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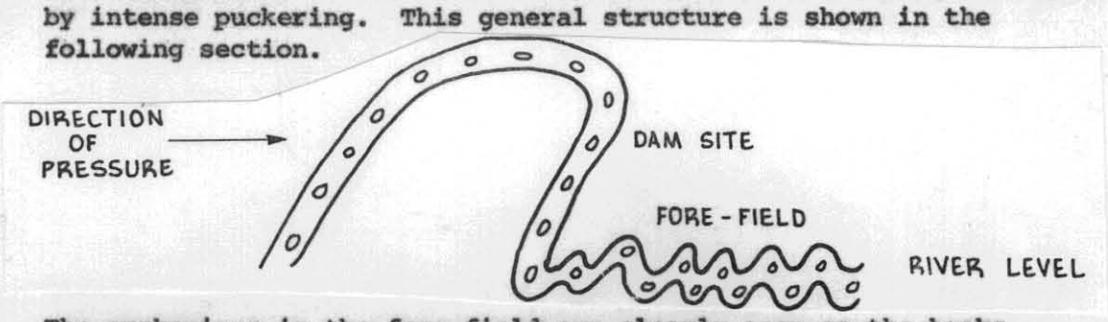
Bormanston,
11th June, 1920

REPORT ON THE KING RIVER DAM SITE

The structural geology of the West Coast Range Conglomerate Series is very complex and the absence of an understanding of the general conception of this structure and of its mode of origin has made decisions on many points in economic and engineering geology very difficult and uncertain.

This applies to the King River Dam Site which is located wholly on rocks of the Conglomerate series. The investigation of that site by Mr. Hartwell Conder M.A. in 1918 was made under the disadvantage of an absence of a complete elucidation of the structural geology of the Huxley-Lyell area. My recent investigations in that area, however, have resulted in a thorough understanding of the structural geology and in accordance with this conception certain interpretations made by Mr. Conder in regard to the existence of fault planes and lines of weakness are seen to be untenable.

The intricate complication of dips and strikes of the beds shown in the map accompanying his report are due to the fact that the dam site is located at the eastern foot of an overfold of large dimensions which is succeeded to the eastwards at about river level by intense puckering. This general structure is shown in the following section.

