

Chapter Five

RIVERS CONTROL FROM 1924

By 1930 the pattern of development within the Lower Hutt and Petone areas had been firmly established. The river channel from Central Hutt to the Estuary was very similar to the channel of the present day.

North of Melling, however, the River was still very much its own master, the alignment changing dramatically with every large flood. From 1924 the Hutt River Board was forced to move its attention from the essentially stable lower river, to the "upper river" - the river north of Melling.

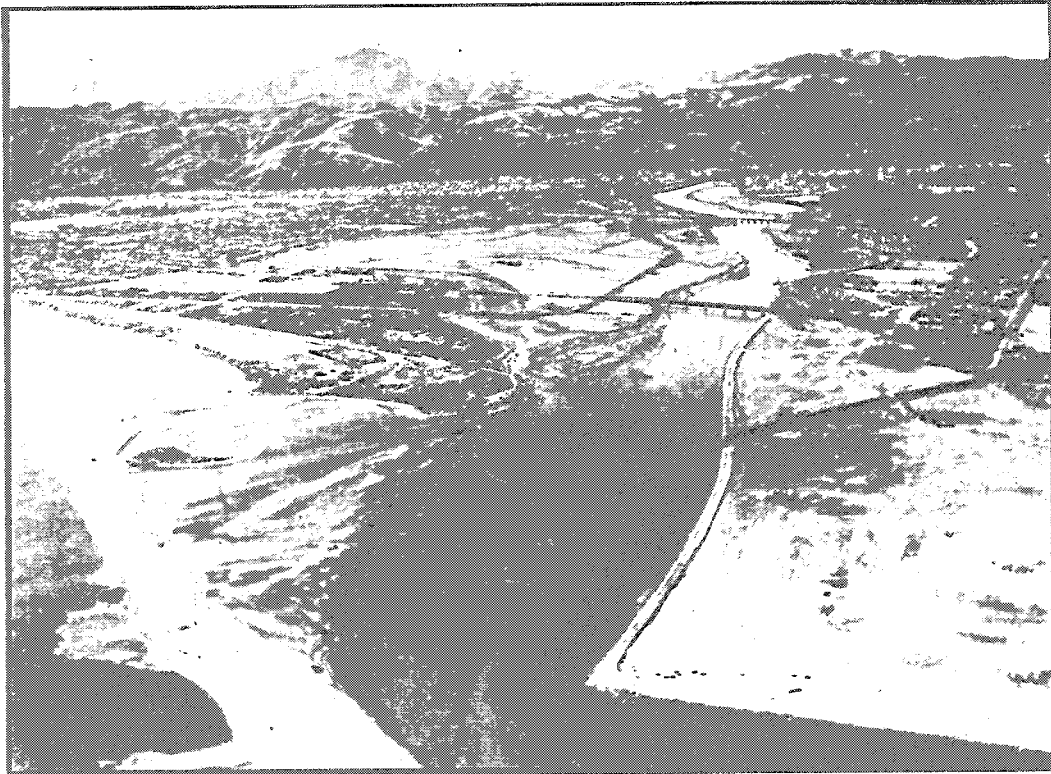


Plate 51: The first reclamation c. 1934 showing the Ava Rail Bridge and the (Jackson Street) Pipe Bridge. Source: Alexander Turnbull Library neg. F122247

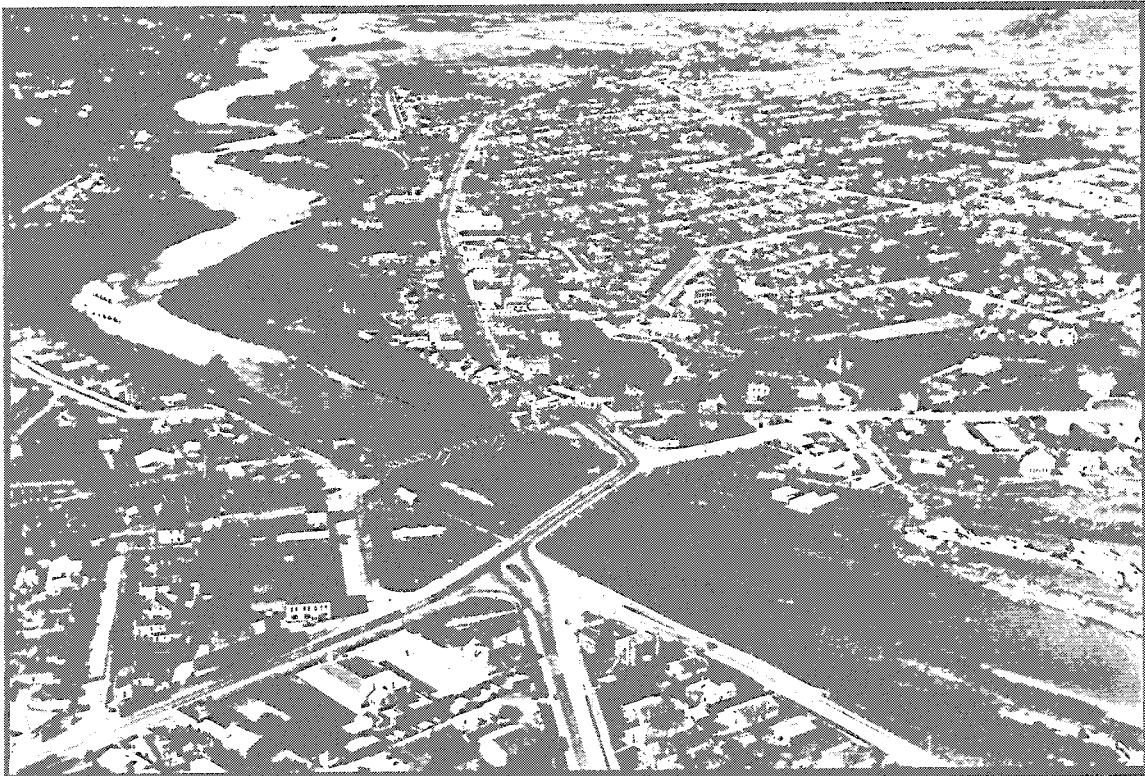


Plate 52: Lower Hutt circa 1934 Source: Alexander Turnbull Library neg. F 122267

A New Era of Security

River management from 1924 is marked by a confidence that was lacking in the early years. Activities within the river zone and the protected flood plain illustrate a conviction that the fight against the river's dominance had been won. This confidence can be attributed to:

- (1) A secure financial base.
- (2) A scheme which had protected the Borough against the 1913 and 1915 floods - events which otherwise would have resulted in widespread damage and inconvenience.
- (3) A successful relationship between the Board and its Engineer, Hubert Sladden, which allowed the river to be managed in a consistent and farsighted manner.

While the "shingle business" had earlier crippled the Board, the successful establishment of the extraction industry provided a financial autonomy not enjoyed by other local authorities. Royalties from the shingle resource exceeded the rating income in 1922 and led to a £15,500 current account surplus by 1945; almost a million dollars in today's terms.

With the exception of an unemployment programme carried out during the depression, all works were constructed from revenue. The Board's desire to retain new works expenditure within the revenue base led to a conflict between the Hutt River Board and central government in the 1950s [refer Archive Table 15, p. 109]. It was also the root cause of the Board's apparent lack of cooperation with the Government sponsored extension of the scheme to include Taita and Upper Hutt.

Developments on the Flood Plain

The record of activity on the protected flood plain for the period 1900 to 1920 is well documented. Immediately following the construction of the embankments land values soared, for example, 26 acres near the railway station sold for £30,000 and part of the Bellevue land, formerly McNab's Gardens, passed in at auction at £11,500 after failing to reach the reserve. The entire Gardens had been purchased in 1900 for £4,000. Between 1900 and 1906 the number of buildings within Lower Hutt Borough doubled from 325 to 656. Land speculation prompted the Government to become involved in the property market to prevent a continuation of the speculative practice of withholding land from sale in order to push up land values, a practice which had dogged New Zealand property development since the establishment of the colony. Between 1901 and 1905 the Government subdivided part of the Epuni area into 44 two acre settlement lots and purchased land in the Moera and Taita areas. As an indication of the profits to be made even by the relatively benevolent Government land developers, a large part of the cost of the Eastern Duplication of the railway line, completed in 1927, was paid for through Government land sales.

Development was not restricted to the Lower Valley. Aerial photographs of the Upper Hutt area (see plates 71 and 72, (pp. 117 and 118), show the eastern, flood free area of the Upper Valley to be well established by the 1950s. Movement into the flood prone "Cottles Block" (Moonshine Bridge area) and McLeods had already started, although these areas were not protected until the 1970s with the extension of the stopbanks to include the Upper Valley.

In Lower Hutt the security offered by the scheme works, and the land sales which followed, increased the confidence and wealth of the community and the standing of the principal political figures. Improvements to public works and the growth of industry followed.

