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My submission to the Canterbury Earthquakes Royal Commission

### **CHRISTCHURCH – PAST, PRESENT AND FUTURE**

I commenced work with the Christchurch Drainage Board in December 1959 as a Civil Engineering Draughtsman and drew plans of all aspects of drainage in the Christchurch area until 1990. I set up a comprehensive index of all of the drainage plans so had an intimate knowledge of the drainage in Christchurch from the original drainage scheme designed by William Clark in 1878.

I have information from four historical books that show that Christchurch was not built in an ideal location and that we have been dealing with major drainage and ground problems since the city site was chosen in 1849.

The books are:

1. Drainage Scheme for Christchurch by William Clark, 1878
2. A City Built Upon a Swamp by Agnes I Hercus, 1948
3. Christchurch Data by E F Scott, 1963
4. Christchurch, Swamp to City by John Wilson, 1989

I drew maps for both E F Scott and John Wilson for their books.

**Agnes Hercus** wrote a Thesis presented for a degree of M.A. and Honours to the University of New Zealand, Christchurch in 1942. It was entitled “A City Built Upon a Swamp”, the story of the drainage of Christchurch, 1850 – 1903 and was published with an Epilogue 1903 – 1936 by The Christchurch Drainage Board in 1948.

In the preface to the book Agnes wrote:

*‘I feel it is a credit to the Board that they have printed my work without deleting any criticisms of their policy which I, as a disinterested person, may have made, and I trust that the record may prove of permanent value to them and to all students of the history of Canterbury, New Zealand.*

It is obvious to me that those people involved with town planning in this city since this book was written have not read it or they have chosen to ignore its valuable information.

*In this study I have tried to show that the Canterbury Settlement, inaugurated by Edward Gibbon Wakefield and his associates and planned to a greater degree than any other British colonial possession, nevertheless failed in at least one aspect.’*

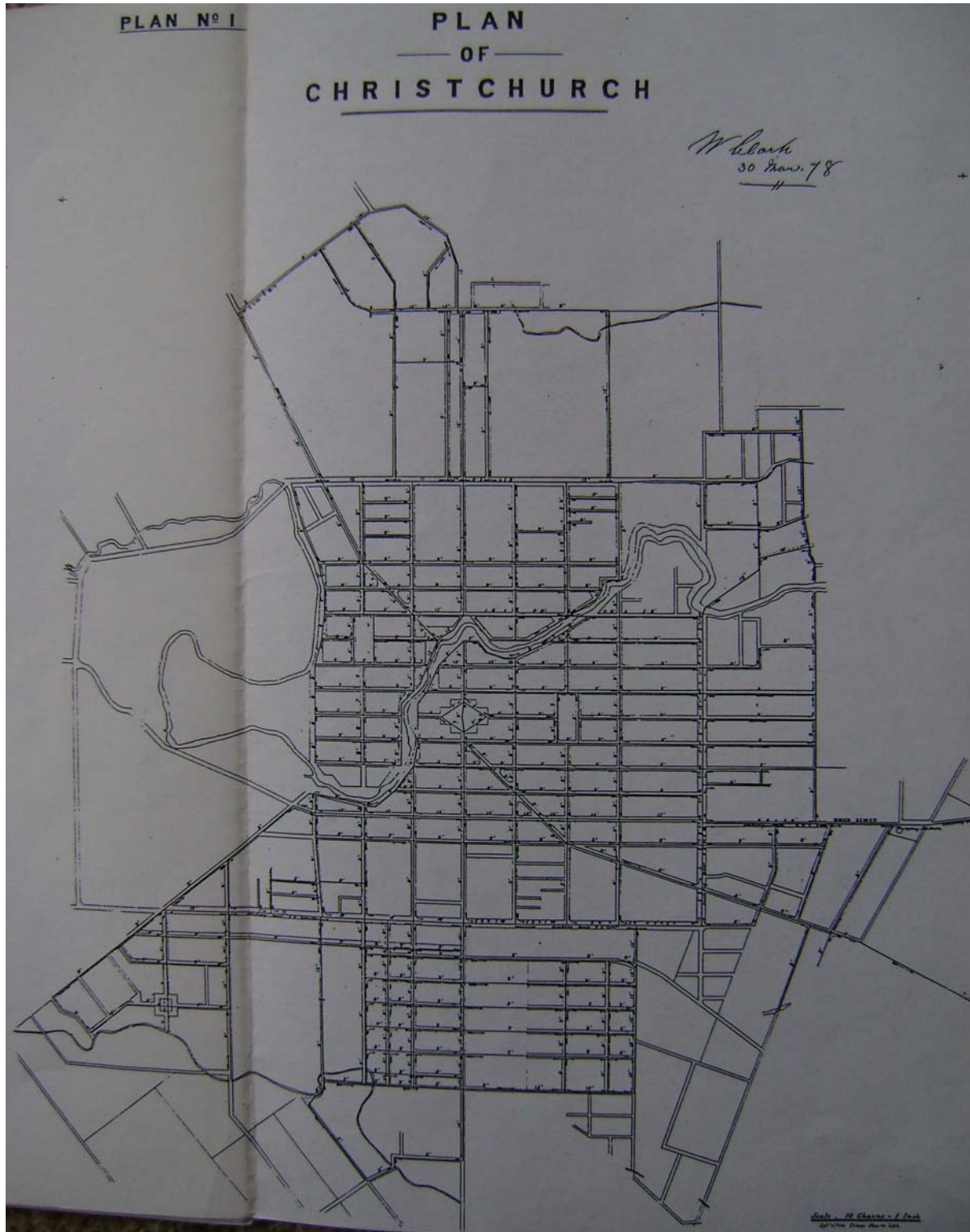
Who in their right mind would choose a swamp on which to build a city?

