DETRITAL GOLD IN NADI BAY

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SUMMARY

In response to a request by the Mineral Resources Department of Fiji, a bathymetric survey, a seismic survey and surface sampling were conducted in Nadi Bay as part of an exploration program for placer gold deposits.

The results of the study clearly define numerous large buried channels associated with old fluvial systems active during previous lowstands of sea level. The presence of buried channels was previously hypothesized but had never been confirmed. Some channels appear to be at least 150 m wide and 10 m in depth. These channels have yet to be tested for gold. There is a good possibility of enriched placer gold deposits in these channels as the hinterland is known for numerous gold deposits within 20 km of the bay.

At least three distinctive sedimentary layers were identified from seismic records. The upper unit is reflection free and is interpreted as marine clay. A soft grey-green marine clay with abundant fossils was recovered during surface sampling. The second unit has chaotic reflections and is interpreted as consisting of channel fill and fan material, The third unit is interpreted to be early Pleistocene Meigunyah beds, a mixture of shallow marine and fluvial material. The contact between the second and third units is an angular unconformity showing considerable erosion.

No significant gold values were recorded in the samples analysed from this survey, despite the very high gold values recorded in the Crawford Marine Specialist's survey.

Sampling of the buried channel-fill material is recommended for follow-up work in the area. An onshore sampling program is also suggested to examine the present active stream deposits such as lag gravels, surficial beach sand, lag gravels, point bars, braid bars, flood plains, and terraces in Vuda and Sabeto Rivers.

ACKNOWLEDGEMENTS

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The authors acknowledge the assistance of Mr Tevita Vuibau, Mr Eroni Tupua, Mr John Banner, Mr Mitieli Kawa, Mr Jimi Etika, Mr Jone Silaira, Mr Luna Wong, and Ms Cristelle Pratt from the Mineral Resources Department. The logistic support provided by Mr Alfred Simpson, Director of the Mineral Resources Department, to the project is appreciated.

The authors also acknowledge the support from the villages of Lautoka, Sabeto and Namotomoto

OBJECTIVES

The objective of this study is to assess the placer gold potential in surficial sediments in Nadi Bay, with the assistance of bathymetric maps, seismic profile and the analysis of surface samples. The study was carried out at the request of the Mineral Resources Department, Ministry of Lands and Minerals Resources, of Fiji,

This report presents the results of Task 92.FJ.18b.

INTRODUCTION

Nadi Bay is located in the west of Viti Levu, Fiji's largest island. Nadi Town lies 2.5 km south of the bay.Nadi International Airport sits on an alluvial plain next to the bay (see Figures 1, 2, and 3). Water in Nadi Bay is generally calm, being protected by the Mamanuca Group of islands and fringing coral reefs. Four rivers, the Vuda, Sabeto, Nasoso and Nadi Rivers discharge into Nadi Bay and form extensive deltas. Vegetation in the deltas consists of dense mangrove forestation. Road access to the bay is excellent through a network of sugar cane and feeder roads leading to residential properties that are rapidly building up along the bay. Access to the delta area of Sabeto is currently more difficult due to destruction of a bridge during Cyclone Oscar in 1983, but. travel is possible by punts that can readily be hired in the area.

There has been interest in the Nadi Bay area since gold was first discovered in the hinterlands of Vuda and Sabeto during the early1900s, rejuvenated when Crawford Marine Specialists Inc. reported widespread high gold values during its exploration of the bay in 1969. To date, excluding this SOPAC study, there have been three exploration programs conducted at Nadi Bay, the last about 10 years ago by Consolidated Goldfields of Australia. Speculation that buried channels in Nadi Bay may contain large placer gold deposits from gold-bearing rocks of Vuda and Sabeto has been prevalent since these surveys. This study identifies and defines these buried channels and describes the depositional environment of Nadi Bay.

