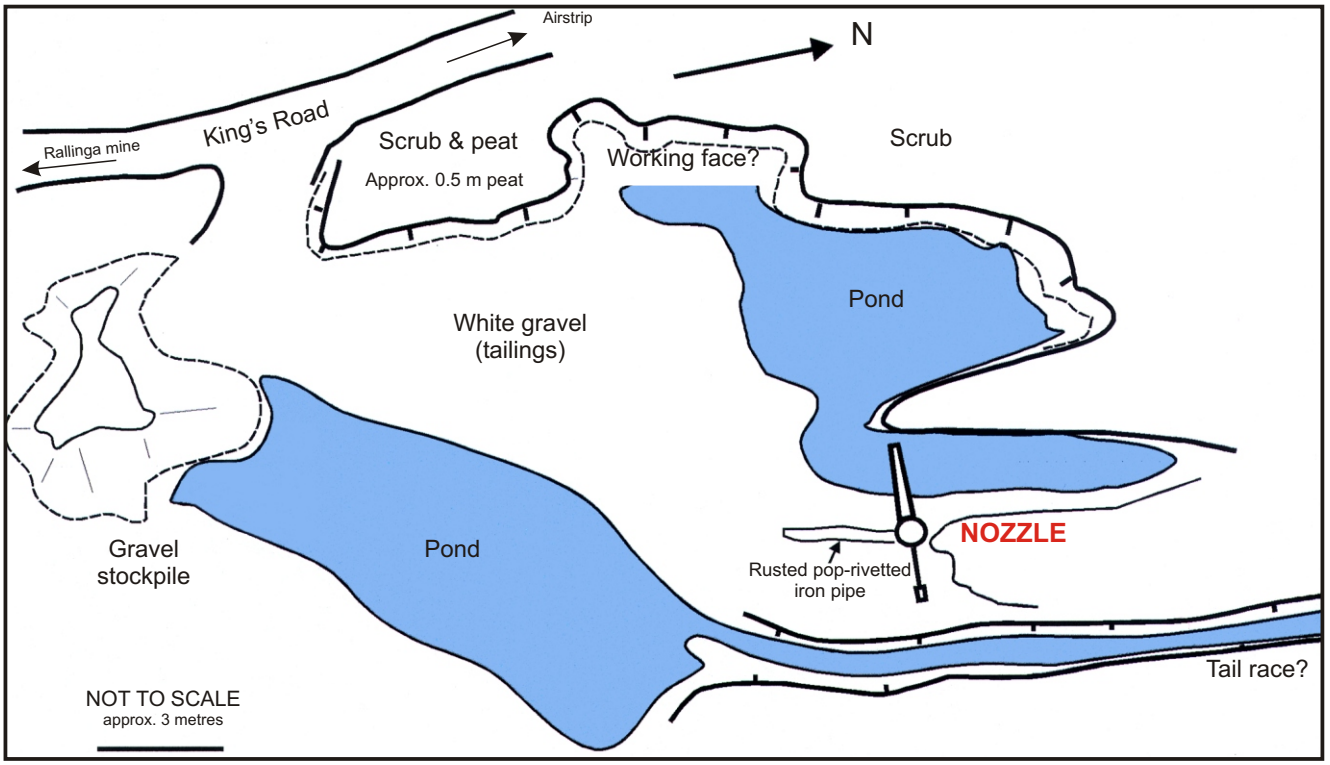


**Figure 3**

*Sketch plan of the sluice nozzle site and associated workings adjacent to 'Kings Road' near King's engine shed. See Figure 2 for location. Not to scale.*

**Figure 4**

*Photo of sluicing nozzle and associated ponds adjacent to 'Kings Road'. See Figure 2 and 3 for context. View is looking approximately north.*

**Figure 5**

*Photo of sluicing nozzle and associated ponds and working face adjacent to 'Kings Road'. See Figure 2 and 3 for context. View is looking approximately NNW.*

## Southern Cross engine shed and precinct

### *Site description*

This site consists of an approximately 50 m 50 m flat area bordering Moth Creek and which is bounded to the southeast by the New Harbour Co. 'canal', to the northeast by Moth Creek, and to the west by rehabilitated mine workings and the air strip road. Contained within the area is the site of the former New Harbour Co. infrastructure (including the water tank site), as well as Deny King's engine shed, the New Harbour Co. 'canal', a variety of mining equipment and related items (including a gravel pump), and the track to the Moth Creek jetty (fig. 6).

### *Southern Cross engine shed*

The Southern Cross engine shed was the centre of motive power for the mine and treatment plant. Mattingley (2001) described the story of the engine that was once housed in this shed and described it in operation.

The shed is painted with red roofing paint. It consists of a tubular steel framed and corrugated iron roofed arched building reminiscent of the wartime 'Nissen huts'. The southwestern end is walled with corrugated iron and the northeastern end is open, although it has a light timber partition. The floor plan of the shed is shown in Figure 6.

The engine bed of the Southern Cross engine occupies the major part of the floor area (fig. 6, 7). Wooden shelving and a small workbench occupy the northwestern inner wall. The shelves are mainly filled with boxes containing spare machinery parts. Of special note are the three yellow-painted boxes in which Deny King stored his Caterpillar parts (Mattingley, 2001) (fig. 8).

Nailed to the inner side of the southwestern wall of the shed is one of Deny's 'poo trays' (fig. 9). Such devices caught the faeces from bird nesting sites in the shed (Mattingley, 2001 describes King's reason for these trays in the extract below).

Lying adjacent to the shed on the canal side is an abandoned double staged pump (fig. 6, 10). This piece of equipment may have originally been owned by the New Harbour Company but may also have been purchased by King after the war as he modernised and mechanised the mine.

