# A. S. JAMES-BEAR PTY. LTD.

## GEOTECHNICAL ENGINEERING SERVICES

7 Carrington Street

KAPUNDA S.A. 5373

Tel: (08) 8566 2399 Fax: (08) 8566 2344


# TRAFFICABILITY ASSESSMENT

# VARIOUS STUDY LOCATIONS - COORONG

# Department of Environment and Natural Resources

**Principal Contact:** Doug Bear

**REPORT NO. 4768001**

**DATE: 15TH JANUARY 2014**



**SOUTH AUSTRALIAN OWNED - NATA ACCREDITED LABORATORY**

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

# TABLE OF CONTENTS

## Contents

# TABLE OF FIGURES

# 1. INTRODUCTION

## 1.1. Investigation Request

The geotechnical investigation was commissioned by Katherine Ryan of Department of Environment & Natural Resources (DN&NR) and the field engagement dates was Thursday 19 December 2013.

## 1.2. Purpose of Investigation

The DN&NR have 6 biology study sites at the Coorong where they are proposing to collect seeds from the top layer of clay on the salt mud flats.

In order to collect and transport the seed, vehicular access is necessary.

During the 2013 program, at a similar location, the harvest was facilitated by the use of 5 ton excavator on track mats and Gator quad bikes.

In order to expedite harvesting and to reduce costs during the 2014 season, the DN&NR are proposing to use larger vehicles for the collection and transportation of the seed.

AS James-Bear were engaged to perform the following for each of the study areas

- field assessment of each study area
- undertake Dynamic Cone Penetrometer (DCP) testing
- using the DCP values, calculate the bearing pressure at the test location
- provide a recommendation regarding the maximum weight of vehicle to drive on the mud flats

## 1.3. Study Area Locations

The five study areas are located in the Coorong region of South Australia, north of the small settlement of Salt Creek.

The areas have been given project names and the locations can be found in APPENDIX B - SITE AND LOCATION PLAN.

## 1.4. Geology

The 1:250,000 Geological map sheet "NARACOORTE (SJ 54-2)" indicates that the local geology is;

Pleistocene BRIDGEWATER FORMATION: Stranded coastal dunes, beach ridges and beach deposits. Mostly medium to coarse grained calcarenites with varying proportions of quartz. Marine fossils (mulluscs, gastropods and foraminifera) are common in the beach deposits, but only rounded shell fragments and eroded foraminifera are found in the aeolianite.

Pleistocene-Recent Modern Coast Dune: Unconsolidated calcareous sand of the coastal dune, beach ridge and beach deposits. Foraminifera present though shells of larger marine animals are common only in lower levels.

See an extract of the "NARACOORTE (SJ 54-2)" in APPENDIX A – GEOLOGY

Locally in the study areas, the surface soils consisted predominantly of shallow tidal salt encrusted lake sediments comprising saturated sands and muds.

### 1.5. Field Methods

Dynamic Cone Penetrometer (DCP) testing was carried out in accordance with AS 1289.6.3.2 and results of the test can be found in APPENDIX C – DCP and BEARING CAPACITY CHARTS

### 1.6. Site Supervision

All field testing was conducted under the direct supervision of a qualified Engineering Geologist from A.S. James-Bear Pty Ltd.

## 2. RESULTS

### 2.1. Fat Cattle Point

Forty one DCP tests were performed over the study area, the results of which can be found in APPENDIX C – DCP and BEARING CAPACITY CHARTS

### 2.2. Jack Point

Thirteen DCP tests were performed over the study area, the results of which can be found in APPENDIX C – DCP and BEARING CAPACITY CHARTS

### 2.3. Policeman Point

Thirteen DCP tests were performed over the study area, the results of which can be found in APPENDIX C – DCP and BEARING CAPACITY CHARTS

### 2.4. Seagull Island

Seventeen DCP tests were performed over the study area, the results of which can be found in APPENDIX C – DCP and BEARING CAPACITY CHARTS

### 2.5. Salt Creek

Nine DCP tests were performed over the study area, the results of which can be found in APPENDIX C – DCP and BEARING CAPACITY CHARTS

## 3. RECOMMENDATIONS

### 3.1. Fat Cattle Point

The results of the forty two DCP testing in this area indicate that the lake surface in the proposed seeding area has highly variable bearing capacity ranging from 25kPa to 100kPa with a couple of small areas where DCP testing gave refusal on exposed hard rock. The bearing capacity of the surface soils is however likely to improve as the lake surface dries up. Average of all sites tested, 87kPa

### 3.2. Jack Point

In this area the DCP testing indicated that bearing capacity ranged from 25 to 100kPa with no apparent pattern to the results. It does not appear that close to shore has better bearing capacity than near the water edge. Again, the results may improve as the lake dries up. The average of all results was 56kPa.

