BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY

AT WELLINGTON

IN THE MATTER	of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 ("the Act")
AND	
IN THE MATTER	of the applications by Trans Tasman Resources Limited (TTR) for marine and discharge consents to recover iron sand under sections 20 and 87B of the Act and
BETWEEN	**Trans- Tasman Resources Limited** Applicant
AND	**The Environmental Protection Authority** EPA
AND	**Kiwis Against Seabed Mining Incorporated (KASM** Submitter

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STATEMENT OF EVIDENCE BY JAMES BINNEY

ON BEHALF OF KIWIS AGAINST SEABED MINING INCORPORATED

Dated 24 January 2017

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STATEMENT OF EVIDENCE OF JAMES BINNEY

INTRODUCTION

1 My name is James (Jim) Bruce Binney.

2 My qualifications include a Bachelor of Business majoring in Finance (1994) and a Bachelors of Economics with Honours majoring in resource and environmental economics (1997).

3 I have worked as an applied resource and environmental economist for approximately 20 years. I have been a consultant for 10 years (5 years as Principal for my own business, and 5 years as a Senior Consultant and Manager for Marsden Jacobs Associates) and have undertaken over 120 consulting assignments. The bulk of my work relates for undertaking formal cost-benefit analysis, cost effectiveness analysis, and economic impact assessments of projects that potentially have external impacts on receiving environments and/or projects to improve environmental condition. Prior to commencing my consulting career, I was the Director of Economics for the Queensland Department of Natural Resources.

4 The focus of my career has been to undertake robust economic analysis in conjunction with other technical professionals on the economic impacts of policies, programs and projects. Around 60% of my work relates to water and waterway management (terrestrial and marine).

5 In addition to my consulting work I have held a number of specialist advisory roles for the Australian and Queensland Governments relating to managing marine environments, particularly the Great Barrier Reef. I have also undertaken technical analysis of the impacts of mining operations on marine receiving environments, and the potential economic impacts of deep seabed mining in Fiji.

PURPOSE AND SCOPE OF EVIDENCE

6 This evidence is directed specifically at the claims of the economic impacts attributable to the project.

7 In preparing this evidence, I have reviewed the application itself, particularly the report *Economic impact analysis of Trans-Tasman Resources Offshore Iron Sands Project,* additional evidence prepared by Jason Leung-Wai and the peer reviews provided by GHD. In addition, I have also reviewed and considered information from a number of other reports outlined in the references section of this evidence.

8 I have read the Code of Conduct for Expert Witnesses Environment Court's Consolidated Practice Note (2014). In so far as I express expert opinions, I agree to comply with that Code. In particular, except where I state that I am relying upon the specified evidence of another

person as the basis for any expert opinion I have formed, my evidence is within my sphere of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions which I express.

SUMMARY

9 Given the inherent uncertain impact on the environment, a more comprehensive economic approach should be used to underpin the EPA's review. I am of the firm view that a comprehensive benefit-costs analysis (BCA) is the only appropriate economic assessment methodology to inform the regulatory approvals process. This should include all relevant environmental and social values that could be adversely impacted by the project.

10 The current economic analysis used to justify the project (Martin Jenkins and Associates) uses an I-O approach. This approach is generally considered to be an inferior approach to estimating impact assessment as it tends to overestimate impacts. This is clear, when the results of this analysis are compared to the analysis undertaken using a CGE approach in 2013 that estimated the number of jobs created (direct and indirect) in the region at around 370 FTEs. This compares to the estimates of 585 using the inferior I-O approach to the analysis. The bottom line is that the approach adopted to support the current application is inferior and delivers less robust results.

11 The analysis used does not formally incorporate environmental or social risks or values (e.g. fishing, recreation, impact on natural capital) and cannot be used to demonstrate the net worth of the project to New Zealanders.

12 The environmental risks *do* have economic values. While no specific local studies have been undertaken to estimate these values for the TTR application, using a value transfer approach of estimated value of ecosystem services for open oceans from projects undertaken elsewhere and the scale of the operations over the 20 year license period, some rough indication of the value of the environmental risks can be established. Our estimates indicate that the present value of the environmental damage could be in the range of $28 – 543 million. These costs may significantly increase the likely royalties revenue received by New Zealand, which is supposed to represent the economic compensation for the permanent loss of the mineral resource.