### *Extracts from King of the Wilderness by Mattingley (2001; p. 234–235)*

> "After his discharge Deny had hunted for a suitable engine with which to start fulfilling his dream of mechanising the mine. He found it at a Hobart shipyard, and it gave its name to Southern Cross Bay in The Narrows, where Clyde anchored the late night of the delivery voyage.
>
> Unloading the tonne and a half engine had needed all Deny's and Clyde's ingenuity. They tied *Arlie D* to the bank, then erected a pair of sturdy bush timber shearlegs, leaning out over the boat, These were supported by wire rope from a powerful hand operated forest devil winch attached to a dead man anchor, a log fixed horizontally in the ground. An endless chain suspended from the head of the shearlegs lifted the engine, and *Arlie D* was manoeuvred from under it, 'pretty quick in case it fell'.
>
> The sturdy *Ark Royal* was brought in and the engine gently lowered. Charlie's latest acquisition, the five metre, one horsepower *Blue Boat* towed her across the lagoon and up Moth Creek to the canal abutting the mine. Here shearlegs were used again to lift the engine, which was then levered and skidded along planks to a concrete bed. The engine drove a pump supplying high pressure water for sluicing, and a sawmill (engine bed in engine house).
>
> A month later Deny bought a one tonne two cylinder engine. (engine bed at gravel pump). Transported, unloaded and manoeuvred into position by the same process, it drove the gravel pump".
>
> "Deny would head straight for the engine shed, another Nissen style building open to the north east, with its warm smell of oil and grease. As he checked the big Southern Cross engine and started it, swallows which built their mud nests on the rafters went about their business, as did dusky robins which also nested in the shed year after year. With his love of birds' company but aversion to excreta, Deny had nailed sections of oil drum as 'poo trays' under their nesting sites.
>
> For his own housekeeping he had made a time clock for recording hours of engine use, enabling him to calculate fuel consumption. He had a coke burning forge with hand turned bellows, in which he heated steel; an anvil on which he sharpened his tools and made parts and an oxyacetylene welding set. Coils of wire and electrical cord hung from nails on the walls, as did long strings of metal washers, and a clipboard listing parts to be ordered. An old frying pan and several billy lids made convenient trays for assorted nuts and bolts. One shelf and several wooden half cases, all painted yellow, stored D2 parts. Tools, shovel blades, crowbars, picks, spanners, wrenches and brushes of all kinds, wire, bristle and even old toothbrushes, lay in heaps. Because of harsh conditions for machinery and tools, more days were devoted to maintenance and repairs than in operating the plant. Deny threw nothing away, because everything had to be brought in, and often parts ordered were incorrectly supplied".

## Moth Creek 'canal' and jetty

To the south of the engine shed is the 'canal' dug by the New Harbour Company to facilitate the offloading of equipment. The canal is now largely silted up but is