FIELD PROGRAM

The field program in Nadi Bay consisted of three activities: (i) bathymetric survey, (ii) sub-bottom profiling, and (iii) collection of surface samples. The Mineral Resources Department vessel Yautalei, an 8-m vessel equipped with a 3 m aluminum A-frame, was used for the field program. The field work was carried out by Bill Collins of SOPAC. Following his departure in September 1992, Jackson Lum continued the analytical part of the study. Appendix 1 documents the daily log of the survey.

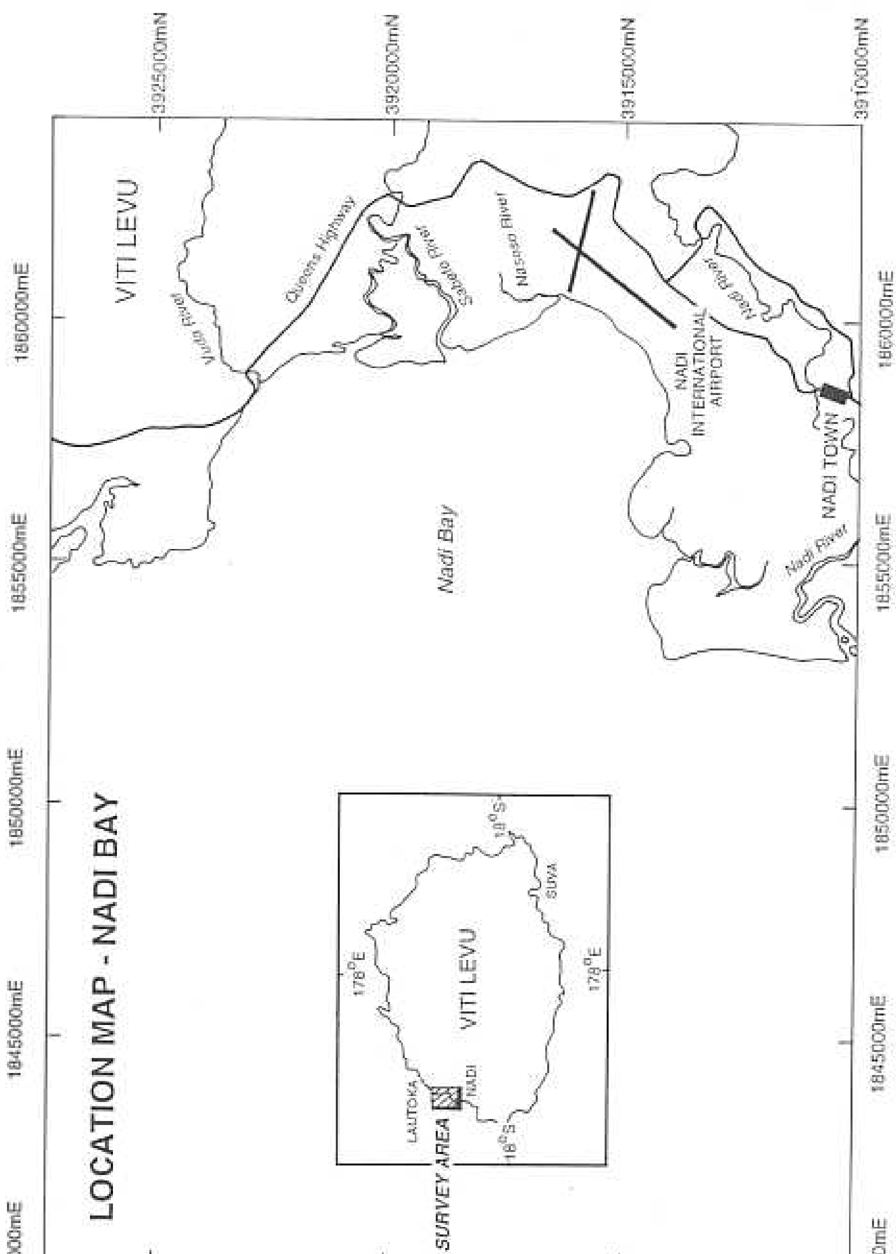

Figure 1. Location map of Nadi Bay.

Figure 2. Air photo of Nadi Bay, looking east. Photo by Dr R. Howorth.

