DEEP SAND DREDGING FROM HAURAKI GULF, MANGAWHAI HEADS TO TE ARAI POINT: HERITAGE ASSESSMENT

Report prepared for Kaipara Ltd

By

Rod Clough (PhD)

2011

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INTRODUCTION

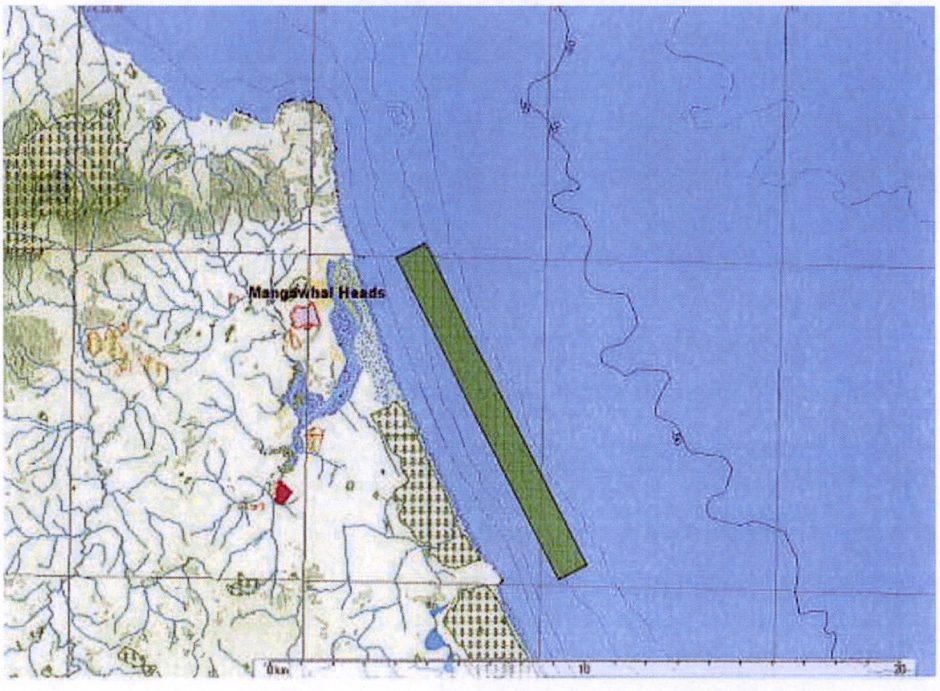
Project Background

Kaipara Ltd is proposing to extract sand from the Hauraki Gulf off shore between Mangawhai Heads and Te Arai Point. A similar appraisal had been carried for deep water dredging to the south of the present project area as one of the consent conditions requires an assessment of effects of the project on heritage sites that might exist in the identified location to be dredged within the permitted area prior to extraction. The condition required the company to:

Include an assessment by a recognised heritage consultant as to the potential for dredging in the PDA to disturb or destroy a site or sites of spiritual or cultural importance and/or any archaeological site (within the meaning of the Historic Places Act (1993).

As part of this assessment relevant documentation was reviewed, and the Auckland Council's Cultural Heritage Inventory searched for recorded heritage sites in the area. Documentation reviewed at that time included a Ngatiwai cultural impact assessment, the results of Side Scan Sonar analysis of the sea bed and an ecological assessment (2003). Side Scan Sonar was also carried out along the 25m isobaths between Te Arai towards Mangawhai but additional Side Scan Sonar analysis will be carried out for this application by MedOcean in the near future.

Table 1. Location of Proposed Dredging (From ASR Ecological Report)



Methodology The Auckland Council Cultural Heritage Inventory was searched and the ASR Pre-Dredging ecological report was reviewed along with the archaeological appraisal for the earlier dredging off Pakiri.

DISCUSSION

The cultural impact assessment carried out by Ngatiwai identifies its traditional relationship and interests in the area of sand extraction; but does not identify any specific cultural sites which would be impacted on.