Chapter II, Origins states:

*Captain Thomas and his assistants, sent out to New Zealand by the Canterbury Association to choose a site for their proposed settlement, arrived there in November 1849. Thomas talked to the Deans brothers and requested that they furnish him with a report on conditions on the plains but there is evidence that Thomas reached his decision for the location of Christchurch independently of the report.*

The Canterbury Association had emphatically stated that the city of Christchurch was to be limited to a thousand acres and was to be surrounded by not more than a thousand acres of suburban land adjoining.

The following plan shows the thousand acres of land inside the four avenues and the suburban land around it as shown by William Clark in his Drainage Scheme for Christchurch.



In selecting the thousand acres which were to be the city of the settlement it seems obvious that Thomas's chief concern must have been to secure a place not too far distant from the port to be readily accessible. The records of early settlers show that the aspect of the site chosen was certainly far from beautiful. The unrelieved flatness of the country, the wilderness of high fern, flax, cabbage trees and raupo, tutu and niggerheads, cannot have presented a very prepossessing picture. One early writer mentioned that the site was as near to the Lyttelton road as the swampy nature of the intervening ground would permit. The Avon solved the problem of a pure water supply and that it could also be utilized as a canal for taking down large quantities of produce from the hinterland to the sea.

Yet when everything that can be said in favour of the site chosen for Christchurch has been said, it still stands condemned. To a future generation, Thomas's lamentable lack of insight into the problems which he was creating by attempting to build a city upon a flat site, a large part of which was nothing but a swamp, must ever be deplored.

One of the Dean's brothers had earlier described the land as being very swampy near the beach but 'mostly quite dry land' two or three miles inland. This, however, must be regarded as a rather euphemistic description of actual conditions. True, the thousand acres chosen by Thomas for the city itself was a dry and slightly elevated spot compared with the surrounding districts. Even so, it contained a large raupo swamp in Lichfield Street, and further east there was a still larger area of marshy ground, the haunt of thousands of duck, pukaki, and other aquatic bird life. A deep gully, too deep to be crossed on foot in winter time or in wet weather, ran right across the main centre of the city from the Avon, past St. Michael's Church, across Cashel Street in the direction of the present Bank of New Zealand, past the Municipal Council Chambers, until it eventually rejoined the river near the Manchester Street bridge.

The fact is that Wakefield and his associates in the planning of Christchurch, showed the same 'blind spot' which caused many of their plans for the settlement as a whole to go awry. So obsessed were they by their own ideals for the new settlement that they became oblivious to facts which others of less intellectual capacity might have seen at a glance.