### 3.3. Policeman Point

Thirteen DCP tests were carried out in this area with results indicating bearing capacity from 30 to 150kPa, with the average 75kPa.

### 3.4. Seagull Island

Seventeen DCP results indicate bearing capacity is extremely variable with values ranging from 25 to 100kPa with an average value of 58kPa.

### 3.5. Salt Creek

In this area nine DCPs were carried out indicating bearing capacity ranging from 25kPa to 90kPa available bearing capacity in all areas tested vary quite significantly from test site to test site with values averaging 50 to 75kPa.

The bearing capacity estimated from the DCP in all areas are highly variable regardless of whether the test locations were near shore or near the waters' edge. The lake surface in its' present moisture state as of December 2013, would not support normal vehicular traffic.

A passenger car exerts a bearing pressure of around 200kPa on the ground surface.

A medium four wheel drive such as a Toyota Hilux exerts 170kPa depending on tyre pressures.

A human male 1.8m tall of medium build exerts approximately 60 to 80kPa on the ground surface while walking.

The tyre pressure of a vehicle is approximately equal to the bearing pressure exerted on the ground so if a vehicle can be supported with large low pressure tyres of say less than about 8psi (55kPa) then it could be used with much less risk of bogging in the lake soils.

It should be noted that in general, the lake surfaces have a dry crust with much softer weaker soils below. Once the crust is broken a vehicle could become hopelessly bogged.

We suggest that lightweight vehicles with large soft tyres such as 6 wheeled John Deere "Gator" or similar could be used with similar light weight trailers.

Tracked vehicle generally exert less ground pressure than wheeled vehicles so small excavators with suitable bog mats may be an option.

**It would be advisable to have the bearing capacity of the areas checked just prior to the proposed work taking place (which I understand is February – March 2014) as the surface will dry and become firmer over the summer months.**

**This could be conducted in 1 day, via repeating a limited number of DCP tests within the study area, prior to vehicular access.**



Doug. R Bear, B.App.Sci.(Geol.)

