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TITANIUM SANDS LIMITED

ACN 009 131 533

Level 11, London House
216 St. Georges Terrace
Perth Western Australia 6000
Tel: +61 (08) 9481 0389
Facsimile: +61 (08) 94636103
website:
<http://titaniumsands.com.au>

Contact:

Dr James Searle
Managing Director
james.searle@titaniumsands.com.au

Directors

Lee Christensen
Dr James Searle
Jason Ferris

Ticket

ASX: TSL

TSL Mannar Island Heavy Mineral Sands Scoping Study Confirms Potential for Major Dredging Project

- Positive scoping study results show potential for an economically robust long life major dredging project based on a single dredge, a primary concentrator, and a mineral separation plant.
- Initial production possible on mineral resource zone of 93Mt at 5.24%THM representing 35% of the total current mineral resource estimate of 265Mt at 4.38%THM¹.
- The resources are exposed at surface with no overburden.
- Metallurgical test work on composite drill hole samples from the possible initial production zone indicates ilmenite mineral product recoveries from material mined of 90.3%².
- Quality assessments of the minerals recovered from the metallurgical test work and long term pricing trends indicate the ilmenite minerals product could achieve a price of A\$305/t and to be of a high quality and likely to find ready markets globally³.
- The project mineral resources remain wholly open at depth and partially laterally, further drilling will support project optimisation in future more definitive studies.
- The company will now undertake more definitive studies looking at the possibility of utilising second and third dredges and commensurately expanded processing capacities.

Notes to the above:

¹ Mineral Resource estimate summarised in Tables 1 and 2 below released in full JORC 2012 compliant form to the ASX 6/5/2020 "TSL Mannar Island project Resource Tonnage Tripled".

² Metallurgical test work on composite samples assessing mineral product recoveries and characteristics of the mineral products, Allied Mineral Laboratories Pty Ltd report referenced at the end of this announcement.

³ Quality assessments and long term price trends in a commissioned report (June-2019) and update (May 2020)-from TZMI Pty Ltd, discussed below and referenced at the end of this announcement.

Titanium Sands, Managing Director, Dr James Searle commented:

“The scoping study has indicated the potential for an economically robust long life project which gives TSL the confidence to examine in more definitive studies expanding the project concept to a second or even third dredge and commensurately larger processing capacities.”

CAUTIONARY STATEMENTS ON THE SCOPING STUDY

The Scoping Study referred to in this announcement is a preliminary technical and economic investigation of the of the Mannar Island Heavy Mineral Sand Project. Under the JORC Code (2012), a scoping study is referred to as “an order of magnitude technical and economic study”. It is based on low accuracy technical and economic assessments, and is insufficient to support estimation of Ore Reserves or to provide assurance of an economic development case at this stage, or to provide certainty that the conclusions of the Study will be realised. Notwithstanding many components of this study, such as plant design, this study does not present a production target. Mineral Resource Estimates referred to in this presentation have been previously reported in a JORC 2012 compliant form as indicated (32%) and inferred (68%) resources. There is a low level of geological confidence associated with inferred mineral resources and there is no certainty that further exploration work will result in the determination of indicated mineral resources or that the production target itself will be realised. The project scenario presented is based on the company’s current expectations of future results or events and should not be solely relied upon by investors when making investment decisions. Further evaluation work and appropriate studies are required to establish sufficient confidence to establish the technical, and commercial viability of the project.

Development of the Mannar Island Heavy Mineral Sand Project will require funding. At this time it is not possible to predict the structure or source of funding. It is possible funding may only be available on terms that may be dilutive to or otherwise effect the value of TSL’s shares.

OVERVIEW

The Mannar Island heavy Mineral Sands Project in North West Sri Lanka is 100% controlled by Titanium Sands Ltd (Figures 1 and 2). The project is an ilmenite feedstock project with minor credits from other mineral components. The high quality ilmenite product is expected to find a ready market with titanium slag and sulphate route pigment producers in the Middle East, Korea, India, China and elsewhere.

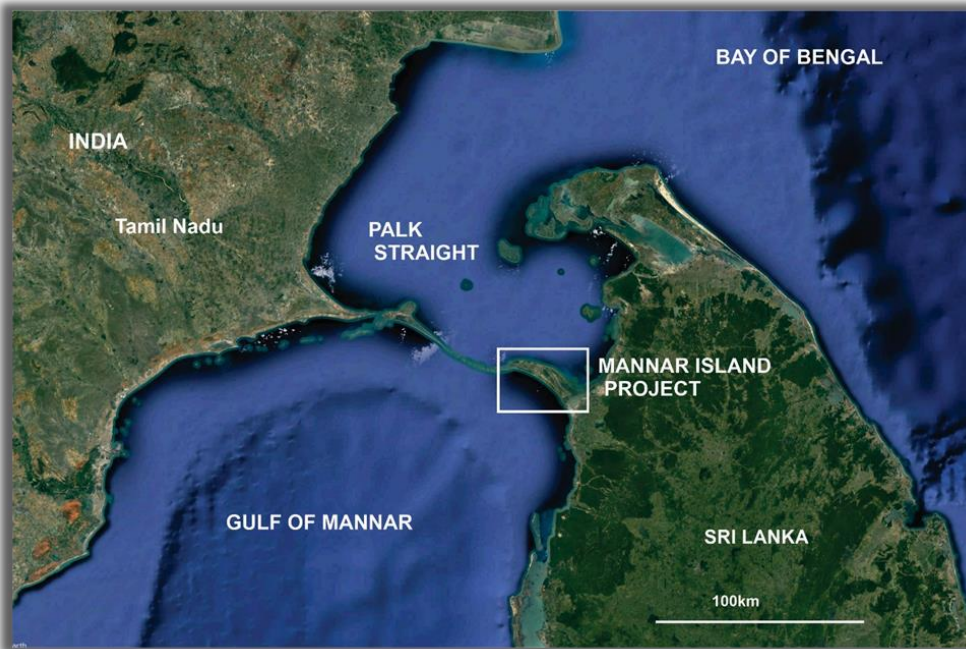


Figure 1 Location of the Mannar Island Heavy Mineral Sand Project, north west Sri Lanka.