It has been a mere 160 years since our city's site was chosen and only 69 years have passed since Agnes wrote her Thesis which showed the lack of insight by Captain Thomas when choosing the site of Christchurch. There are cities overseas that are thousands of years old and are destined to survive for many more.

One has to ask one's self how far we are looking ahead. This may be the one and only opportunity to correct the failures of the past and relocate our CBD. To me, the current thinking shows a complete lack of intellectual capacity of our city planners and councillors who seem not to have looked at history or our present day disaster when planning our city's future.

BLACK MAP

The 'BLACK MAP' shows quite plainly the swampy nature of the land that the major part of our city has been built on. The City Council and the various borough and county councils over time have just continued blindly on allowing the city to spread further and further into the swamp and now the chickens have come home to roost. We must learn by our mistakes and now do things differently.

It seems nonsensical to me to pour money into trying to strengthen the ground and make buildings stronger so as to build back in the swamp. A better solution to me would be to build on the stable and less productive land to the west and leave the swamp to agriculture and the birds.

**William Clark** was a member of the Institute of Civil Engineers and in his 1878 report to the Christchurch Drainage Board stated;

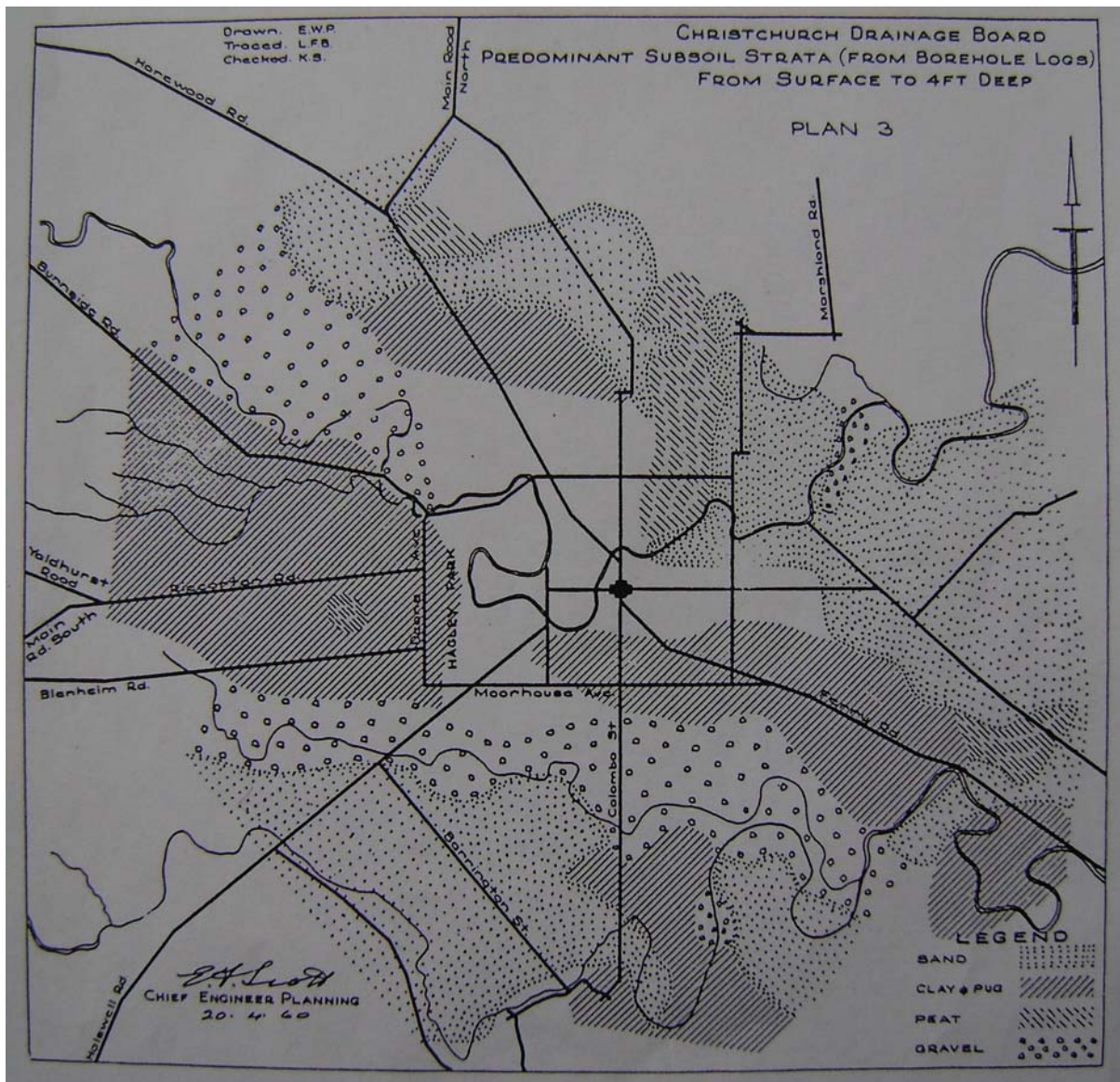
- Borings which have been made show beneath the surface soil an irregular succession of beds of clay, sand and gravel, generally filled with water.
- A long drainage outfall sewer constructed from a point in Selwyn Street along the South and East Belts to Tuam Street and thence to the Estuary. The construction of this sewer was, it is said, attended with considerable difficulty, owing to the quicksands met with, and is now in a somewhat ruinous condition.
- I would therefore point out what is to me the most prominent feature in its condition, as affecting the public health of Christchurch and its suburbs. This is a water-logged site. Over a large area of the city, especially in winter, water is met with at from 4 feet to a few inches only below the surface of the ground, and at Waltham the water during winter time is stagnant on the surface; .....
- I by no means desire to ignore the fact that great difficulty will be found in carrying out the works in a soil so saturated as is that of Christchurch; that occasionally permanent running springs may be encountered which it will be impossible to admit into the sewers.....