Engineering Geologist

MANAGING DIRECTOR

A.S. JAMES-BEAR PTY LTD

# APPENDICES

# APPENDIX A – GEOLOGY

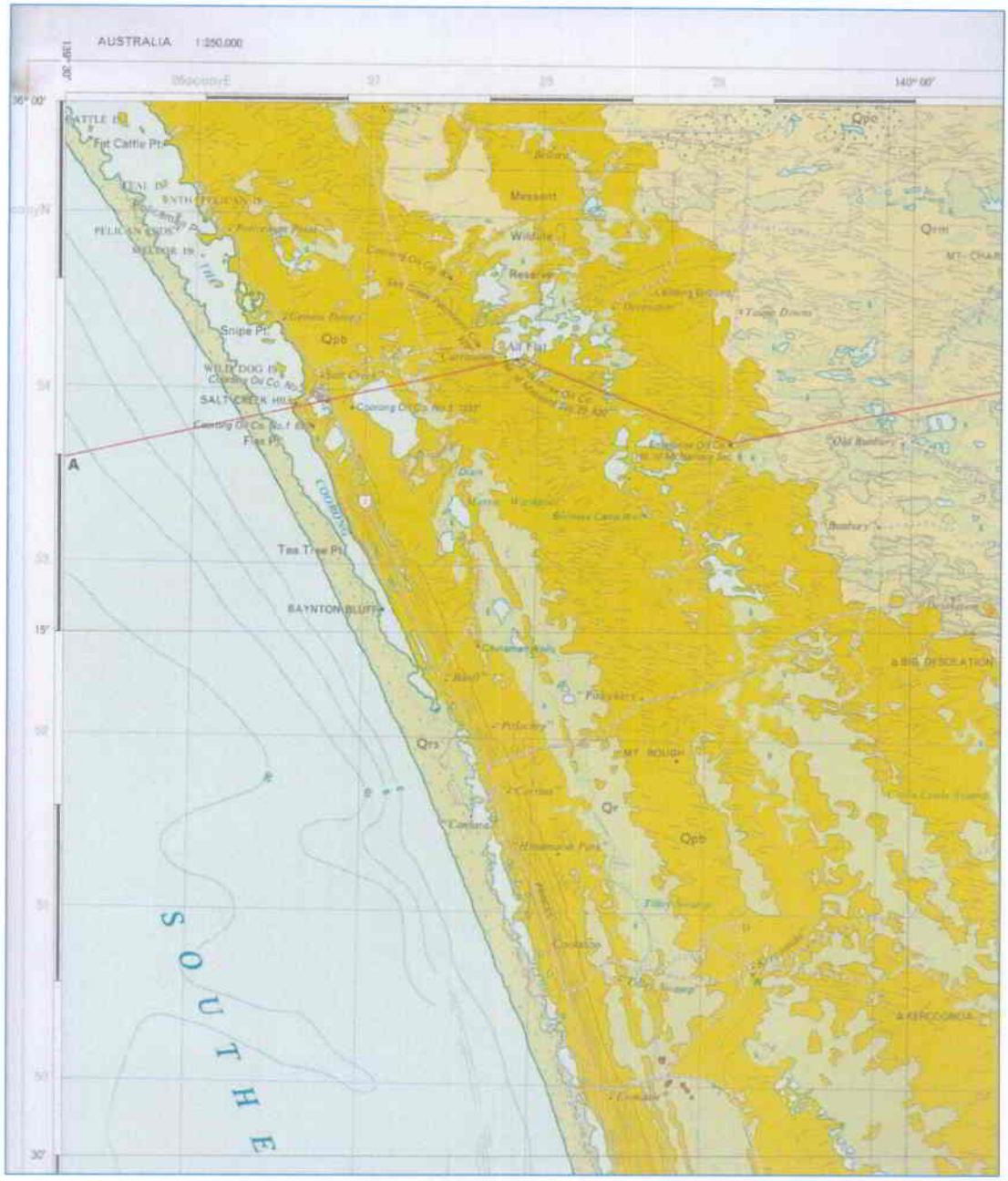


*Figure 1 Extract from the 1:250,000 Geological map sheet "NARACOORTE (SJ 54-2)"*

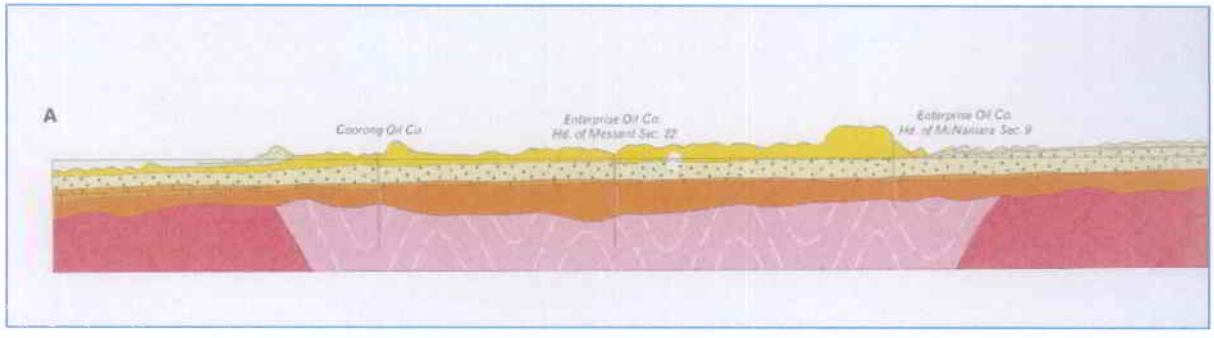


*Figure 2 General cross section of the study area, from the 1:250,000 Geological map sheet "NARACOORTE (SJ 54-2)"General cross section of the study area, from the 1:250,000 Geological map sheet "NARACOORTE (SJ 54-2)"*

