



**ICRMCE 4TH
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**STUDY OF GEOTECHNICAL ASPECT BASE ON GIS AS
BASIC DESIGN OF ROAD**

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INTRODUCTION

- The development of a region requires road infrastructure to facilitate accessibility.
- Sustainable development can be achieved if road traces take into account the existing environmental conditions.
- Physical environmental aspects have a major role in the achievement of sustainable development which includes geotechnical aspects, such as soil type, peat soil, soil texture, and CBR value.
- This study aims to spatially analyze geotechnical aspects in determining road traces.

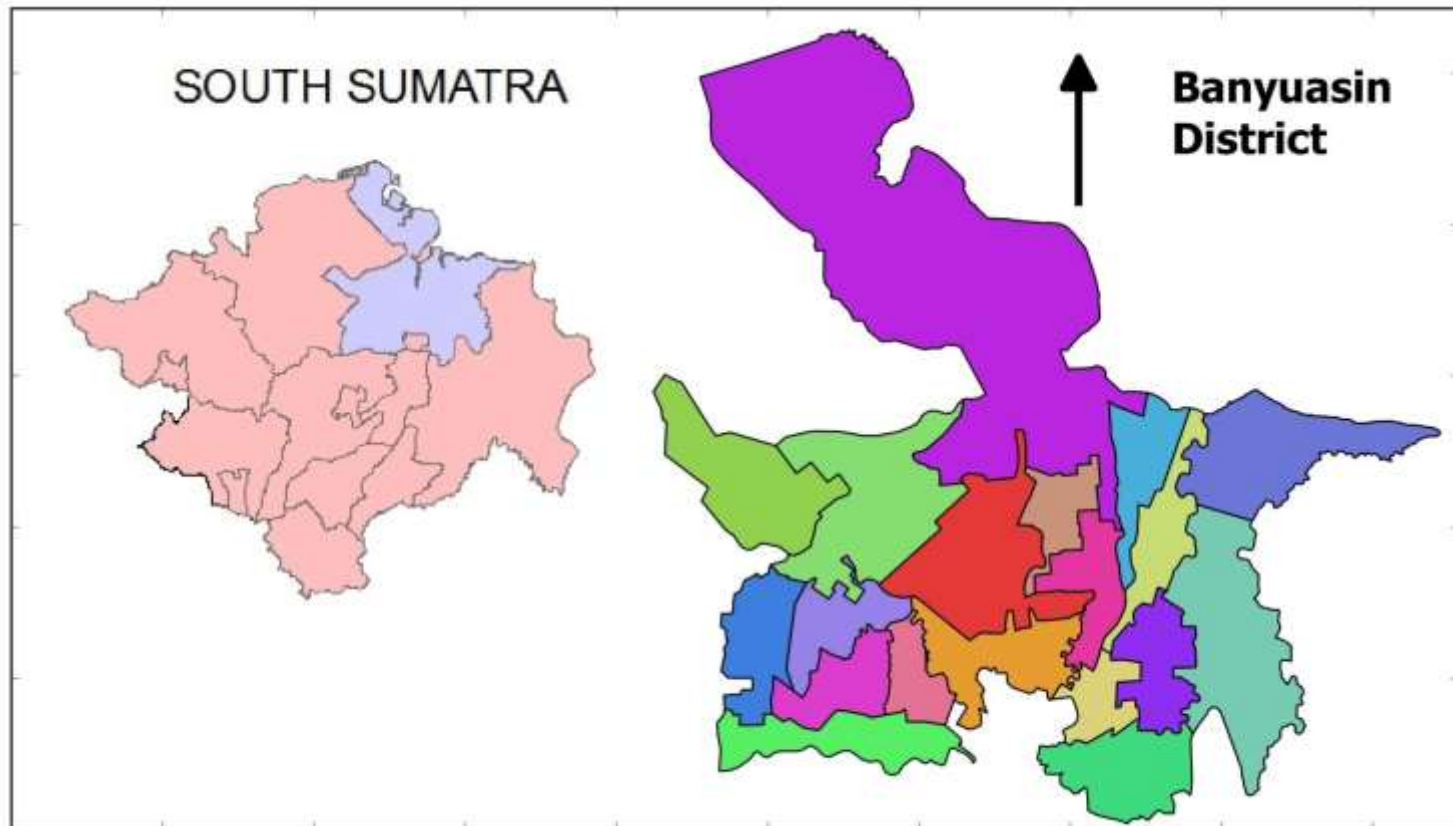
WHY GEOTECHNICAL ASPECTS?