Shipwrecks are the only type of heritage site likely to have any physical remains, although other artefacts lost overboard are a possibility. A search of the CHI indicated that several shipwrecks were recorded from the general area. These included the curter *Rose Blanche, SS Tauranga* (1867) and ketch *Enterprise* (1858), *PS Ruby* (1876) and the curter *Smuggler* (1865). With the exception of the *Rose Blanche,* which was beached 3 miles south of Mangawhai, there is no precise locational data available from the records.

Lives were lost from these vessels but survival of skeletal material is unlikely. Advice from the consent holder's technical consultants was that they have never encountered any identifiable bones over many years of side scanning. In addition, they noted that the area had been trawled for decades without any observations of human material or remains potentially relating to shipwrecks.

The method of sand extraction, which employs a small diameter pipe (20cm, with a mesh of 6mm), will not suck up any large objects. Thus any artefacts (apart from very small ones) that might be buried in the sand would not be removed by the process.

The 2006 study of (Mead, Haggitt and Frazerhurst) which employed drop video, side scan sonar and grab sample analysis, did not detect any remains relating to human activities (no evidence of shipwrecks or any other human artefacts). At the highest resolution it is possible to detect items as small as 10cm, but while objects of this size would present difficulties in identification, larger objects would be easily detected. For example, a number of beds of horse mussel were observed. No human artefacts were observed in the Drop-Camera or video transects employed during the ecological study.

CONCLUSIONS

A search of records indicated that no heritage sites such as shipwrecks have been recorded within the extraction area and a review of the ecological study and limited sonar analysis of the extraction area failed to identify any remains relating to human activity and it is considered unlikely that the extraction process and the technology employed will have any impact on any heritage sites.

From a heritage perspective there are no constraints on sand extraction proceeding from within the identified location. Furthermore, in the absence of direct detection of artefacts by side scan sonar, it is anticipated that a similar conclusion will be likely for all other specific areas that may be dredged in future within the permitted area

BIBLIOGRAPHY

Ngatiwai Trust Board Resource Management Unit. August 2003. Cultural Impact Assessment. Kaipara Excavators Sand Extraction off the Pakiri Coast.

Healy, T. and D. Immenga. Pre Dredging Assessment for Deep Sand Extraction from the Hauraki Gulf off Pakiri. Part 1: Side Scan Sonar and Textural Analysis of the Sea Floor Sediments. University of Waikato, Coastal Marine Group.

Mead, S., B. Beamsley and T. Haggitt. 2003. Pre-Dredging Assessment: Ecological Component. Infaunal Sampling and Drop-Camera Video Surveys of a I x 8km Area off Pakiri Beach. Report Prepared for Kaipara Excavators Ltd.

Mead, S., T. Haggitt and J. Frazerhurst. 2006. Pre-Dredging Assessment: Ecological Component. Infaunal Sampling and Drop-Camera Video Surveys of a I x 8km Area off Pakiri Beach. Report Prepared for Kaipara Excavators Ltd.

KITT LITTLEJOHN
Barrister

10 November 2003

Auckland Regional Council
DX CP28008
Pitt Street
AUCKLAND

Attention: Mr Mathew McNeil

Dear Mr McNeil

KAIPARA LIMITED - DEEP PRE-DREDGING ASSESSMENT

Further to our telephone discussion on 10 November 2003 and my subsequent email, I **enclose** a copy of Dr Clough's heritage assessment of the proposed dredging area. I would appreciate it if you could forward a copy of the report to Council's in-house heritage personnel for comment.

The condition 10A requires Kaipara Limited to circulate the draft heritage report to "any persons or bodies identified by the Director as having a legitimate interest as tangata whenua in the potential presence of heritage sites in the PDA".

I have forwarded a copy of the report to Ngatiwai for their comment. I would appreciate it if you could advise whether the Director considers there are any other tangata whenua to whom a copy of the heritage report should be forwarded.

Consistent with the condition, I have sent a copy of the draft report to the Historic Places Trust for their comment.

