

Winnipeg is 710 feet above the sea level. Lake of the Woods is at an elevation of 1,060 feet, so that the fall to the provincial boundary is 77 feet. The fall of 710 feet from Lake Winnipeg to the sea level in Hudson Bay, combined with the immense flows from the tributary watersheds indicates the enormous potential water powers on the Nelson River.

The commercial value of the numerous water powers of the Winnipeg River are fully appreciated. The proximity to the city of Winnipeg, whose growth, in population, in wealth, in industry and in commerce, has been amazingly beyond the most optimistic predictions, has in itself provided a market of great magnitude now being served by two developed falls of this river. The rapid increase in power consumption has already exhausted the capacity of one power development, and has necessitated the other continually installing additional machinery, much in excess of the unit capacity originally contemplated. That the possible extent of market of the immediate future is fully anticipated by the keenest of power developing interests is most positively indicated by the fact that the Water Power Branch of the Department of the Interior of the Dominion Government has received numerous applications from capable and sound sources for the various undeveloped water powers; many of these overlap, many contemplate the combination of several successive falls by the concentration of their respective drops at one power site, and several are for individual falls.

The application for the respective power sites on the Winnipeg River are so varied and so conflicting, while at the same time supported by such reputable engineering advice that the government found it inadvisable to commit itself, with respect to any future developments on the river, until from an exhaustive survey and investigation could be constructed a proper basis of consideration which would determine the maximum possible advantageous utilization of the water power resources. This river study has advanced to the final stages and the full possibilities can only now be fully recognized.

After several years of work, by the government's engineers, the various power sites have been established; the proper combination of the small falls selected to conform to the most economic development; the most feasible scheme of utilization planned, and the general design proceeded with sufficiently to determine constructional costs on a reliable basis, and from these, the yearly cost of power deduced. The Department is therefore in a position to dictate a policy of power development which will ensure the full and maximum utilization of the river resources.

The Winnipeg River power sites are concisely shown in the following:—

DEVELOPED POWER SITES ON THE WINNIPEG RIVER IN MANITOBA.

Site.	Distance from Winnipeg in miles.	Head	24 hour power at 75% efficiency.		Turbine Installation.	
			12,000 sec. ft.	20,000 sec. ft.	12,000 sec. ft.	20,000 sec. ft.
Point du Bois (City of Winnipeg Municipal plant).	77	45	45,600	76,000 (119,500 using available pondage)	5-5,200	5-5,200
Lac du Bonnet Pinawa Channel (Winnipeg Electric Ry. plant).	65	39	28,200 (has steam auxiliary in Winnipeg)		4-1,000 5-2,000	

UNDEVELOPED POWER SITES ON THE WINNIPEG RIVER IN MANITOBA.

Site.	Distance from Winnipeg in miles.	Head	24 hour power at 75% efficiency.		Turbine Installation (Units considered).	
			12,000 sec. ft.	20,000 sec. ft.	12,000 sec. ft.	20,000 sec. ft.
Pine Falls	64	37	37,900	63,100	6-10,000	10-10,000
Du Bonnet Falls	64	56	57,300	95,500	9-10,000	14-10,000
McArthur Falls	62	18	18,400	37,000	11- 2,500	17- 2,500
Lower Seven Sisters	52	37	12,600	37,900		6-10,000
Upper "	55	29	9,900	29,600		8- 6,000
Slave Falls	74	26	26,600	44,400	8- 5,000	13- 5,000
TOTAL			162,700	301,200	217,500	555,500

NOTE:—The Upper and Lower Seven Sisters are located in the main channel on the Winnipeg River, paralleling the Pinawa, through which 8,000 second feet are assumed to be diverted for the operation of the Winnipeg Electric Railway Company's plant.

It will be noted that the Winnipeg municipal plant and the Winnipeg Electric Railway Company's plant are developed and aggregate a turbine capacity of 79,700 h.p. Further, it will be noted that capacities of all sites are given for flow of both 12,000 and 20,000 cubic feet of water per second, as representing respectively present conditions and future conditions after storage is established.

The two developed plants of the city of Winnipeg and of the Winnipeg Electric Railway are well known, but even their large capacities are quite insufficient for the loads of but a few years to come. The Du Bonnet site has already been leased to the Winnipeg River Power Company, who propose a large development of eight 11,500-kw. generators, an aggregate of 123,000 h.p., and transmitting to Winnipeg at 110,000 volts.

The Bow River rivals the Winnipeg in immediate importance, although its various power sites are smaller in capacity. The Bow has its source in the mountain lakes and streams and in the glaciers and snowfields of the Rocky Mountains. It drains an area of 3,138 square miles on the eastern slope of the mountains immediately west of the city of Calgary in the province of Alberta. The waterfalls are numerous as from the farthest of its headwaters, up in the mountains, 6,500 feet above the level of the sea, it falls 2,750 feet to Kananaskis Falls, where the Kananaskis River joins the Bow, and from Kananaskis Falls to Calgary, a distance of 55 miles, a further drop of 720 feet takes place. It is in this latter stretch that the most promising power sites exist and where the three Bow River developments at Eau Clair, Horseshoe Falls and Kananaskis Falls are situated. (The Eau Clair and Horseshoe Falls developments were described in *The Canadian Engineer* for December 17th, 1914. The Kananaskis Falls development in our issues of February 4th, 11th and 18th, 1915.)

Above Kananaskis Falls the entire drainage area of 1,710 square miles lies wholly within the Rocky Mountains National Park of Canada, and by the conserving and co-operating policy of the park's administration, the extensive storage possibilities are readily capable of full utilization, and already considerable storage has been created. The flow of the river, as in all mountain streams of this character, is subject to sudden variation and is greatly influenced by conditions of temperature. During the winter months the flow is held in check, but in the hot summer months of June and July the melting winter snows and the glaciers loose their floods which rush through the mountain gorges to the Bow, down the Bow to the Saskatchewan and to Lake Winnipeg, then down the Nelson to the sea. The summer floods are very great