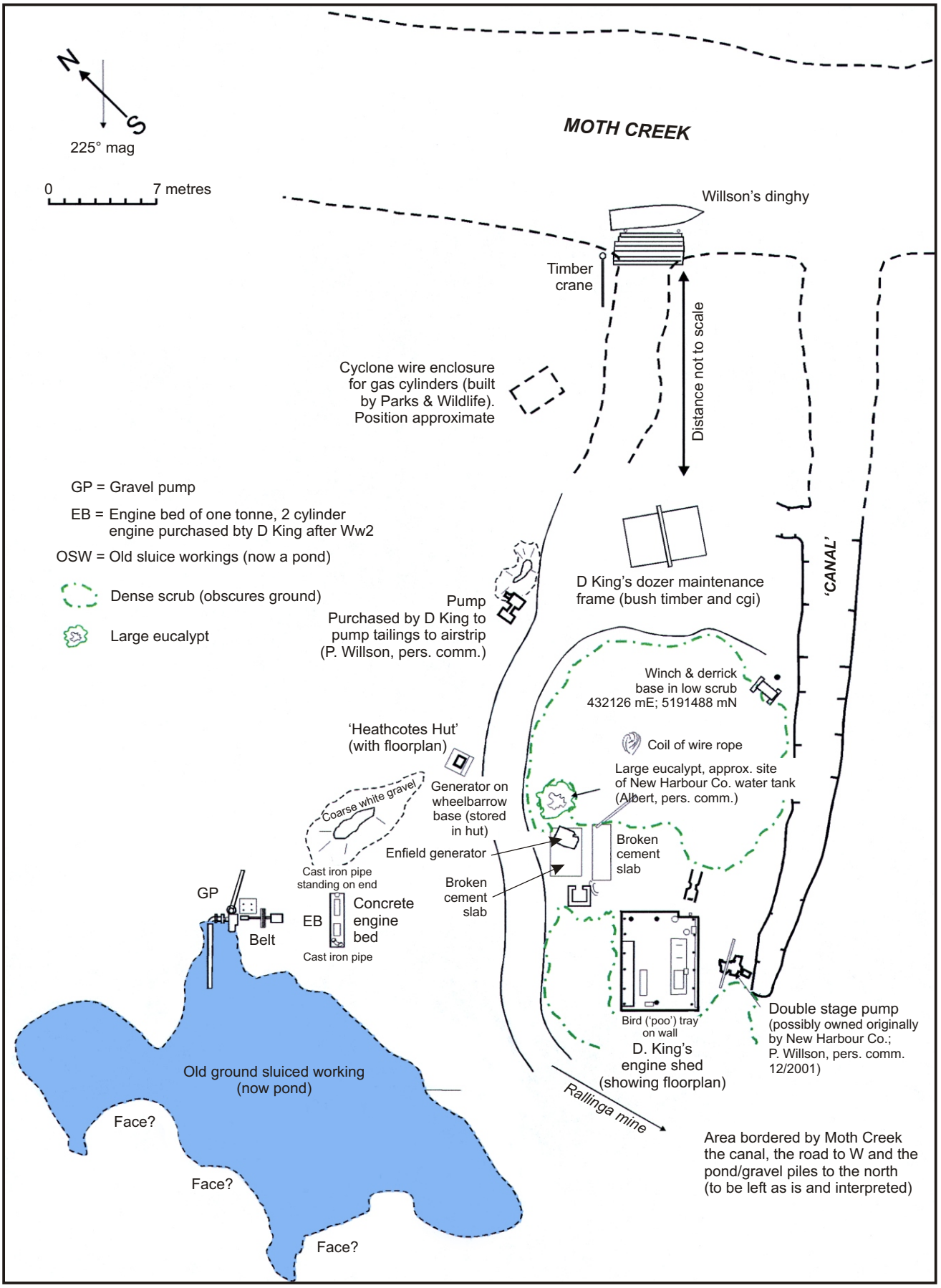


**Figure 6**

*Scaled site plan of C. D. King's engine shed and 'dozer maintenance area. Also shown is the current Moth Creek landing currently used by P. and B. Willson of Rallinga Mines Pty Ltd and the New Harbour Company 'canal'. This site was one of the centres of operation of the original New Harbour Company in the 1930's and became the location of Deny King's Southern Cross engine.*

still a major feature of the site (fig. 6). To the west of the engine shed is the gravelled track that runs from the main airstrip road to the Moth Creek jetty (fig. 6). Scattered along its length are a variety of pieces of mining-related equipment left by Deny King (fig. 11–14). One piece of equipment in this scatter is a pump that was bought to send tailings to the airstrip (Peter Willson, pers. comm., 2001). The makers plate is 'Thompson's Engineering and Pipe Co Ltd Castlemaine Victoria'.

The jetty is still in use by the Willson's and is the main means by which they unload equipment and stores from their dinghy. A timber crane is used to unload heavier items and was replaced in 2000 because the previous timbers were decayed. The crane was still in use in 2002 (fig. 15, 16).

Mid-way along the track between the engine shed and Moth Creek is a cleared and gravelled area, in the centre of which there is a bush timber 'H'-frame and corrugated iron structure that was used by Deny King to assist in machinery maintenance (fig. 14).

### Gravel pump

Approximately 25 m west of the engine shed lies a 'Kershaw and Thompson' gravel pump (fig. 17–20) and associated engine footing (fig. 22). The gravel pump appears to be in situ and is associated with a shallow pond in the peat that probably represents former sluice workings (fig. 6).

## King's plant site

The centre of King's alluvial tin extraction operation, the site of his treatment plant, was located southwest of the Southern Cross engine shed area. Several important elements remain at the site and are shown on the site plan (fig. 21) and in Figures 23 and 24. Site records for features of this area are also included in Tassell and Wishart (1992).

The extract from Mattingley (2001) below describes the operation of this plant site in colourful detail.

### SITE ELEMENTS

- Nozzling platform, trommel and washing box;
- Jig, jig drain and gravel pump;
- Amenities shed;
- Bulldozer shed;
- Gravel dumps;
- Vehicle and welding shop site;

### Nozzling platform, trommel and washing box

The nozzling platform (fig. 25) was a raised plate-steel lined platform constructed on a mound of waste rock and gravel. It was the beginning of the tin extraction process, where the tin-bearing material excavated from the mine was placed and initial washing took place. A description of how Deny King worked the plant is provided below (Mattingley, 2001)

From the platform, the tin-bearing gravel was washed into a rotating perforated drum known as a trommel (fig. 26). Coarse material and waste passed through the drum and accumulated at the end. Finer tin-bearing sand and gravel dropped through the perforations in the drum sides and accumulated in a sump excavated below (fig. 26). From the sump, the tin-bearing sand and gravel was pumped, via the gravel pump, to the jig.

Coarse tin-bearing material (such as lumps of clay or peat) that had passed through the jig could be washed in the timber washing box below the lower mouth of the trommel drum. Any tin bound up with this material could be extracted.

Rejected waste material, such as coarse cobbles and other waste, was removed from the end of the trommel by a conveyor belt to a stockpile and then removed later by front-end loader. The conveyor has been removed (Peter Willson, pers. comm., 2001).

### Jig, jig drain and gravel pump

The main extraction of tin was achieved by the mechanical jig (fig. 21; fig. 27). A gravel pump (fig. 28) pumped tin-bearing gravel and sand from the sump below the trommel to the jig. The jig mechanism pulsates, lifting a veneer of magnetite or other heavy dense material, covered in water. Heavier tin particles pass through the magnetite as it pulses and the lighter materials, such as sand and gravel, pass across the more dense material to be washed off into the drain box. The tin accumulated in a hopper underneath the main box. Additional washing of the rejected material took place in the drain box before the tailings washed off the end of the box (fig. 30, 31).

The jig itself is a two-chambered steel box with a hopper underneath. The pulsing motion of the jig was driven by two diaphragms, moved by a drive-arm that seems to have obtained motive power from the same pump motor as the gravel pump.

Coarse waste material from the trommel is now stockpiled on the side of the airport road where it is accessed for airstrip and road maintenance (fig. 29). The Department of Primary Industries, Water and Environment is apparently planning to remove the gravel or rehabilitate this area. Should the airstrip be decommissioned and rehabilitated, these stockpiles will become redundant. Should it be retained, a source of maintenance material will be required indefinitely and this material will be a valuable resource.

Stockpiles of coarse gravel and cobbles are also placed to the northeast of the treatment plant (see Figure 21). This material could be smoothed and rehabilitated without seriously impacting on the fabric of the plant site.

### Amenities shed

Adjacent to the drain box of the jig is a small corrugated iron and timber shed (location and floor plan shown in Figure 21) in which tools and other items are stored (fig. 32, 33). Many of the tools in the

shed were designed and made by Deny King at Melaleuca.

### Bulldozer shed

The dominant feature of the treatment plant area is the curved corrugated iron and tubular steel-framed building of 'nissen' hut style. The tubular steel frame struts are embedded in hand-adzed logs which form the foundation of the building. Presumably these logs are fixed to the ground in some manner. This was the shed in which the D2 bulldozer was stored (fig. 34).