13 In summary, the use of an inappropriate approach to the economic analysis, a lack of transparency, and no real attempt to incorporate environmental risks into the economic analysis, means that the economic analysis does not demonstrate that the project would deliver a net benefit to New Zealanders.

THE APPROPRIATENESS OF THE ECONOMIC APPROACH USED

14 The main economic approach used in evidence provided by Trans-Tasman Resources Limited (TTR) is inappropriate to inform any regulatory decision on the project as it does not assess economic benefits vs. economic costs to determine if the project may provide a net benefit to New Zealanders.

15 Broadly the TTR project involves a capital investment of around $850-900 million NZD for specialised equipment which will be almost exclusively imported providing no economic benefit to New Zealand manufacturers. Over the 20-year project life, annual operational spend is expected to be around $250 million NZD, of which around $130 million will actually be spent in New Zealand on inputs (labour, specialised fabricated metal product manufacturing, some transport and wholesaling services (primarily staff and parts), and a number of specialised services (exploration and mining, scientific and engineering, legal and accounting, insurances).

16 The major economic evidence supporting the project's approval is the report *Economic impact analysis of Trans-Tasman Resources Offshore Iron Sands Project* prepared by Martin Jenkins and Associates. This report is underpinned by a regional input-output (I-O) multiplier analysis. This report seeks to assess the impacts at the local (South Taranaki), regional (Taranaki) and national scales.

17 Broadly the economic analysis of the TTR project uses an Economic Impact Analysis (EIA) approach. This aggregates money spent, taxes paid and jobs received and proposes that they are all benefits of some activity. This approach has been underpinned by the use of I-O analysis to measure the flow-on impacts throughout the economy.

18 While the use of I-O analysis and more robust impact assessment approaches (e.g. computable general equilibrium (CGE) modelling), this is not an appropriate means to assess whether a project such as the one proposed is likely to deliver a *net benefit* to New Zealanders as all economic activity is considered beneficial and many costs (e.g. environmental and social externalities) are excluded from the analysis altogether.

19 Given the inherent uncertain impact on the environment, a more comprehensive economic approach should be used to underpin the EPA's review. I am of the firm view that a comprehensive benefit-costs analysis (BCA), sometimes called cost-benefit analysis (CBA) is the only appropriate economic assessment methodology to inform the regulatory approvals process. *"Under conditions of considerable uncertainty, cost-benefit analysis remains a useful*

technique for assessing and comparing options."[1] Benefit-cost analysis (BCA) looks more carefully at that spending attributable to a project and recognises that some spending is benefit, some is cost and that taxes are simply transfers from one economic agent to another. It compares benefits to costs over the long-term to determine efficient policies. This should include all relevant environmental and social values that could be adversely impacted by the project.

20 While an I/O approach is commonly used by project proponents when seeking a development approval, it is of little use to underpinning environmental regulatory decision making for several reasons:

a. The approach simply estimates the value of economic activity (i.e. the flow of money through the economy). It does not measure the benefits and costs of the project, and provides no insight into the projects desirability (i.e. do the benefits of the project exceed the costs?).
b. The I-O approach is based on economic activity typically incorporated into a national accounting approach. It does not, and cannot, easily incorporate environmental and social impacts that are not already measured within a national accounting framework. Only a proper BCA can provide insight into the net benefits of the project to society (including environmental and social considerations).
c. I-O analysis is a static linear modelling framework that provides no real insight into the desirability of the projects that have long-term consequences (in this case, at least 20 years). Given the fact that much of the environmental damage attributable to the project could be permanent, only a proper long-term economic analysis approach such as BCA is appropriate.
d. I-O approaches assume no price impacts and would be attributable to the project and all inputs are freely available. These assumptions are questionable at best for such projects and often results in overestimates of any job creation or flow-on impacts throughout the economy.
e. The I-O analysis and subsequent multipliers used to estimate the flow-on impacts of the project are developed based on national-scale statistics. There are then adjusted based on local available data to establish multipliers for the local and regional

[1] Cameron. L (2006) Environmental Risk Management in New Zealand – Is There Scope to Apply A More Generic Framework? New Zealand Treasury Policy Perspectives Paper 06/06

scales. The quality and availability of data rapidly declines the smaller the geographical scale of the analysis (e.g. local). The consequence of this is that the local and regional findings should be treated with extreme caution. The lack of transparency in the Martin Jenkins report makes it impossible to assess the robustness of economic relationships underpinning the local and regional analysis produced.

