

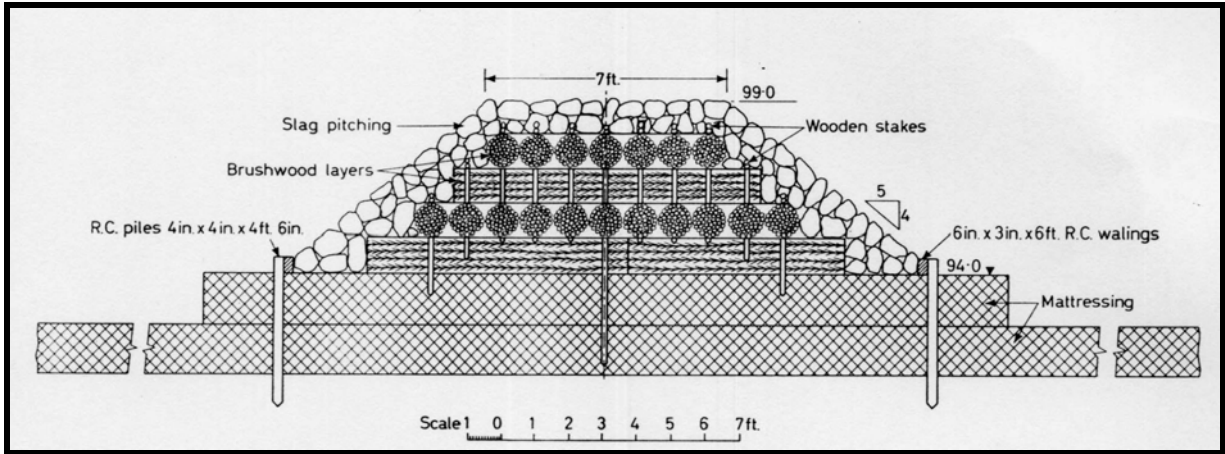
## William Nisbet's plans for engineering on the Fitzroy

William D. Nisbet (M.I.C.E), was the third Engineer for Harbours and Rivers in Queensland. Nisbet's ability to undertake such a scheme was never in doubt because, as the press stated, he brought with him 'great experience on the River Nile and elsewhere...[and was]...very sanguine of the complete success' of the planned works.<sup>1</sup> Nisbet recommended the construction of a gently curving longitudinal training wall to half-tide level on the southern side of the river to narrow the stream and force it to scour its own bed. Scouring would be assisted by dredging, the spoils of which would be dumped in the space between the wall and the natural bank. He assured the government that that was the system currently adopted in tidal rivers such as the Thames, Clyde, Tyne and Tees in Britain and on the Seine in France, giving easy port access to shipping. In the antipodean Fitzroy, he proposed to obtain a minimum of 10ft at low water from Keppel Bay to the town wharves.

