

Summary of Work done.—Hereunder is a summary of the principal work carried out during the year: Drains cleared, 42 miles 35 chains; drains widened and deepened, 3 miles 68 chains; new drains constructed, 78 chains. Dredge cuts—90 ft. completed width, 47 chains; 60 ft. completed width, 29.08 chains; 40 ft. completed width, 1 mile 14.27 chains. New stop-banks formed, 60 chains; repairs to stop-banks, 4 miles. Levels taken, 8 miles. Flood-gates built, 11. Pile bridge erected (temporary), 70 ft., 1; pile bridge lengthened from 72 ft. to 126 ft., 1; Sill bridges erected—18 ft., 2; 14 ft., 3. Buildings erected, 2 (1 quarters for men, 1 storehouse for tools, &c.). Fascines used, 80 bundles. Spoil excavated by land-excavators, 207,218 cubic yards.

Proposals for ensuing Year.—The principal work in hand for the ensuing year is the widening of the Whangatane Spillway, raising and lengthening of existing bridges, and installation of flood-gates to carry local run-off under the spoil-banks and prevent back flow of flood-waters on to the country adjoining the spillway. It is anticipated that the western side of the cut will be completed within twelve months, and work on the eastern side carried to such a point that the spillway may be used to a limited extent, and shortly afterwards to its full capacity.

Works Expenditure, and General.—The sum of £25,661 1s. 11d. was expended during the year, of which day labour absorbed £8,493 2s. 3d. Some fifteen piecework contracts were let, entailing an expenditure of £1,622 19s. 1d.

HIKURANGI DRAINAGE AREA (50,000 ACRES), WHANGAREI COUNTY.

Rainfall.—The year has been notable for the number of heavy rainfalls, but owing to frequent winds the hill country and roads were not so sodden as usual in winter. The total rainfall for the year at the Ruatangata headquarters was 50.65 in., whilst at Puhipuhi—where the heaviest rainfalls occur—the total recorded was 79.83 in. The heaviest daily fall at the Ruatangata headquarters was 2.84 in., on the 7th July, 1928, whilst at Puhipuhi the heaviest was 5.04 in., on 29th April, 1928. The greatest rainfall at Ruatangata for any one storm was that from the 7th to the 9th July, 1928, inclusive, when 3.99 in. was recorded, whilst at Puhipuhi 8.53 in. fell from the 29th April to the 1st May, 1928, inclusive. A graph showing rainfall and run-off data for the year is attached.

Floods.—The highest flood of the year occurred at the beginning of the winter, at the end of April, when the ground was still dry after the summer months. On the 2nd May the maximum flood heights were reached—viz., 33.7 ft. at the Jordan Bridge, 32.5 ft. at Lewis's Bridge, 25.1 ft. at Purua Bridge, 18.5 ft. above G-H Diversion, and 3.7 ft. at lower lagoon. Several more heavy floods occurred during the winter. Although the floods were high during the year, the effect of the still uncompleted works down-stream from the swamp show in the rapidity with which the flood-waters got away compared with former years before the commencement of these works. The plan attached shows the maximum flood levels and the low summer level for the past year.

Run-off.—The maximum discharge of the Wairua River at the Ruatangata camp (0 m. 55 ch.) during the flood of the 2nd May mentioned above was in the vicinity of 4,000 cusecs, representing a run-off from the catchment area of 19 cusecs per square mile, or $\frac{3}{4}$ in. run-off for twenty-four hours; but the inflow from the tributary streams at their maximum stages was very much in excess of this discharge. The low summer discharge at 0 m. 55 ch. was 45 cusecs, or a run-off of 0.2 cusecs a square mile, or 0.008 in. run-off for twenty-four hours over the whole area. The Whakapara Stream contributed nearly half of this low discharge.

River-gauges.—Twelve staff gauges have been installed on the river and tributaries, and one Gurley Automatic Stage Recorder has been installed at the gauging-station at 0 m. 55 ch. Two more are being installed, one at the Jordan Bridge and one at Lewis's Bridge on the Wairua River. With the use of these gauges and the current-meter a fair amount of discharge data has been collected, and during the coming winter careful and frequent gaugings will be made on the river and tributaries to determine the relation between inflow to the swamp area and outflow at flood periods.

Utilization of the Swamp: Production.—The only two areas to date that are practically protected from flooding are the upper end of the Ngararatunua arm of the swamp and the Mangahahuru Valley. These two areas are now safe from flooding except at the junction with the main swamp, and capable of being brought to a state of full production. The remainder of the swamp is still subject to flooding.

Construction Work.—Construction work on the Wairua River and subsidiary channels was pushed on as expeditiously as possible during the year, though floods seriously hindered some portions of the work.

Wairua River Diversions.—The shovel-work at G-H diversion was completed at the end of April, while the top and bottom ends were opened out to full depth and width by drag-line during the summer. The G-H spillway was also completed by drag-line through the summer.

In May, drilling and blasting, followed later by shovel-work, was commenced in the long spillway around the D-B diversion, and up to the end of October 14 chains of rock-excitation was completed. The spoil was tracked down the spillway and across a temporary bridge over the lower end of the D-E diversion to a dump around the edge of the No. 2 lagoon. The amount of rock trucked out was 9,250 cubic yards. At the end of October the machine was equipped as a drag-line and completed the stripping of this spillway, excavating 8,800 cubic yards before being moved to the G-H cut at the end of November.

Nos. 1, 2, and 11 rock bars were drilled and blasted in the summer months, No. 1 bar and part of No. 2 bar being excavated by drag-line. The excavation of these rock bars is the heaviest work that the Bucyrus plant could possibly be put on when rigged as a drag-line. From No. 1 bar 2,000 cubic yards of rock was excavated, and from No. 2 bar 1,600 cubic yards.