Figure 3. Air photo of Nadi Bay, looking southeast. Photo by Dr R. Howorth.

Bathymetric Survey

Bathymetric data were collected by a Raytheon DE-719 echo sounder and precision depth recorder powered by a 12-volt battery. The transducer was mounted on a boom extended over the side of the vessel and fixed at a depth of 60 cm in the water. The echo sounder was calibrated daily by means of a bar check. The accuracy of the data is estimated to be plus or minus 10 cm.

Sub-bottom Profiling

Sub-bottom profiles were obtained with a Datasonic Bubble Pulsar, a boomer-type seismic profiler operating in a frequency range of 400 to 2000 Hz. It consists of a power supply, a control/signal processing unit and a transducer mounted vertically on the bottom of a small surf board. This transducer was towed from a point 1.5 m along the boom. Power was provided by a 1.5-k watt generator. Signal processing included Time Varied Gain (TVG) with no delay. The key pulse for the signal was generated eternally by the graphic recorder.

Data were recorded on an EPC 4800 linescan recorder at a scan rate of 250 ms per sweep. Ten scale lines were recorded over the paper width. A total of 73 line kilometers of data was collected (see Figure 4).

Navigation Control

A Del Norte trisponder positioning system provided line-of-sight relative accuracy of 3 m. The system operates in the microwave band. The master unit was mounted on the vessel and the antenna was secured to a 3 m mast, providing adequate height above water. The control console on the bridge was powered by two car batteries wired in series to produce 24 volts.

Two remote stations were used. The first was located on the east side of Malamala island, 18 km WSW of Nadi International Airport, The approximate position of the site is 1842650E and 3919290N on the Fiji Map Grid (FMG). The second remote station was located at the seaward edge of the Mobil Oil rock jetty at their Vuda Point Terminal. The approximate locations provided angles of cut generally greater than 50' (90' being the ideal) for most fixes. Navigation logs are provided in Appendix 2.

A Zenith laptop computer provided event times. A computer program was written to record line numbers, fix numbers and time (Appendix 3). A signal was generated at each event. The echosounder and EPC data records were marked simultaneously using a manually activated markbox.