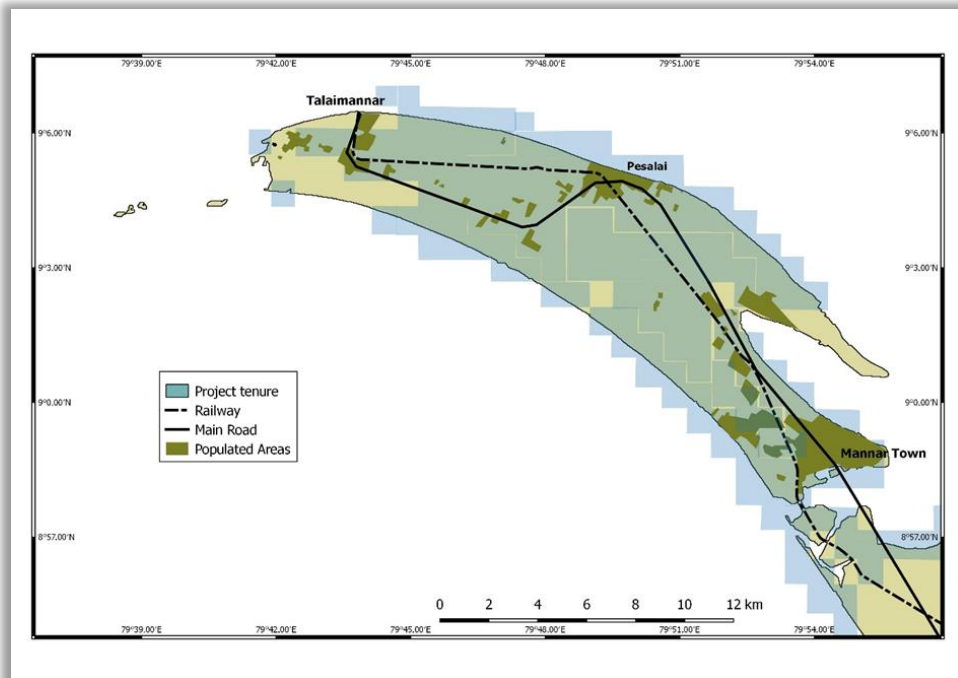


Figure 2 Mannar Island Project Tenure.

Titanium Sands Ltd completed the initial acquisition of the Mannar Island Project in December 2018 and made a further acquisition of adjacent tenure in in March 2020. The scoping study has sought to demonstrate the technical and commercial viability of the project in order to focus more definitive resource drilling, metallurgical, engineering, and commercial studies.

Initial production would most likely occur on a zone measuring 10km by average of 2km wide that contains 92.56Mt at 5.24% THM out of the total current mineral resource estimate of 264.93Mt at 4.38%THM (Figure 3). The mineral resources in this area represent 35% of the current mineral resource estimate.

The scoping study has indicated that this project scenario is economically robust and consequently subsequent more definitive studies should also examine the feasibility of second or even third dredges and expanded processing capacities to potentially exploit capital and operational efficiencies.

Development of the project and its schedule for development are dependent on a number of factors. The project needs to receive regulatory approval from Sri Lankan regulators and will include submission of an Environmental Impact Assessment, granting of a mining licenses and licenses for the transport and export of mineral products. Finance for the project would need to be secured and at this time there is no certainty as to the form this financing would take or its effect on dilution of existing shareholders.

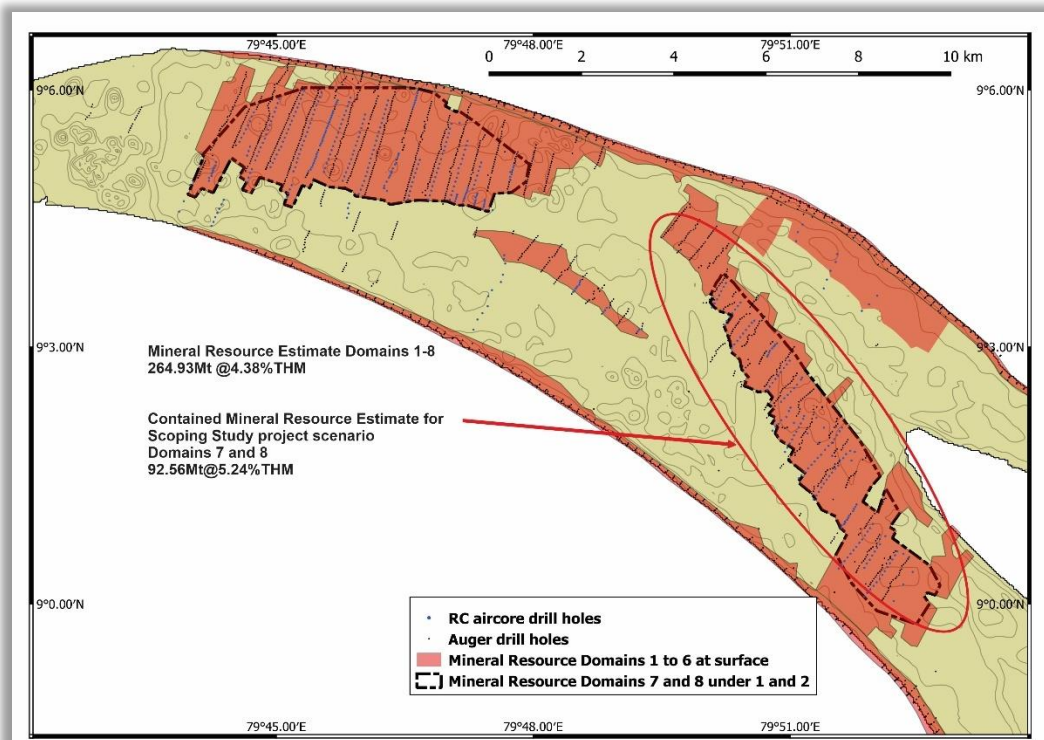


Figure 3 Mineral Resource Estimate Domains (as reported in full in *ASX Announcement of the 6th of May 2020¹*) and resources forming the basis of the Scoping Study Project Scenario.