- Mistakes in the evaluation of subgrade could lead to differences in carrying capacity of the traffic. It is up to 10 times, which means fixing the subgrade strength is the main requirement in getting a good pavement performance (Decree of the Director General Higways No 22.2/KPTS/Db/2012), so geotechnical aspect must be take in identification of road traces.

METHODOLOGY

- The method used in this research is the overlay method on geotechnical aspect weights, including soil type, soil texture, CBR value, and peat depth.
- The data used are secondary data obtained from related institutions, such as soil type maps and peat depth maps, whereas soil texture and CBR values were determined based on soil type conversion literature and results of previous study.
- Each attribute is assigned a value with a range of values between 1 and 5.
- A score of 1 is given for the most suitable parameter, while a score of 5 is given if very unsuitable.
- The weights ratio of each criterion is 25% because each aspect has the same level of importance.

WHERE STUDY AREA ?



Situated between $1^{\circ}37'32.12''$ up to $3^{\circ}09'15.03''$ LS and $104^{\circ}02'21.79''$ up to $105^{\circ}33'38.5''$ BT (RTRW Banyuasin, 2011).

WHY STUDY AREA IN BANYUASIN ?

1. This area has topography consisting of 80% wet lowland which a slope of 0 – 8 % of 1.18 million hectare wide, 8 - 15% of 1.68 million hectares has coastal area
2. A formulation of spatial planning policies of Banyuasin has developed into hierarchical road network which connects the centers of urban services with each service area
3. It will be made Special Economic Zone in the region of Tanjung Api-Api based on Government Regulation No. 51 in 2014 about Special Economic Zones Tanjung Api-Api.