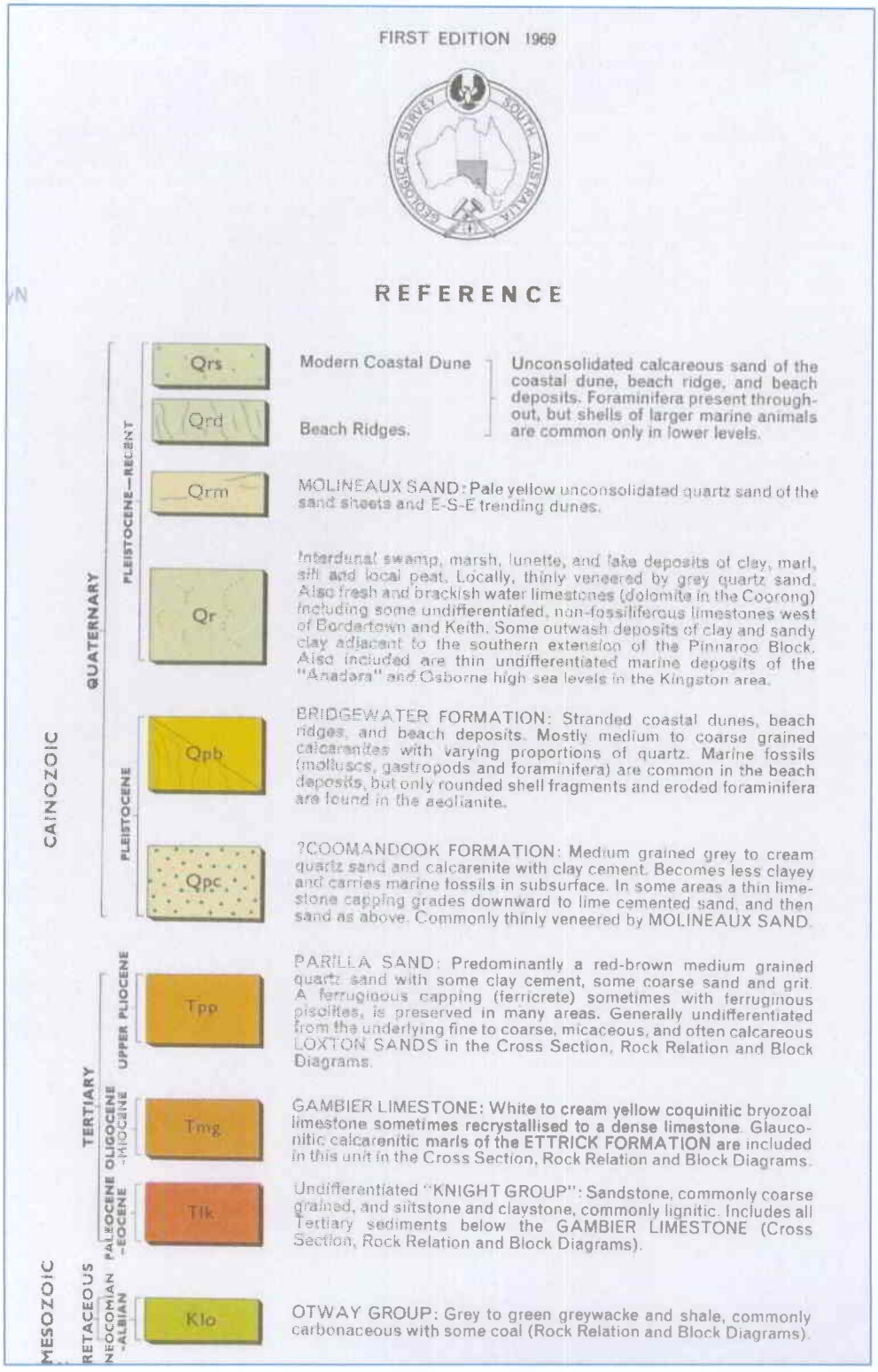


*Figure 3 Extract of the legend from Extract from the 1:250,000 Geological map sheet "NARACOORTE (SJ 54-2)"*

