

# Neumann Contractors Pty Ltd

## Recycling acid sulphate soils

Marketing Videotape Documentary Script

**REPRINTED FOR CHINESE MANDARIN TRANSLATION**  
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<i>PARA No.</i>	<i>NARRATION</i>
1	Traffic roars across this narrow, two lane bridge at the rate of 2000 vehicles an hour at its peak.
2	It's the bottle-neck through which all coastal traffic between Queensland and New South Wales must travel- across the Tweed River at Barney Point.
3	With traffic flow on this strategic Brisbane-Sydney section of coastal highway growing at 3.5% a year, the New South Wales Roads and Traffic Authority decided on a \$50million option to build a highway by-pass.
4	The new road leaves the existing highway at Barney Point Hill - crosses the Tweed on a high level, 4 lane bridge, and sweeps in a semi circle through cane farms and coastal swamp to join up with the existing highway almost 6 kilometres into New South Wales.

5	Building the bridge and the new road might seem easy enough - but the challenge was how to build a significant road by-pass on one of Australia's busiest roads - without disrupting an already aggravated traffic situation.
6	Also to be considered was the heavy local traffic, serving the river-side community of Chinderah and the coastal resorts of the northern New South Wales coast.
7	The proximity of the Tweed River, clogged with sand which hindered navigation and flood run-off, provided the answer.
8	It was a politically perfect solution - royalties gained from pumping the sand for the road would be returned to the Government to improve boating facilities in the Tweed, popular for fishing and water recreation of all kinds.
9	To be an all-weather road, the by-pass needed to be built on a base an average of two metres above ground level. At the northern abutments to the new bridge over the Tweed River, 14 metres of fill would be needed.
10	The job was awarded to Cook's Constructions Pty Ltd, Civil Construction Contractors, who in turn called in as sub-contractors the operators of Australia's biggest privately-owned dredging fleet, Neumann Contractors Pty Ltd.
11	For Neumann's, it was their "home turf". The company's headquarters, where their technologically superior bucketwheel suction dredges are designed, manufactured and sent all over the world, is at Currumbin, a few kilometres north of the Chinderah by-pass.
12	Neumann's had certainly pumped sand for roads before. It has a wide range of experience in all manner of reclamation and alluvial mining.
13	The new highway section which today takes the traffic from Coolangatta to the Tweed was built on a sand pad pumped up from Neumann dredges.

14	Their dredges were also of a size which suited the job. Anything bigger and the through-put would have been difficult to keep under control in an environmentally sensitive area.
15	Neumann's ran a total of 13 kilometres of pipelines under the existing highway from their three dredges in the Tweed River, to the road site. The longest single run of pipeline was 4.3 kilometres.
16	The highway traffic of 28,000 vehicles a day was oblivious to the massive construction going on just a few metres inland.
17	The Neumann dredges had to import 728,000 cubic metres of solid fill....of which almost half was needed at the northern abutment of the high level bridge across the Tweed.
18	Had this been road-hauled to the site it would have added one truck every minute to the already chaotic highway- not to mention the road maintenance bill.
19	So far, the job posed no engineering difficulty - the only outstanding question - perhaps the biggest single question - was an environmental one.
20	An environmental impact statement revealed concerns about local habitat and the effects of moving vast quantities of material.
21	...and along the Tweed coastal plain - there is one major concern which dominates all others.
22	Locals have always known about it - it's called acid run-off.
23	Sea life died in catastrophic proportions in 1987 in the Tweed River.
24	Similar kills have occurred in other coastal rivers.
25	At the time, water samples revealed a dangerously low pH - a signal of high acidity and low oxygen.

26	Professor Paul Saffigna, head of the School of Applied Science at Griffith University explains the chemical cocktail.
27	<p><i>“About 6000 years ago, Mother Nature laid down a problem in terms of the formation of pyrite under anaerobic conditions - this was during the Holocene period. Basically what happened then was sulphate from sea water was reduced to iron pyrite which formed in the mud in these coastal swamps. The second stage of the whole process is when man intervenes and basically you get the formation of sulphuric acid when the pyrites is exposed to air. So that you have the iron pyrite here actually forming H<sub>2</sub>SO<sub>4</sub> which of course is sulphuric acid and that is in essence the problem we have to deal with during the exposure of this pyrites material during coastal development and some agricultural activities. “</i></p> <p>(This will be shortened a little to make it more understandable)</p>
28	The iron pyrite remains benign while its under the seabed or below the water table.....the moment it is exposed to air, sulphuric acid is formed.
29	The potential magnitude of the acid soil problem in the Tweed valley is well documented.
30	Scientists calculate that half a million tonnes of sulphuric acid lies dormant beneath the soils of the Tweed.
31	To put it in perspective - a spillage from a single 40-tonne tanker load of sulphuric acid would cause a high level emergency - the amount of sulphide beneath the Tweed soils is equivalent to 12,500 road tankers.
32	Neumann Contractors were faced with daunting environmental issues.
33	Look at the numbers - in producing 728,000 cubic metres of solid sand fill, they also produced 70,000 cubic metres - about 10% of the total - in slimes.
34	The slimes were loaded with pyrites.