THE ANALYSIS FRAMEWORK

Factors into consideration

Geotechnical Aspect

Soil
type

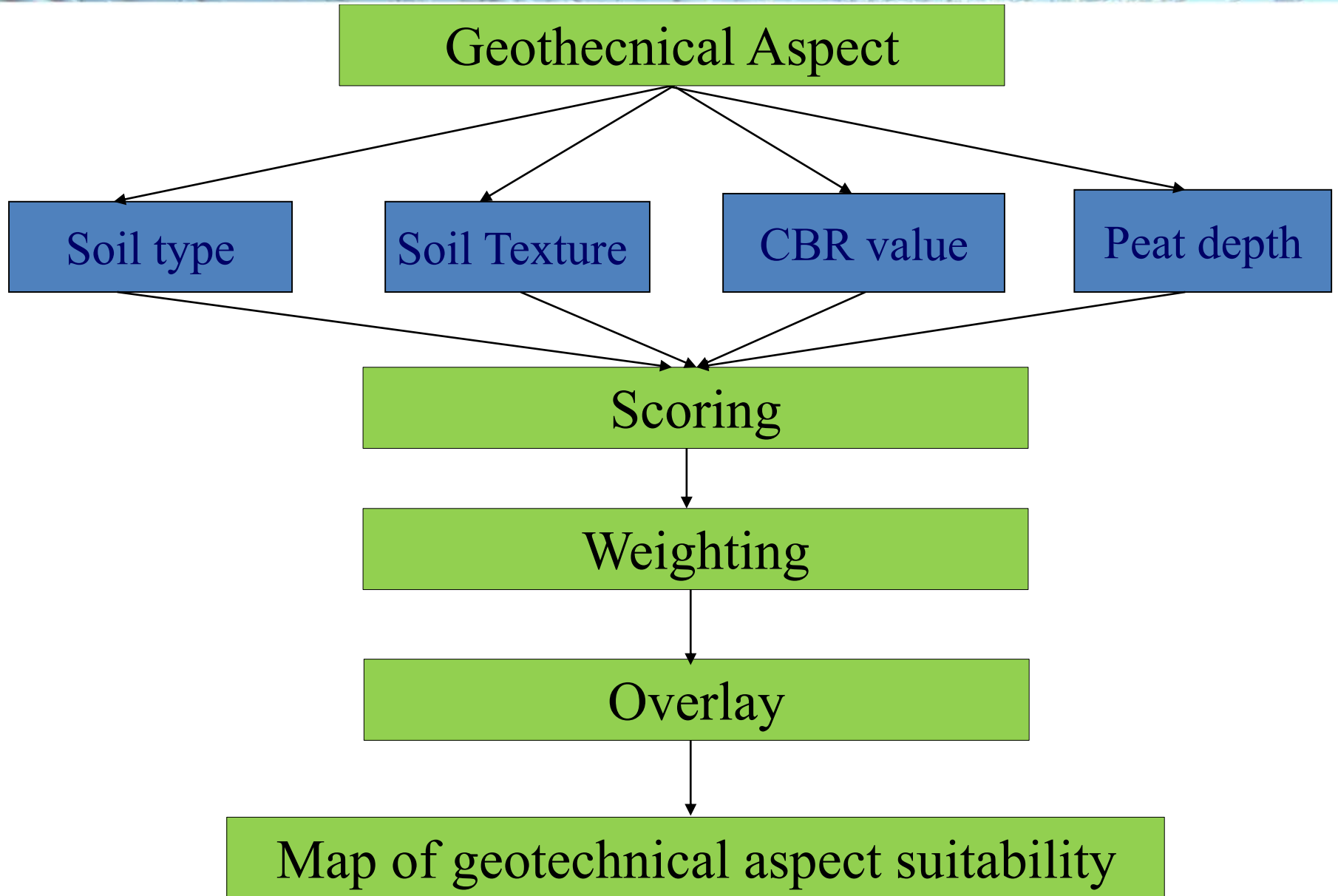
Soil
Texture

CBR
value

Peat
depth

- ✓ Soil type parameter was taken based on PPT Bogor Classification
- ✓ Soil texture parameter was taken based on AASTHO soil classification
- ✓ CBR value was taken based on the result of field and laboratory testing which was previously conducted by other resecher
- ✓ Peat depth criterian was taken base on International Indonesia Wetland map, 1998

FLOWCHART



Score of soil type criterion

Soil Type	Sensitivity Against Erosion	Score
Aluvial, Gley, Planosolm, Hidromorf.	Not Sensitive	1
Laterit, Latosol	Sensitive Enough	2
Brown Soil	Less Sensitive	3
Andosol, Laterit, Grumosol, Podsol, Podsolik.	Sensitive	4
Regosol, Litosol, Organosol, Renzina	Very Sensitive	5

Score of peat depth criterion

Ketebalan Gambut (cm)	Criteria	Skor
20 – 50	Vary shallow	1
50 - 100	Shallow/ thin	2
100 - 200	Moderate	3
200 - 300	Deep/ thick	4
> 300	Very deep/ thick	5