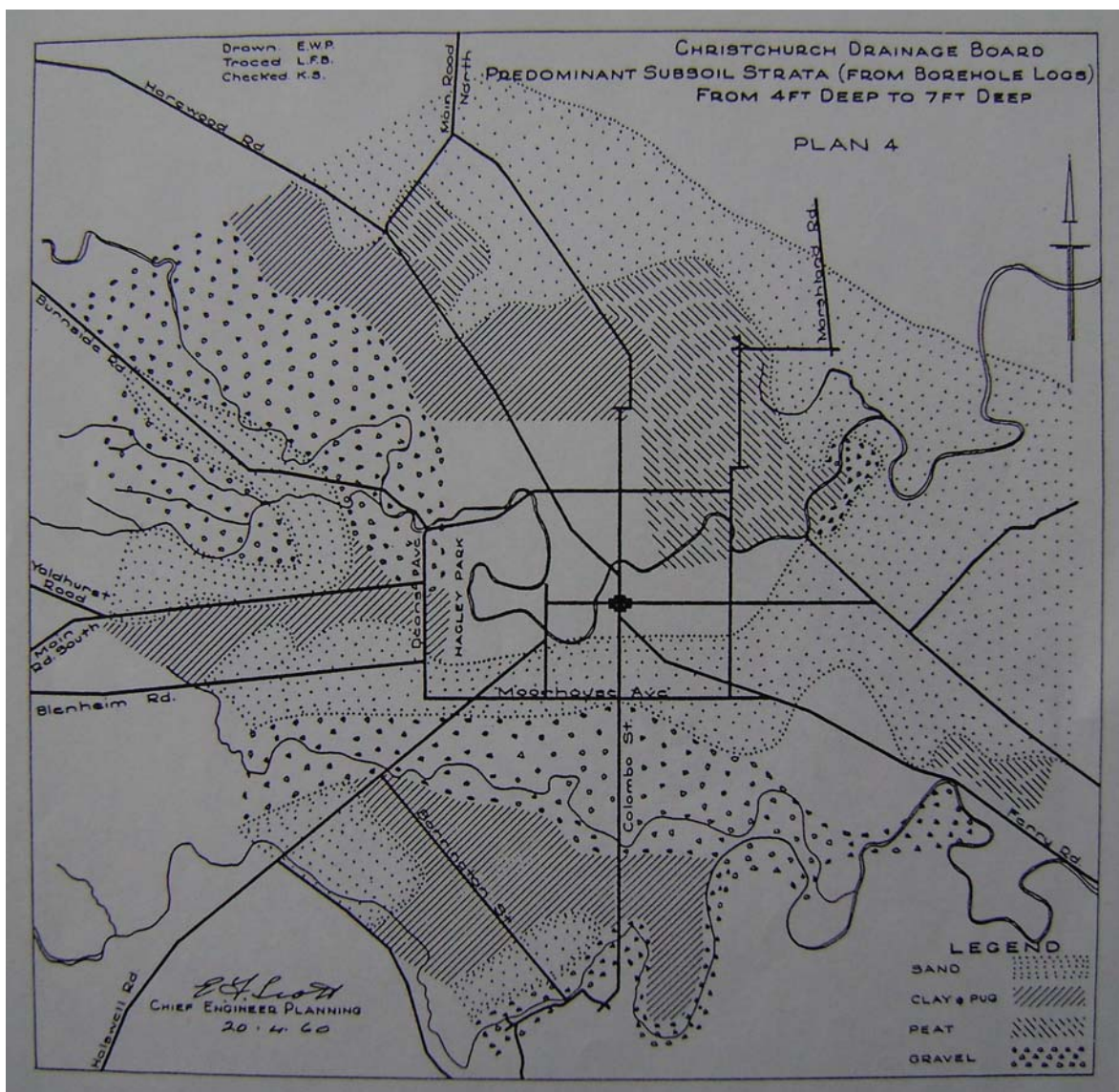
Clark stated that Christchurch was a water-logged site and over the years since the initial development of Christchurch it has cost its ratepayers many unnecessary millions of dollars in storm water piping to eliminate flooding and for the temporary dewatering of the ground so that pipelines could be installed. These are ongoing costs because if the city is maintained in its present site the sewer piping in the CBD will have to be replaced, it is about 140 years old and the earthquakes have caused damage.