SUMMARY BASIS FOR SCOPING STUDY

Geological Model

Mannar Island is a Holocene sand island formed over the last 8,000 to 6,000 years after seas ceased rising rapidly from their Pleistocene low stand of 20,000 years before present. Mannar Island has formed as a sand island prograding westward across Palk Straight over a Pleistocene/Holocene unconformity surface of Pleistocene to Miocene limestones and terrestrial clays to form a sequence of nearshore sands, beach, and dune sands 12 to 14m thick (Figure 4). Accumulation of Holocene sediment into the accreting axis of Mannar Island has been driven by alternating monsoon driven longshore and nearshore transport.

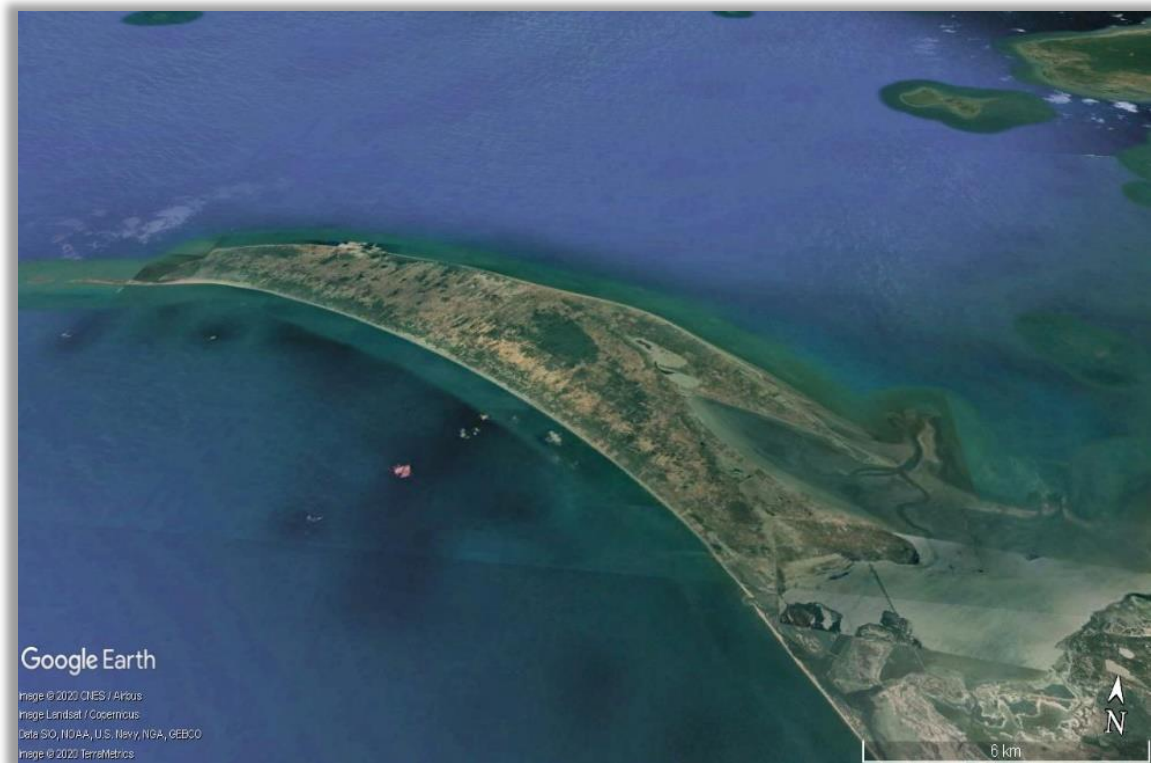


Figure 4 Mannar Island is a 26km long by up to 6km wide sand island that has developed in multiple stages over the last 8,000 to 6,000 years.

Over geologic time scales the rivers draining Precambrian igneous and metamorphic complexes of central Sri Lanka have transported heavy mineral bearing sands to the coast where they have been deposited in riverine outwash plains and coastal sedimentary sequences of Miocene, Pleistocene, and Holocene-Modern age (Figure 5).

Multiple phases of coastal reworking and re-deposition of the older coastal deposits has tended to concentrate the heavy minerals. As the sands were transported and re-deposited lighter sediment grains were winnowed out and heavy minerals concentrated. Winnowing and concentration occurred in the shallow nearshore, along the beach and by wind deflation along the back beach areas. The balance between sediment supply and heavy mineral concentration across the shoreface from the nearshore, the beach and back beach areas tended to form extensive zones of heavy mineral concentration rather than just narrow shoreline strands. Consequently continuous zones of heavy mineral concentration up to 3km wide , 8km long and at least 12m thick have been formed. This exceptional continuity of heavy mineral concentration means little or no zones of barren material

within the interpreted resource block model. In addition there is essentially no barren sand overburden on the heavy mineral sand resources.