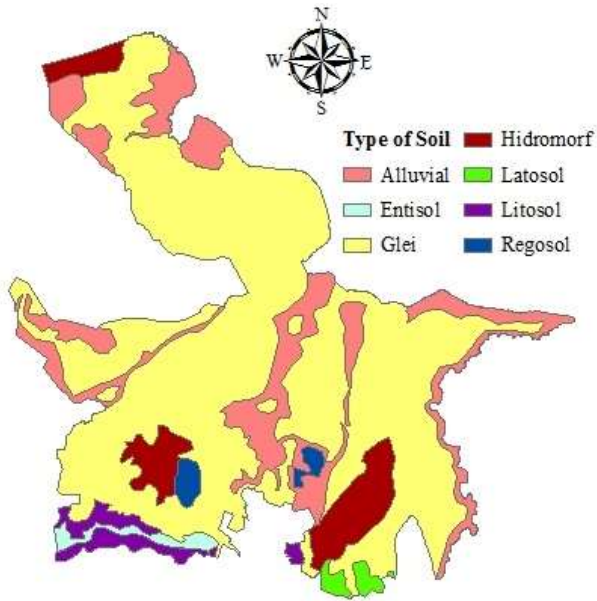
Score of soil texture criterion

Soil Texture	Category	Score
Gravel	Excelent	1
Fine sand	Good	2
Gravel with silt and clay	Fair	3
Silt	Poor to Fair	4
Clay	Very Poor	5

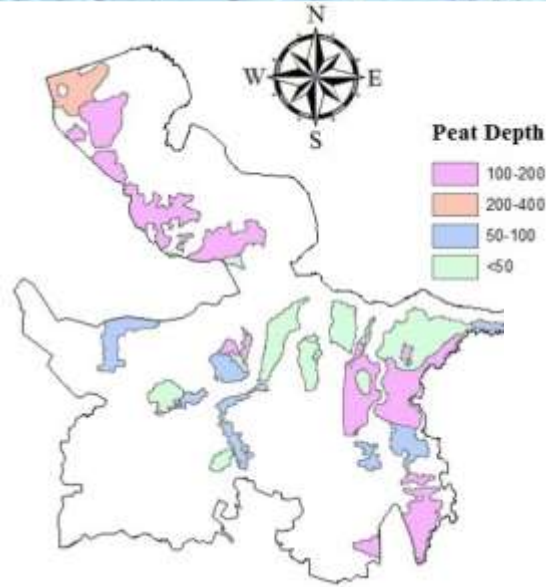
Score of CBR value criterion

CBR	General Rating	Score
0 – 3	Very poor	5
3 – 7	Poor to fair	4
7 – 20	Fair	3
20 – 50	Good	2
> 50	Excellent	1