Yours sincerely

Kitt Littlejohn

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Clough & Associates Ltd – Heritage Consultants

RE: DEEP SAND DREDGING FROM HAURAKI GULF, OFF PAKIRI - HERITAGE ASSESSMENT

Background

Kaipara Ltd is proposing to extract sand from the Hauraki Gulf in deep water off Pakiri. One of the consent conditions requires an assessment of effects of the project on heritage sites that might exist in the identified location to be dredged within the permitted area prior to extraction. The condition requires the company to:

> *Include an assessment by a recognised heritage consultant as to the potential for dredging in the PDA to disturb or destroy a site or sites of spiritual or cultural importance and/or any archaeological site (within the meaning of the Historic Places Act (1993).*

As part of this assessment relevant documentation was reviewed, and the ARC's Cultural Heritage Inventory searched for recorded heritage sites in the area. Documentation included a Ngatiwai cultural impact assessment, the results of Side Scan Sonar analysis of the sea bed and an ecological assessment.

Results& Discussion

The cultural impact assessment carried out by Ngatiwai identifies its traditional relationship and interests in the area of sand extraction, but does not identify any specific cultural sites which would be impacted on.

Shipwrecks are the only type of heritage site likely to have any physical remains, although other artefacts lost overboard are a possibility. A search of the CHI indicated that several shipwrecks were recorded from the general area. These included the cutter *Rose Blanche*, *S.S. Tauranga* (1867) and ketch *Enterprise* (1858), *P.S. Ruby* (1876) and the cutter *Smuggler* (1865). With the exception of the *Rose Blanche*, which was beached 3 miles south of Mangawhai, there is no precise locational data available from the records.

Lives were lost from these vessels but survival of skeletal material is unlikely. Advice from the consent holder's technical consultants was that:

> *"...after a year on the sea floor I doubt any skeleton would be intact. In all the years I have been side scanning we never came across any identifiable bones or skeletons. Come to think of it I don't think that they found any in the Titanic either - something about solution of $CaCO_3$. In our area go ask the trawl fishermen - remember that the sea floor over that area was trawled for decades and the dragging of nets over the sea floor would well and truly have either recovered any available bones or otherwise dissipated any human remains. But human remains are relatively buoyant and would more easily be transported by the currents away from the area than sand and shell. There is no chance of any human remains from the 1800s being on the sea floor in the proposed dredging area.*[1]

The method of sand extraction, which employs a small diameter pipe (20mm) and meshes up to 6mm in diameter, will not suck up any objects larger than 20mm. Thus any artefacts (apart from very small ones) that might be buried in the sand would not be removed by the process.

The Side Scan Sonar study (also ground truthed using video) did not indicate any evidence of shipwrecks or any other human artefacts. At the highest resolution it is possible to detect items as small as 10cm, but while objects of this size would present difficulties in identification, larger objects would be easily detected. For example, a number of beds of horse mussel were observed. No human artefacts were observed in the Drop-Camera or video transects employed during the ecological study.

Conclusion

A search of records and a review of sonar analysis of the extraction area failed to identify any remains relating to human activity and it is considered unlikely that the extraction process and the technology employed will have any impact on any heritage sites. From a heritage perspective there are no constraints on sand extraction proceeding from within the identified location. Furthermore, in the absence of direct detection of artefacts by side scan sonar, it is anticipated that a similar conclusion will be likely for all other specific areas that may be dredged in future within the permitted area.

References

Ngatiwai Trust Board Resource Management Unit. August 2003. Cultural Impact Assessment. Kaipara Excavators Sand Extraction off the Pakari Coast.

Healy, T. and D. Immenga. Pre Dredging Assessment for Deep Sand Extraction from the Hauraki Gulf off Pakiri. Part 1: Side Scan Sonar and Textural Analysis of the Sea Floor Sediments. University of Waikato, Coastal Marine Group.

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[1] Healy, T – Personal communication: November 2003.