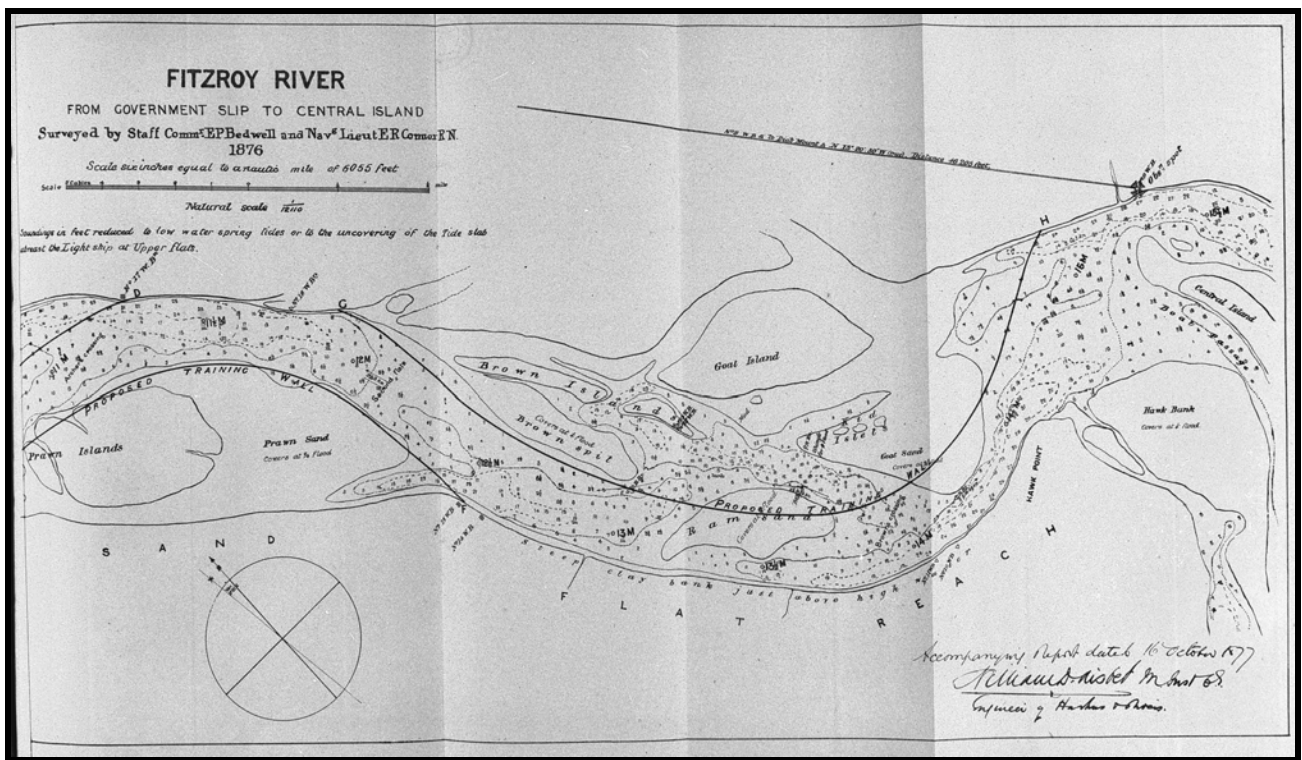
In place of solid rubble stone which was still considered too expensive, Nisbet proposed a combination timber-and-stone construction using local materials for a total outlay of only £30,000. Such a system had already been used effectively on the Bremer River at Ipswich but, rather than simple fascines (bundles of sticks tied together, laid and staked at right angles to the stream) as used there, Nisbet preferred a stronger construction as in use on the Mississippi for the stronger tidal flow in the Fitzroy. Nisbet's 1877 report on the river works described the wall as being:

...formed of rough stone with hearting of fascines laid on a foundation of mattresses formed of small timber and brushwood, cut and prepared on the banks opposite the work. This combines the most economical form of construction that can possibly be adopted for a work of this kind, although greater advantages would be derived if less expensive labour than is at present obtainable could be employed on it.<sup>2</sup>