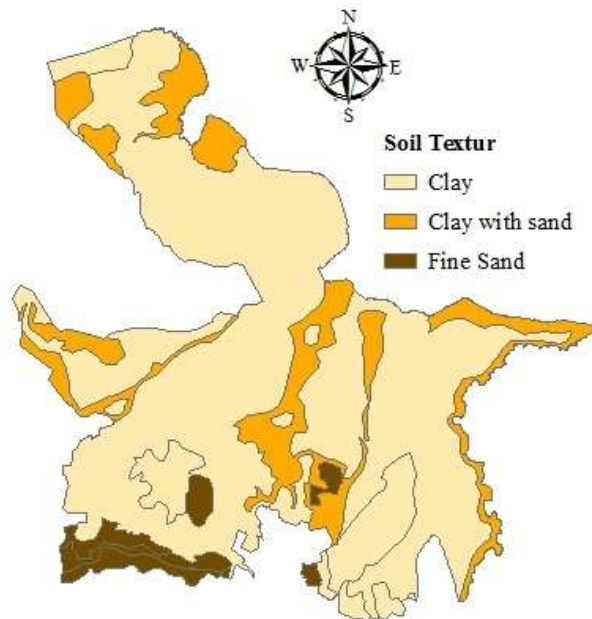
Criteria of the Geotechnical Aspects



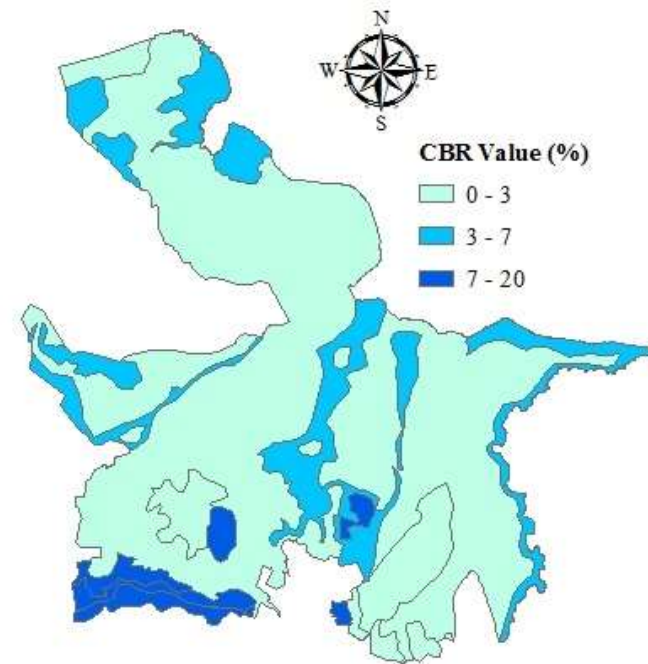
Type of soil



peat depth



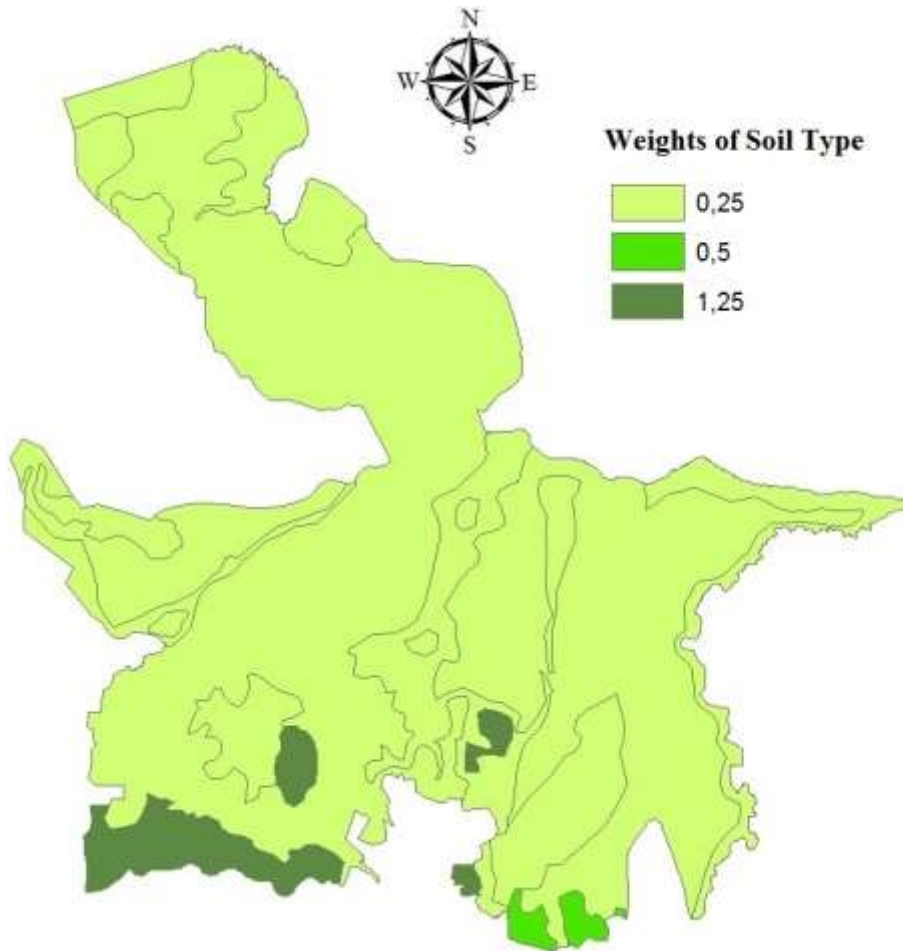
Soil texture



CBR value

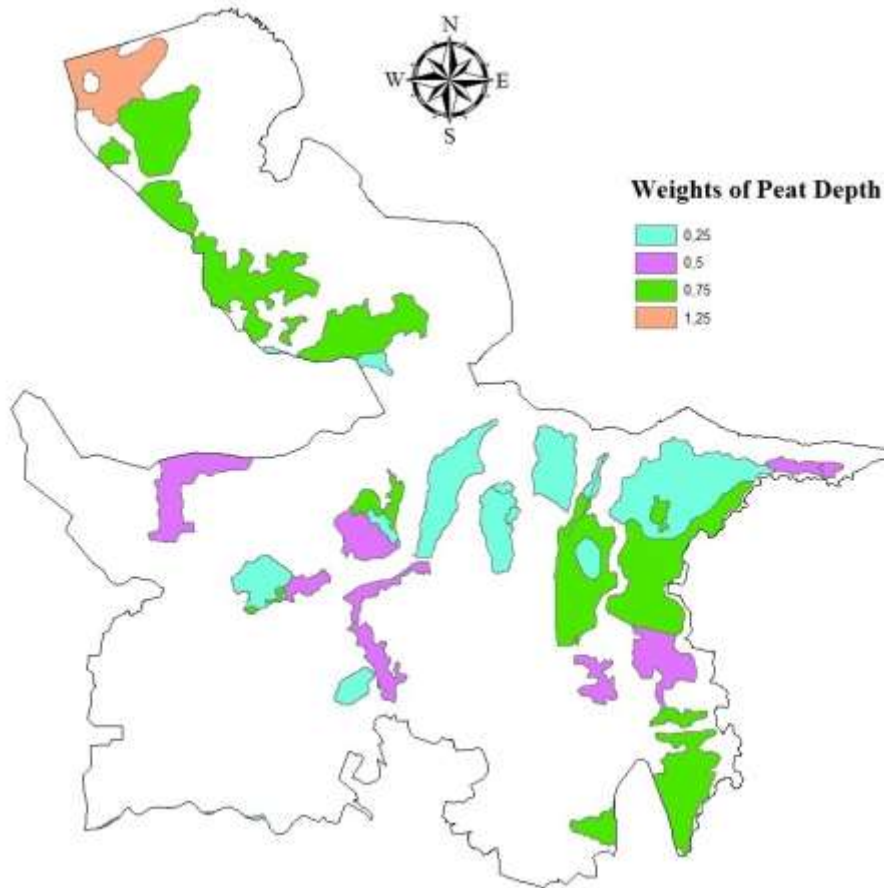