Mead, S., B. Beamsley and T. Haggitt. Pre-Dredging Assessment: Ecological Component. Infaunal Sampling and Drop-Camera Video Surveys of a 1 x 8km Area off Pakiri Beach. Report Prepared for Kaipara Excavators Ltd.

PRE DREDGING ASSESSMENT FOR DEEP SAND EXTRACTION FROM THE HAURAKI GULF OFF PAKIRI

PART 1: SIDE SCAN SONAR ANDTEXTURAL ANALYSIS OF THE SEA FLOOR SEDIMENTS

Terry Healy and Dirk Immenga
Coastal Marine Group
University of Waikato

1. Background

In 2000 Kaipara Excators Ltd (Kaipara) was granted a Resource Consent from the ARC to extract up to 2 million m^3 of sand over 20 years from the sea floor within an area of ~ 480 km^2 of the Hauraki Gulf and off Pakiri Beach. Subsequently that decision was appealed to the Environment Court (2001). The Environment Court re-affirmed recommendation to the Minister of Conservation to allow deep sand extraction from the Hauraki Gulf. A condition of that consent is the requirement for a Pre-dredging Assessment (PDA) of the areas expected to be dredged by Kaipara:

The PDA shall, under the direction of a suitably skilled and qualified scientist, in terms of sand quality, identify:
Sediment transport pathways
Areas of rippled bedforms
Areas of sea floor in which mud exceeds 20% by volume.

In terms of Biology
Areas of benthic macro fauna or communities of particular conservation value and their significance

The PDA is being co-ordinated by Mr Chris Johnson, of the Ngatiwai Trust Board. He has identified:

The overall purpose of the PDA is to provide a quantitative, spatially extensive description of the sediments and benthic fauna, including the identification of important / sensitive habits or species, over an area encompassing the predicted effects of dredging activity. It is intended that the PDA will include the following activities:

- *A sidescan sonar and bathymetric survey of the proposed dredge and surrounding areas*
- *Video and grab sampling to ground truth the sidescan sonar output in terms of sediment composition and benthic species and numbers.*
- *Analysis of sediment samples collected during the grab sampling with particular emphasis on identifying samples / areas with greater than 20% mud content.*
- *Collection and identification of the animals in each sample.*
- *Analysis of all data collected (i.e. sidescan, video & grab samples) to identify spatial extent of species and habitats over and adjacent to the proposed dredge areas.*
- *On-the-job training in field data collection and laboratory analysis for suitably qualified staff from Ngatiwai Trust Board.*
- *Production of associated reports – results and findings, recommendations.*

2. Area to be Dredged

The site initially identified by Kaipara and proposed to be dredged, has been delineated as offshore from Te Arai Point and extending southeast approximately 8 km parallel to the 25 m isobath. The proposed area is ~8 km by 1 km, and marked by red hashed lines on the accompanying chart, encompassing water depths of ~25-35 m. The surveys extended over the entire area, are as well as outside the area to obtain data against which to compare potential effects from future dredging.

3. Side-scan Sonar Survey

The side scan survey over the area requested by Kaipara is shown in the accompanying map, produced at a large scale. Apart from the major area off Pakiri we were also requested to scan along the 25 m contour north of Te Arai Point toward Mangawhai.

The survey was carried out on 2nd and 3rd July 2003 using the Auckland University vessel *R.V. Hawere.* The system used was a Klein 595 Dual Frequency (100 and 500

kHz) integrated with Trimble Differential GPS position fixing. Side scan data logging was with Triton Elics processing hardware. The system records both digital and analog imagery, with analog output on plastic paper. The digital data is processed with ISIS software and exported to Arcview GIS for map output.

The survey commenced in the afternoon of 2 July, 2003, in somewhat choppy wave conditions. However on the 3rd run there was interference from an external radar system which affected the position fixing. On the second day (3 July, 2003) only conventional GPS was available. This is accurate to about 3-5 m. For this day the sea was mostly calm with a slight swell.