In 1906 the final stages of the Western Hills stormwater diversion were completed and work was gradually put in hand to contain the streams which ran through the eastern half of Lower Hutt Borough (in a similar way as the internal drainage of Petone had followed stopbank construction). Roading was improved and there was pressure to upgrade the bridge links between the two halves of Lower Hutt Borough. In 1904 the Fourth Hutt Bridge was opened followed by the Melling suspension bridge in 1909. The eastern duplication of the Wairarapa railway (the Waterloo Line) was completed in 1927, crossing the River at Ava. The diversion of the main rail route from the western line did not take place until the construction of the Pomare rail bridge in 1954. The second Pipe Bridge to service the eastern estuary area was completed circa 1911.

The Fifth Hutt Bridge had been built by 1927 to carry the heavier loads being transported to the booming Waiwhetu and Seaview industrial areas. Fourteen major industries were established on the reclamation and adjoining areas over the period 1929 to 1950. The third Pipe Bridge (current Estuary Bridge) was constructed in 1956 to divert the heavy transport load away from the town centre. Plans for a replacement Melling Bridge were first mooted in 1931 although it took 25 years before construction commenced. Bridges built in other parts of the valley during this boom period included the Manor Park Bridge (access to Ford Road, Stokes Valley, destroyed in the 1939 flood), the Silverstream Road and Rail Bridges, the Moonshine and Maoribank road bridges and the Akatarawa Road Bridge.

The stopbanks, promoted and funded by approximately 1000 residents in 1900, protected 45,000 in Lower Hutt and 12,000 in Petone by 1950. Petone was included in the Hutt River Board District in 1947 (see Archive Table 6, p. 53). In contrast to the early Board's small group of highly critical ratepayers, Boards after 1924 received the support of a large number of satisfied residents. This was undoubtedly due in part to the very low river rates and the Board's good fortune not to suffer a design flood, however, much of the credit is due to the pragmatic methods of the Board and its Engineer, Hubert Sladden.

Under New Management

Laing-Meason's Scheme to control the Hutt River had been in place for 20 years when Hubert Sladden accepted responsibility as Engineer to the Board. Commissioning of the scheme had effectively been completed and it was now Sladden's responsibility to develop ongoing strengthening and maintenance programmes.



Plate 53: Hubert Sladden. From CAC Treadwell, *The Hutt River - Its History and Its Conquest*, H H Tombs, 1959.

Sladden had served his apprenticeship with Laing-Meason, so it is not surprising that few changes followed his appointment. His reports reflect his confidence in the methods adopted for managing and improving the scheme.

Sladden's success did not stem from new methods but from the good relationship he developed with the Board and the river users. Although few Hutt River Board records now remain, it is clear that in operational matters Sladden enjoyed an autonomy and authority denied to Laing-Meason. For most users the river was managed by Sladden, assisted by the Board Secretary and River Overseer. As a team, they adopted a management style marked by a straightforward, consistent and reliable approach, which although simplistic by today's standards, appears to have served the Hutt Valley well.

Possibly Sladden's greatest contribution was his intuitive appreciation of the dynamics of the natural river system. His "gradual" methods of easing the River into a loosely defined central channel alignment (defined as the "Ultimate Channel" by Laing-Meason in 1903 and extended by Sladden into the Upper Valley) provided the basis for all river control works constructed until 1985.

As can be seen from Archive Table 14, River Management from 1924, p. 99, Sladden built very few large works. The "Ultimate Alignment" was a long-term objective achieved through careful river zone management. Methods used extensively included:

1. **Control of Extraction**

By capitalising on the high value of the shingle resource. Extractors were required to position their plants to the Board's advantage. The construction of supplementary draglines and dredging for hundreds of metres parallel to the river's course were not unknown.

2. **Construction of Groynes**

By the use of timber boom groynes. These heavy timber groynes were used throughout the River until as late as 1945. (A pile driving barge was moved up and down the river while the river was in low flood). The groynes were used to cause deposition and to encourage bank erosion in areas where the river was considered too narrow.

3. **Controlled Aggradation**

By the use of weirs and low embankments to reduce the flow velocity in old flood channels and so encourage deposition.



Plate 54: Avalon Area 1949. Source: Mosaic by Hope Cross and Richardson, Masterton.



Plate 55: Avalon Area 1955. Source: Mosaic by Air Surveys Ltd.

4. Isolated Large Works

By the use of spur groynes constructed of a variety of materials - mainly rock, concrete blocks, boulders contained in netting and timber boxes infilled with boulders. These were used to reduce flow through old channels and occasionally to redirect flow.

5. Diversions

Through the excavation of pilot cuts (and development of these by blasting) for realignment of the central channel. Sometimes used in association with 3 and 4 above and through the occasional use of cut to fill methods.

6. Debris Removal

Through systematic delogging of the river and removal of stumps, the remnants of the post-glacial forests.

7. Establishment of Willow Plantations

When the river banks reached the Ultimate Alignment, heavy willow planting was carried out with the aim of eventually establishing a continuous belt of willows on both banks. Willow plantings were strengthened during the planting season each winter. New willow plantings were established with the assistance of fascines or tethered plant material held in place with wire, concrete blocks and boulder and netting work.

The development of these works tended to span decades rather than years, with the result that they were often described as "puny" and "ill conceived". For the same reason it is now difficult to locate individual works. For example there is no visible evidence of the substantial works shown in plates 54 and 59.

To appreciate the effectiveness of the Board's river control activities, the development of the river alignment as captured in aerial photographs taken in 1936, 1951, 1967, and 1974 has been recorded in Appendix B. The historical alignments have been copied and rescaled using computer techniques and can be considered as accurate as the original photographic copy. They have been printed over the current (rectified) Scheme Review aerial photography. Distortions copied from the original photography has been accommodated by reference to landmarks. Earlier alignments have also been copied from archive plans and the 1871 and 1903 channels are recorded in figure 8, p. 32. Changes in the river alignment in the lower river prior to 1900 are most probably attributable to natural adjustments following the 1855 uplift, rather than to the activities of the early river Engineers. Archive Table 13, p. 90, Historical River Alignments, contains a schedule of the historical river alignments held in the Wellington Regional Council Land Information computer archives. Figure B.1, Appendix B, is an example of how the alignment data base can be combined with other land information to assist in decision making.

Historical River Alignments

LIST OF DRAWINGS CAPTURED FOR HISTORICAL PROJECT AND STORED ON THE WELLINGTON REGIONAL GEOGRAPHIC INFORMATION SYSTEM (WREGGIS)

LOWER HUTT

1871	Gear Island - Melling	Drawing
1899	Estuary - Melling	Drawing
1936	Estuary - Silverstream	Photo mosaic
1950-TOT	Central Hutt only	Drawing
1951-TOT	Estuary - Taita	Photo
1967-TOT	Estuary - Stokes Valley	
1974-TOT	Estuary - Silverstream	Photo
1985-TOT	Works only	Photo

UPPER HUTT

1936	Silverstream - Maoribank	Photo mosaic
1942	Silverstream - Maoribank	Photo
1951	Silverstream - Maoribank	Photo
1967	Silverstream - Maoribank	Photo
1974	Trentham - Maoribank	Photo
1989	Moonshine - Maoribank - Maoribank Works only	

FULL LENGTH

1852	Patchy	Drawing(*)
1867	Patchy	Drawing(*)
1902	Patchy	Drawing(*)
1927	Patchy	Drawing(*)
1989	Riverworks	Photo(##)
1989	Cross Sections and Sight Lines	Photo(+)

BASE DATA

Road alignments, grid lines, etc., available from the WREGGIS

Notes:

- (*) = Drawn by DOSLI onto orthophotos
- (##) = Drawn onto 1:2500 orthophotos
- (+) = Drawn onto 1:2500 orthophotos and digitised from these

REFERENCE

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Archive Table 13: Historical River Alignments

Archive Table 14 (p. 99), River Management from 1924, include reference to the small works undertaken during this period. Many of the small works will be similar to the recent maintenance works carried out by the Wellington Regional Council and detailed in Project Reports 49 to 53 are cross referenced by river section number and also include notations.

The various works referred to in the Archive Tables. The commonly used names for the sections of the river have also been included so that the reader can more readily translate the original archive documents. The Archives are held in the Wellington Regional Council library and are available for reference use.

The major river control works and all stopbanking works are described separately in the project reports contained in Part 2 of this History.

The plates on the following pages show some examples of commonly used training methods. Timber boom groynes were the mainstay protection work from 1870 to 1924 and continued to be used until the late 1960s. Plate 56, p. 92, shows the "floating dams" used to control erosion and damage by flood borne debris. Plates 52, p. 84, and 57, p. 92 show the fixed multibay groynes used throughout the lower River. The Hutt River Board imported quantities of turpentine piles which were driven into the bed using a barge mounted pile driving rig. The rig was used throughout the lower valley and was transported from site to site by dragging it up river during small floods. In this way it was dragged as far north as Taita Gorge.