21 The Consultants (Martin, Jenkins and Associates Ltd) have rightfully acknowledged some of the limitations and pitfalls of the analytical approach used.[2]

22 If an impact assessment approach is to be used (it shouldn't be), it is more preferable to use a computable general equilibrium (CGE) approach as this overcomes some of the methodological shortcomings in the I-O approach.[3] A CGE approach was used in an earlier application by TTR (see NZIER 2013) that estimated the number of jobs created (direct and indirect) in the region at around 370 FTEs. This compares to the estimates of 585 using the inferior I-O approach to the analysis. It would appear that the economic analysis supporting the current application may overstates the likely positive economic impacts attributable to the project.[4] However, it should be noted that the CGE analysis undertaken in 2013 also failed to formally incorporate environmental and social costs and doesn't provide a basis for regulatory decision making either.

DIRECT ECONOMIC EFFECTS OF PROPOSED ACTIVITY

23 Direct benefits of the construction phase of the project are likely to be negligible. The benefits of the operational phase are not compared to costs to demonstrate a net benefit to New Zealanders. Furthermore, the analysis suggest a large proportion of the direct economic benefits will be captured locally. This assumption is not underpinned by transparent analysis and appears to be in conflict with other analysis.

24 The Consultants (Martin, Jenkins and Associates Ltd) have rightfully concluded that the establishment phase of the project will have little impact on the NZ economy as virtually all capital equipment will be imported. Any local value adding will be negligible.

[2] See pages 9, 10, and 34 of their report.

[3] It should be noted that a CGE approach still cannot incorporate environmental and social values and does not include any formal decision rules to judge of the project actually provides net benefits.

[4] GHD (2016) Review of TTRL's Impact Assessment Report (Lodged, August 2016). Economic Effects of the South Taranaki Bight Offshore Iron Sand Extraction and Processing Project

25 The benefits of any operational activities for the project will be determined by the extent to which those benefits can actually be captured (i.e. provided by New Zealand companies and labour with a significant local content). Of the estimated $254 million NZD of project expenditure on inputs, only $133 million NZD will actually be spent in New Zealand. The extent to which domestically-provided inputs source their inputs from overseas, the benefits to the New Zealand economy will be even lower.

26 The nature of the project (a large proportion of inputs are imported or sources from elsewhere in New Zealand) means that very little benefit will actually accrue to the local community in the South Taranaki, while that community will be most at risk from environmental and social damage attributable to the project.

27 Project documentation indicates a 24/7 operation (two shifts) with workers transported via helicopter. TTR information indicates crews will undertake work on a three-week roster. Local (South Taranaki) direct employment may be low as outlined in earlier analysis of the project. *"TTR estimates that 170 positions (66% of the new workforce) will be located offshore on the FPSO and FSO - these vessels will operate continuously offshore with a workforce that lives on them during their shifts. The remainder of the positions will either be based on vessels that will launch regularly from a port, or will be office-based positions (88 FTE / 34% of the new workforce).[5]"* Given this finding, it is difficult to see how the high proportions total employment in the South Taranaki would eventuate, even including employment attributable to local expenditure in the South Taranaki. There is no evidence in other regional analysis of the offshore project to indicate they generate significant high paid jobs in local host regions.[6]

28 The TTR operation will be very bespoke in nature (design, capital, much of the equipment etc.) and major domestic inputs such as fabricated metal manufacturing will require a level of sophistication and skill that is higher than most other major project in the Taranaki. This will make it more difficult for local and regional providers of these inputs in a competitive manner, increasing the risk of further leakage from the New Zealand economy.

29 Many of the other major direct inputs relate to services (e.g. scientific, legal, accounting, insurance) that are not necessarily geographically tied to the project location. While this expenditure will occur, the extent to which the benefits accrue to local (or even regional) business is unknown. While it is acknowledged that TTR will attempt to implement policies to

[5] Croydon Consultants Ltd (2013). Page 35

[6] Venture Taranaki (2014) Live-Work Patterns in the Taranaki Region

source some inputs locally, experience elsewhere indicates such policies are easily gamed by suppliers.

INDIRECT EFFECTS OF PROPOSED ACTIVITY

30 The use of I-O analysis potentially overestimates the benefits to the regional and New Zealand economies attributable to the project. Unfortunately the significant lack of transparency in the analysis presented makes it virtually impossible to scrutinise the robustness of the analysis undertaken for the project proponent.