The score of each criterion is multiplied by the weights of each aspect of 25%.

The weights of soil type



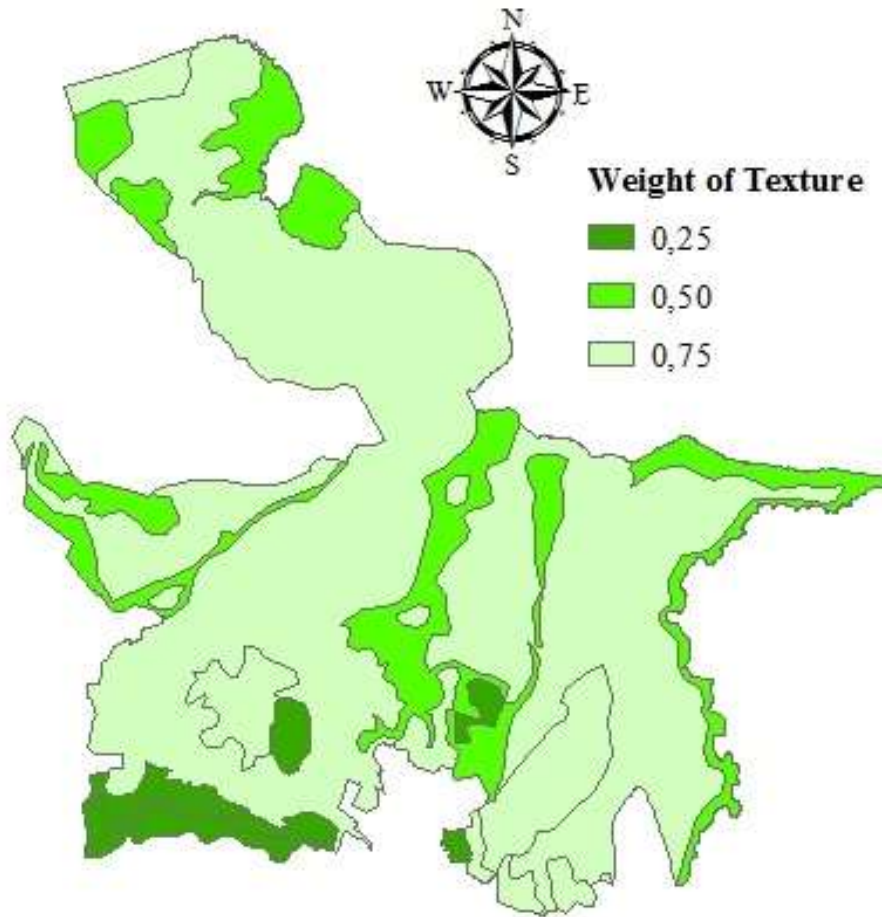
- The lowest weights of soil type happen on gley and alluvial soil, this indicates that this area can be selected as a road traces because the soil has low sensitivity to erosion.