Plate 58, p. 93, shows the railway iron breastwork used at Gear Island to protect against wavelap erosion. Breastwork such as this was used to line the drainage channel (within the berm areas) and other points of direct attack. The rails were usually lined with manuka "faggots", bundles of manuka wired together as a protective layer. Plate 59, p. 93, shows an example of the extensive netting groynes used in the 1940 to 1972 period. Similar groynes were constructed in Upper Hutt and throughout the Avalon area. Most have either served their purpose and are now buried within the berms, or have failed through abrasion or foundation failure.

Scheme Performance

The first flood to really test the scheme occurred on Good Friday, 18 November 1931 (plate 61, p. 95) Sladden calculated its discharge to be 59,000 cusecs (1666 cumecs), approximately 30 percent larger than the 1915 flood. It is reported that vast quantities of shingle were brought down from the upper reaches, and that damage to the training works was significant, although less than expected. The works were considered to have generally performed well and the channel was considered to have been generally improved by the flood in the sense that it subsequently followed the Ultimate Alignment more closely.

However, there was a near disaster in Lower Hutt. Throughout the night of Good Friday the entire Hutt River Board staff and others battled to secure a willow mattress against the stopbank adjacent to Daly Street (on the eastern bank). The threat to Lower Hutt was sufficiently serious for preparations to be made for a general evacuation, to be signalled by ringing of the town bell.