Placed against the western end wall of the building is an electrical switchboard that may be the one that Mattingley (2001) describes Deny King building (fig. 35).

This shed has little heritage significance, apart from its association with Deny King and his machinery. The proposed adaptation of the shed for kayak storage would be a good use of the building.

### Vehicle and welding shop site

Large rectangular concrete slabs immediately to the north of the dozer shed mark the site of the former welding shop and tractor shed (Tassell and Wishart, 1992). These sheds have been removed since Tassell and Wishart's 1993 visit. The construction materials have probably been used to build the new undercover parking area built at Deny King's house, where the tractor is now stored (see Figure 21 for location).

### Extract on King's treatment plant from *King of the Wilderness* (Mattingley, 2001; p.238–239)

> "Now there was a new procedure on sluicing days. Deny scooped up a load of pay dirt with its mingled smell of peat and diesel, drove it up to the timber nozzling platform and dumped it. Then he squirted the pump driven hissing water jet to wash the dirt along the wooden sided platform. In his gumboots Deny jumped on clods to smash them up and remove rocks, before they got to the trommel.
>
> The mud was washed into it, to be sprayed again from a perforated metal pipe. All material less than a centimetre, mud, tin and water passed through the screen as it rotated, dropping into a hopper below, connected by a pipe to a metre deep sump hole. From the end of the rattling trommel a conveyor belt [now used by the Willson's] hurried the mullock five metres along to tip over the platform edge. Before the tailings heap grew too big, it had to be removed by dozer, either to backfill previous excavations, or to a stockpile for road making and other earthworks.
>
> The gravel pump located by the sump hole was fed with dam water by a pipe with a butterfly valve and float to regulate the level. When the primed pump was switched on it sucked up the slurry to be spewed over the top of the jig. The metal jig, as big as a bed, comprised two chambers filled with water, covered by two perforated metal screens. Beneath the ragging, a layer of coarse hematite gravel, rubber diaphragms bolted to a rod driven by an eccentric wheel caused the water welling up through the hematite to pulse intermittently, keeping everything in motion. Being heavier, cassiterite sank through the hematite into hoppers below, while lighter quartzite gravel moved on with the slurry to a raised peat slab drain.
>
> At day's end Deny switched off the machines. Quiet returned. Then he opened the valves at the bottom of the hopper and estimated the day's yield as the cassiterite poured into cut forty-four gallon drums beneath, to await streaming.
>
> Janet described her father and his mine with feeling:
>
> The mine was a busy, changing, shifting, pulsing work environment, constantly evolving. There was a satisfaction in watching his system functioning a moving flowing rhythm of muddy brown water. Eyes and ears were constantly alert for any small changes, which could require adjustment.
>
> When mining on his own, he was on the move constantly. He stood at the nozzle for a while, then trotted down the clod embankment and onto the dozer for another load of pay dirt. Back at the nozzle platform, then off checking pumps and water flow. He galloped down a gravel heap and shovelled stones away from the conveyor belt. There was a companionship in the whirr and hum of pumps and electric motors, the pulsing of jig and rattle of trommel. When he switched off all would be still except for the drip of water from recently active machines and the gentle lifting of steam from warm motors, as he opened the hoppers to see if he 'had a good haul'.
>
> By September 1968 Deny's perseverance in getting the new plant to function efficiently was paying off. He had thirty five bags of tin."

## Miscellaneous site features

### Kings peat mining area and drying rack

A major fuel source for the King's at Melaleuca was dried peat (see Figure 1 for location). Deny had a small peat 'quarry' adjacent to the edge of the airstrip, near the small arrival shelter (fig. 36). Location 432 102 mE; 5 191 879 mN.

Adjacent to the pit is a raised steel mesh and timber rack on which cut slabs of peat could be left to drain and dry out (fig. 37).

### Corduroy airstrip

Remains of a 'corduroy' landing strip (a hard surface constructed from lengths of bush timber laid parallel and intertwined to produce a firm surface on soft ground) can be seen in the well-worn path from the Ranger's quarters to the windmill (see Figure 1 for location; fig. 38). Some fringing timber is exposed on

the track from the ranger's hut to the airstrip. The majority of the strips of timber are covered by tea tree regrowth, much of which may have actually sprung from the green strips that Deny King cut and placed to form the strip (fig. 39). The closely laid timbers are particularly visible after fires. Mattingley (2001, see below) provides a detailed account of the reasons for, and construction of, the corduroy airstrip by Deny King.

> "Beach landings depended on tide and weather, so pilots were searching for a location for an alternative strip. From the air button grass looks deceptively smooth and level, but the tussocks and the boggy peat between are quite hazardous.
>
> In 1947, Neil Gaston, a pilot from Brown and Dureau's aerial survey, had arranged for Deny to remove the tussocks on an area behind the house as an emergency strip. He had also asked Clyde to prepare a space at Bond Bay, but Clyde judged the terrain unsuitable and, when Gaston flew over, waved him away. Gaston circled and dropped a note saying he would attempt to land on Deny's tract.
>
> He succeeded in bringing 'Auntie', his de Havilland Dragon Rapide, a twin engined wood and fabric biplane, down on the rough flat. Before leaving he took the precaution of draining fuel to lighten the aircraft and had his photographer walk to Cox's for pick up. Yet despite his care, on attempting take off, 'Auntie', almost at flying speed, hit soft ground and nosed over. The propellers dug into the mud, sprayed clods and broke. The toolbox narrowly missed Gaston's head, shattered the windscreen, and hurtled onwards, disgorging tools which Deny was still finding for weeks.
>
> On their return from taking Gaston to Hobart, Deny, Charlie and Clyde built a corduroy strip, which took three weeks' hard work. Clyde recalled, 'We never stopped for rain. Deny did the most, of course. Win kept up the tucker. The improvised runway consisted of two parallel strips, 160 metres long and two and a half metres wide. Deny estimated that 3000 poles were used. Mainly tea tree, they had to be cut and rowed upriver in *Ark Royal* towed by *Nifty*. They were laid straight on the ground and wired crisscross together. Then gravel dug from the bank was spread to make the surface smooth and firm.
>
> The aircraft was grounded for almost six weeks, so before takeoff Deny, realising that water had entered, bored a drainage hole, and it poured out. Alan Hume, chief engineer for the Aero Club of Southern Tasmania, landed his Tiger Moth at Cox Bight with new propellers, which had to be carried to Melaleuca. The repaired Dragon was dragged up to the strip awaiting a strong wind to assist take off, which went smoothly.
>
> Gaston deeply appreciated Deny's and Clyde's, help and voluntary work, and as a memento gave Deny a broken propeller. Deny had a barometer inserted and mounted it on the chimney breast."