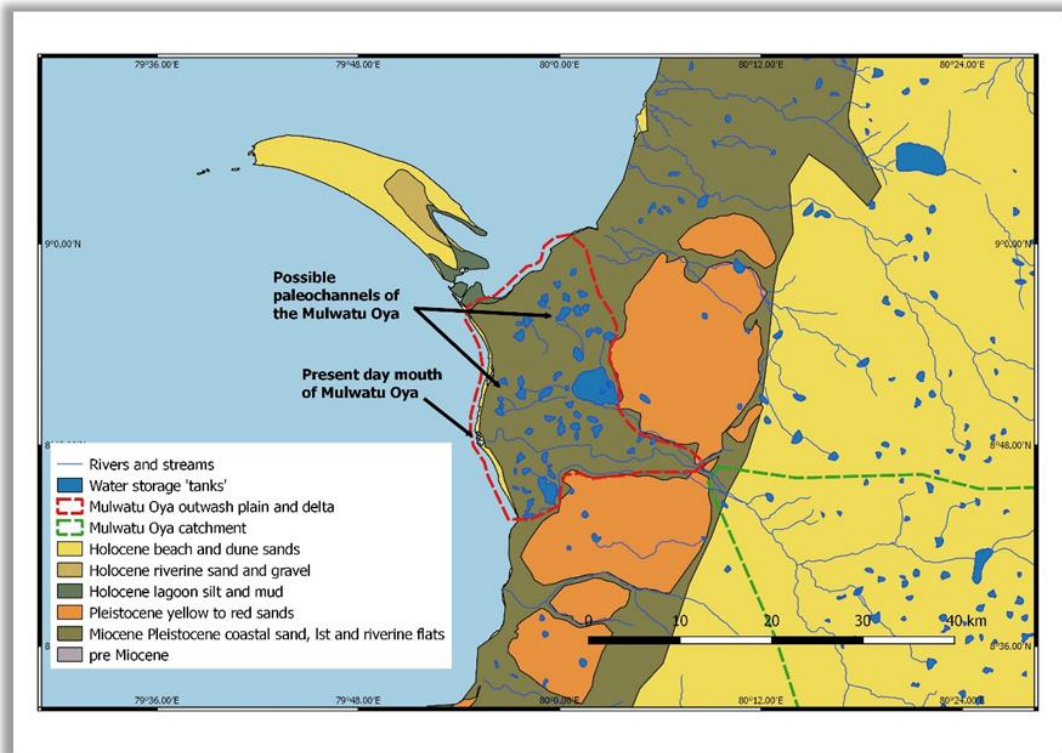


Figure 5 Mannar Island geological setting.

Resource Base

The current mineral resource estimate for the Mannar Island Heavy Mineral Sand Project was reported in full in the [ASX Announcement of the 6th of May 2020¹](#). The mineral resource estimate defined the resources in 8 domains (Figures 6 and 7).

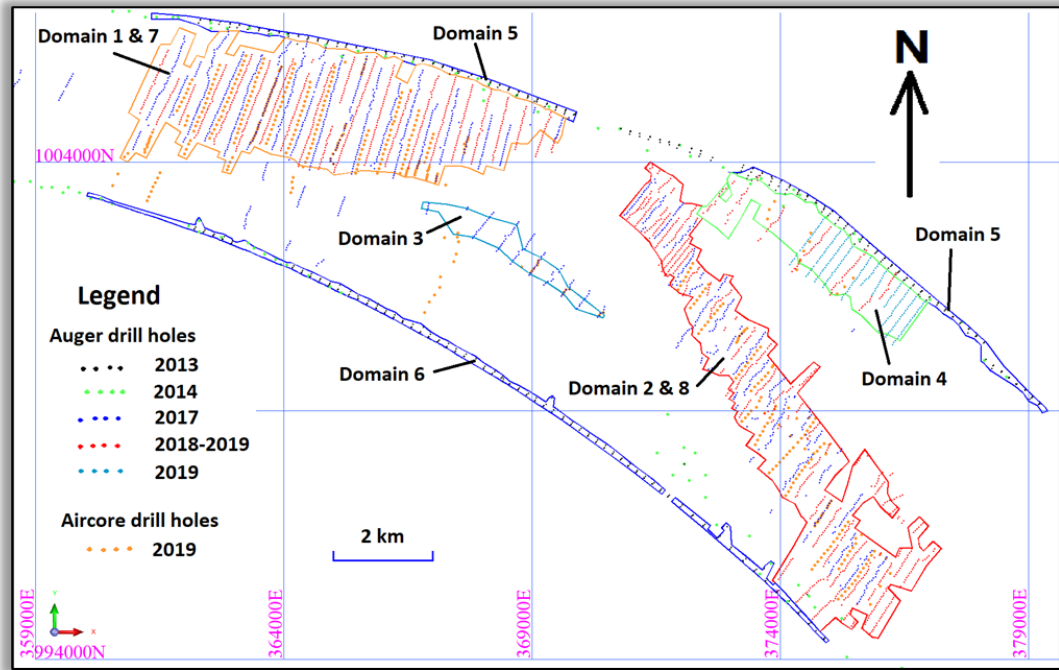


Figure 6 Resource drilling used in current Mineral Resource Estimate 1.