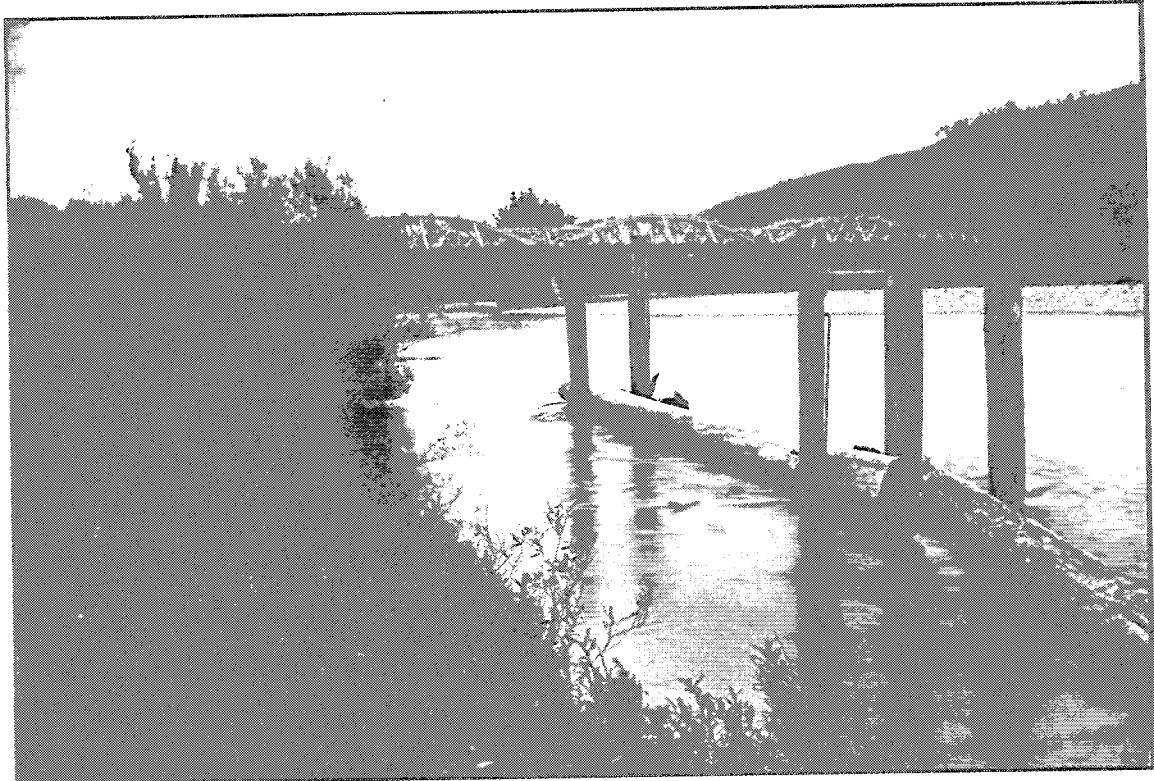


Plate 56: Fourth Hutt Bridge

Source: Alexander Turnbull Library neg. 25983

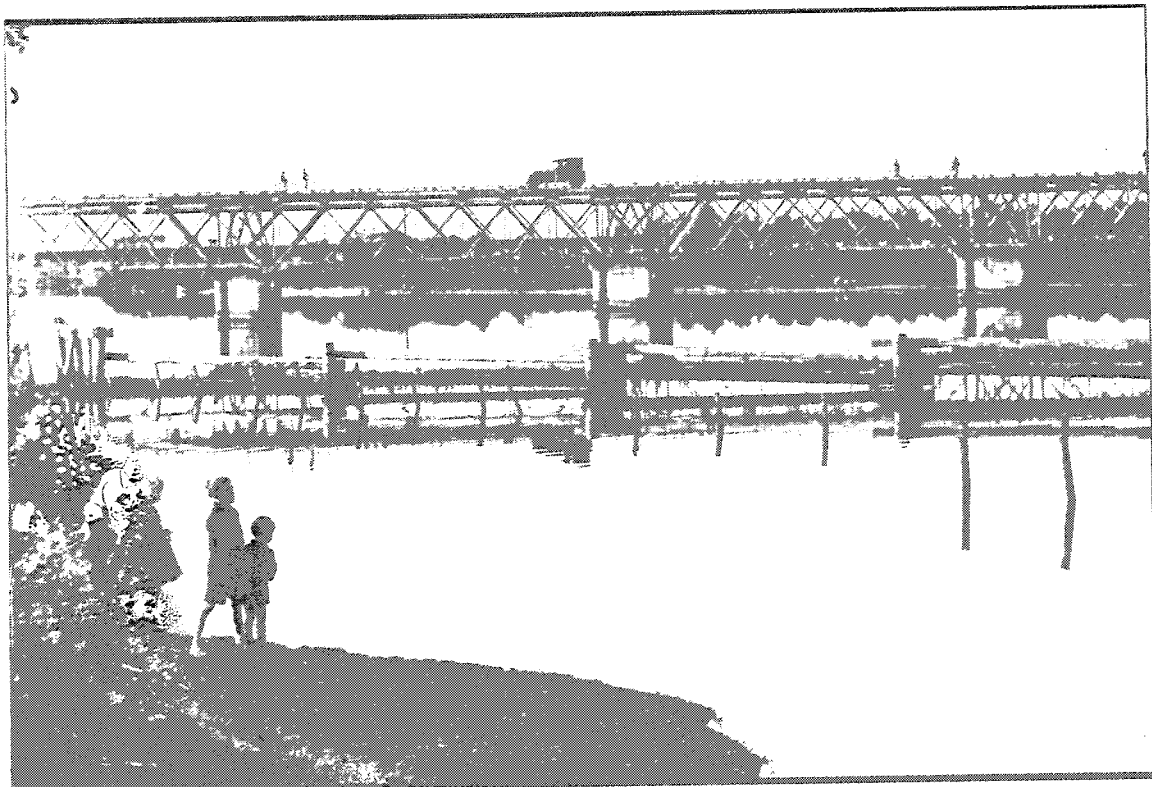


Plate 57: Second Pipe Bridge 1924

Source: Alexander Turnbull Library neg. 48573

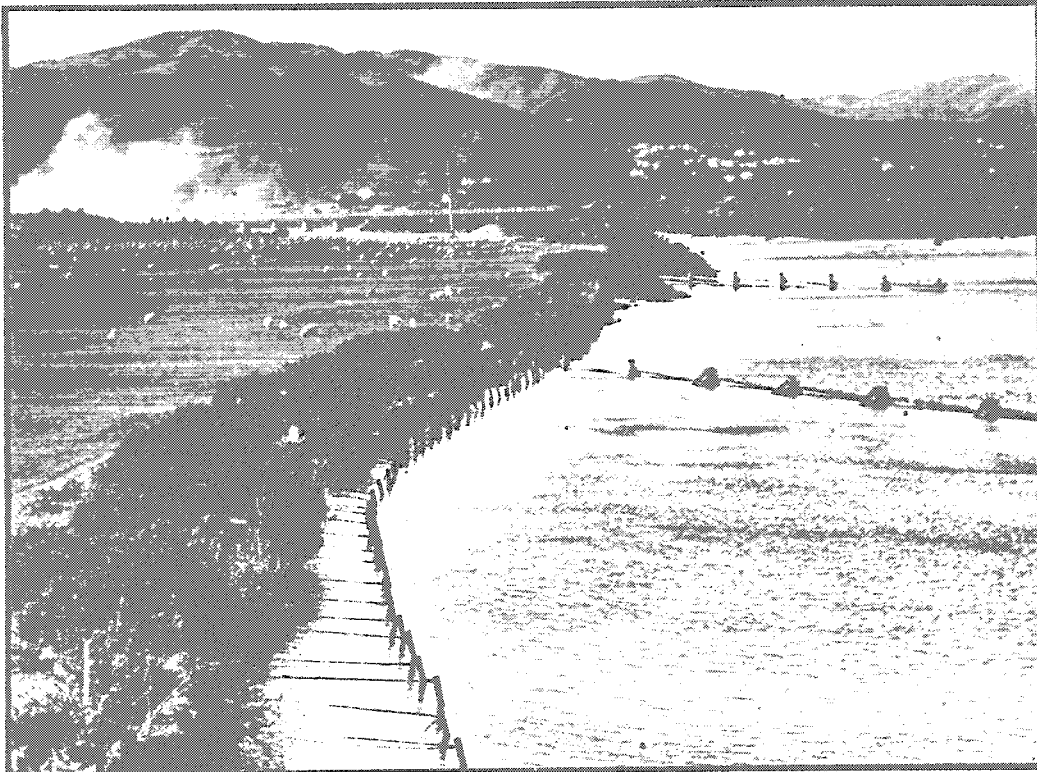


Plate 58: Gear Island c. 1930

Source: Alexander Turnbull Library, neg. C11318 1/1



Plate 59: Protection of Eastern Hutt Road c. 1945

Source: Alexander Turnbull Library, neg. C11327

In Moera there was concern as the river rose to within 2 ft (600 mm) of the stopbank crest. Following this flood, repairs to the training works were started immediately, as was an investigation into the raising of the stopbanks from the Hutt Bridge to the estuary. The need to raise the banks was attributed to flood volumes being "much in excess of that estimated when the protective works were designed some twenty years ago."

The Engineer reported that the flood had demonstrated:

- (1) *...maximum flood volume has much increased ... as a result of forest denudation ... in the higher reaches.*
- (2) *The problem of bed aggradation resulting from moving shingle required careful consideration,*
- (3) *The dredging by shingle companies in the lower reaches was of tremendous value.*

Contract documents were prepared for the raising of both banks by 300 to 600 mm from the Hutt Bridge to the Estuary, but with the onset of the Great Depression these did not go to tender. Following requests from the Unemployment Board the proposals were modified to be undertaken by hand, using picks and shovels, horses and drays. For reasons that are not recorded only a small portion of the stopbanks were raised: only 29 chains of stopbank on the east bank south of the Ava Bridge as shown by the 1956 plans HRB 48/3 for stopbank raising in the same reach (see Project Report 3, p. 170).

As in the 1870s and 1890s, a decade of nuisance flooding was followed by an "old man flood" on the 11 March 1939.



Plate 60: Manor Park Bridge (Ford Road/Georges Bridge), 1931.

Source: Alexander Turnbull Library, Evening Post col. neg. C11331.



Plate 61: 1931 flood at Silverstream. Source: Treadwell.

Again the flood was described as being the highest on record, computed at 71,000 cusecs, 20 percent higher than the 1931 flood. Lower Hutt escaped flooding by only 150 mm (6") the top of the concrete flood walls at the Ewen Bridge. In many ways the Engineer's reports mirror those on the 1931 flood: improvement to the outlet channel through dredging had apparently allowed a 20 percent larger flood to pass at approximately the same or lower level, there was no damage to stopbanks and generally the damage to training works was no more than could be expected. However, damages in the Belmont reach were severe. For years the riparian owners had argued that the Board's methods were inadequate and for years Sladden had expressed confidence that the gradual process of erosion and deposition would produce a stable channel.

Although the damages in this area are only reported in outline, it is clear that the river reverted to its old eastern channel - close to the present day National Film Unit - for in the following years the Board built a series of substantial spur groynes and breakwaters to help the establishment of new pilot cuts. The Engineer's reports indicate some chagrin at the reversal of control in the area. The adequacy of the stopbanks was again questioned, however, the Engineer reported that:

The 2 ft. margin in (the) lower reaches need not be inadequate as the river and channel improvement carried out since 1915 still continues.

His opinion was that continued extraction would depend on economic factors but that demand was unlikely to decrease. He considered that the channel at the estuary would maintain itself and furthermore he computed the existing banks would contain an additional 10,000 cusecs (282 cumecs) without great risk. Nevertheless he noted that it was desirable to maintain a freeboard of not less than 3 ft above the level of the recent flood. At this time it was the practise to design urban stopbanks with a 3 ft freeboard and 2:1 batters.

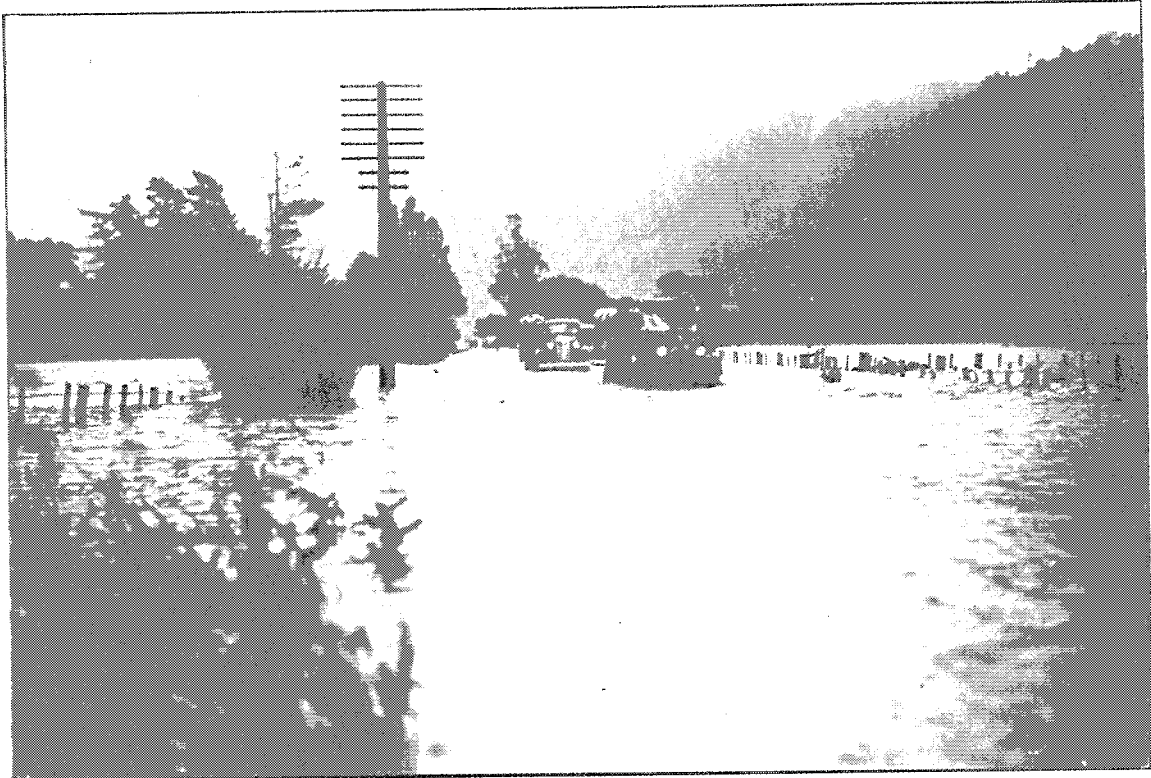


Plate 63: 1939 flood at Silverstream. Source: Alexander Turnbull Library, S C Smith col. neg. G47865.



Plate 62: 1939 Flood at Maoribank. Source: Alexander Turnbull Library neg. G47864

A 2 ft freeboard and 1.5:1 batter was the standard for the protection of agricultural lands.

The Engineer's reports on the 1931 and 1939 floods are paraphrased in Archive Table 19, p. ?, "Flood Observations from 1924". The surprising lack of detail or analytical comment on these and other floods may be due to the Engineer's reliance on observations made by the Overseer or the public. It is possible that Sladden did not observe the high floods as he lived and managed his business from Masterton, outside the River District. Most observations are of receding flood levels in terms of bridge deck levels and other landmarks, and the few quantitative records suggest that the Engineer's conclusions should not be regarded as definitive. Although events recorded after 1941 were monitored by a chart recorder at the position of the Fourth Hutt Bridge (approximately 70 m upstream of the present Ewen Bridge), and later at Maoribank, Taita Gorge, Birchville, Silverstream and Boulcott, discharges which have been assigned on the basis of "rating curves" are unlikely to be accurate due to the rapidly changing bed levels.