4. Side Scan Sonar Interpretation.

The large scale digital data presentation is attached in the accompanying chart. The major features in the area the proposed dredge are:

- Along the southwestern (landward) flank of the proposed dredging area, at water depths of 25-30 m, the sea floor consists predominantly of shore-parallel ripple bedforms, with some areas of finer sand more lightly rippled. Typically ripple wavelength of λ = ~0.7 m. These are wave formed ripples formed from the oscillatory motion on the bottom. Typically such features occur with "medium" sand. In the northern area there are occasional patches of larger megaripples (λ = ~1.5 m). There is little obvious evidence of horse mussels, although some isolated clumps appear to occur; however there is not the predominant horse mussel coverage recorded at 15 -20 m water depth in the 1996 survey (Healy et al. 1996). Notably the 1996 survey recorded a small zone of horse mussels at 25 m depth south of the Pakiri River.

- Seaward, in water depths of 30 m typically the bedforms are less distinct, and the minor rippling only is evident. Large areas of finer surface sands are evident (with indistinct ripple features). A distinct patterning of patches of finer sand overriding the coarser more strongly rippled areas begins to emerge. Horse mussels are not obvious.

- Further seaward in water depths of 35 m, the bottom is again predominantly lightly rippled (λ = ~0.7 m) m in the central sections, with patches of larger bedforms (λ = ~1.2 to 1.5 m) at both the southern and northern ends, more evident at the southern end

where there is strong differentiation of fine sand patches migrating over the large bedforms. Patches of horse mussels are apparent in the central-northern sector.

- On the seaward-most (eastern) side of the defined area, the sea floor is predominantly covered in well defined shore-parallel megaripple bedforms of λ = ~1.5 m. In the southern sector, well differentiated patches and fingers of fine sand are overriding the heavily developed megaripples, moving in an onshore and southerly direction.

- In terms of active sediment transport pathways, the major feature is the evidence of fine sand patches moving generally south and overriding the coarse grained megaripples in the southern sector. Such southwards moving patches were also identified in earlier side scan surveys at 35-50 m water depths near the Jellicoe Channel, presented to the ARC hearing committee as part of the Kaipara application. The predominant signal of shore parallel and wave generated bedforms over much of the proposed area is indicative of frequent bottom agitation of the sediments with some potential diabathic transfer associated with upwelling/downwelling currents. The bedform features seen here are typical of deeper shoreface (20-35 m) features on lee shelves such as off Pakiri.

- There is no evidence in the side scan records of human artefacts on the sea floor. However there is evidence of a dredge mark at about 28 m depth, possibly a scallop dredge.

5. Textural Data for the Sea floor samples

Some 66 sea floor samples were collected using a Smith –McIntyre remote grab sampler. The sampling pattern extends over, as well as outside of, the proposed dredging area. The samples collected were used both for the benthic biological analysis as well as for the sediment textural analysis. Sub-samples were analysed for texture in the Rapid Sediment Analyser fall tube system at the University of Waikato. The results are given as "hydraulic quartz equivalent" textural analyses. Sites of the samples collected are plotted on the chart, and data for each site is summarised as per the table below, detailing the mean grain size (in sedimentological phi units), sorting and skewness values. In terms of the phi mean grain size, coarse sand values are < 1; medium sand 1-2, and fine sand > 2. The "gravely sand" description refers to broken shell as part of the sample.