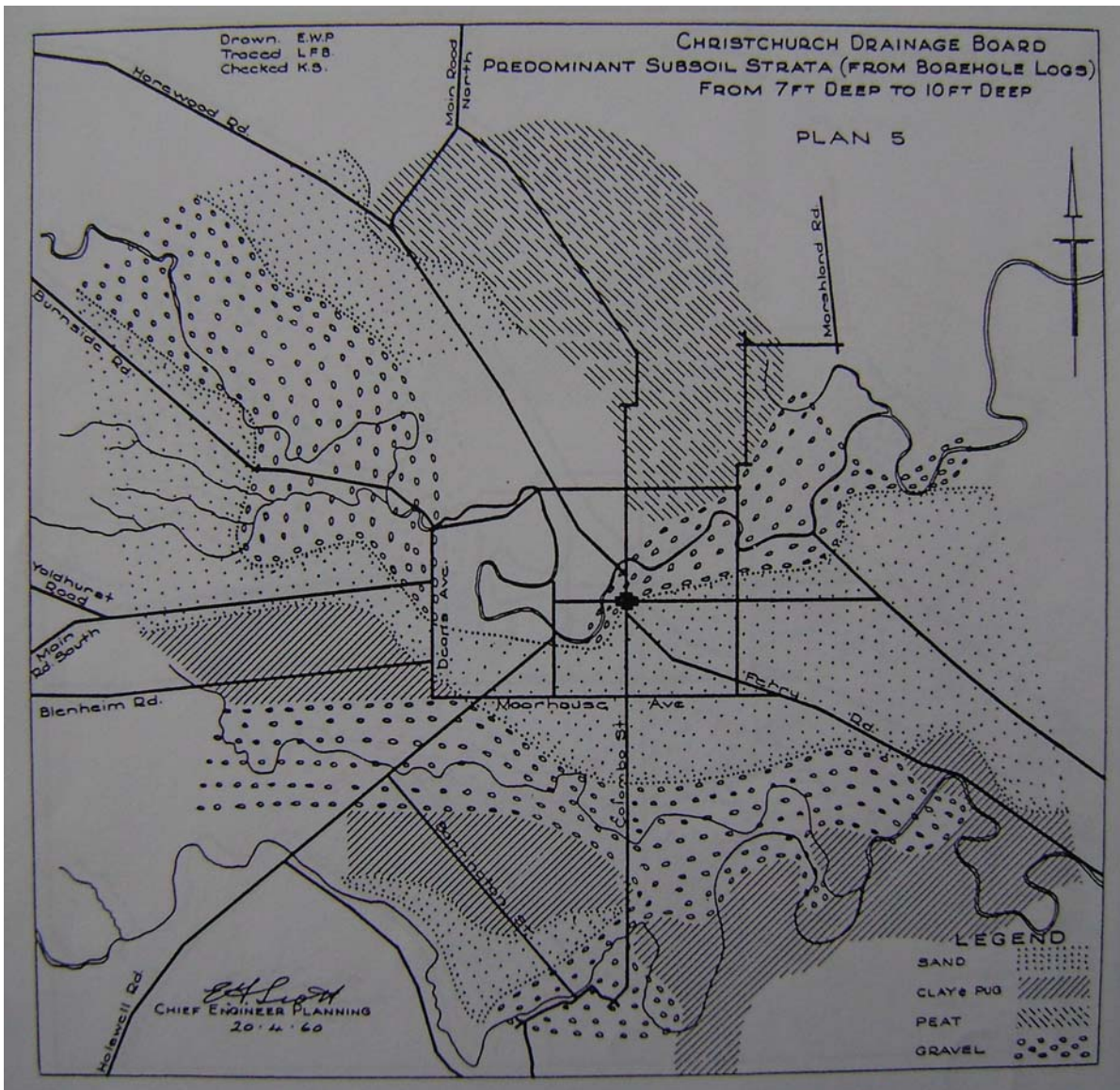
If we are to believe the climate change people and the sea level does rise the water table will also rise and piping that may require replacing in another 150 years will again require even more costly dewatering to be able to be installed.