Design Standards

From the outset, the design and improvement of the flood control scheme had been pragmatic rather than analytical. The 1900 works appear to have been designed to protect against a repeat of the 1898 floods. The 1933 proposed upgrading was based on the safe passage of the 1931 flood and the engineering response to the 1939 event was similar. Scheme improvements included generous freeboards above the recorded flood profiles so in one sense a conscious allowance was made for larger events.

Prior to the mid-1950s there is no evidence to suggest that an analytical attempt had been made to determine or design for a maximum event. To satisfy his commitment to maintain and improve the scheme Sladden required a knowledge of the flood gradients as measured following the larger floods, and a good quota of engineering intuition. The accurate determination of peak discharge was not required in this era, before cost benefit analyses were necessary to obtain Government assistance.

To gain an appreciation of the comparative size of the historical floods (particularly those of last century) the flood observations and engineer's records have been used to model the historical flood events through computerised river modelling techniques. Table III, p. 150, contains the results of the rerouting study which quantified the observations of the historical floods in terms of our current knowledge of the River Hydraulics.

Chapter Eight, "River Hydrology", contains details of the monitoring and analysis of the Hutt River flood flows undertaken by Sladden. His flood frequency relationship is depicted in figure 21, p. 156, and the rating curve for the Hutt River Board "Hutt Bridge" water level recording site is contained in figure 19, p. 154.

Scheme Improvements 1925-1945

The flood control scheme as designed and implemented by Laing-Meason between 1899 and 1906 remained unchanged until the development of the Taita area in the late 1940s, see Chapter 6, "The 1950s Scheme Review". Until this time the Scheme continued as a flood control system for the Borough of Lower Hutt, with a district extended to Taita Gorge to control river alignment in the rural land north of the Borough.

With the exception of in-channel improvements - and the works required to control the Avalon reach show that these reached major proportion - the only major improvement to the scheme was the raising of the Moera stopbank during the depression years; Project Report 3. The Melling Cut, a diversion cut to remove the dogleg bend at the Melling Suspension Bridge, was considered an essential work but was delayed until the Melling Bridge was replaced in 1956; see Project Reports 5, 6 and 9. It would appear the successful conveyance of the 1939 flood postponed the completion of the stopbank raising as proposed after the 1931 event, and instilled a sense of confidence which delayed further improvements.

Recreational and Residential Developments 1925-1972

As the flood control scheme progressed, large areas of land were vested in the Board for river control purposes. Note the steady increase in assets and land values in the statements of accounts, Tables I and II, p. 58. From the earliest years these lands were made available for sports and recreational use. The Johnsonville Golf Club Links on Gear Island, and Strand Park (NZRFU) were the first, in the mid-1920s. As is the case today, there was intense competition for the use of these "reclaimed" areas. The histories of Petone and Lower Hutt referred to in the Introduction, p. 5, contain detail of the sporting and recreational facilities which quickly occupied the River Zone.

The problems of maintaining river lands and the conflict between recreational users and the underlying rivers control use is also evident. As early as 1926 there are Engineers' reports of vehicle damage to stopbanks and records of complaints of gorse and weed growth. Following World War II an ex-serviceman offered his services using a flame thrower to control rank growth. By the mid-1930s the control of vehicle access to the berms was firmly established.

During this period of rapid urban development the stopbank system was under attack from without, as well as within. Residential developments pushed hard up to the embankments and in a number of cases the stopbanks were excavated and supported with retaining walls. Most of the old retaining walls which now appear to have been constructed to prevent the encroachment of the stopbanks were in fact built long after the stopbanks had been constructed. The granting of authority to permit such encroachment onto an essential public work is an indication of the confidence then placed in the security of the flood control scheme. Archive Table 14 contains reference to some examples of River Zone encroachment which took place during this period.

River Management from 1924

(Codes refer Archive Table 2, p. 7)

- B34: 1924: SSPHRB6: 1270-1280
Diversion Cut Contract for 4 chain length of diversion cut 30 ch. downstream of the Silverstream Bridge. 9 ft wide at base with side batters of 1.5 to 1, bottom 6" below water level on gradient of 6" in 66 ft. Approx. 350 cu. yds material.
- B35: 1924: SSPHRB6: 40
Waiwhetu outlet channel specification for construction of a timber-lined channel to form the outlet for the Waiwhetu Stream.
- B36: 18 Aug 1924: SSPHRB6: 140
Proposal from Engineer to repair a boom groyne at Jorgensen's Bend.
- B37: 10 Sept 1924: SSPHRB6 from Engineer's monthly report.
Proposed protection works:
(1) Protection works at Huse's property (1080) near Haywards, including 225 ft long weir to close old channel;
(2) Protection works at McLaren's property at Melling;
(3) Develop Adam's point (430) cut through sale of spoil from top end;
(4) Page's land (1110) - small weir across flood channel;
(5) At downstream end of Dickie's (980), modifications to boom groynes built on contract - lowering at downstream end, shingle must not be removed from between groynes, extractor directed to another beach.
- B38: 10 Oct 1924: SSPHRB6 from Engineer's monthly report.
Recommending: (1) Curtail some groyne construction until the following season; (2) Require contractors who screen in the river to place oversize material back into holes at the heads of groynes; (3) Use explosives to loosen areas that the Board wishes eroded.
- B39: 14 Nov 1924: SSPHRB6
Plans from Laing-Meason (first Engineer to HRB) estate delivered to SSP from Engineers Mr Silver and Mr Truebridge.
- B40: 16 Feb 1925: SSPHRB6: 690
Boom groynes at Stellins (Avalon) to close off old channel.
- B41: 16 Nov 1925: SSPHRB6 from Engineer's monthly report: 200
Groynes placed along the bank of Gear Island to encourage erosion no longer required because of P.W.D. excavation for the Ava Rail Bridge.
- C20: 21 Jan 1926: SSPHRB6
Gorse growth on stopbanks.
- B42: 12 May 1926: SSPHRB6
A report from Mr Smith, Board Member, of the success of Osier species and general plantings.
- B43: 7 June 1926: SSPHRB6: 200
In development of the Ultimate Channel at Gear Island the Engineer will be required to mark on the ground where erosion is to be halted by willow planting.
- B44: 30 June 1926: SSPHRB6 from Engineer's monthly report: 200
Recommended dismantling of some groynes from Gear Island and storage for later reerection after Railways' borrowings for Ava Bridge construction. Wire and willow work required in several parts of the river.
- B45: 4 Aug 1926: SSPHRB6 from Engineer's monthly report: 410-430
Adam's cut to be blasted along entire length. Remove part of railway siding which is no longer in use.
- B46: 15 Oct 1926: SSPHRB6: 410-430
Engineer requests permission to scoop Adam's cut after the blasting; 6 ft wide over its length.
- B47: 1928: SSPHRB6: 30-330
Plan showing "Ultimate Channel" from old Hutt Bridge to Harbour.
- C21: 24 Jul 1928: SSPHRB6: 250
Excavation of stopbank at Clark and Coutts plant for shingle storage bins.
- E12: 10 Aug 1928: SSPHRB6: 540-550
Culvert through stopbank from Fry's Lane. Plan on file.
- C22: Nov 1928: SSPHRB6: 540-550
Reinstatement of stopbank at Fry's Lane.
- E11: 1929: HRB8/7: 320
Completion of sixth and present Ewen Bridge. Note that the previous (fifth) bridge stood for many years before partial removal.
- C23: 8 Jan 1929: SSPHRB6: 540-550
Details of stopbank retaining wall - Fry's Lane.
- C24: 30 Apr 1929: SSPHRB6: 140
Record of erosion to stopbank downstream of Jorgensen's Bend
- E13: 27 Aug 1929: SSPHRB6: 170-200
Outlet from Randwick Road stormwater downstream of Ava Br.
- B48: 10 Oct 1929: SSPHRB10:
Reports; disease in willow growth; general works.
- E14: 19 Oct 1929: SSPHRB6: 300-310
Stormwater outlet, end of Market St, Lower Hutt.
- C25: 1 Dec 1930: SSPHRB6
Potter encroachment on the stopbank near Shearers remedied with a concrete retaining wall.
- E15: 30 Dec 1929: SSPHRB6:120-200
Showing location of culverts beneath stopbank between Ava Bridge and Jackson Street, on right bank.
- E16: 28 Mar 1930: SSPHRB6
18" culvert south of Ava Bridge, LHBC.
- E17: 27 Jan 1931: SSPHRB6
Stormwater from Pirie St subdivision.
- C26: 10 Feb 1931: SSPHRB6: 560
Final agreement to lower the stopbank at Troon Cres - Boulcott Farm Subdivision - to 18" above the terrace. H.R.B. previously refused to allow lowering at all. Stopbank originally 5' 6" above terraces.
- B49: 19 May 1931: SSPHRB6 and 10
River works to repair flood damage.
- C27: June/July 1931: SSPHRB6
Specifications and plans submitted to the Board, by the Engineer, for stopbank raising and repairs to existing concrete flood walls between the mouth and the Hutt Bridge.
(Note, however, that these works were not carried out until in a modified form in 1956 - except for raising the eastern stopbank between Black Creek and the Ava Rail Bridge in 1933.) Estimate for the raising;
- | | |
|------------------|-------|
| Stopbank raising | £4585 |
| Concrete wall | £400 |
| Boom groynes | £1015 |
| Total | £6000 |
- * includes protection work at the Convent - £700
- B50: 12 Sept 1932: SSPHRB6: 100-270
Wave lap erosion in lower reaches as result of bed lowering.
- E18: 22 Dec 1932: SSPHRB6: 130
Drains from fellmongery and scouring works, Moera.
- C28: 1932-33: SSPHRB6: 130-200
Raising of a section of the eastern stopbank, between the Ava Rail Bridge and the Black Creek, using Unemployed Relief Labour.
- B51: 1933: SSPHRB8: 1400-1780
Contains detailed description of Hutt River (including works required to achieve channel control) from Silverstream to Moonshine.
- B52: 12 May 1934: SSPHRB6: 1180-1400
First plan of Ultimate channel alignment from the Haywards suspension bridge to Silverstream. Prepared by Sladden.
- B53: 24 July 1934: SSPHRB6
Report by Engineer re replenishment of materials for boom groynes. 100 poles required at cost of £333.
- E19: 10 Jul 1936: SSPHRB6: 110-460
Power cables in stopbank, Melling Bridge to Pipe Bridge.
- B54: 10 Apr 1937: SSPHRB6: 380-410
Development of cut (Kingdons beach) through blasting.
- E20: 10 Jun 1937: SSPHRB6: 510-520
Power cables in stopbank, Ariki Street to Connelly Street.