– 3-4=V.fine sand
4-8 = silt
8-12 = clay

Sample Number	Mean Grain Size (phi)	Sorting	Skewness	Description
1	1.92	1.02	1.01	slightly gravelly sand
2	1.12	0.57	1.38	sand
3	1.39	0.57	1.85	sand
4	1.35	0.67	1.06	slightly gravelly sand
5	1.03	0.73	0.49	slightly gravelly sand
6	1.53	0.64	-1.11	slightly gravelly sand
7	1.45	0.48	0.71	slightly gravelly sand
8	1.24	0.4	1.47	slightly gravelly sand
9	1.24	0.65	0.21	sand
10	0.65	0.56	0.73	slightly gravelly sand
11	1.41	0.76	-0.24	slightly gravelly sand
12	1.80	0.49	0.62	sand
13	1.60	0.45	0.47	slightly gravelly sand
14	2.35	0.73	-3.52	slightly gravelly sand
15	0.80	0.84	0.15	sand
16	0.89	0.79	-0.27	slightly gravelly sand
17	1.93	0.69	1.05	slightly gravelly sand
18	1.54	0.63	-1.05	slightly gravelly sand
19	1.97	0.65	-0.41	slightly gravelly sand
20	1.88	0.75	0.14	slightly gravelly sand
21	1.61	0.56	-0.04	slightly gravelly sand
22	0.95	0.68	0.69	slightly gravelly sand
23	1.76	1.15	0.62	slightly gravelly sand
24	1.87	0.46	-1.18	slightly gravelly sand
25	2.11	0.41	0.96	sand
26	0.84	0.56	-2.37	slightly gravelly sand
27	1.88	0.37	0.45	sand
28	1.51	0.45	1.57	sand
29	1.29	0.48	1.11	sand
30	2.07	0.41	-0.14	sand
31	1.64	0.44	-1.5	slightly gravelly sand
32	1.45	0.42	1.46	slightly gravelly sand
33	1.19	0.85	1.68	slightly gravelly sand

34	0.91	0.63	-0.13	slightly gravelly sand
35	0.79	0.78	1.34	sand
36	1.88	0.82	0.79	slightly gravelly sand
37	1.54	0.58	-1.1	slightly gravelly sand
38	1.53	0.5	0.11	sand
39	1.38	0.45	0.04	sand
40	1.56	0.43	1.4	sand
41	1.32	0.59	0.56	slightly gravelly sand
42	0.96	0.6	-0.41	slightly gravelly sand
43	1.05	0.76	1.19	slightly gravelly sand
44	1.78	1.32	0.39	Sand + silt
45	1.18	0.45	0.98	slightly gravelly sand
46	1.82	0.47	0.97	sand
47	1.56	0.61	0.76	slightly gravelly sand
48	1.5	0.44	-0.15	slightly gravelly sand
49	2	0.47	-0.54	sand
50	1.33	0.47	1.64	slightly gravelly sand
51	1.31	0.6	1.94	slightly gravelly sand
52	1.05	0.64	-0.93	slightly gravelly sand
53	1.25	0.49	-0.49	slightly gravelly sand
54	2.64	1.01	-0.82	slightly gravelly sand
55	1.62	0.47	-0.29	slightly gravelly sand
56	1.64	0.95	-1.52	slightly gravelly sand
57	2.49	0.65	-4.23	slightly gravelly sand
58	1.03	0.55	0.27	slightly gravelly sand
59	1.7	0.43	0.35	sand
60	2.03	1.04	0.6	slightly gravelly sand
61	1.6	0.54	0.47	sand
62	2.39	0.93	-0.38	slightly gravelly sand
63	1.05	0.81	-0.03	slightly gravelly sand
64	0.89	0.56	-0.81	slightly gravelly sand
65	1.45	0.75	1.61	sand

It is evident from the table that the majority of samples analysed possess mean grain sizes within the "medium sand" (1-2 phi) category. For the few that are not medium sand, the "coarse sand" samples (10,15,16,22,42,64) tend to be located in deeper water and /or associated with the coarse megarippled sea floor, while the samples classifying as "fine sand"(14,25,30,54,57,60,62) tend to be in the shallower water. In general the medium sands are associated with the lightly rippled sea floor.