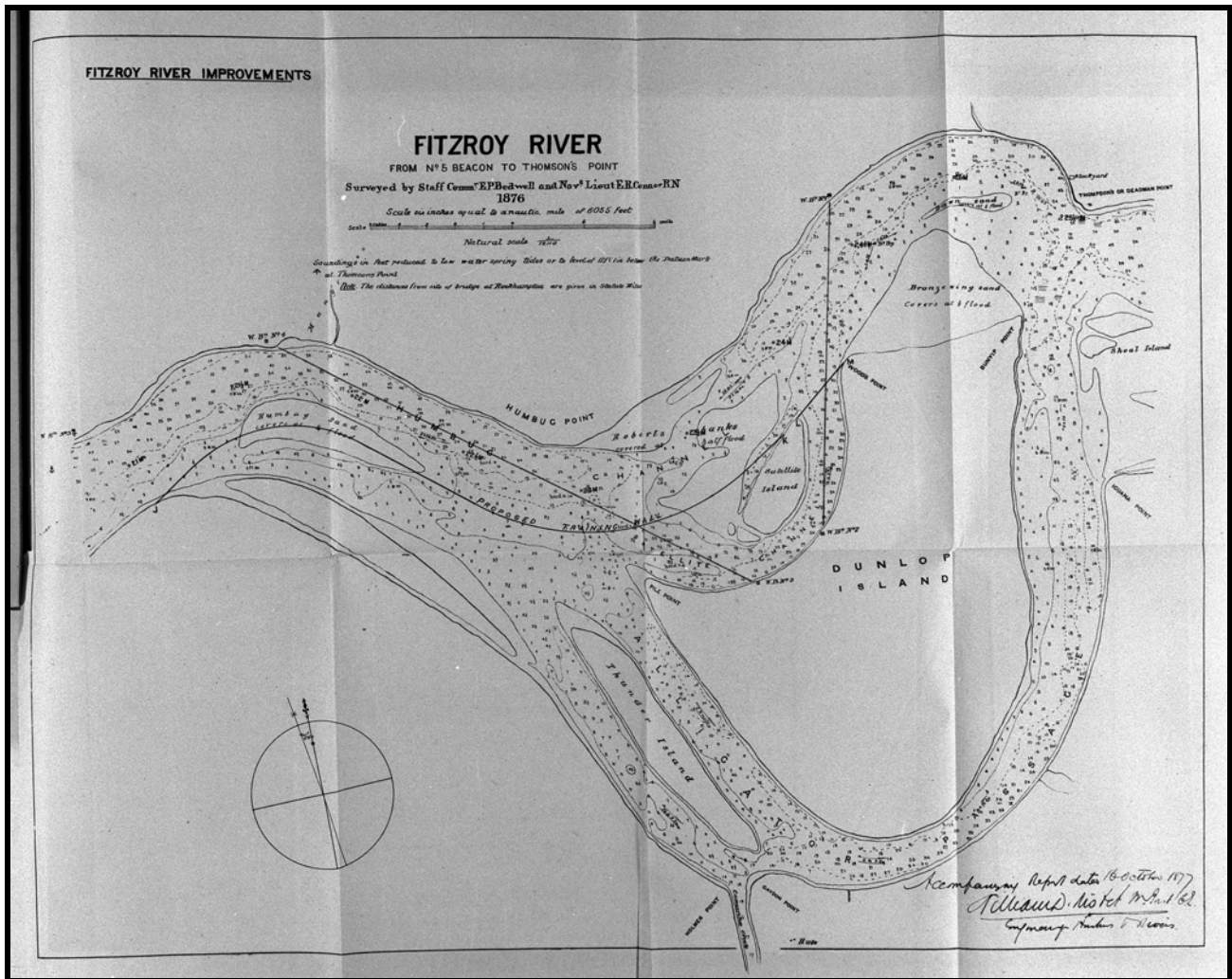
The mattresses were fabricated from mangrove timber cut from the northern bank, then floated into position, loaded with stone from the Berserkers and sunk in layers. Mangrove fascines were piled on the mattresses and covered with rubble stone, then topped with dredged sand and mud to fill spaces within. Nisbet looked upon this design as 'an experiment', never before undertaken in the colony of Queensland. Nevertheless, he confidently assured the government, that the result would be 'permanently beneficial to the navigation of this portion of the Fitzroy River'.<sup>3</sup> Using 10,000 cubic yards of mangrove mattresses in the foundations<sup>4</sup> and 50,000 tons of stone, Nisbet completed No. 1 training wall with 'economy and durability' by 1880. Nisbet also drew plans for training walls at other problem sites, especially in Sand Flats Reach (First Flats, Archer's Crossing, Second Flats, Brown's Crossing and Hawke Point Crossing) and lower in the river in Humbug Reach to close off side channels where the flow of the river was dissipated and scouring capacity reduced.



Timber and stone walls similar to Nisbet's design for the Fitzroy, as used on the River Ouse, Britain. (Thorn, 1966, p. 244)