31 The report by Martin Jenkins and Associates uses an I-O approach to estimating indirect economic impacts. I-O is based on the interdependencies between economic sectors and is commonly used to estimate the changes in economic activity that may be attributable to a major project. The consultants have attempted to estimate the flow-on impacts to the local, regional and national economies.

32 Much of the argument for approving the project is the supposed significant flow-on effects in the regional and New Zealand economies attributable to the purchasing of inputs (goods and services) for the project. The use if I-O modelling typically overestimates benefits, and this has also been identified by other reviewers (see GHD 2016).

33 The I-O analysis and subsequent multipliers used to estimate the flow-on impacts of the project are developed based on national-scale statistics, adjusted for local and regional circumstances without any supporting evidence. The lack of transparency in the Martin Jenkins report makes it impossible to assess the robustness of economic relationships underpinning the local and regional analysis produced.

34 The degree to which the indirect flow-on economic activity effects of the project are captured in the local and regional economies will be determined by the degree to which local and regional suppliers of inputs are competitive and the provision of those inputs actually generates economic value added.

35 Despite the fact that the indirect flow on effects identified in the analysis may appear substantial, they do not justify the project. The analysis represents a measure of activity, not a measure of net benefits from the project. Environmental and social costs are not included into the analysis.

36 Because of the scale of the investment required for the project. *"TTR suggest the project requires US$575 million capital investment that will largely be funded from offshore*

financing."[7] The consequence of this financing strategy is that the bulk of the return on investment from the project will also flow directly overseas, significantly reducing the benefits accruing to New Zealanders.

37 Taxes and royalties represent a transfer payment in a proper BCA and should not be used to justify a project. Royalties represent a payment to Government to represent the permanent loss of a non-renewable public asset (the resource).

ENVIRONMENTAL COSTS

38 No significant attempts have been made by the project proponents to evaluate the potential value of the costs to the environment attributable to the project. This should be done as part of a comprehensive BCA to determine the net benefits of the project to New Zealand.

39 The deep-sea marine environment provides an array of ecosystem functions, goods and services, many of which contribute significantly to human wellbeing and the functioning of the planet. The open ocean and the deep marine floor form an extensive and complex system that is linked to the rest of the planet in exchanges of matter, energy and biodiversity, and the functioning of open ocean ecosystems is crucial to global biogeochemical cycles.[8]

40 Extensive knowledge gaps, however, remain. For example, the interactions between the different bio-chemical cycles, habitats, ecosystems, and species remain largely unknown. This means we know little about the resilience and vulnerabilities of the systems that provide open ocean goods and services.[9]

41 Remarkably little is known in quantitative terms about the economic flow of values from the open ocean environment compared to terrestrial ecosystems or coral reefs. As noted by Nunes and Ghermandi,[10] only 34 of the 1,310 estimates of monetary values of ecosystem services that are included in the Economics of Ecosystems and Biodiversity Ecosystem Services Valuation Database[11] pertain to the marine environment and open oceans. In a recent study seeking to

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[7] Trans-Tasman Resources Limited (2013) South Taranaki Bight Iron Sand Extraction Project. Marine Consent Application. P176

[8] Armstrong, Claire W., et al. (2010). 'Ecosystem goods and services of the deep sea.' *Deliverable* D6 2: 68.

[9] Armstrong, Claire W., et al. (2010). 'Ecosystem goods and services of the deep sea.' *Deliverable* D6 2: 68.

[10] Nunes, Paulo ALD, and Andrea Ghermandi. (2013). 'The Economics of Marine Ecosystems: Reconciling Use and Conservation of Coastal and Marine Systems and the Underlying Natural Capital.' *Environmental and Resource Economics* (2013): 1–7

[11] See: http://www.teebweb.org/.

value the deep sea, Jobstovgt et al.[12] acknowledge a dearth of empirical studies that quantify the non-market benefits of protecting deep sea areas. This dearth of specific NZ valuations has also been noted by consultants relating to the TTR project.[13]

42 In the most comprehensive assessment of the ecosystem goods and services provided by the deep-sea marine environment undertaken to date, Armstrong et al.[14] note a lack of evidence on monetary values of deep-sea ecosystem services and biodiversity as one of the main research gaps.