6. Summary

1. The majority of the sea floor within the proposed dredging area are shore parallel (wave generated) ripples of $\lambda = 0.7$ m. Typically these are associated with medium grain sizes.
2. Large shore parallel coarse grained ripples and megarippled patches are found to the north and south of the proposed dredging area. These large bedforms ($\lambda = 1.5$ m) are associated with coarser mean grain sizes.
3. Particularly in the south of the proposed dredging area, patches of fine sand are identified overriding the large megaripples. These patches of fine sand are moving in a generally southerly direction. Elsewhere the finer sand patches are indistinct and clearly rippled.
4. Some minor horse mussel clumps were identified, mainly in the north-central sector of the proposed dredging area at water depths of 35 m.
5. The implication of the wide coverage of large ripples over the surveyed area is that the sea floor is frequently mobile from the process of wave generated orbital motion at the sea floor.
6. In terms of sediment texture the majority of samples analysed were in the "medium sand" range, and these occurred widely over the proposed dredging area, with coarser sediments tending to be located in the deeper water, and finer sediments in the shallower water.
7. The side scan sonar provided no evidence of human artefacts on the seas floor.

7. Reference

Healy, T., S. Nichol, T. Hume, D. Immenga, and J. Mathew, 1996: The Mangawhai-Pakiri Sand Study. Module 2: Marine Sands. Report to the ARC. 111p.

COPY

KITT LITTLEJOHN
Barrister

15 October 2003

Mr Monty Wilson
Ngatiwai Trust Board
P O Box 1332
WHANGAREI

Tena koe Monty

NGATIWAI - KAIPARA LIMITED - DEEP WATER SAND DREDGING - PRE-DREDGING ASSESSMENT REPORTS

You will be aware that with the assistance of Mr Johnson of your Resource Management Unit, Kaipara Limited has been preparing to exercise the permit granted to it by the Minister of Conservation on the 13th of February this year and commence dredging of sand from deep water areas in the Hauraki Gulf within the rohe of Ngatiwai.

Part of the pre-dredging assessment programme required Kaipara Limited to obtain specialist reports on sand quality, biology and heritage/archaeological sites.

With that latter requirement in mind, a cultural impact assessment report was commissioned from Ngatiwai and, I understand, completed by Mr Volkering on its behalf. That report, dated August 2003, comprehensively provides an assessment of all relevant cultural matters consistent with the relationship that was secured between the parties in 1998 when the project commenced.

The precise wording of Condition 10A(iii) concerning "Heritage Sites" is that:

> Include an assessment by a recognised heritage consultant as to the potential for dredging in the PDA to disturb or destroy a site or sites of spiritual or cultural importance and/or any archaeological sites (within the meaning of the Historic Places Act 1993).

The cultural impact assessment report provided by Ngatiwai has, necessarily and appropriately aimed at a much broader level of cross cultural assessment issues. It has, as such, not specifically addressed the particular requirement under the condition of consent. I anticipate that has not occurred because the necessary technical information to enable that assessment to be made would not have been available at the time the assessment was completed. That information would include the outcome of the side scan sonar survey and the textural analysis of the seafloor sediments undertaken by the University of Waikato. I **enclose** copies of those two reports.

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Importantly, the technical work undertaken in this area has focused on an area of the seafloor far removed from the surrounding area of Hauturu. You will recall that it was the alleged potential for ancestral remains on the seafloor in the vicinity of this Island that originally gave rise to this concern.

Secondly, the textural analysis of the sediments undertaken by Professor Healy indicates that no physical objects were identified on the seafloor that would be consistent with human remains or, human artefacts (eg waka etc) on the seafloor in the proposed dredging area.

I invite you to contact Professor Healy to discuss that aspect of his report.

Kaipara Limited intends to provide a copy of the Ngatiwai Cultural Impact Assessment to the Auckland Regional Council as a part of the pre-dredging assessment requirements. In addition, it would be extremely useful if Ngatiwai could consider the matters that I have outlined above and confirm their understanding that extraction from the area proposed would not disturb or destroy a site or sites of spiritual or cultural importance or any archaeological site. That advice and the assessment, will then be provided to the Regional Council and the Historic Places Trust and their comments sought. That step is necessary before final approval of dredging in the proposed area can occur.

I would appreciate your urgent call if there are any matters arising from this letter that you wish to discuss. I would be more than willing to assist Ngatiwai in completing the specific report required, after it has had an opportunity to review the technical information.

Yours sincerely

Kitt Littlejohn

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