

PRELIMINARY REPORT ON SITE INVESTIGATIONPROPOSED HOUSING TRUST AREA.OLD B.H.P. AERODROME.WHYALLA.Section 37, Hundred Randell, County York.I SUMMARY.

Following a request by the South Australian Housing Trust, a brief preliminary survey was made of the old B.H.P. aerodrome in Whyalla, to determine foundation conditions for home building. The main problem was the suspected salinity of portion of the area, and the effect that this would have on future gardens, and whether the salinity of the soil could be improved by a drainage system.

It was found that although foundation conditions are relatively stable, a great portion of the area is definitely saline, to the extent that gardens, and possibly foundations could be seriously affected. Further testing, and consultation with the Department of Agriculture is recommended, to determine whether conditions can be improved by artificial means.

II INTRODUCTION

Following a request by Mr. H.P. Smith, Sites Architect, of the South Australian Housing Trust, a preliminary inspection was made of an area in Whyalla, to determine foundation and other conditions for a proposed housing scheme.

From an earlier proposed but abandoned B.H.P. Housing Scheme, portion of the area had been reported to be saline, and the preliminary survey was made to determine the extent and nature of the salinity, and to assess the possible effect on houses and gardens. The possibility of reducing the salinity of the soil by a deep drainage system was also to be investigated.

The area examined is Section 37, Hundred of Randell, County of York. It is approximately a mile to the west of the Whyalla Post Office, and consists of an irregularly shaped tract, on what was formerly the old B.H.P. Aerodrome.

### III TOPOGRAPHY.

The area can be divided into two sections, the gently sloping northerly portion, which occupies approximately one third of the area, and the relatively flat southern portion. The lower portion of this southern area is saline, and is a low lying area, approximately 8' - 12' above high water mark. The land then rises gradually to the north until at the edge of the proposed area, it is approximately 50' above high water mark.

The drainage of the area is towards the southern portion, and south of the Cowell road there is a creek flowing towards the sea. This creek is possibly of artificial origin, and may have been constructed to drain that particular portion of the area. At the time of the inspection this creek or channel contained water, although it was not flowing, and as the bottom of the channel is only four feet below the level of the southern portion of the old aerodrome, a very shallow water table is indicated, probably only three feet below the surface in the winter months.

### IV SOIL GEOLOGY.

#### 1. Soil Types

The survey was of a preliminary nature only, and as the site was only briefly examined little can be stated about the soil types. However, three main divisions could be recognized, although these may have been modified during the construction of the aerodrome. The three soil types are as follows:

##### (a) Mallee Type Soil.

This occurs in the higher portion of the area, and consists generally of a sandy soil with abundant limestone rubble and many lime coated waterworn pebbles. In the areas examined there was no definite profile development, and possibly the lime is due to the influence of cyclic salts.

##### (b) Estuarine and Marine Soil Type.

This occurs in the low lying southerly portion of the

area, and is a fine grained silty soil with visible salt accumulation, and little profile development. It is generally much less sandy than the mallee soil type, and has a greater proportion of clay minerals. Lime is not present in any appreciable quantities, and the soil appears to be poorly drained with a high water table, possibly only 3' below the surface.

The presence of sea shells on the surface near the old Aero Club buildings appears indicative that the area has been subjected to tidal waters in recent times.

(c) Intermediate Soil Type.

This consists of a thin sandy topsoil overlying the fine grained material previously mentioned. There is some lime development and drainage appears to be better than in the estuarine and marine type of soil, although there is still no profile development.

2. Stability.

All the soil types mentioned above appear to be stable and foundation conditions should generally be good. Although the area was only very briefly examined it does not appear likely that any shrinking and swelling clays will be encountered. Some initial settlement under load may be experienced in the finer grained varieties, and may necessitate a broader type of foundation but foundation conditions cannot be assessed until the recommended test pits have been examined, and an indication of the soil profiles obtained.

V. SALINITY.

1. Extent

The whole area shows signs of being saline to a certain degree, probably due in part to the effect of cyclic salts from the nearby coast. However, the upper sandy portions are well drained, and the saline content of the soil is of a minor nature only and should not present any difficulties, either with gardens or foundations. The dominant vegetation on this area is blue bush, indicating that the soil is not very saline.