# APPENDIX B - SITE AND LOCATION PLAN

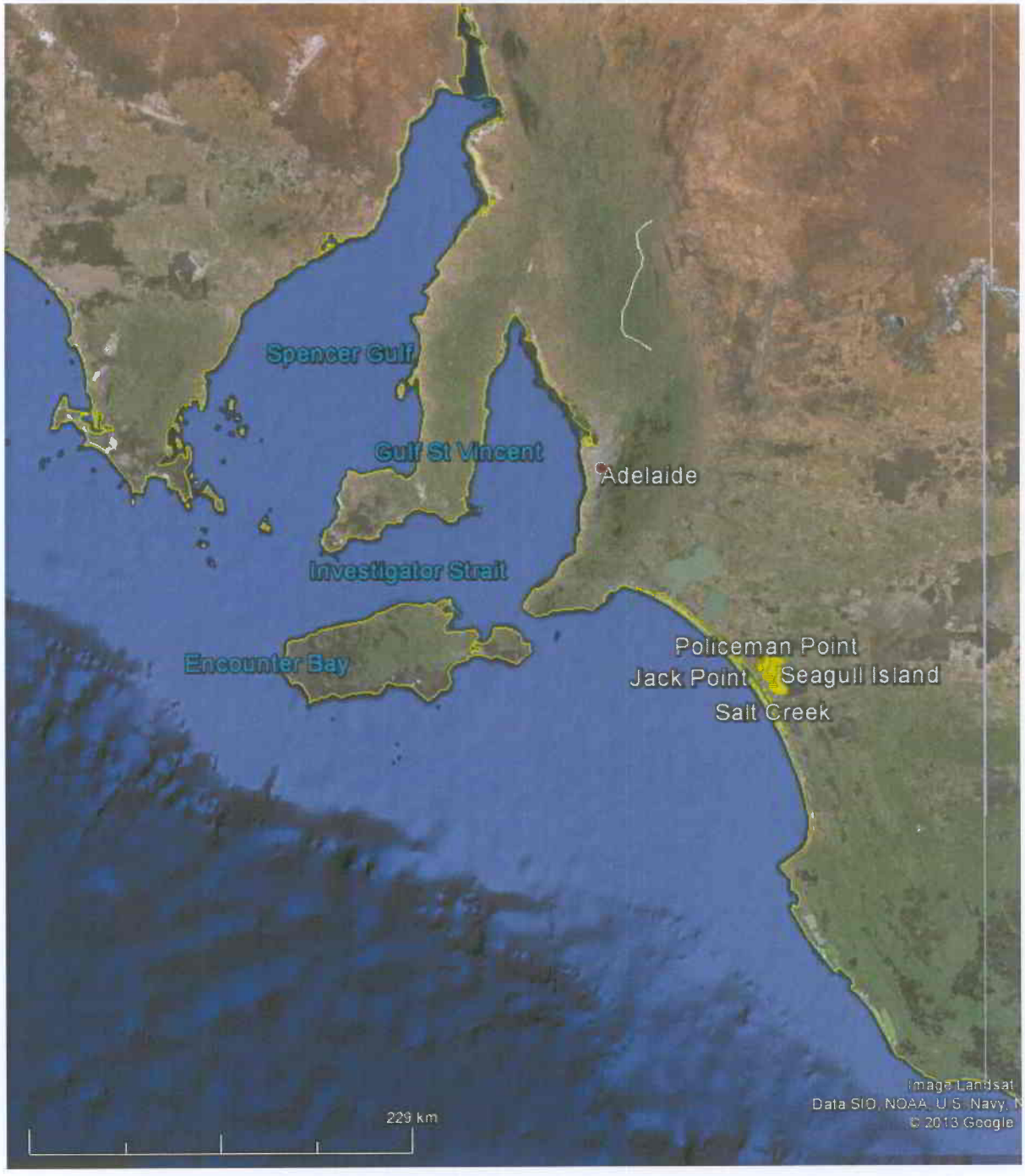


*Figure 4 General location of the study areas*


*Figure 5 Location of the study areas*

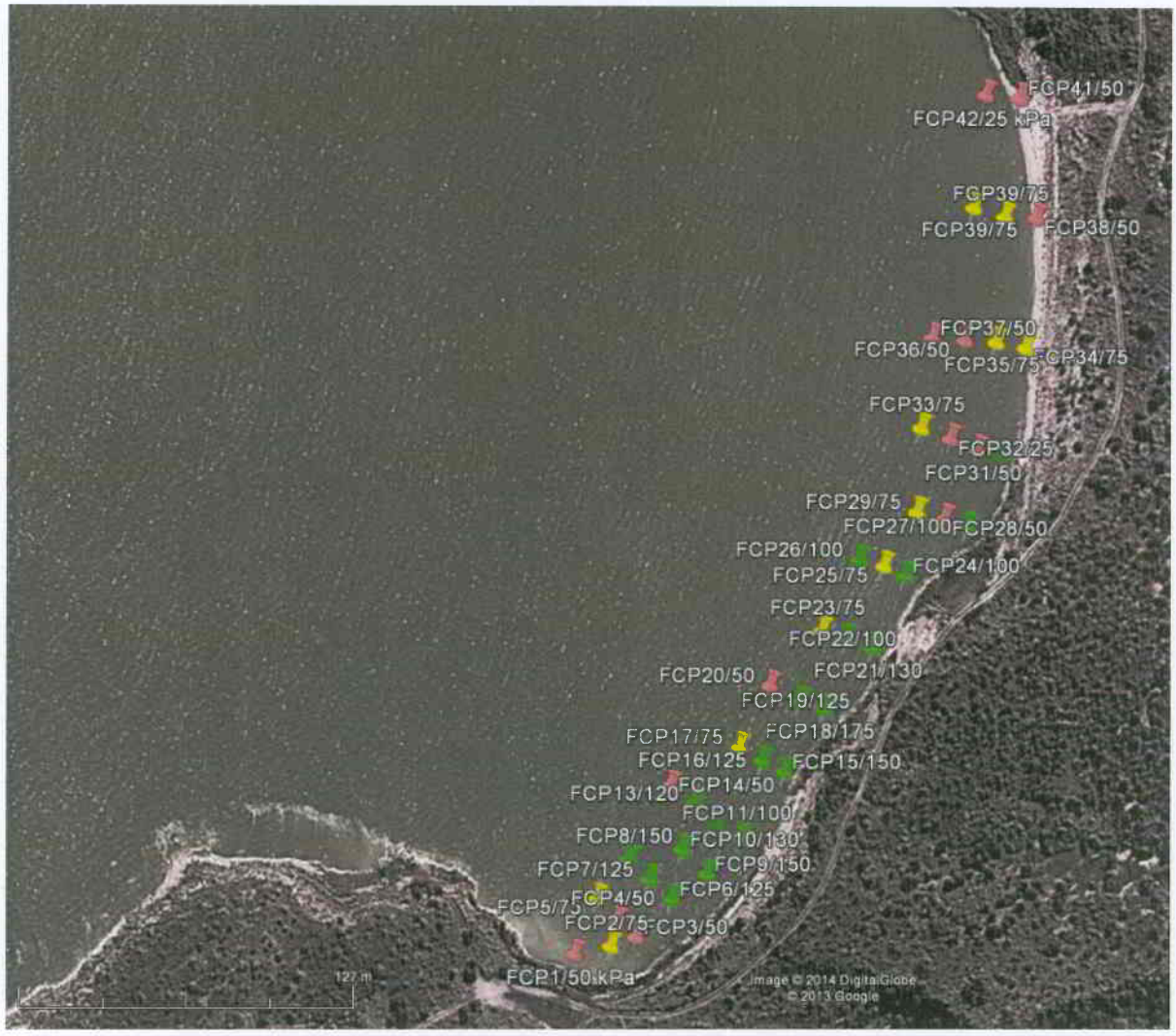


*Figure 6 Fat Cattle Point test locations and estimated Bearing Pressure in kPa*


*Figure 7 Jack Point test locations and estimated Bearing Pressure in kPa*


*Figure 8 Policemans Point test locations and estimated Bearing Pressure in kPa*


*Figure 9 Sea Gull Island test locations and estimated Bearing Pressure in kPa*


*Figure 10 Salt Creek test locations and estimated Bearing Pressure in kPa*

# APPENDIX C – DCP and BEARING CAPACITY CHARTS