If the city was moved west on to porous gravels there would not be flooding problems requiring costly storm water piping and because the water table is lower the further west you go piping can be installed without dewatering. The city would not be affected by potential sea level rise either.

**E F Scott** in his book 'Christchurch Data' printed in 1963 contains 3 maps showing the Predominant Subsoil Strata for much of the city up to 1960, compiled from borehole logs. Plan 3 from the book covers from the surface to 4 feet deep, Plan 4 covers from 4 feet to 7 feet and Plan 5 covers from 7 feet to 10 feet deep. The soils are sand, clay and pug, peat and gravel.



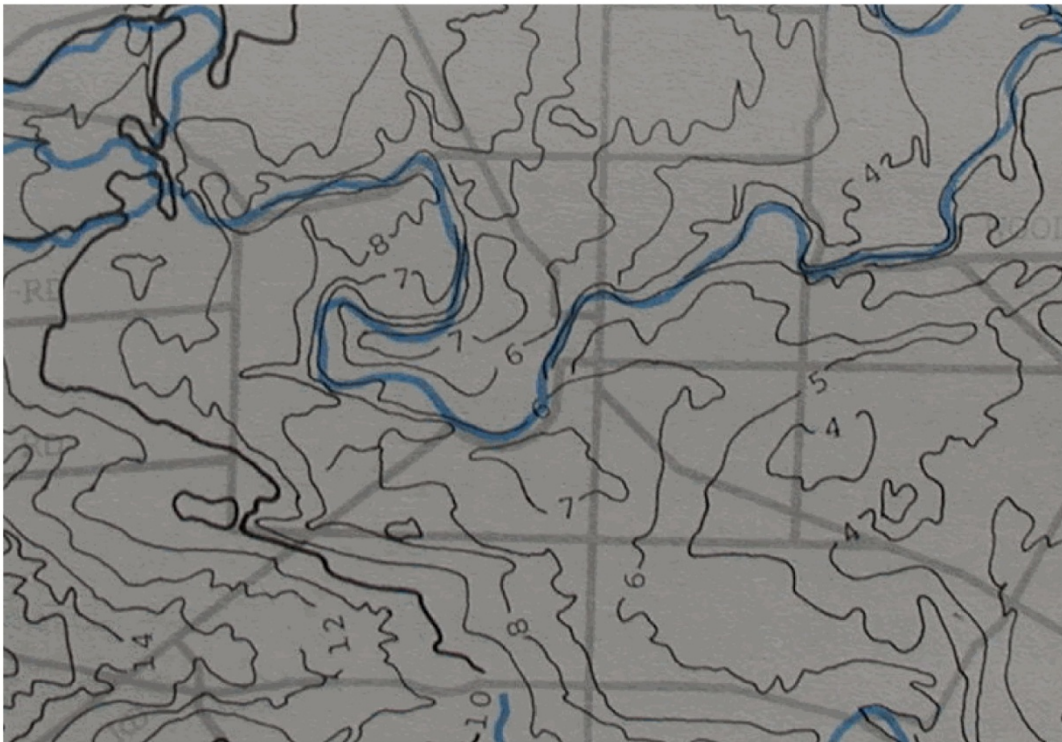




These subsoil's show a very irregular deposition of material from the Waimakariri River mouth as it moved about the plains over thousands of years. The Waimakariri River had not finished its plains building process before man intervened and confined it between stopbanks so as to prevent the city they had build in the swamp from being flooded. Potential flooding from the Waimakariri River is another good reason for not rebuilding the CBD in the current location.

**John Wilson** wrote 'Christchurch, Swamp to City, a short history of the Christchurch Drainage Board 1875 – 1989'. In the early part of his book the basic source was taken from Agnes Hercus's book and then added too from information gained from the present staff in 1989 and former staff.

- I compiled maps for the book including a 1 meter contour map of the city from the coast to just beyond the Christchurch airport. Contours showed an even grade from the west to about Hagley Park and then to rather a mess of contours at a flatter grade from there to the sea. The map below shows the contours of the Christchurch central area but needs to be read in conjunction with the whole map to get an appreciation of why the site chosen for the city was a poor one.



CONTOURS AT 1 METER INTERVALS ABOVE MEAN SEA LEVEL COMPILED BY KEN SIBLY 1989



- The 'Black Map' showing Waterways, Swamps and Vegetation Cover in 1856. I compiled this in 1989 from the original 'Black Maps' held by Land Information New Zealand and maps held at the Canterbury Museum and it has been an invaluable document in gaining an in-site as to what was here at the time of the establishment of Christchurch. The map below is a portion of the 'Black Map' showing the Christchurch central area and it should be read with the complete map to get the overall picture of why the site chosen for the city was again a poor one.