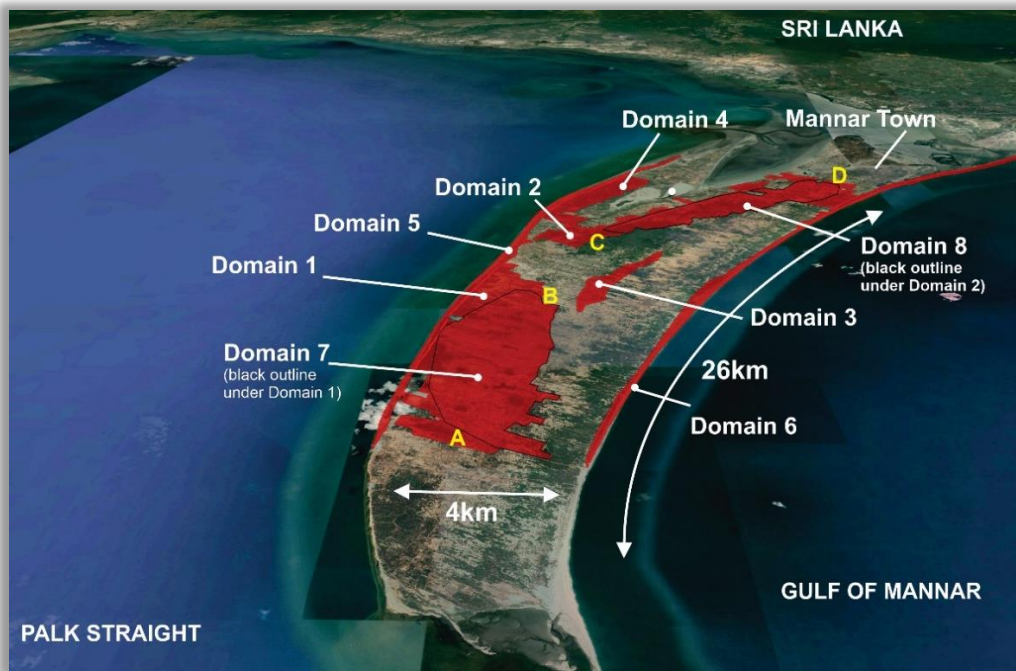


Figure 7 Mineral Resource Estimate¹ domains. A-B and C-D show the location of long sections in Figure 7 below.

The mineral resource estimate was based on drilling data down to the maximum depth of reliable sampling generally 8 to 10m below surface (Figure 8). However all holes were logged to the maximum 12m depth and concentrations of heavy minerals were observed in nearly all holes to their termination depth.

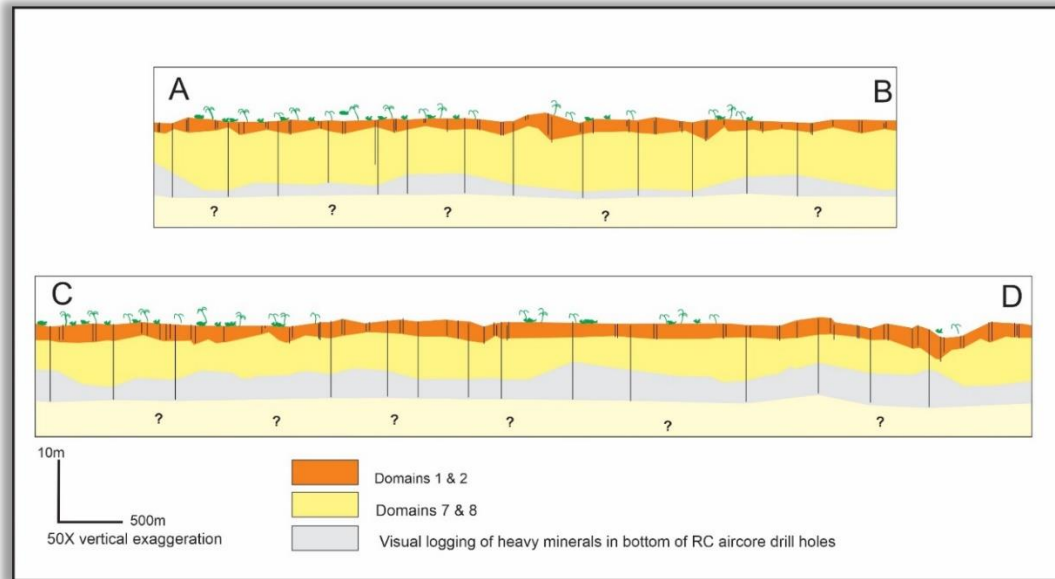


Figure 8 Schematic long sections, locations A-B, C-D shown on Figure 6.

Cut	Cat.	Tonnes M	Thm %	Silt %	Ovz %	Ilm %	Leu %	Rut %	Zir %
0%	Ind	88.39	4.46	0.76	13.80	1.98	0.37	0.08	0.08
	Inf	307.86	3.03	0.99	19.86	1.32	0.23	0.06	0.07
	Total	396.26	3.35	0.94	18.51	1.47	0.26	0.07	0.07
2%	Ind	66.14	5.54	0.83	11.63	2.48	0.46	0.10	0.10
	Inf	198.79	3.99	1.06	17.56	1.77	0.30	0.08	0.10
	Total	264.93	4.38	1.00	16.08	1.95	0.34	0.09	0.10
3%	Ind.	52.22	6.36	0.83	11.14	2.89	0.53	0.11	0.12
	Inf.	111.80	5.15	1.08	15.96	2.33	0.39	0.10	0.12
	Total	164.02	5.53	1.00	14.43	2.51	0.43	0.11	0.12

Table 1 Mineral Resource Estimate for the Mannar Island heavy Mineral Sand Project, as reported in full in the [ASX Announcement of the 6th of May 2020¹](#).

The mineral resource estimate is summarised in Table 1, with lower cut off grades of 0%, 2% and 3%. The 2% lower cut off resource is considered most in keeping with the production economics of analogous projects.

Table 2 is a summary of the contiguous zone of the current mineral resources (Figure 3).

Domain	Cat.	Tonnes M	Thm %	Silt %	Ovz %	Ilm %	Leu %	Rut %	Zir %
2	Ind	29.51	7.25	0.75	20.39	3.25	0.62	0.10	0.12
2	Inf	12.46	7.07	1.46	19.84	3.04	0.58	0.10	0.12
8	Inf	50.59	3.61	0.88	26.40	1.50	0.27	0.06	0.07
	Total	92.56	5.24	0.92	23.60	2.27	0.42	0.08	0.09

Table 2 Mineral Resource Estimate for Domains 2 and 8 forming the resource base for the scoping study project scenario as reported in full as part of the full Mineral Resource Estimate tabulated above [ASX Announcement of the 6th of May 2020¹](#)

There is a low level of geological confidence associated with inferred mineral resources and there is no certainty that further exploration work will result in the determination of indicated mineral resources or that the production target itself will be realised. However it should be noted that the mineral resources subject to the scoping study scenario represent 35% of the current mineral resource estimate ¹.