The intermediate soil type, (see attached plan), which is topographically lower than the mallee soil, does not have as great a cover of sand, and is not as well drained as the mallee soil type. There is evidence of salinity in this soil as can be seen in the gardens along Playford Terrace, where the lawns have the bleached effect associated with salt. The dominant vegetation on this soil type is still the blue bush variety, but salt bush becomes more prevalent in the lower portions, indicating that the salt content increases in this direction.

The Estuarine and Marine soil type which is present on the flats in the southern portion of the area is very saline, with salt accumulation in the profile and on the surface. The dominant vegetation on this soil type is salt bush, with only a very occasional blue bush, indicating that the salt content of the soil is high. Gardens and lawns have been seriously affected on this soil, and on the recreation reserve there is no vegetation, although several attempts have been made to plant turf on the oval.

## 2. Nature of Salts.

The composition of the salts occurring in the soils could not be determined in the brief preliminary survey, and it will be necessary to obtain soil and water samples for analysis from the recommended pits and drill holes. The degree of salinity of the soil which will affect household gardens in the area is beyond the scope of this department, and it is recommended that the Department of Agriculture be consulted in this respect.

The nature of the salinity will also have a bearing on foundation conditions, as certain salts, e.g. gypsum, have a deleterious effect upon concrete, and can cause structural failure. Normally gypsum is relatively insoluble, but the solubility is increased in the presence of sodium chloride, and as there is almost certain to be considerable quantities of sodium chloride in the groundwaters, there may also be sufficient gypsum to effect foundations. This can and will be determined however by analyses of the water soluble salts in the soils and groundwater.

## VI DRAINAGE.

The possibility of a drainage system, using deep agricultural drains to decrease the salinity of the soil, is dependent upon several factors.

- (a) Topography: The saline area is topographically low, varying from 5' - 15' above high water mark, (This figure is approximate only as the available plans do not define the relationship between the contours and mean sea level.) Towards the sea there is a maximum fall of approximately 14 feet per mile with some areas having a much lower fall. Because of this low fall, drainage of surface water is very poor.
- (b) Water Table: The depth of the water table was not determined in the preliminary survey, but from surface indications, and from a channel to the south of the area, it appears to be shallow in the low lying areas, which would indicate poor drainage conditions.
- (c) Water intake of the area: This includes both meteoric and groundwaters, since to decrease the saline content of the soil, sufficient water of low salinity must pass through the soil profile to remove soluble salts. In this case the groundwaters would be contaminated by the overflow of the septic tanks of the houses north of Nicolson Avenue, as the resultant effluent must drain through the proposed area and must necessarily increase the salinity of the groundwater. The meteoric waters depend entirely on the annual rainfall which is not high in this area.
- (d) Porosity of the Soil: The drainage of groundwaters is partially dependent on the porosity of the soil, and although the upper soils appear to be well drained the lower fine grained soils are not as porous, and could impede grainage of the salins waters to be removed. The determination of the above conditions and the effect upon a drainage system is beyond the scope of this

department, and it is recommended that the Department of Agriculture be consulted.

## VII RECOMMENDATIONS

The preliminary survey indicated that although foundation conditions are relatively stable there is evidence of salinity in the soil profiles, and in some areas, viz. the lower lying southerly portions, the salinity is such that gardens and possibly foundations could be affected.

It is recommended that a series of test pits be dug, so that a further inspection can be made, and soil profiles can be obtained. The number and location of these pits is shown on the attached plan, and the pits will be supplemented by auger holes. The pits should be at least 5 feet deep, unless the water table is encountered before this depth.