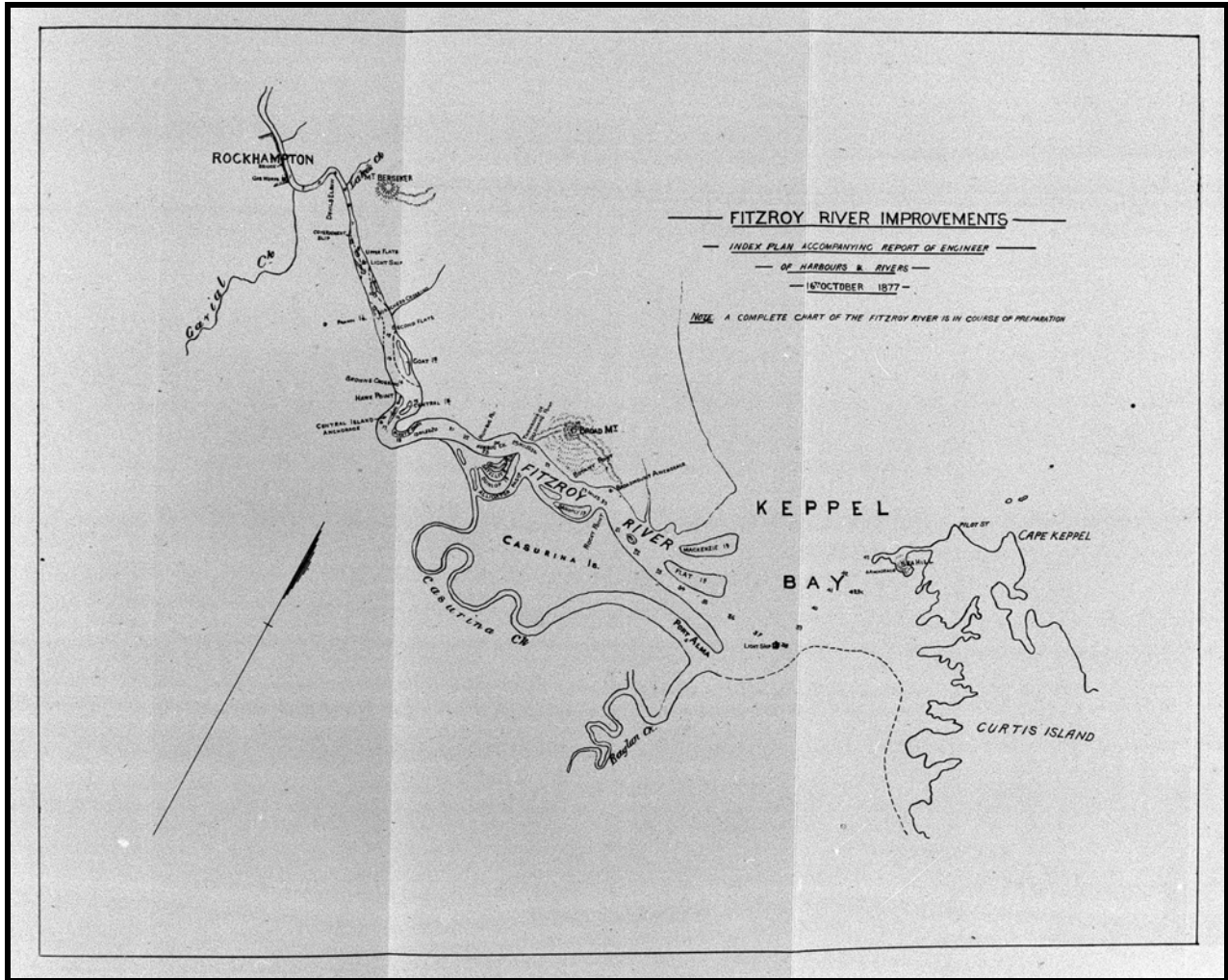
Nisbet's plans for Sand Flats Reach, 1877, with a wall around Prawn Islands and Prawn Sands (No. 3 Wall) and another around Brown Islands and spit, Goat Island, Ram Sand, Goat Sand and Kid Islets. (QV&P, 1877)



Nisbet's plans for Humbug Reach, 1877, showing the proposed training wall to close off Satellite Channel and Alligator Passage to concentrate flow through the main Humbug Channel.