Metallurgy

Test work was undertaken by a specialist metallurgical laboratory² on composites of heavy minerals produced by heavy media separations in the analytical laboratory. The aim of the test work was to characterise the mineral products that could be produced by analyses representing standard processing techniques such as gravity, magnetic and electrostatic separation processes. This test work also gave indications of mineral recoveries that could be expected for the mineral products. This work while sufficient for a scoping study cannot be regarded as optimised. The mineral species identified in magnetic separations of composite drilling samples are shown in Figure 9.

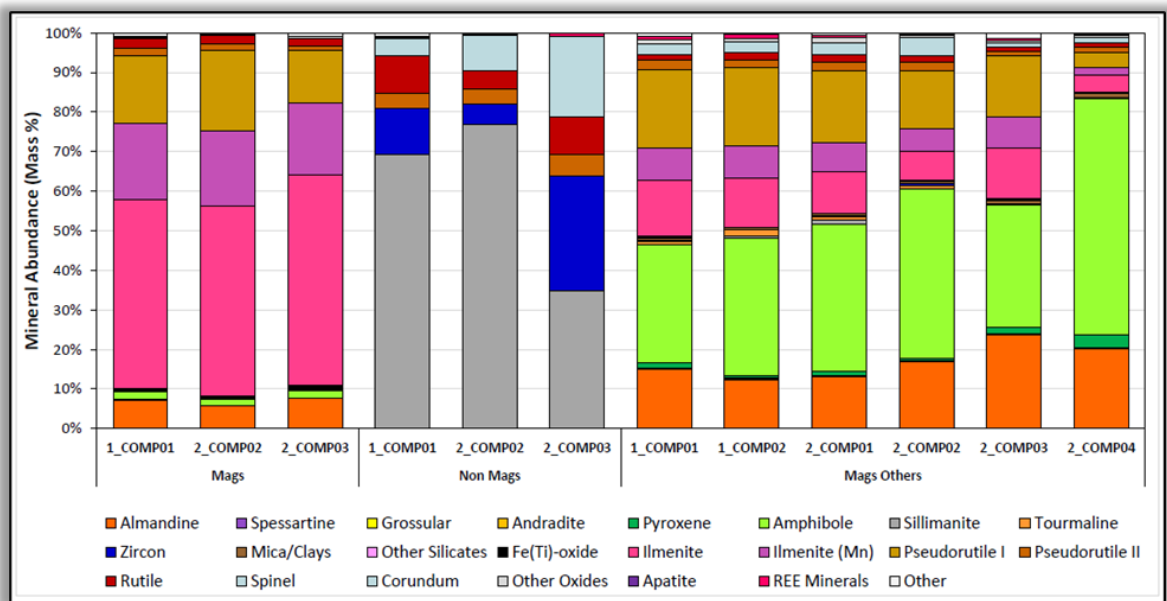


Figure 9 Valuable and gangue minerals in magnetic separations of the composite heavy mineral composite samples.

The potentially saleable products that were able to be separated during test work were:

- Ilmenite (including Hi Ti, leucoxene, and pseudorutile).
- Rutile
- Zircon
- Garnet

Mining

As shown in Figures 3 and 7 the Mannar island heavy mineral sands are contained in near continuous bodies from 2-3m above the water table down to at least 10m below the water table. Drilling has shown there is little or no induration and the slimes (<45 micron) components are less than 1%. This makes dredge mining the most suitable option. The project concept for the scoping study is for a dredge mining down to 10m below the level of the dredge pond. The design of the dredge head has not yet been determined but is likely to be either a 'rose cone' design or a bucket wheel.

The dredge will feed a floating wet concentration plant (WCP). The primary concentrate would then be feed a centrally located mineral separation plant (MSP). It is anticipated that in an initial mining scenario the dredge will advance along the continuous 10km long and up to 2km wide zone (Figure 3) that the scoping study scenario is based on.

No attempt has been made to schedule production grades in the scoping study on the basis of:

- Resource definition needs to be to a mining reserve standard for this to be meaningful.
- The Mineral Resource Estimate block model for Domains 2 and 8¹ do not show any marked grade trend along the 10km strike of the zone to be mined in the scoping study project scenario.

Sand tails will be discharged from the WCP to the dredge pond void to re-establish a landform for progressive rehabilitation. Fines from the WCP will be pumped through a thickener with water being returned to the dredge pond and the fines being utilised in the rehabilitation process. The rehabilitation concept at this time is envisaged being based on the eventual establishment of areas of productive palm and nut plantation agriculture as well as areas of natural vegetation. This concept will be developed further in consultation with local communities and regulators.

Processing

The initial processing will involve wet concentration plant (WCP) with initial screening of trash materials and oversize particles and then gravity spirals to produce a heavy mineral concentrate. The heavy mineral concentrate will then pass into a mineral separation plant (MSP). Based on the metallurgical test work a conceptual process flow sheet for the MSP was developed project (Figure 10).

