P.W. 15/2

M.R. Bolt 1965.

Ministry of Works,
DUNEDIN.

17 August 1965

The District Commissioner of Works,
DUNEDIN.

IDA VALLEY IRRIGATION SCHEME : INCREASED SUPPLY UTILISING HOPES CREEK

Ref: H.O. P.W.64/276 of 19.5.65 enclosing memo from the Minister reporting on his visit to the area.

1.1 A reassessment of the scheme has now been made, incorporating the diversion by tunnel of the Upper Hopes Creek catchment into the Upper Manorburn reservoir, and utilising the actual available water quantities for Poolburn and Upper Manorburn reservoirs and stream-flow records of Hopes Creek for the last fifteen years, i.e. for irrigation seasons 1950/51 to 1964/65.

1.2 The Hopes Creek diversion assumed is Proposal 4(b) of the 1949 report, known as the Upper Tunnel Scheme and consisting of a 40ft head dam and 16,000 foot long tunnel, and now costing an estimated £500,000 plus. The overall layout of the system is shown diagrammatically in the attached sketch.

2. AVAILABLE WATER

2.1 The Poolburn dam has a storage capacity of 10,500 dayheads; the net gain for the period May 1950 to May 1965 was 38,400 dayheads or an average annual gain of 2560 d.h. The dam serves an area of 4817 acres with a quota of 18 inches, i.e. a requirement of 3,610 d.h. excluding losses.

2.2 The Manorburn Dam has a storage capacity of 20,800 dayheads; the net gain for the period May 1950 to May 1965 was 127,500 d.h. or an average annual gain of 8,500 d.h. The dam serves an area of 7520 acres in Ida Valley with a quota of 18" i.e. a net requirement of 5640 d.h., plus 149¾ acres in the Galloway area with a quota varying between 19.8" and 30" having a net requirement 1510 d.h. Manorburn water is also diverted to some of the 4817 acres under the Poolburn system of 2.1 above.

2.3 Hopes Creek flows have been recorded at the Stone Hut weir (with some winter breaks due to freeze-up) and the total runoff for the same 15 year period is calculated as 94,800 d.h. The runoff at the Upper Tunnel site is approximately 74% that of the weir, hence the available water for diversion totalled 70,000 d.h. or an annual average of 4,670 d.h. This however must be modified due to (i) some evapouration losses from the increased surface area of Manorburn plus diverting reservoir, (ii) water lost during flood peaks (the quantity diverted being limited by tunnel and diversion dam capacity), and (iii) the need for some flow to be maintained during the later summer months down Hopes Creek. Little Valley Creek and Hopes Creek are the main contributes to the Lower Manorburn Dam and in the second half of the irrigation season when all Little Valley water is taken in upstream rights, Hopes Creek is the mainstay of this supply. Actual figures for these losses are somewhat nebulous - (ii) could amount to 400 d.h. and (iii) to 600 d.h. It would be reasonable to take a figure of 3,500 d.h. as an annual diversion figure.

2.4 Summing the above,

Average annual gain Manorburn	8,500 d.h.
" " " Poolburn	2,560
	11,060 d.h.
Plus Hopes Creek diversion	3,500
Total	14,560 d.h. avge.

Actual water figures vary considerably from this average of course - total gain May 1957 to May 1958 was 36,900 d.h. this being an

Ctd...

2.4 (Ctd)

exceptionally wet season. Conversely the year from May 1954 to May 1955 totalled only 9,500 d.h. Deducting the 57/58 gain from the fifteen year total has the effect of reducing the above average to 12,970 d.h. for the other fourteen years.

3. WATER REQUIREMENTS:

3.1 Race and other losses for the last five years have averaged 15½% for the Ida Valley system and 13½% for the Galloway system. Using these figures and those quoted in 2.1 and 2.2 above, the gross requirement is:-

	Area	Quota	Net	Losses	Gross
Poolburn	4817 acres	18 ins.	3610 d.h.	15½%	4275 d.h.
Manorburn	7520 "	18 "	5640 "	15½%	6675 "
Galloway	1494 "	19.8-30	1510 "	13½%	1750 "
					12,700 d.h.

3.2 It can thus be seen that bringing in the Hopes Creek supply will give sufficient water to provide the full quota for all the existing irrigation areas under agreement and also provide a small surplus. This surplus on the 15 year average is 1860 d.h. (or 18 inches on 2,100 Ida Valley acres with 15½% losses), but on the 14 year figure is only 270 d.h. (or 18 inches on 305 acres). The 15 year average is considerably inflated by the inclusion of an exceptionally wet year.

4. CONCLUSIONS:

4.1 Two graphs are attached on which hypothetical plots have been made of (i) a steady seasonal draw-off from Poolburn dam and (ii) a full quota seasonal draw-off from Manorburn Dam including Hopes Creek water, for (a) the existing irrigation area and (b) the same plus an additional 1000 acres. The plots were made with dams at half capacity at the start of the 1950/51 season, and the effect of the 1957/58 rains can be readily seen with the Poolburn Dam filling and the Manorburn overflowing in both cases. Manorburn Dam did in fact spill throughout the 1958 winter under actual operating conditions.

4.2 From the graphs it can be seen that (a) the existing area can receive its full quota each season without embarrassment i.e. the overall gain keeps comfortably ahead of the base plot, (b) an additional 1000 acres could cause embarrassment, i.e. the base plot steadily approaches the gain graph and it is only the advent of the central wet year that prevents any shortage.