River Management from 1924

(Codes refer Archive Table 2, p. 7)

B55: 1938: SSPHRB8: 1400-2300

Detailed description of channel from Silverstream to Maoribank.

E21: 10 Feb 1939: SSPHRB6: 250

Strand Park - laying of 15" pipe within original pipe to drain HV High School.

E22: 29 Feb 1940: SSPHRB6: 180

Ministry of Housing - intention to jack new culvert beneath stopbank at Randwick.

B56: 17 Apr 1940: SSPHRB6 from Engineer's monthly report.

Construction of a stone spur on the left bank near the downstream end of the Belmont Diversion Cut (680). A stone spur on the right bank at Belmont (700 or 760). A stone spur at Augusts (900).

B57: 25 July 1940: SSPHRB6: 470

Melling diversion cut first discussed. Dependent on the Lower Hutt Borough Council replacing the (old) Melling Suspension Bridge and the NZR plans to retain the Wairarapa Line on the west bank. The Engineer said the Melling Cut would result in a lowering of flood levels:

- (1) Ponding occurring because of the existing bends;
- (2) The cut would enable progressive lowering of the bed upstream. Up to now there had been considerable improvement up to Melling but little improvement from there up.

B58: 8 May 1941: SSPHRB6 from Engineer's monthly report.

Re Left Bank between Native Land and Kells' (800-850). Flood waters go in large volumes through low ground to Mabey Road. A small stopbank several chains long advisable. Specification prepared for contract. Another small stopbank advised near Mabey Road across a low area where floods sweep through. The Melling railway siding to be repaired again following flood damage several months previously.

B59: 24 Sept 1941: SSPHRB6 from Engineer's monthly report : 680

Proposed river control work at Stellins.

- (1) Low stone weir of about 4 chains required to prevent flood waters that lead into the head of the golf links.
- (2) Engineer hopes that the Board's powers under the Soil Erosion Bill will allow the Board to control destruction of willows where landowners decline to cooperate.

B60: 18 Dec 1941: SSPHRB6 Engineer's report.

The Melling Cut will be required if improvement above Kingdon's Beach to be achieved. Should be done as soon as possible. If delayed, the shingle that will flood down after the cut is made will lead to deterioration in the lower channel. Cost of maintaining the Melling protection works is high.

B61: 2 Sept 1943: SSPHRB6: 850

HRB request Downers for a price to divert the river at Giesen's, near Belmont - see Plan No. HRB 43/1. Bank erosion following a small fresh was threatening the Certified Concrete Plant: a cut to be carried out immediately to "relieve pressure" on the bank. Certified cast concrete blocks to be placed in a groyne, and paid half cost of works. 5,100 cu. yd. excavation completed 17/11/43 for £255.

B62: 28 Oct 1943: SSPHRB10A

Protection works at Avalon.

E23: 1 November 1943: 100

PWD initiated meetings of engineers to discuss the proposed new pipe bridge at the river mouth.

C29: 27 Mar 1944: SSPHRB6: 340

from Engineer's Monthly Report:

Unauthorised excavations have been carried out into the stopbank behind Munday's (late Gadsby's - southern High Street area) and south to the concrete wall. Recommended that the bank be restored to its original slope as far as possible. Carried out by 24 April 1944.

B63: 3 Nov 1944: SSPHRB6: 1080

PWD construction of embankment and block groynes across old flood channels at Routley's (Taita Block).

C30: 24 Mar 1945: SSPHRB6: 890-1080

from Engineer's Monthly Report:

Flood embankment in conjunction with Housing Department works constructed from Routley's to August Bros, [approx Pomare Bridge to Fraser Park in present day terms] for the purpose of closing off the old flood channels. The works ultimately to be included in the "major scheme" of protective embankments then in preparation.

B64: 21 May 1945: SSPHRB6: 790-870

Cut 3 at Giesons (Belmont). Developed 28/8/45

C31: 28 May 1945: SSPHRB6

Estimate for raising banks from Melling to estuary presented

C32: 10 Sept 1945:

Plan showing occupancy and titles to stopbank area, High Street, Lower Hutt at 10/9/45.

C33: 23 Oct 1945: SSPHRB6 - minutes of Board Meeting.

Discussion of plans for:

- (1) stopbank raising from the mouth to Melling,
- (2) stopbank construction from Melling to Taita.

Preliminary discussions and survey attended to. Government representatives were of the opinion that the HRB should give thought as to what contribution would be offered by it toward the cost. Estimated cost of works £212,000. All members agreed that the work should be carried out by PWD. The Engineer and Solicitor to be actively concerned with matters of construction and acquisition of land (but not with design or process of purchase - see later entry).

Amount of HRB contribution suggested to be £35,000. A further report to be submitted by the Engineer and Solicitor to a 30 October meeting.

C34: 30 Oct 1945: SSPHRB6 - minutes of Board Meeting.

Mr A P Grant (PWD) stated that as all land would be in the name of the Board, the PWD would welcome the assistance of the Board's legal advisers.

The members resolved to contribute £35,000.

Board's Statement of Accounts shows surplus of £15,500.

C35: 11 Dec 1945: SSPHRB6 - letter from Board Solicitor.

Reply from PWD on Board resolution.

- (1) PWD considering the proposed HRB contribution,
- (2) PWD want to complete the work over two years. This will make it impossible for the Board to pay for the work out of revenue as desired unless PWD will bear the initial cost and accept payment over a period.
- (3) PWD will be pleased to associate with Mr Sladden,
- (4) PWD consider it premature to start negotiate land purchase despite two year construction period,
- (5) PWD consider the exchange of correspondence satisfactory - no formal agreement required.

B65: 1945-1950: WRWB 8/7

PWD report on upper valley scheme, J Hunt Sept 1953

B66: Circa 1945: 1820

Newton St (UH Borough) stopbank. 30 ch to protect land between Newton St and main road. Overtopped frequently. Abandoned when Newton St abandoned. Presumably built by PWD.

B67: Circa 1945: 1880

Low groyne built across Buckletons overflow to prevent flows down old channel.

B68: 1946: 2100

Ebdentown Rd, UH. A new channel constructed and substantial shingle groyne upstream across the old channel. Renewed 1953.

B69: 1946: 2060-2110

McCurdys stopbank. Half mile long on north side of the river opposite Ebdentown Rd. Bisected by flood circa 1948-51

B70: 1946: 1930-1940

Buckletons stopbank. Golders road to Whakatiki Street (now Masfield). 6 ch groyne of stopbank dimensions at right angles to the river and along the bank parallel to the river for a short distance upstream. To prevent shingle deposition and erosion.

C36: 31 Oct 1946: SSPHRB6

Letter from PWD to HRB expressing concern that the initial stopbanks at Taita are being eroded, in what is in effect the position of the future stopbanks. (The location a little to the north of the PWD fitting shop at the Taita Housing Block.) The HRB requested to open the right bank channel and to construct a low but substantial weir across the left bank channel to assist in building up and closing off the channel. The weir to be added to as the infill takes place.

C37: 26 Dec 1946: SSPHRB6

Letter from PWD re Scheme.

Confirming Sladden's opinion that the risk of flooding has not increased but has improved as a whole due to bed lowering, etc. Sladden was of the opinion that increased development warranted increased protection.