### Remains of the Willson's mining operations

The rehabilitated mine workings of Rallinga Mines Pty Ltd are relatively difficult to discern from the air. Evidence of mining can be even more difficult to discern on the ground, particularly the sites of former treatment plants that the Willson's have operated. One of the few structural features at their plant sites is the bush timber support for fluming at the No. 4 (?) plant site at the far south end of the Rallinga mine workings (fig. 40).

The Willson's have been mining at Melaleuca for over 27 years. They have built and moved at least four treatment plants as the centre of operation has moved through different sections of the lease. The signs of the locations of the plants that the Willson's have built are quite difficult to recognise.

Prior to mining, the tin-bearing gravel was systematically tested by the Willson's by drilling auger holes and pitting on a 100 feet by 100 feet grid pattern. Barbara Willson logged all holes (depth of peat, depth of wash, bedrock, etc.). Peter had a very accurate pace (1 yard) and paced out the hole locations. Hole locations are marked by bush poles that stand about three metres above surface (fig. 41). Each pegged hole is individually numbered and the grid co-ordinate recorded by etching aluminium tags. Each marked hole also has a colour-coded flagging which tells the tin grade in ounces per dish (tin grades are converted to $Sn/yd^3$) encountered in the hole (fig. 41; 432 209 mE; 5 190 620 mN). A return of 0.5 ounces/dish is the minimum economic grade. Records of all hole locations, geological logs of the holes and grades encountered are maintained by the Willson's in 'exercise book' ledgers.

Many of the drilling program test hole pegs have been affected by a recent scrub fire but there are adequate remaining to show the professionalism of the current operators.

### Early water race (location 432 235 mE; 5 190 481 mN)

A 1.5 m deep, 1 m wide, vertical-sided water race traverses the button grass south of the Willson's main centre of operations (fig. 42). It appears to have channelled water to workings to the south of the main area (possibly the former Coopers/Tober workings, see below). It is cut through the peat, into the underlying gravel and may even reach bedrock.

The age of this feature is not known for certain and may even be pre-1940's and certainly pre-dates the Willson's arrival (Peter Willson, pers. comm., 2001).

This feature shows that such excavations in peat can be remarkably stable.

### Cooper's (later Tober) workings

A series of small conical mounds of white cobbles and gravel form the southernmost workings of the field (fig. 43, 44, see Figure 1 for location). The actual workings themselves have largely revegetated naturally and it is only the low waste heaps from the washing boxes that remain as significant features. A brief history of the site is included at the end of the site history section above.

This site should be left intact as a reminder of the small-scale mining operations that were once common there. Any effort to smooth and revegetate the area with machinery would leave more lasting scars than the small mounds.

### Former New Harbour Company workings

The main centre of original large-scale mining activity at Melaleuca was the ground sluicing workings of the New Harbour Company, located to the southwest of King's treatment plant and north of the Willson's residence and current treatment plant.

The area was ground sluiced to bedrock. The peat and gravel have been stripped away to bedrock to reveal clean greyish-white deformed metasedimentary rocks with occasional white quartz veining. After 65 years, the workings have not revegetated.

A small rectangular stone rubble engine bed/nozzle bed or tank stand is the only sign of the infrastructure. Tail races and water channels have largely regrown or been reworked later for their tin content. At the time of writing this section (March 2002), the Willson's had completed rehabilitating this area at the request of MRT and the National Parks and Wildlife Service.

#### *Wood sluice frames and hole (sump?) blasted into rock*

Peter Willson has dug up a couple of wooden sluice boxes buried in tailings and peat while excavating in areas around the site. In February 2002, the Willson's had completed their track into these workings and rehabilitation had commenced.

## Preservation of the site

The infrastructure elements at King's mine are rapidly deteriorating. A combination of salt air, acidic peaty waters, harsh climate, damp conditions and decay have degraded the equipment since it ceased being used in the 1980s. Wooden components of the mining plant are particularly susceptible to deterioration and will soon be gone (e.g. washing box and wooden components of nozzling platform).

Several key components of King's mining equipment have been removed (e.g. the conveyor, D2 dozer). The conveyor from the trommel has been utilised by the Willson's (with permission of the Fenton family). The Southern Cross engine is gone. The D2 and loader have been removed by the Fenton family, the wooden sided platform above the trommel has lost most of its timber framing (salvaged or collapsed) and the workings are mostly overgrown. Trommel waste (coarse white gravel) is stacked near the engine shed. The tractor has been moved up to the residence, in a new shed constructed from the materials salvaged from the demolition of the welding shed and vehicle shed at the mine site.

The sheds are in good condition as they are tube steel framed and located on relatively high, well drained ground. They are at risk of becoming overgrown by thick regenerating scrub (e.g. King's engine shed at the New Harbour site). Metallic components are rapidly rusting out (particularly the jig). The site will continue to deteriorate and one of the best ways to delay this process is to utilise the buildings and provide a reason for their ongoing maintenance. Any re-use should be done in consultation with the King family and should not impact on the main fabric of the structures.