4.3 Although, apart from the very end of the 1950/51 season, the existing area plus 1000 acres could receive its full quota for each season, this could not be taken as a generality. Actual operating conditions usually demand more water in a dry year and less in a wet one, hence spillage during the wet 1957/58 period would probably increase and demand over the dry years could be above quota.

4.4 Increasing the capacity of Manorburn dam by raising the crest a few feet could have conserved some of the spillage and so left a greater quantity in hand at the end of the 1964/65 season, but over the period considered such raising would have had negligible use as the reservoir was nearly emptied prior to 1957. From a structural point of view also, raising the crest level could be a doubtful proposition as some of the existing arch is not in first class condition.

5. SUMMARY:

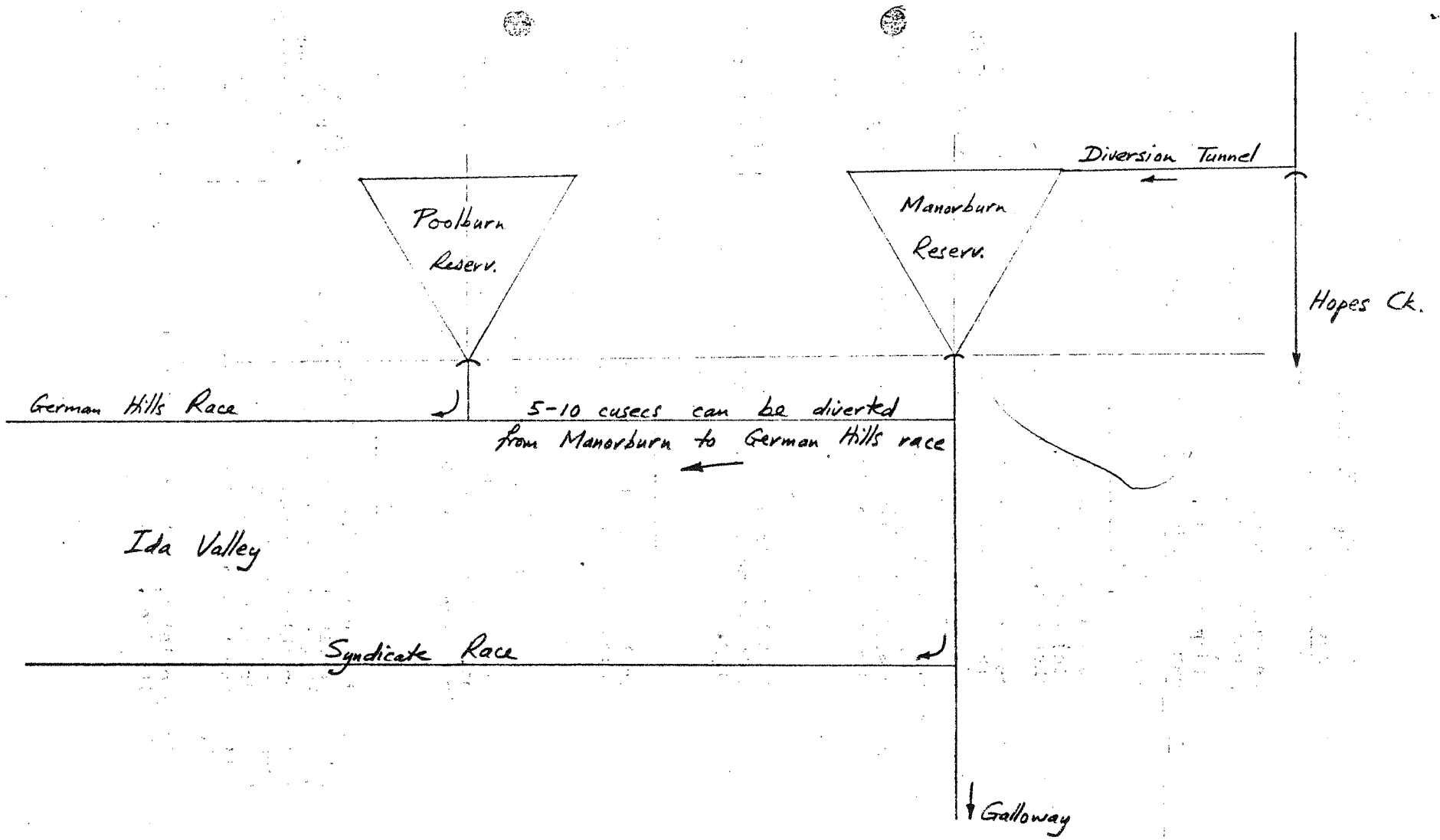
The above conclusions serve only to substantiate the general findings of the 1956 investigations (i) that bringing in Hopes Creek to the Manorburn reservoir by means of a diverting dam 40 feet high and

Ctd...

5. SUMMARY: (CTD)

16,000 feet of 80 cusec tunnel at a cost of upwards of £500,000 will provide Ida Valley farmers with the full 18 inch quota each season, but that (ii) there would be insufficient water to guarantee a quota to any extension of the present irrigation area.

M.R. Bolt
I.I.E.


Diversion Tunnel
Poolburn Reserv.
Manorburn Reserv.
Hopes Ck.
German Hills Race
5-10 cusecs can be diverted from Manorburn to German Hills race
Ida Valley
Syndicate Race
Galloway