River Management from 1924

(Codes refer Archive Table 2, p. 7)

- B73: 12 Aug 1946: SSPHRB6: 470-480
Hire of bulldozer from Downer and Co for cross blading work at Melling.
- B74: Sept 46: SSPHRB32: 400
Bed lowering causing subsidence of banks at Convent, LH.
- B75: 22 Sept 1947: SSPHRB6 from Engineer's monthly report
Works carried out after June flood. Repair Work Required: a very large volume of shingle moved by bulldozer in the reach from the Native Land to Mabey Road (750-850). 16 chain of substantially constructed willow and cable work with heavy stone gabions required on the left bank from Bognuda's to Mabey Road (740). Willow planting to 4 chains downstream of Mabey Road. Heavy gabions and willow work at the Belmont Extension (760-790).
- B76: 1947/48: SSPHRB41: 550-620
Cut at golf links (Boulcott) 22.5 ch 12,500 cyds.
- E24: 10 Mar 1948: HRB8/7: 460
H.R.B. concern over protection of Melling Suspension Bridge. (H.R.B. wanted old bridge demolished to make way for proposed Melling diversion Cut).
- B77: 21 June 1948: SSPHRB10 from Engineer's monthly report: 650
A netted boulder groyne 5 chains long built on the boundary of the Golf Club and Stellin's land 550 cu. yds of boulders, 1500 sq yds netting, cost 9.750.
- B78: 1948: SSPHRB10: 1170-1270
Subsidised river works at Manor Park Golf Club. Soil Cons and Rivers Control Council/HRB cost split 2:1
- (a) reduction of left bank shingle spit £470
(b) netted boulder groynes £900
(c) willows and gabions £825
(d) remainder £515
- B79: 24 April 1949: SSPHRB10 from Engineer's monthly report.
All works carried out following floods of 1947-48 are proving satisfactory and all cuts developing well. Reach from Pitcaithleys to Belmont Extension suffered severely in June 1947 flood (750-900).
- E25: 27 Sept 1949: SSPHRB6
Alignment of Pomare Bridge piers.
- B80: 1949: SSPHRB41
Diversion cut at Melling - long section & cross section. Cut at Pitcaithleys - 19 ch, 5400 cyds.
- B71: 1949: 1680-1170
Bartons Bush diversion cut and stopbank. To prevent erosion to Bartons Bush. High enough to contain 100,000 cusec flow in lower end but lower upstream to allow overflow and deposition in the old channel.
- E26: 22 May 1950: HRB8/7
HRB approval of Melling Bridge.
- B81: 27 Mar 1950: SSPHRB10 from Engineer's monthly report.
Progress made in "snagging-in" the lower reach below Melling (i.e., removing snags).
- E28: 24 July 1950: 490
Details recorded of pipeline beneath the stopbank at Mills Street.
- B72: Dec 1950: 1900-1940
Contract let calling for the removal of 2/3rds of Buckletons bank and formation of 36 ch radius stopbank. Included partial stabilisation of channel upstream at Whakatiki Shingle.
- With the exception of McCurdy's stopbank these works appear to have been built by the PWD. Their failure to prevent continued damage led to UHBC dissatisfaction with PWD measures and led to overall scheme.
- B82: 1950-55: SSPHRB52
Re Melling diversion cut.
- B83: 3 Jul 1953: SSPHRB6: 830-850
NZR tipping blocks at Giesons (Belmont)
- C38: 16 Oct 1953: SSPHRB6: 1050-1080
Housing Construction Div. (PWD) to HRB.
Seeking permission to alter the alignment of the stopbank to permit the extension of Taita Drive North. Alteration to be over 8 chains - maximum shift 34 ft.
- E29: 17 Mar 1954: HRB8/7
HRB suggests Melling Bridge be called "Sladden Bridge".
- C39: Jan 1955: SSPHRB6
Plan of a proposal by the LHCC for manual floodgates to allow the Andrews Ave ramp to be lower than the stopbank.
- B84: 1955: SSPHRB61: 1980
Riverbank protection at McLeod St, UH.
- B85: 1955: SSPHRB63: 740
Diversion and pilot cuts, Mabey Rd, LH.
- B86: 1955: SSPHRB66: 700-900
Channel alignment at Belmont.
- E30: 15 March 1955: 330
Request from HRB to LHCC to remove old Hutt Bridge piers.
- B87: 22 Mar 1955: NA96/298000: vicinity 710-810
PWD internal report. Diversion cut and netted boulder weir required near B Webb's shingle plant after recent floods outflanked or destroyed willow work. Willows difficult to maintain.
- 16 chain diversion cut, involving 13,850 cu. yds @ 2/3 = £1568
Netted boulder weir, approx. 375 cu. yds @ 30/- = £562
Engineering and contingencies = £250
2:1 subsidy approved
- E31: 4 Apr 1955: SSPHRB6
11 kV cable to cross stopbank. Plans included.
- C40: 8 Jul 1955: SSPHRB6: 130
Elbe Products Ltd - tannery at Moera.
Request permission to build between the stopbank and river. They are aware that the HRB may wish to increase the height of the stopbank and accept that the factory wall adjacent to the stopbank be designed and built as a retaining wall so that the bank may be raised against the building and the windows be bricked up for the same purpose.
- C41: 11 Jul 1955: letter from HRB Chairman.
- (1) A scheme to raise and strengthen the existing stopbanks has been decided upon,
(2) The channel has deepened by over 12 ft. since 1900. This has been brought about by dredging and realignment,
(3) Notwithstanding this, stopbanks should be strengthened to give a margin of safety should a flood occur which is larger than has been experienced in the past.
(4) Following a request by the HCC and UHBC an application has been lodged to extend the Hutt River District to the Wellington City and Suburban Water Supply Catchment boundary,
(5) In the past river improvement works, including warning devices, had been carried out by the PWD,
(6) During recent months the HRB has been employed by the UHBC to construct protective works in certain areas threatened by erosion. However, these works do not reduce the risk of flooding to houses in low lying areas.
- C42: 15 Aug 1955: SSPHRB6
Appointment of Mr Mackie as the Classifier of the HRB's new District.
- C43: 13 Oct 1955: SSPHRB6
The HRB accepts the stopbanks constructed by the Dept of Housing at Taita, provided that certain repairs -trimming, topsoiling and grassing - are carried out.

River Management from 1924

(Codes refer Archive Table 2, p. 7)

C44: 1 Nov 1955: SSPHRB6

HRB to LHCC re Taita Drive Extension.

Proposed scheme considered premature and should be deferred in the meantime. HRB policy is to refuse to approve permits for building on land subject to flooding. As the Engineer is in consultation with the SC and RCC on the ultimate alignment of the stopbank, the HRB cannot see its way clear to approve the scheme at present.

C45: 1956

Commencement of the first section of the Hutt Scheme; stopbank raising from the Pipe Bridge to the Ewen Bridge.

E32: 13 Jan 1956: SSPHRB6

HRB/HVEB general agreement for laying of cables in stopbanks.

C46: mid-1956: SSPHRB6

Letter to the Commissioner of Crown Lands requesting that land at Taita, including the stopbanks and berms, be vested in the HRB. The ultimate aim is to make the berms available to sports bodies, etc., but in the meantime the river is not under control, and it will be necessary to remove shingle from the area for some time.

C47: 12 Sept 1956: SSPHRB6

MOW to HRB re Taita Gorge Road realignment. Realignment of Taita Gorge Road as a 4 lane highway; request permission to dispose of fill at the mouth of the Stokes Valley Stream, to a level slightly above the 100,000 cusec flood level. Also will have 70,000 cu. yds of fill for use in stopbanks.

C48: 16 Nov 1956: SSPHRB6

Request from LHCC for a river and stopbank cross section upstream of the Ewen Bridge so that it can finalise the southern entrance to the car park.

B88: 1957: SSPHRB68: 2180-2230

Clearing diversion channels at Maoribank.

E33: 1957

Melling Suspension Bridge demolished. New Melling Bridge opened.

C49: 11 Feb 1957: HRB8/7: 410-460

LHCC request that stopbank be realigned so that the Melling approach roads can be built.

B89: 1 May 1957: SSPHRB69

Report on Hutt River Control Scheme, Silverstream to Maoribank.

C50: 8 May 1957: HRB8/7

Alterations to approaches to LHCC amenities required after stopbanks raised from Ewen Bridge to estuary.

C51: 8 Oct 1957: SSPHRB6: 280-300

Plan of encroachment of buildings, Mudie Street, Lower Hutt

E35: 27 Jun 1958: HRB8/7: 110-120

Demolition of old Pipe Bridge.

C52: 1 Sept 1958: SSPHRB6

Velocities on berms.

C53: 1959: SSPHRB6: 460-480

Melling Diversion Cut, Stage I; part of the Hutt Scheme.

C54: 29 Jan 1959: HRB8/7

Stopbank alteration, part of Melling Bridge construction.