## Assessment and recommendations

The Melaleuca mine site of Deny King offers a rare opportunity to relate the physical remains of what was essentially a one-man operation to the story of the man himself. The recent release of the book about Deny King, *King of the Wilderness*, by Christobel Mattingley provides a rare insight into the site and the remarkable man who lived and worked there. The key features of the plant site should be left as they are and where they are.

The mining area at Melaleuca also provides testimony to a remarkable couple, Peter and Barbara Willson, who still live there and mine the tin deposits. The small but highly professional mining operation that they run (as Rallinga Mines Pty Ltd) is done with minimal impact on the landscape and continues the long tradition of tin mining by small self-sufficient operators in this remote region. Their presence and role at Melaleuca is, in many ways, just as significant as the late Deny King's.

The only area of historic significance that is likely to be affected by proposed rehabilitation works is the barren ground-sluiced area left by the New Harbour Company. While this is a striking feature of the site and an excellent exposure of the bedrock geology of the Melaleuca site, its visual impact is more eyesore than benefit. It is recommended that rehabilitation takes place.

Gravel stockpiles adjacent to King's treatment plant are more problematical. Revegetation can proceed on barren areas as long as an adequate cleared buffer zone is left so that any future re-use of the site has space to move. A buffer zone will also ensure that regenerating vegetation does not overcome the site.

Finally, it is strongly recommended that an effort is made to record the lifestyle and story of Peter and Barbara Willson, probably Australia's last pioneer miners.

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**Figure 7**

*Detailed view of the interior of C. D. King's Southern Cross engine shed showing the footings of the engine.*

**Figure 8**

*Detailed view of the interior of C. D. King's Southern Cross engine shed showing the shelving units for parts and other equipment. Note the yellow painted boxes which were for the storage of Caterpillar parts (Mattingley, 2001).*

**Figure 9**

*One of Deny's 'poo trays' nailed to the inner side of the southwestern wall of the shed to catch the faeces from birds nesting in the shed (Mattingley, 2001).*

**Figure 10**

*Abandoned double stage pump lying in scrub between the engine shed and the 'canal' (see Figure 6 for location).*

**Figure 11**

*View showing the airstrip in the distance as seen from the track running from the engine shed to the Moth Creek jetty. There are several pieces of mining equipment scattered along the northern side of this track. The pump at the left of the view was purchased by Deny King to send mine tailings to the airstrip for surfacing (P. Willson, pers. comm., December 2001). See Figure 6 for location.*

**Figure 12**

*Small cyclone wire fenced enclosure built for gas bottle storage. This was built by the National Parks and Wildlife Service.*

**Figure 13**

*View looking approximately west along the track from the engine shed to the Moth Creek jetty. The small box-like structure is 'Heathcote's Hut' which now contains a small portable generator. The pump, shown in Figure 11, is in the centre of the view.*

**Figure 14**

*General view looking west along the track to the engine shed from the Moth Creek jetty. The cyclone wire gas bottle storage enclosure is on the right and the timber dozer maintenance frame built by Deny King is on the left. The engine shed is at the left rear. See Figure 6 for locations.*

**Figure 15**

*The timber crane is used to unload equipment at the Moth Creek jetty. This is still used by the Willson's and is the main means by which they unload equipment and stores from their dinghy. It was replaced in 2000 because the previous timbers were decayed. The timber jetty, Moth Creek and the Willson's dinghy are also in the view. Two of Deny King's small dinghies lie upturned at the left of the view. See Figure 6 for location.*

**Figure 16**

*Moth Creek jetty looking northeast.*

**Figure 17**

*General view of the 'Kershaw and Thompson' gravel pump located to the west of the engine shed showing general context. The airstrip can be seen in the background. The gravel pump appears to be in situ and is associated with a shallow pond in the peat that probably represents former sluice workings. See Figure 6 for location.*

**Figure 18**
*Close-up of the 'Kershaw and Thompson' gravel pump shown in Figure 17. See Figure 6 for location.*

**Figure 19**
*Detail of the arrangement of the 'Kershaw and Thompson' gravel pump shown in Figure 17. See Figure 6 for location.*

**Figure 20**
*Detail of the 'Kershaw and Thompson' gravel pump showing manufacturer's inscription on main castings. See Figure 6 for location.*