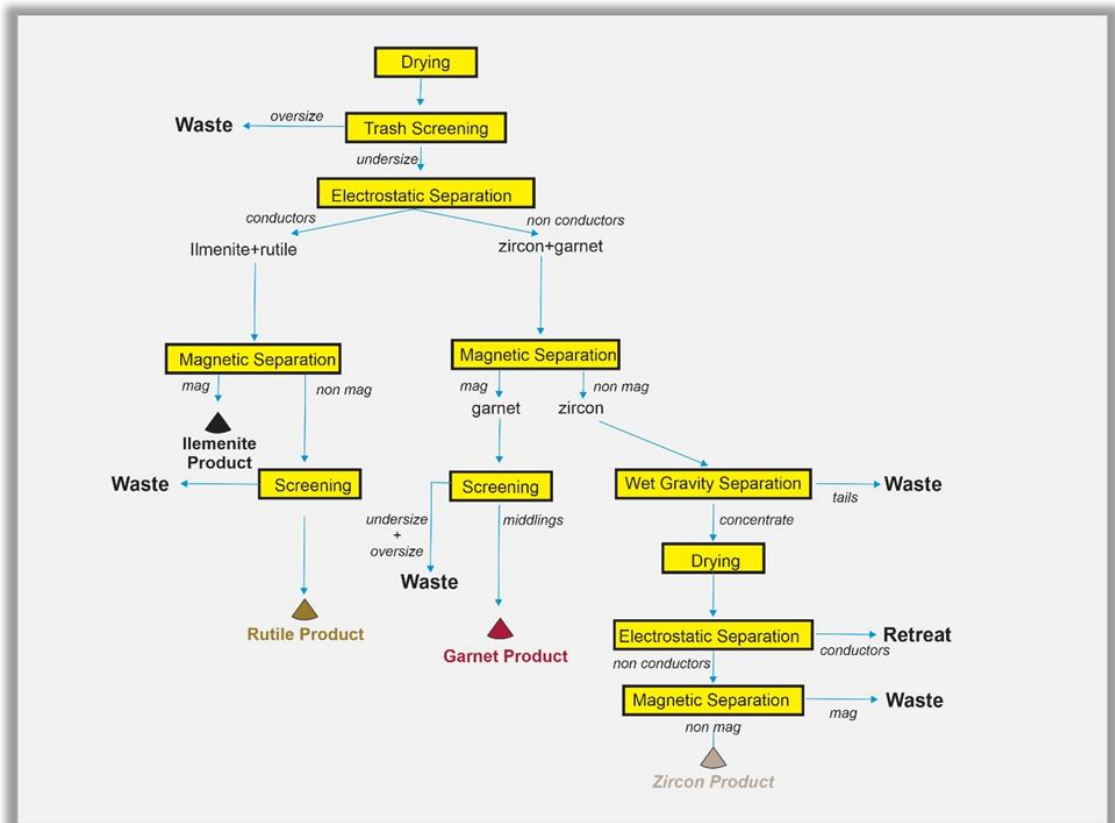


Figure 10 Mannar Island Project conceptual process flow sheet.

The processing flow sheet concepts for the WCP and MSP were then used by Mineral Technologies Pty Ltd (MT)⁴ to provide engineering services to develop conceptual flow sheets and conceptual designs for WCP and MSP processing plants suitable for a scoping level study. The WCP and MSP would utilise standard mineral sands industry processes and equipment available from a range of manufacturers. Local (Sri Lankan) manufacturing capacities have also been considered for some components and may offer cost effective solutions to some steel fabricated components.

Product Price Forecasts and Markets

A quality and market review³ of the project's mineral products were commissioned from TZ Minerals International Pty Ltd, a leading global consultancy group in mineral sands markets. Their advice was updated in May 2020. The assessments were based on metallurgical test work based on composite samples.

The ilmenite product was judged a high quality product with potential end users in the titanium slag and sulphate route pigment producers. The other mineral products (rutile, zircon, and garnet) were also considered likely to find ready markets.

Based on long term pricing trends the product prices adopted for the Scoping Study were:

Ilmenite	305	A\$/t
Rutile	1,764	A\$/t
Zircon	2,317	A\$/t
Garnet	357	A\$/t

Table 3 Long term product prices used for the scoping study; pricing based on long term trends

³. Based on US\$1= A\$1.55

Pricing indications, supply and demand conditions for the mineral products while based on long term price and consumption data are predictions and must be regarded as such.

Regulatory Framework and Approvals Processes

Regulatory approval for the project will require the submission of a comprehensive Environmental Impact Assessment (EIA). The EIA process is summarised in Figure 11. The required EIA will be comprehensive and address environmental, social, and economic impacts and benefits as well as on going management and monitoring plans. Part of the EIA process involves community consultations and a public review.

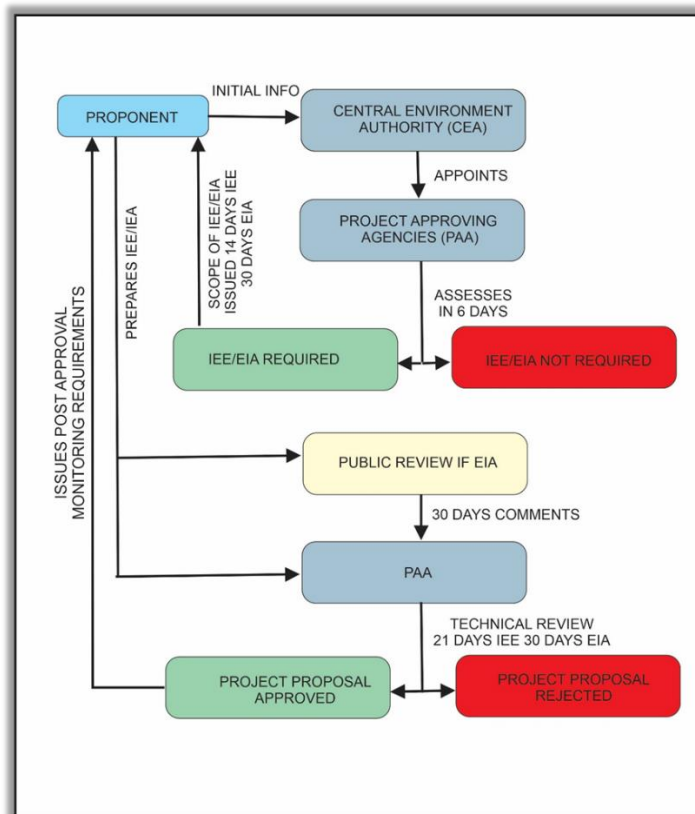


Figure 11 Environmental approval process under the Sri Lankan National Environment Act (NEA)

Other regulatory approvals include granting of mining licences under the Sri Lankan Mines Act, acting through the Geological Survey and Mines Bureau (GSMB). Mining rights are issued on application to the holders of exploration licences. The process for a mining right application is similar to the process of applying for an exploration licence but requires considerably more detail

in the technical scope, environmental, economic, social impacts. The GSMB is again the issuing body but the other agencies are required to review the project information and require further evaluation.