43 Some guidance, however, is offered by de Groot et al.[15] who classify and value ecosystem services according to the Millennium Ecosystem Assessment framework.[16] As employed by de Groot et al., this framework sets out four main categories:

a. provisioning services — products used by humans that are obtained directly from habitats and ecosystems (e.g. protein)
b. regulating services — benefits obtained through the natural regulation of habitats and ecosystem processes (waste absorption and detoxification)
c. habitat — those functions necessary for the production of all other ecosystem services, that is they feed into provisioning, regulating and cultural services (e.g. genetic diversity)
d. cultural services — non-material benefits people obtain from habitats and ecosystems (e.g. cultural and traditional value to Māori).

44 A subsequent major meta analysis of economic valuations using a total economic valuation approach relating to ecosystem services (Costanza et al)[17] specifically reviewed previous valuation studies by ecosystem type. The purpose of this study was to establish a reasonable basis for value transfer based on previous relevant studies. There was a significant range in estimates ($/hectare/annum), specifically:

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[12] Jobstvogt, N., Hanley, N., Hynes, S., Kenter, J., & Witte, U. (2014). 'Twenty thousand sterling under the sea: Estimating the value of protecting deep-sea biodiversity.' *Ecological Economics*, 97: 10–19.

[13] Covec (2013a) TRANS-TASMAN RESOURCES IRON SAND PROJECT: REVIEW OF TECHNICAL REPORTS ON ECONOMIC IMPACTS BY NZIER & CORYDON CONSULTANTS

[14] Armstrong, Claire W., et al. (2010). 'Ecosystem goods and services of the deep sea.' *Deliverable* D6 2: 68.

[15] de Groot, R., Brander, L., van der Ploega, S., Costanza, R., Bernardd, F., Braat, L., van Beukering, P. (2012). 'Global estimates of the value of ecosystems and their services in monetary units.' *Ecosystem Services*, 1, 50–61.

[16] Millennium Assessment (2005). 'Ecosystems and human well-being: Current state and trends.' *Millennium Ecosystem Assessment*, vol. 1. Island Press, Washington DC.

[17] Costanza et al (2014) Changes in the global value of ecosystem services. Global Environmental Change. Volume 26, May 2014, Pages 152–158

a. The lowest estimate was the equivalent of $124/hectare/annum
b. The median estimate from the studies reviewed was $197/hectare/annum
c. The highest estimate was the equivalent of $2,432/hectare/annum.[18]

45 The unit rates can then be applied to the areas impacted by the operations to obtain a rough indication of the economic value of the ecosystem services that may be lost. *"The operational procedure requires the IMV to follow the extraction crawler at an average rate of 70m/hr. At this speed a 900m x 600m block will typically be worked in around 30 days."*[19] This equates to approximately 650 hectares per annum, and a cumulative impacted area of around 12,960 hectares after 20 years of operations.

46 If the ecosystem services are effectively lost in the long-term, using the range of values identified by Costanza et al and the potential area impacted, the present value of the loss of ecosystem services attributable to 20 years operations is in the range of $28 – 543 million ($44 million based in the median valuation from the studies reviewed by Costanza et al).[20] This may also be an underestimate as it doesn't estimate the impacts of the plume, which covers an even larger area.

47 While there is significant variability and uncertainty underpinning these estimates, they do demonstrate the impacts could be significant and these values have not been incorporated into any formal economic evaluation of the project.

CONCLUSION

48 I conclude as follows:

1 The economic analysis undertaken by Martin Jenkins and Associates on behalf of TTR does not provide a solid economic argument that the project should be approved. While an economic impact assessment (underpinned by I-O modelling) has been done, it generally overstates the likely benefits of economic activity attributable to the project, while effectively ignoring environmental and social risks. Given the inherent long-term risks associated with the project, a comprehensive BCA would provide more insight to regulatory decision-making.

[18] The original estimates from the Costanza paper have been converted to NZD from international $ at a rate of 71.1 (rate as at the time period for the published estimates) and have been adjusted for inflation (up 3.9% representing the change in the NZ Consumer Prices Index since June 2012).

[19] Trans-Tasman Resources Limited (Undated) Stakeholder Engagement Pack. P4

[20] A 4% (real) discount rate has been used and ongoing costs beyond year 20 have been capitalised for incorporation within the present value calculation.

2 The application of the I-O modelling has not been done in a transparent fashion and any results should be treated with extreme caution.

3 The bottom line is that the economic analysis presented does not provide an economic case for the approval of the project. Only a comprehensive BCA would meet those needs.

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