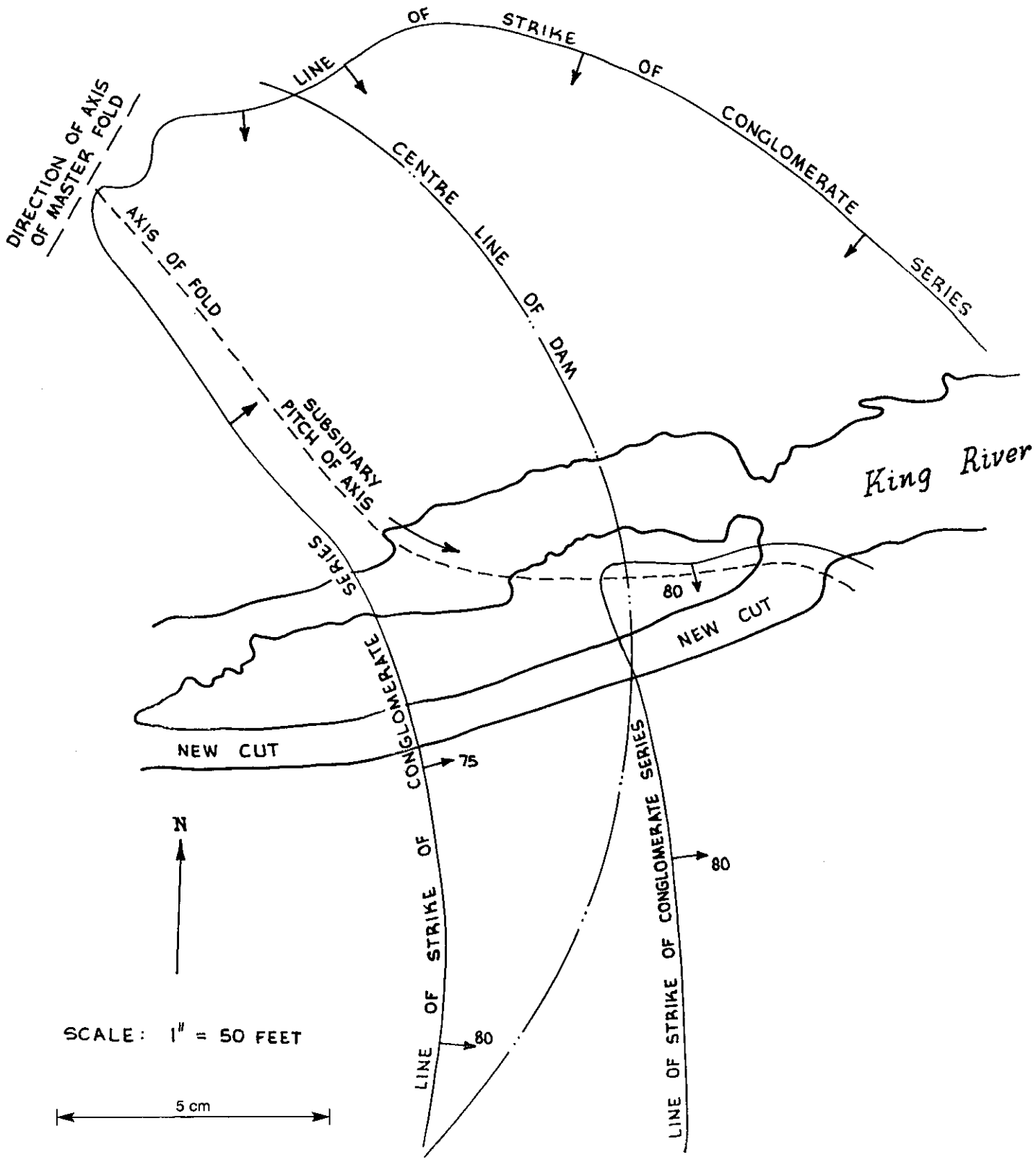


The puckerings in the fore-field are clearly seen on the banks of the river above the dam site and it is these that Mr. Conder has shown as indefinitely confused dip and strike in his plan. The frequent fault planes there indicated do not, therefore, exist, the sharp changes in strike and dip being the result of the sharp folding and puckering.

The geologic structure of the actual location of the dam is shown in the following plan.

The axis of the subsidiary fold runs approximately at right angles to the direction of the axis of the main overfold - the master fold - and pitches from the level of the top of the proposed dam to the river level as shown in the plan. That plan shows the relation of the curve of the dam to these axes. Obviously, the axis which has the greater effect on the strength of the foundation and abutments of the dam is the subsidiary axis. On the south side of the river the relation of the dip and strike to the curve of the dam is clearly such as to present very satisfactory conditions for foundation and abutments. From the middle of the river northwards to the north bank the dam crosses the axis of the fold at right angles and taking cognisance of the steep upward slope of the trough of the fold in a downstream direction thoroughly sound conditions for the foundation are presented. The remainder of the dam runs approximately at right angles to the strike of the beds, the dip of which is nearly parallel to the centre line of the dam and is directed upstream at about 45°. These conditions present satisfactory evidence of the suitability of this portion of the site for dam construction.

The structural geology is, therefore, favourable to the construction of a dam of the dimensions proposed.


LINE OF STRIKE OF CONGLOMERATE SERIES
DIRECTION OF AXIS OF MASTER FOLD
AXIS OF FOLD
CENTRE LINE OF DAM
SUBSIDIARY PITCH OF AXIS
King River
SERIES
80
NEW CUT
NEW CUT
CONGLOMERATE
75
N
80
LINE OF STRIKE OF
LINE OF STRIKE OF CONGLOMERATE SERIES
SCALE: 1" = 50 FEET
80
5 cm

The character of the beds, structurally arranged as described above is that of red quartzites, fine-grained conglomerates and greenish-grey argillaceous-siliceous beds. These belong to the uppermost members of the conglomerate series and correspond exactly to the horizon and beds constituting the footwall of the Mount Lyell open-cut. Their hard and massive character has there been thoroughly demonstrated and any apparent weakness which may have been feared at the dam site is simply the effect of weathering which only extends a few feet below the surface. The greenish-grey shales have been referred to as schists and it has been feared that they would present the weaknesses of that class of rock. Although they may have had a quasi-schistose character developed in them by pressure at certain localities they do not present at the dam site slippery argillaceous surfaces but are fissile slightly argillaceous siliceous rocks of considerable structural strength.

The fissures mentioned in Mr. Conder's report are of common occurrence on the West Coast Range and are largely due to the wedging effect of ice. They are purely surface features and do not extend beyond a few feet from the surface. They are, in the writer's opinion, not likely to affect either the structural strength or the water-holding capabilities of the conglomerate series as a whole as developed at the dam site.

In conclusion, it may be concisely stated that, after an examination of the geologic structure and petrologic character of the rocks at the dam site, taken in conjunction with his recent investigations of the structural geology and detailed stratigraphy of the West Coast Range conglomerate series, the writer is of the opinion that the geologic conditions at the King River dam site are favourable and safe for dam construction.

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Gormaston,
21st June, 1920