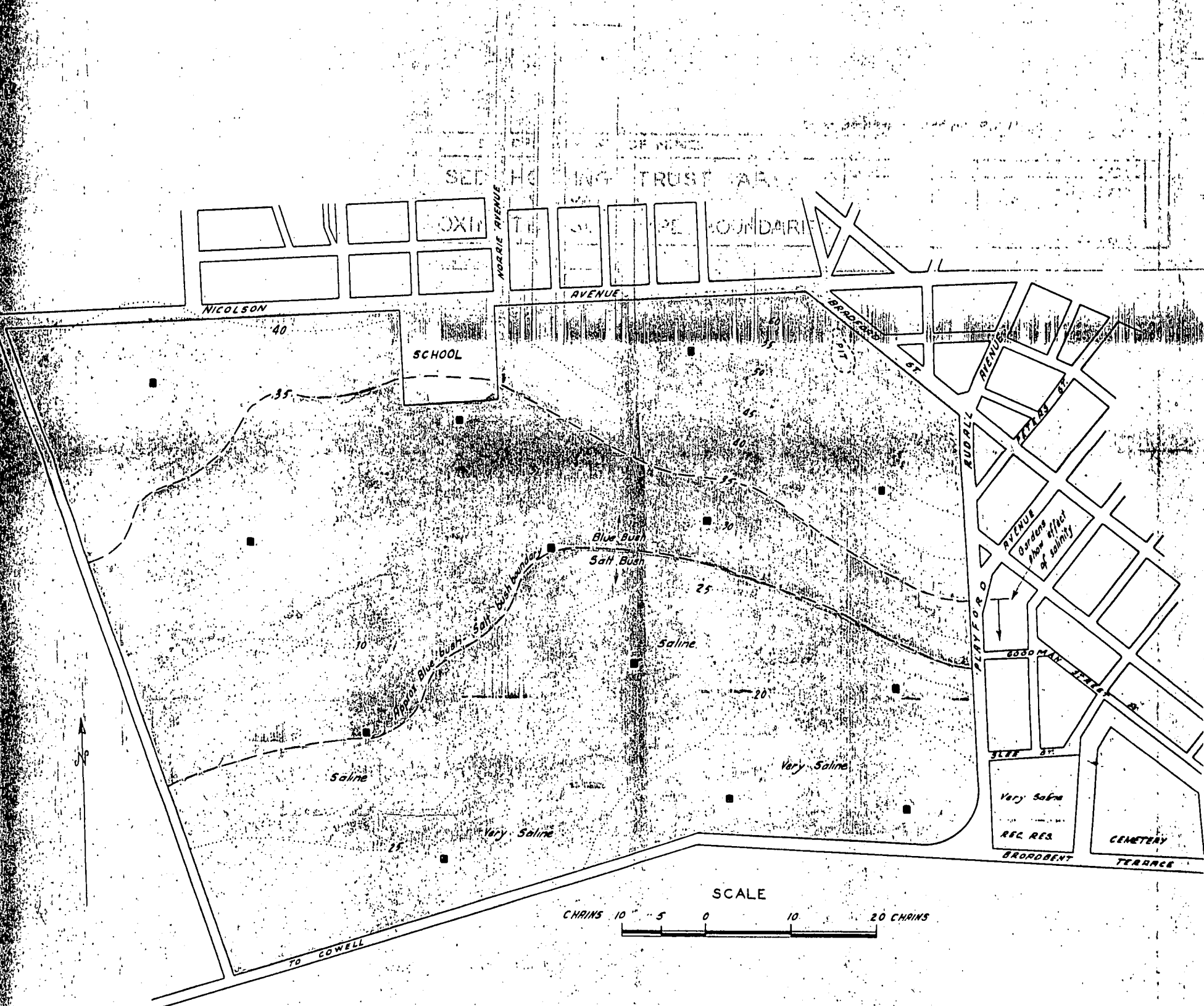
Soil profile sections can then be determined, and samples of the soils and groundwaters will be taken and analysed to determine the nature and amount of water soluble salts present in the soil.

With regard to the effect of the salinity on future gardens, and the possibility of improving the salinity by a drainage system, it is recommended that the Department of Agriculture be consulted, as this work is beyond the scope of the Soils Geology Section.

PGM:CERF  
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*P.G. Miller*  
P. G. MILLER.  
GEOLOGIST.  
SOILS GEOLOGY SECTION.

Sandy Mallee Soil: Slightly Saline  
 Intermediate Soil: Slightly to Moderately Saline  
 Estuarine & Marine Soil: Moderately to Extremely Saline  
 Recommended Test Pits (3-ft. in Depth or Water Level)



LEGEND

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From Housing Trust Plan S.L. 642

To accompany report by P.G. Miller.

S.A. DEPARTMENT OF MINES				To accompany report by P.G. Miller.			
PROPOSED HOUSING TRUST AREA				Scale: 10 CHAINS = 1"			
WHYALLA				58-249			
APPROXIMATE SOIL TYPE BOUNDARIES				Dk 2			
No.	Amendment	Ext.	Date	Approved	Passed	Director	Date 4-9-58