CHARACTERIZATION OF RIVER SAND DEPOSITS AND ASSESMENT OF THE SUITABILITY OF MINING SITES

By

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DECLARATION

I do hereby declare that the work reported in this project report was exclusively carried out by me under the supervision of Dr. Ranjith Premasiri and Dr. (Rev) Pinanawala Sangasumana Thero. And a report on this has not been submitted in whole or in part to any University or any other institution for another degree.

Date: 03/05/2014

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DECLARATION

We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.

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LIST OF ABREVIATIONS

Abbreviation

Anon	-	Unknown
DID	-	Department of Irrigation and Drainage (Malaysia)
DN	–	Digital Number
DSD	–	Divisional Secretariat Divisions
ex	-	Example
ft^3	-	Cubic Feet
GIS	–	Geographic Information System
GND	–	Grama Niladari Divisions
GPS	–	Global Positioning System
GSMB	-	Geological Survey and Mines Bureau
i.e.	-	That is
JAES	-	Japan Aerospace Exploration Agency
Km	–	Kilo Meter
m	–	Meter
m^2	-	Square Meter
m^3	-	Cubic Meter
m3/s	–	Cubic Meter per Second
NIR	-	Near Infrared
n.d	-	No Date
No	-	Number
Nos	-	Numbers
RS	–	Remote Sensing
RGB	-	Red, Green, Blue (multispectral band combination)
SIC	-	Satellite Imagine Corporation

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W.D.D.R. GANEGAMA

ABSTRACT

Construction industry is a key sector in the Sri Lankan economy which is recording a higher growth amongst other sectors. River sand is one of the key ingredients of all construction activities and the demand for the river sand is ever increasing. As a result over extraction of river sand, irrational mining and illegal sand mining pause a series of serious environmental hazards such as river bank erosion, sea water intrusion, lowering the water level, exposure of the river bed to solar radiation and lowering of the ground water level. Geological Surveys & Mines Bureau (GSMB) is the regulating body of river sand mining, sand storage, sand transport and trading and it is observed that while administering the river sand mining, there is a disparity of where the river sand deposits are and where the mining activities are being carried out. The sand surveys were carried out manually and it is a time consuming, tedious and very expensive exercise. The study focuses on characterization of river sand deposits using technology based remote sensing method to assess the suitability of mining sites. The study is limited to a 6 Km stretch of the Kelani River due to monitory and time constraints. I have used the IKONOS geo referenced satellite images, one panchromatic image (Band) in 1 meter resolution and 4 multispectral images (Bands = Blue, Green, Red and Near Infrared) in 4 meter resolution. The images were processed by using supervised and unsupervised methods and identified the river sand deposits. The river sand deposits were quantified and evaluated authorized minable quantity allowed to be extracted in each of the mining sites. The coordinates of the existing mining sites were taken and the locations of the mining sites were overlapped and compared with the identified river sand deposits. The disparity and mismatches of the existing mining sites and deposits have been identified in the study. I propose the model to be adopted and fine-tuned by the GSMB as the

primary basis of regulating and administering the river sand mining process. Also, I wish to propose the remote sensing based sand surveys to be conducted quarterly by GSMB based on the four main rainy seasons and if high resolution radar images have been utilized, identification of the river sand deposits would probably have been more effective. River sand mining is done on all rivers in Sri Lanka either legally or illegally. By regulating the river sand mining based on a rational basis is one of the key areas to overcome numerous serious environmental hazards and I have made recommendations based on my study.