The weights of peat depth



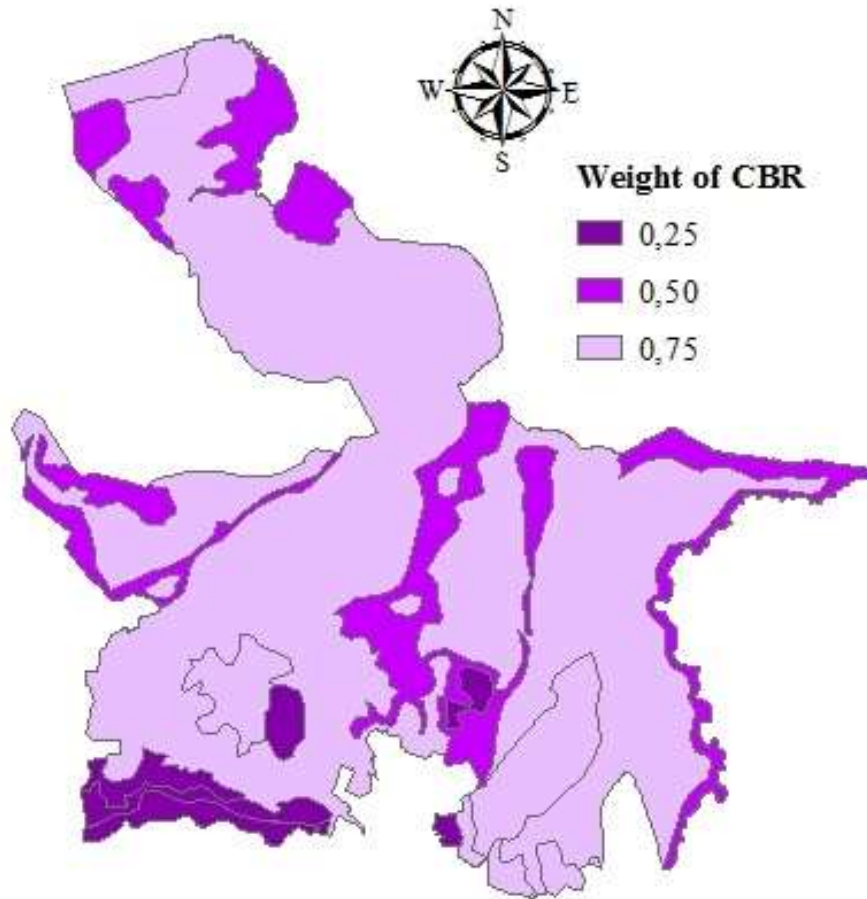
- The lowest weights are located at 20 to 50 cm depth.
- This means that this area can also be selected as a road traces however it still needs special treatment

The weights of soil texture



- The lowest weights on soil texture map are found on fine sandy texture.
- It is the most suitable as road traces because the coarser grains have higher carrying capacity.