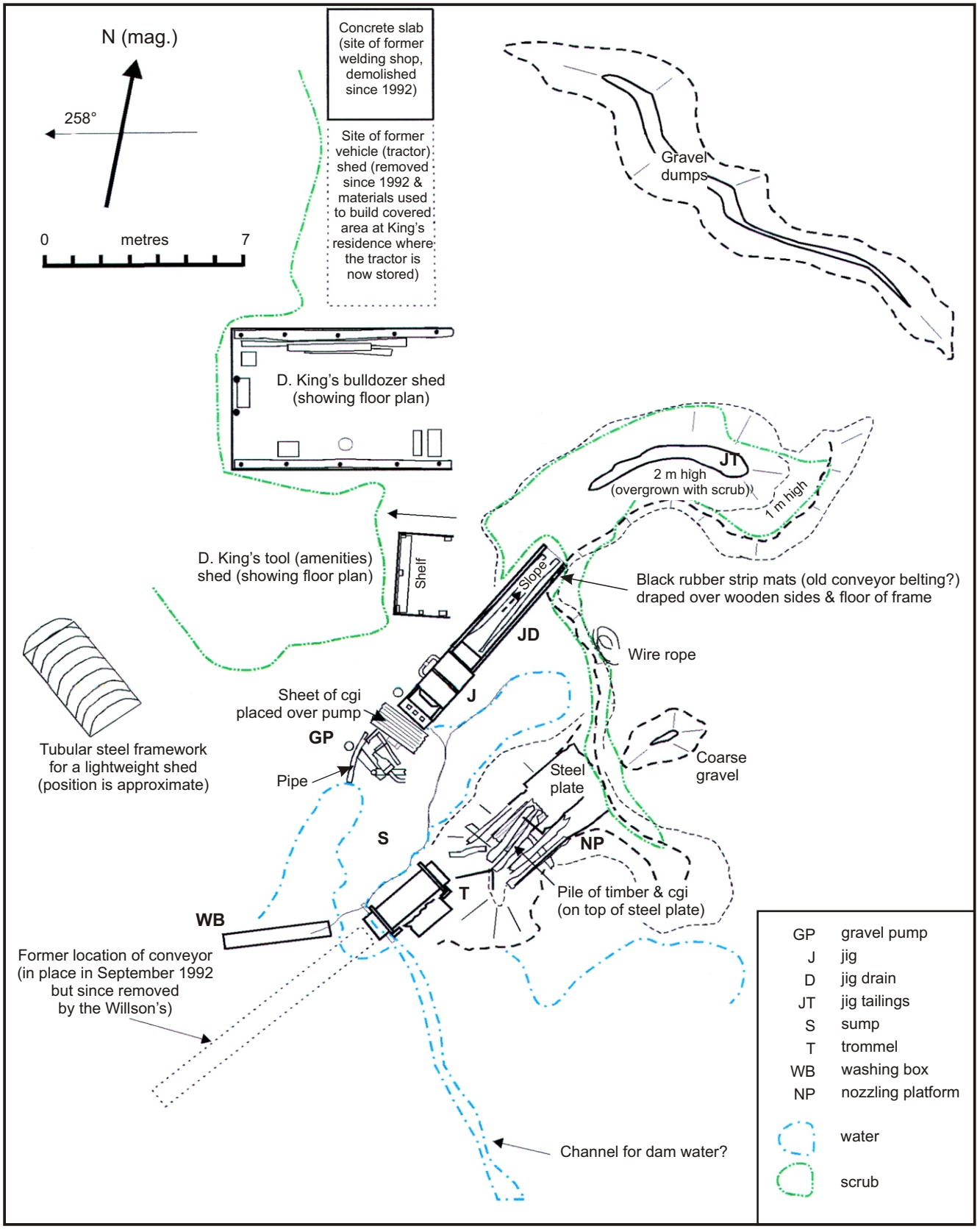


**Figure 21**

*Scaled site plan of C. D. King's alluvial tin processing plant as it was in December 2001.*

**Figure 22**

*Concrete bed for a small stationary engine located adjacent to the gravel pump shown in Figure 17. Note the two corner pieces of cast iron pipe associated with the engine footing.*
*See Figure 6 for location.*

**Figure 23**

*Detailed view of the trommel (foreground) and nozzling platform with the jig in the background. The amenities shed (red) and the dozer shed (green building) are in the background.*
*See Figure 21 for location.*

*Run of mine alluvial material was placed on the nuzzling platform and washed through the rotating trommel. Coarse waste and gravel passed through the rotating drum while the finer and heavier tin passed through the perforations in the drum and collected in the sump below. This was then pumped to the jig for further treatment.*

**Figure 24**

*A further view of the trommel and nozzling platform to more clearly show the relationship of these features with the amenity and dozer sheds.*
*See Figure 21 for location.*

**Figure 25**
*Detailed view of the remains of the nozzling platform. Timber components of the structure are decayed and steel plates are heavily corroded.*

**Figure 26**
*Detailed view of the trommel. This component of the plant is in good order.*

**Figure 27**
*Remains of wooden washing box for finer manual treatment of tin-bearing gravel after it has passed through the trommel. Like all wooden components of the plant that are exposed to the weather, this is in poor condition and will continue to deteriorate.*

**Figure 28**

*Detailed view of the gravel pump that is located adjacent to the jig (see fig. 21 for location). This pump moved the tin-laden gravel from the sump below the trommel to the jig. It may also have driven the jig.*

**Figure 29**

*General view from the treatment plant to the mine waste gravel heaps that lie adjacent to King's Road. These heaps and others like them provided the material for the construction of the airstrip and they also provide the main source of material for the ongoing maintenance of the airstrip.*

**Figure 30**

*Overflow drainage fluming (labelled JD on fig. 21) which took the overflowing waste material from the jig to a waste stockpile where it could be later removed. The timber components of this structure are badly deteriorated.*

**Figure 31**

*A further view of the overflow drainage fluming (labelled JD on fig. 21) taken from in front of the amenities shed. The timber components of this structure are badly deteriorated.*

**Figure 32**

*Detailed view of the inside of the corrugated iron amenities shed. Many of the hand tools and small pieces of equipment used by Deny King around the treatment plant during the tin extraction process are still stored here. Some of the implements are hand made.*

**Figure 33**

*Detailed view of tools that are stored inside the corrugated iron amenities shed. Many of the hand tools were hand made by Deny King.*

**Figure 34**

*General view of the dozer shed. This structure is built from curved tubular steel piping and corrugated iron. Equipment storage sheds that were located on the concrete slabs to the right (N) of this shed have since been removed. See Figure 21 for location and floor plan.*

**Figure 35**

*Detail view of the switchboard and refrigerator located within the dozer shed. This electrical switchboard may be the one that Mattingley (2001) describes Deny King building.*

**Figure 36**

*Shallow peat pit adjacent to the airstrip. It was from this location the Deny King cut and dried peat for domestic heating and other uses around Melaleuca. A National Parks & Wildlife Service hut can be seen in the background.*

**Figure 37**

*Steel mesh peat drying rack used by Deny King. This site is located adjacent to the peat pit near the arrivals shed at the airstrip.*

**Figure 38**

*Section of tea tree corduroy airstrip laid by Deny King in 1947 to assist in the takeoff of the Dragon 'Rapide' aircraft. This feature is exposed in the foot track from the NPWS camp to the meteorological station. It is in excellent condition where exposed.*