COMPILED BY KEN SIBLY IN 1989 FROM BLACK MAPS BY J THOMAS AND THOMAS CASS 1856

## CONCLUSION

We can draw a parallel between the New Zealand leaky building disaster and the Christchurch earthquake disaster. In the case of the leaky buildings, products and methods were designed to keep buildings watertight but many have now failed to do what the so called experts told us they would do. We now have leaky buildings that have rotted and costing the poor tax and ratepayers huge amounts of money to repair.

We now have the earthquake disaster where a city was built in a swamp and areas with a high water table. Again, people in authority, and who we trusted, gave approval for subdivisions and buildings to be built, infrastructure to be installed that we were happy to buy, occupy and use. And again, there has been a catastrophic failure that is going to cost the tax and ratepayers huge amounts of money.

It would seem to me that in Christchurch the Council wants to approve new developments in swamps and areas with a high water table for Mother Nature to again destroy.

We can see that the so called experts do get it wrong and often don't learn by their mistakes. They just carry on with the same old methods because they are never held accountable for their mistakes.

We cannot afford for our city fathers to be so obsessed by their own dreams and ideals and make the same mistakes again. Planning for the future has to be for the long term and that needs to be for much more than 150 years because the planning in the last 150 years has proved to be appalling.

**WHERE NOT TO REBUILD**

- On swampy areas
- On filled land
- Near rivers
- Near any rivers with stop banks
- In potential flooding areas
- Near the sea (sea level rise)
- Areas prone to tsunamis
- On areas with a high water table
- On land where there was a known waterway
- On areas of productive soils

**WHERE DO WE BUILD**

- On the gravel Plains
- At least above the 50m contour beyond the airport
- A safe distance from the Waimakariri River
- Where it is easy to build underground infrastructure.
- On low productive soils

**Please note:**

I will only be in Christchurch until December 15<sup>th</sup> and then be back at the end of February for a few days and the away until at least the end of April. If you need clarification of any part of my submission or require questions answering I can be available at any time while in Christchurch.