E36: 29 Apr 1959: HRB8/7

Drainage channels from Fraser Park to river across berms.

B90: 25 May 1959: WRWB 8/7 26/5/77: 460-480

Melling Diversion Cut - Proposal as explained to LHCC.

(1) Carried out in two major stages,

(2) First stage a 50 ft wide pilot cut at normal water level, completed in 10 weeks.

(2) When completed had a minimum width of 200 ft and easy batters.

(3) Excavation was from just north of the (existing) Melling Bridge to a point 24 chains north. Included construction of a weir in the bed of the old channel, and willow planting, to assist in developing the alignment.

(4) The bulk of the material from the first stage was taken by the LHCC for raising the level of council land at Taita Drive. By the 17 August 1959, 22,000 cu. yds taken.

C55: 29 Sept 1959: HRB8/7

Removal of old Melling Stopbank as part of new Melling Bridge construction.

B91: 2 Oct 1959: SSPHRB10

Corporation of Invercargill supplied samples of "Spartina Townsendii" grass for transplanting in the estuary of the Hutt River.

B92: 1960: 460-480

Melling Diversion Cut stage II

C56: 1960: HRB17: 460-480

Melling Diversion Cut, Stage II.

C57: 1960: HRB56: 320-430

Start of stopbank raising from Ewen Bridge to Melling.

E37: 19 Sept 1960: 1080-1090

Letter from NZR seeking information to allow N.Z.R. to specify protection works to piles on the Pomare Bridge, now exposed due to bed lowering.

E38: 6 Mar 1961: HRB8/7: 400

24" culvert Rutherford Street.

E39: 24 May 1961: HRB8/7: not located

Record of stormwater outfall near the northern end of the (Eastern) Hutt Road. Plans missing.

E40: 21 Dec 1961: HRB8/7

LHCC letter re flaggates in manholes

C58: 21 Dec 1962: HRB8/7: 560-660

Request for stopbank on landward side of Boucott and Hutt golf courses.

C59: 1964: HRB17: 460-480

Melling Diversion cut, Stage III (final).

C60: 1964: HRB109: 460-490

Stopbank raising from Melling Road (opposite Brunswick Street) to Mills Street.

C61: 1964: HRB73

Start of stopbank construction at Haywards Settlement (1150-1230). Start of Upper Hutt Major Scheme; stopbanking from Masefield Street to Maoribank (1900-2260).

C62: 1965: HRB116: 210-270

Stopbank slope flattened at Hutt Valley High School.

C63: 1966: 1620-1900

Upper Hutt stopbanking continued; Masefield Street to Wellington Golf Club.

C64: 1966: 1400-1740

Commencement of the "Silverstream Cut"; channel realignment from Trentham Memorial Park to the Silverstream Bridge (in anticipation of proposed roading works).

C65: 1969: HRB117: 660-740

Stopbank construction from Boucott Golf Course to Mabey Road.

E41: 4 Jun 1970: HRB8/7: 130-140

25" diameter stormwater from UEB site, Randwick Road.

C67: 16 Feb 1972: HRBgeneral: 2060-2050

Totara Park stopbanks partly accepted.

E42: 11 May 1972: HRBgeneral: 300-330

11 kV/400 V cable in stopbank at Marsden Street.

B93: 31 Oct 1972: HRB GENERAL

Wellington Acclimatisation Society complained that intensified bulldozing in the river bed was disturbing bottom fauna.

B94: 16 Nov 1972: HRB GENERAL reply to B58 from HRB

(1) Most shingle plants operating in Upper Hutt in conjunction with the major scheme.

(2) Belmont to Taita - an even bed must be maintained with normal water level as high as possible to provide as much head as possible on the aquifer; reducing pumping costs and the risk of sea water intrusion.

E43: 21 Dec 1973: WRWB8/7:

LHCC 10" water main across river at Belmont.

E44: 8 Apr 1974: WRWB8/7:

Proposal from HVDB to lay sewer main in the river bank at Harcourt Park, Upper Hutt, within 1 chain of the river.

River Management from 1924

(Codes refer Archive Table 2, p. 7)

E45: 2 Dec 1974: WRWB8/7: 1350
Sewer crossing, Silverstream.

B95: 3 Dec 1974: WRWB 8/7: 2270-2390
At Totara Park, upstream of Maoribank Bridge, a 2 chain reserve recommended for erosion protection, plus allowance for a stopbank to cope with an 85,000 cusec flood.

B96: 23 May 1975: WRWB 8/7
Flood damage to the Silverstream Cut (1490). Degradation at Pomare (1080-1090).

E46: 3 Nov 1975: 2750-2770
Mangaroa Bridge Approaches.
MOW calculations for design of waterway and bank protection; details of proposal for approval.

E47: 9 Dec 1975: WRWB8/7: 330
Details of extension of a sewer from Marsden Street into the HVDB main, on right bank upstream of the Ewen Bridge.

E48: 7 Jun 1976: HRB8/7: 230
Fitzherbert St 4' culvert relaid north of Ava Bridge

E49: 6 Sept 1976: WRWB8/7: 90 south
NZPO phone duct along foreshore of reclamation.

E50: 5 Oct 1976: WRWB8/7: 240
Plan of position of LHCC stormwater pipe through stopbank at Wakefield Street/Mudie Street intersection.

E51: 13 Oct 1976: WRWB8/7
Plans showing position of HVDB main sewer through Wellington Golf Club.

E52: Feb 1977: WRWB8/7
Details of stormwater design for Upper Hutt subdivision.

E53: 31 May 1977: WRWB8/7
Plan of 450 mm dia. stormwater north of Pomare Bridge, through stopbank and into river.

E54: 31 May 1977: WRWB8/7
Permission given by WRWB for HVEB to lay a gas main in the top of the stopbank between the Ewen and Ava Bridges as an alternative to laying the pipe in Alicetown streets (not shown on service plans).

E55: 27 Jun 1978: WRWB8/7
Plans of stormwater lines in the berm, associated with roading improvements on Harcourt Werry Drive and Percy Cameron Street.

E56: 14 Jul 1978: WRWB8/7: 190
Record of HVEB 100 mm pipe supplying Petone, crossing Hutt River south of Ava Bridge. Recently exposed and laid back into the river bed. Alterations made to allow this river crossing to be shut down during emergencies.

E57: 28 Aug 1978: WRWB8/7
750 mm stormwater main from Pomare Station Car Park to river. LHCC plans SD2855-2858.

C68: 1980-81: WRC8/31/1: 1160-1190
Stokes Valley Stream outlet channel auxiliary stopbank constructed.

C69: 1983-84: WRC8/7/18: 2560-2590
Parkdale Subdivision stopbank constructed.

B97: 1983-84: 680-1150
Formation of a concrete cycle track on the left stopbank crest.

B98: 1984-90: 3000-3100
Protection works carried out by Te Marua Golf Club.

C70: 1984: WRC8/7/1: 130
Placement of rip-rap to protect the stopbank at the "Woollen Mills", Pirie Cres, Lower Hutt.

B99: 1984-86: 160-200
Trial of bank stabilisation options, Sladden Park.

B100: 1984 and 1990: 1100-1170
Reconstruction of left bank protection works adjacent to the Pomare Bridge.

B101: 1984-89: 2080-2280
Bank protection works, Totara Park, associated with Bypass River Works.

C71: 1984: WRC8/7/1: 150-200
Black Creek auxiliary stopbank upgrading and protective works commenced.

B102: 1984: 1340-1370
Reconstruction of 300 m of eroded bank by regrading and construction of debris fences, willow planting, toe protection.

B103: 1984-89: 610-840
Replanting of willows.

B104: 1984-87: 1760-1860
Establishment of willows and construction of debris fences along Trentham Memorial Park boundary.

B105: 1985-87: 2430-2520
Stabilisation of Haukaretu and Harcourt Parks, Upper Hutt.

1985-86: WRC8/7/1: 320-330
Protective works at the Ewen Bridge (left bank) to protect the stopbank and the bridge.

1985-88: WRC8/7/1: 100-130
Bank stabilisation commenced at Croft Grove, Lower Hutt to protect the stopbank.

1985-86: WRC8/7/1: 1990-2020
Auxiliary Stopbank constructed at Gibbons Street drainage channel outlet.

B106: 1985-89: 1460-1890 and 2080-2420
Upper Hutt Bypass Road river works.

B107: 1985-89: 2670-2710
Willow planting and debris fences, Twin Bridges, Akatarawa.

B108: 1987-89: 640-720
Willow planting and debris fence construction to protect berm beneath Kennedy-Good Bridge.

B109: 1989: 310-360
Reconstruction of timber groynes and rip-rap work upstream of Ewen Bridge.

B110: 1989: 450-460
Removal of trees from stopbank, Melling Reserve.

B111: 1990: 110-130
Placement of rip-rap at Croft Grove.