The weights of CBR



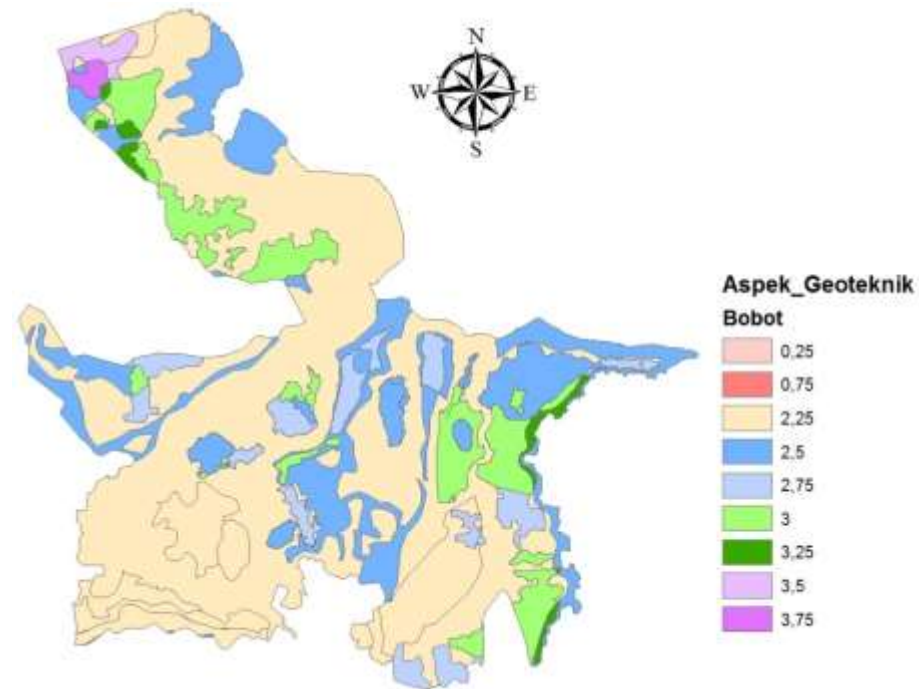
This is related to the soil texture map which also shows the lowest weights on the fine sandy soil

Weights of geotechnical aspects suitability

Rank	Geotechnical Aspects Suitable	Weights
1	Very Suitable	$< 0,88$
2	Suitable	$0.88 - 1.60$
3	Quite Suitable	$1.60 - 2.40$
4	Unsuitable	$2.40 - 3.20$
5	Very Unsuitable	> 3.20

From the overlay result, it can be seen that the lowest weights are 2.25. This indicates that the Banyuasin regency area is quite suitable for road traces, while some areas with weighting > 2.4 are unsuitable to be taken as road traces.

Suitability map of geotechnical aspects



DISCUSSION

- Banyuasin consists mostly of the swamp areas that have a low soil bearing capacity. From the results of the study, it can be seen that the average values of CBR in this area range from <math><5\%</math> to 10%, with a texture of clay to sandy clay, and some areas are peat soils with a depth of 50 to 200 cm.
- Banyuasin has enormous potential for development in various sectors such as agriculture, plantation, and industry. Such development requires road infrastructure.

DISCUSSION

- In this study, the level of conformity in the determination of road traces will not be the same as the construction in highland areas that have a high soil bearing capacity, due the study area is a swamp area have low soil bearing capacity so there is no area that is really appropriate to be taken in the selection of road traces.
- Therefore, the construction of roads implemented in this area must be preceded by special calculations.



CONCLUSION

The results of this study show that the lowest weights on the result of the overlay of the map are 2.25 which indicates that most of the area in Banyuasin Regency is "quite suitable" to be chosen as the road traces, so special handling is needed for the road construction in this area.

**Any Questions
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**Any Suggestions
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**Thank You For
Your Attention**

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