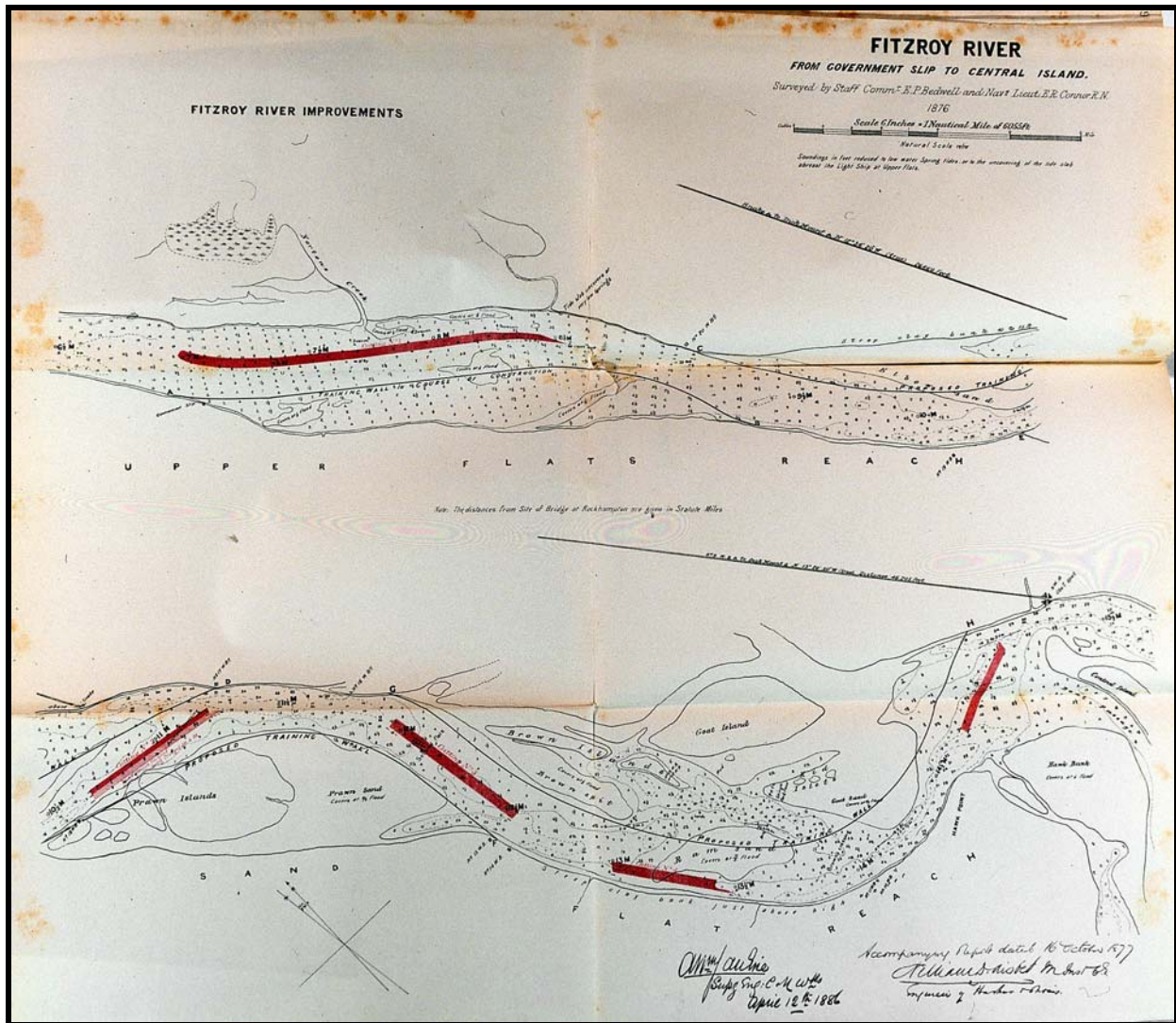
(QV&P, 1877)

According to Nisbet's design, No. 3 Wall was constructed around Prawn Islands, No. 2 Wall along the northern bank was commenced and dykes erected to close the braided channels at Goat Island. Unfortunately, Nisbet's combination of materials proved unsuitable for a tidal river, with the timber mattresses and fascine hearting soon falling victim to a marine borer, *teredo* or shipworm, which was more active in tropical waters. His 'experiment' therefore had not been as successful as he had anticipated. Subsequent walls were constructed entirely of stone rubble as was No. 1 Wall itself when later realigned to effect better scouring.<sup>5</sup>



Nisbet's overview of plans for the Fitzroy River, 1877.

(QV&P, 1877)



Dredging plans drawn up by Nisbet's subordinate, Alexander Jardine, Supervising Engineer for Central and Northern Works, for *Saurian* on the Fitzroy River. Dredging was still necessary, despite the construction of Nisbet's walls to induce scouring. (QV&P, 1886, vol. 3.)

**References:**

1. MB, 1 October 1875.
2. 'Report from the Engineer for Harbours and Rivers on Works to 30th June 1877', QV&P, 1877, vol. 3, p.4.
3. William D. Nisbet, 'Fitzroy River Improvements, Laid on the Table by Command', QV&P, 1875, vol. 2, pp. 1 & 2; 'Report from the Engineer for Harbours and Rivers on Works to 30th June, 1877', QV&P, 1877, vol. III, pp. 4 & 5 and QV&P, 1880, vol. 2, p. 4.
4. 'Report of the Engineer for Harbours and Rivers on Works for the Year ended 30th June, 1878', QV&P, 1878, vol. 2, p. 5.
5. Rockhampton Harbour Board, *The Fitzroy River, Improvement Works: Mr Schmidt's Scheme*, 1897, p. 5. Capricornia Central Queensland Collection, Central Queensland University (RDHS 64).