3 5	The tailings water containing the slimes could not be allowed to simply run back into the Tweed River.
3 6	The acceptable level of suspended solids in the tail water was 50 parts per million.
3 7	It couldn't be done without setting up a treatment plant capable of handling the quantity of water.
3 8	Neumann's literally designed and established a plant which sprawled over 11 hectares of leased farmland, which was capable of de-silting the tailwater and then treating the slimes.
3 9	There was no precedence - no blueprints for such a plant in Australia or elsewhere.
4 0	Such environmental issues were simply not addressed barely a decade ago.
4 1	Introducing a flocculating agent settled the silts, and through a ponding arrangement, criss-crossed with filters, the tailings water was able to be released back into the river.
4 2	The slimes posed a bigger problem.
4 3	Standard treatment is to neutralise the salt with lime - but that simply creates yet another stockpile of suspect material.
4 4	Neumann's considered that the preferred option was to neutralise the salt, add sand and sell the mix as topsoil.
4 5	Queensland's Griffith University's Environmental Science Division set up a field laboratory on site and instituted experimental programs on how best to treat and dispose of the silts.
4 6	Like so many miniature farms, the scientists simulated rainfall to test theories about the soil's ability to regenerate and grow life.
4 7	Trials so far are promising - a plot of lime-treated acid slimes was happily producing a range of grasses and native plants.

48	But to achieve Environmental Protection Agency approval to dispose of treated soils requires convincing evidence.
49	The Neumann/Griffith University team are heading in this direction - only time will tell.
50	But the work is pioneering for Australia and will go a long way towards overcoming similar environmental hazards on public and private works in future.
51	Neumann Contractors had to meet stringent goals for their portion of the contract.
52	Dredging, placement and compaction of the material for the road bed required an accelerated program. There was no time to wait for the sand to settle.
53	Compactors worked under water to achieve a 98% compaction. In addition, the amount of silt content allowed in the sand was less than 5%.
54	Once the bed was in place, the embankment had to be trimmed ready for the placement of road gravel.
55	Accuracy of a high order was required, graders worked to a fine tolerance.
56	Then there were the secondary goals - tailwater silts control and management.
57	As the tailings water ran off the road base, it was collected in ponds and pumped up to five kilometres to the treatment ponds.
58	Finally, there was the treatment and disposal of the collected silts.
59	Taking care of the environment- and coping with the potential devastation of acid soils - has a cost and time penalty.
60	The road job might have taken only a year to complete - the desilting of tailwater and treatment of the slimes is likely to be a three year program.

61	Neumann Contractors won the contract, which went to tender, because they went the extra distance and devised an effective system for handling water and slimes.
62	It was a \$4million premium over the trucking option - -the motoring public, the people of the Tweed and the watching, environmentally- aware world, would say it was a bargain.
63	The unique exercise has given Neumann Contractors a unique competitive edge, as an Australian firm capable of environmental dredging.
64	They have positioned themselves at the leading edge of environmental research and knowledge.
65	In the case of the Chinderah road by-pass, Neumann's have used technology, science and good old-fashioned dredging know-how to solve a significant and sensitive problem.
66	These are skills they are willing to share with governments and corporations who believe that today's children are the inheritors of the earth - that we are merely caretakers.
67	Since this documentary was made, the Environmental Protection Authority in New South Wales has approved the sale of the recycled acid soils, using the treatment methods pioneered by Neumann Contractors and their research team.
68	With the approved process, the acid soil slimes are pumped from the dredge to a sand bed.
69	....after drying out, the bed is alternately ploughed and irrigated to leach out the acid and salt.
70	.....scientific monitoring determines the quantity of lime to be added.

7 1	...then it's stockpiled and screened, ready for its new life as topsoil.
7 2	The quality is such that plant nurseries are successfully using the topsoil as a basis for organic mixes.....the results speak for themselves.
7 3	The EPA commended Neumann Contractors on the systematic manner in which the acid sulphate soils research was conducted.
7 4	....since this is a story with a happy ending...we also report that the motorists are <u>delighted</u> with the new highway.
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