The GSMB also issues the licences necessary for the transport and export of mineral products.

The GSMB also has an oversight and regulatory enforcement role in the conduct of mining operations.

The Sri Lankan Mines Act also contains provisions detailing land access and dealings with private landowners. Land access is subject to negotiated agreement with landowners that generally involves compensation for temporary or permanent loss of amenity, with provisions for legal consideration of the mineral tenure holder to explore for minerals. The Mannar Island Project area consists almost entirely of undeveloped scrubland and naturally occurring sparse palmyra palm woodlands. However much of this area is still subject to formal private and institutional land holdings and areas that could be regarded as subject to informal use by local communities. As part of the EIA process consultations with both formal and informal landowners will be required.

There are also Sri Lankan investment facilitation Acts designed to encourage inbound investments. Through the Board of Investment (BOI) accepted projects can have access to preferential tax rates, accelerated depreciation, relief from import duties, free flow of currency transfers and other incentives.

Sri Lanka also has Bilateral Investment Promotion and Protection Treaties with 28 countries including Australia. It also has Agreements on avoiding double taxation with 44 countries including Australia and Mauritius.

OVERVIEW OF THE MANNAR ISLAND HEAVY MINERAL SAND PROJECT

The Mannar Island Heavy Mineral Sands Project is located in the dry north west of Sri Lanka. Mannar Island is a 26 km long by 5 km wide sand island joined to the Sri Lankan mainland by a 3 km road and rail causeway (Figure 12).

Sri Lanka is a stable democratic nation of ~21m people. The country is supportive of foreign investment and has a favourable tax regime. Power, rail, and road infrastructure extends across the country and Mannar Island. The Government is actively enhancing infrastructure in many locations including the North West where Mannar Island is located (Figures 12 and 13).

Regionally Sri Lanka is ideally situated for product export to all parts of Asia including China. It is situated on one of the Chinese belt and road maritime routes and as part of this a major new port has been developed at Hambantota. Other major ports are located at Trincomalee (north east coast) and Colombo.



Figure 12 Rail track on Mannar Island that connects to the mainland network.



Figure 13 Road and power infrastructure leading to Mannar Island

Ends-

The Board of Directors of Titanium Sands Ltd authorised this announcement to be given to ASX.

Further information contact:

James Searle

Managing Director

T: +61 8 9481 0389

E: james.searle@titaniumsands.com.au

COMPLIANCE STATEMENTS

Competent Persons Statements

The Mannar Island Scoping Study reported here has been compiled from source reports, exploration data and other information by James Searle BSc (hons), PhD, a Competent Person who is a Member of the Australian Institute of Mining and Metallurgy, with over 37 years of experience in metallic and energy minerals exploration and development, and as such has sufficient experience which is relevant to the style of mineralisation and type of deposits under consideration as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Dr Searle is the Managing Director of Titanium Sands Limited and consents to the inclusion of this technical information in the format and context in which it appears.

Compliance Statement

This report includes information (Table 1 and 2) that relates to Exploration Results and Mineral Resources prepared and first disclosed under JORC Code 2012. The information was extracted from the Company's previous ASX announcement as follows:

1 Released to the ASX 6/5/2020 "TSL Mannar Island project Resource Tonnage Tripled".

This announcements is available to view on the Company's website www.titaniumsands.com.au

The Company confirms that it is not aware of any new information or data that materially affect the information included in the relevant market announcement and, in the case of estimates of the Company's Mineral Resources that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply with respect to the resource block model and total heavy mineral content and have not materially changed. The Company confirms that the form and context in which the Competent Persons' findings are presented have not been materially modified from the relevant original market announcements.

Other Reports References

2 Allied Mineral laboratories 3/2019 : Titanium Sands Ltd Composite HM sample Characterisation Test Work.

3 TZMI 5/2019 and Update 5/2020: Product Quality Review, Titanium Sands. (Confidential).

4 Mineral Technologies Pty Ltd 3/2020 : Titanium Sands Ltd Mannar Island project Sri Lanka, Scoping Study Report.

Forward Looking Statements

This document may include forward-looking statements. When used in this document, the words such as "could," "plan," "expect," "intend," "may", "potential," "should," "further" and similar expressions are forward-looking statements. Forward looking statements, opinions and estimates included in this announcement are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions. Forward looking statements are provided as a general guide only and should not be relied on as a guarantee of future performance. Forward looking statements may be affected by a range of variables that could cause results or events expressed or implied in any forward-looking statement to differ from actual results. No forward-looking statement is a guarantee or representation as to future performance or any other future matters, which will be influenced by a number of factors and subject to various risks and uncertainties. These risks and uncertainties include but are not limited to liabilities inherent in mine development and production, geological, mining and processing technical problems, the inability to obtain the necessary mine licenses, permits and other regulatory approvals required in connection with mining and processing operations, changes in commodity prices and exchange rate and various events which could disrupt operations. Although the Company believes that its expectations reflected in these forward- looking statements are reasonable, such statements involve risks and uncertainties and no assurance can be given that the forward looking statements will prove to be correct.