**Figure 39**

*Detail view of a section of the tea tree corduroy airstrip from which a new growth of tea tree has sprung.*

**Figure 40**

*One of the few structural features at the Rallinga mine workings (Willson's) several former alluvial tin treatment plant sites at Melaleuca. Other features remaining at these sites include remains of earthen ramps and some tracks. This structure is a bush timber support for fluming (polyethylene piping) at the No. 4 (?) plant site at the far south end of the mining lease.*

**Figure 41**

*A bush pole and aluminium tag marking one of the alluvial tin test hole locations undertaken by Rallinga Mines P/L during its exploration of the alluvial tin deposits of the lease. Each pegged hole is individually numbered and the grid co-ordinate recorded by etching aluminium tags. Records of the testing programme are maintained by the Willson's.*

*Many of these poles were destroyed in recent scrub fires that have passed over the southern part of the lease. They are now an uncommon feature of the site.*

**Figure 42**

*A 1.5 m deep, 1 m wide, vertical sided water race cut through the button grass and peat and reaching bedrock. This race appears to have channelled water to workings to the south of the present lease area (possibly to the former Coopers/Tober workings). The age of this feature is uncertain and it may even date to the 1930's. The race is still in remarkably good condition.*

**Figure 43**

*Linear conical waste mounds remaining at the site of alluvial tin treatment washing boxes. The mounds are composed of white cobbles and gravel that have been manually shovelled out of the timber washing boxes (which are gone). The waste mounds mark the site of alluvial washing and lie to the east of the sluiced area which is now represented by low faces cut into the gravel on the low rise. A system of channels and tailraces channelled the water and tin-bearing alluvial gravel to the boxes and is still evident (see fig. 44).*

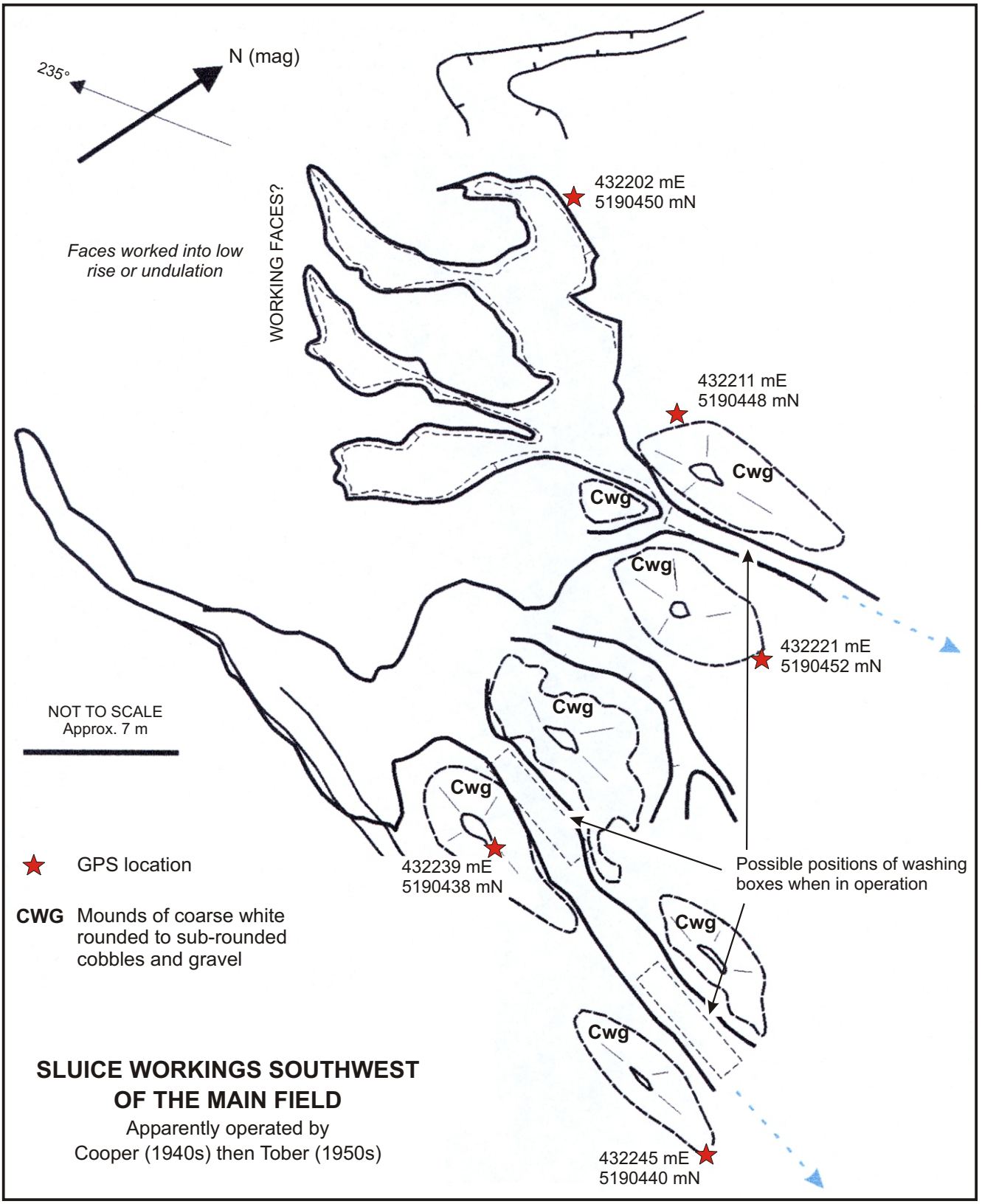


**Figure 44**

*Sketch plan of the alluvial workings at the far southern end of the alluvial mining area at Melaleuca. Note the arrangement of the waste mounds, channels and races and the sluicing faces. Not to scale.*