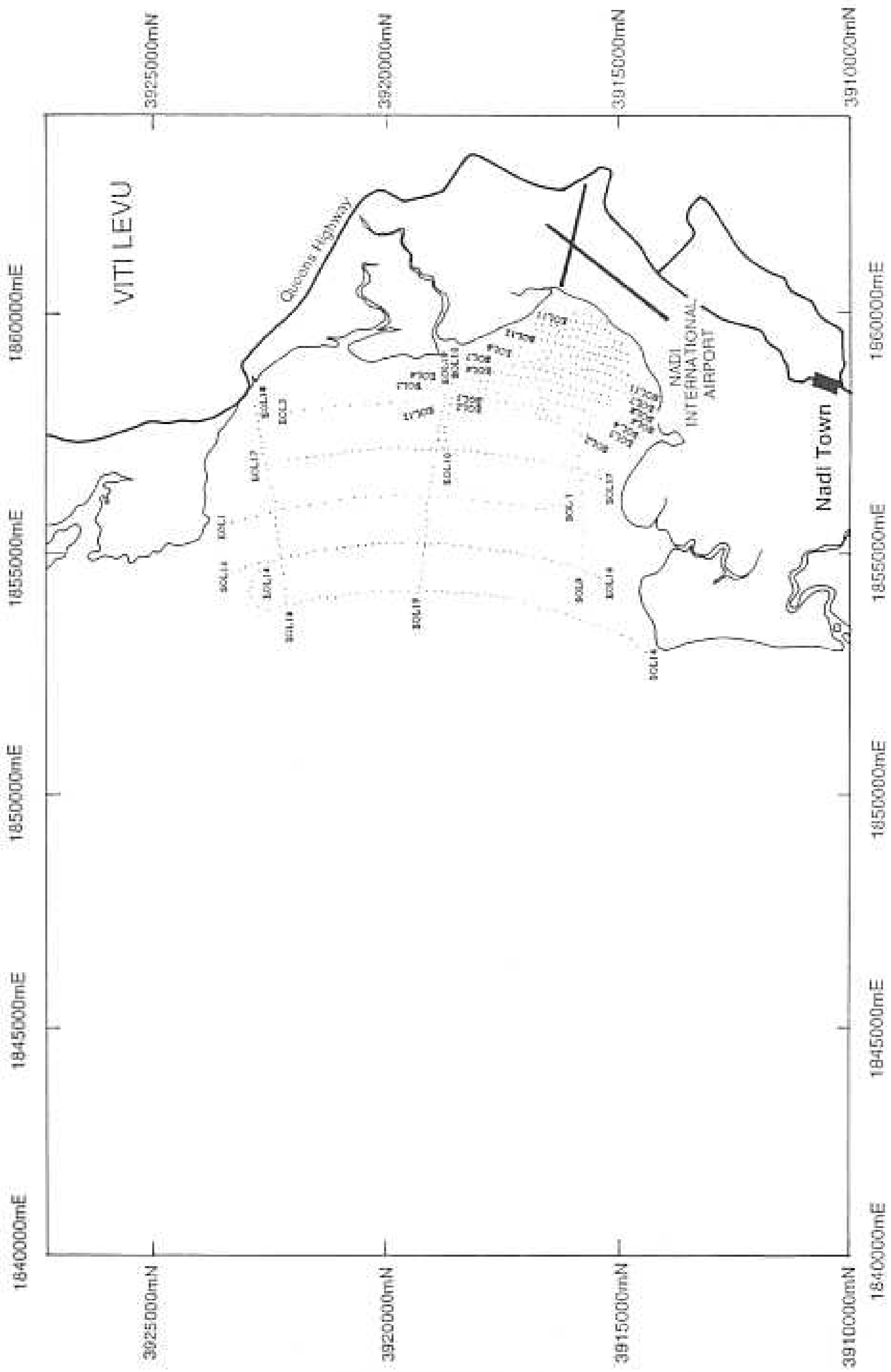

Figure 4. Track plot for the 73 line kilometres of data.

Water-level Recorder

An Aanderra water-level recorder, tied into the Suva tide gauges, was placed on the seafloor in Nadi Bay for the duration of the survey. It recorded the water level at 65-minute intervals in order to correct the data for tidal variations.

Sampling

Forty-nine surface sediment samples were collected on a 1 km grid over the greater Nadi Bay area, using a hand-lowered 0.15 m Van Veen grab sampler. Figure 5 shows sample locations and Appendix 4 the sample log.

PREVIOUS WORK

Nadi Bay has been investigated for minerals, particularly gold and magnetite, by three exploration companies in the last twenty-three years, namely Crawford Marine Specialists Inc. (1969-1971), Manganex Ltd (1972-1974) and Consolidated Gold Fields (Fiji) Ltd. (1980-1981). An excellent summary of these companies' results is reported in Htay et al. (1990). Offshore exploration by the three companies consisted of drag-bucket and shallow gravity core sampling and beach-sand augering. A seismic bottom-profile survey was conducted by Crawford Marine Specialists Inc.

Early offshore sampling by Crawford Marine reported anomalous gold values up to 3740 mg/m (1.87 ppm). The survey reported 20 samples with values > 1360 mg/m over approximately 20 km in the Nadi Bay area. Thirty-one samples out of seventy-eight samples yielded gold values. Seismic sub-bottom profile interpretation indicated sediments up to 15 m thick overlying layered inclined bottom sediments with angular unconformity. For unknown reasons, the company later discontinued exploration and relinquished the licensed area.

In 1972, Manganex Ltd investigated the Nadi Bay area in search for magnetite with gold as a secondary interest. Manganex reported "no gold was detected in the interface zone, and only one speck of gold was found in the upper part of the sediment". Assay values taken from 25 offshore samples recorded gold values below detection limits. Three samples were taken from holes drilled to 12 m. The Atomic Absorption Spectrometry method was used to analyze for gold.

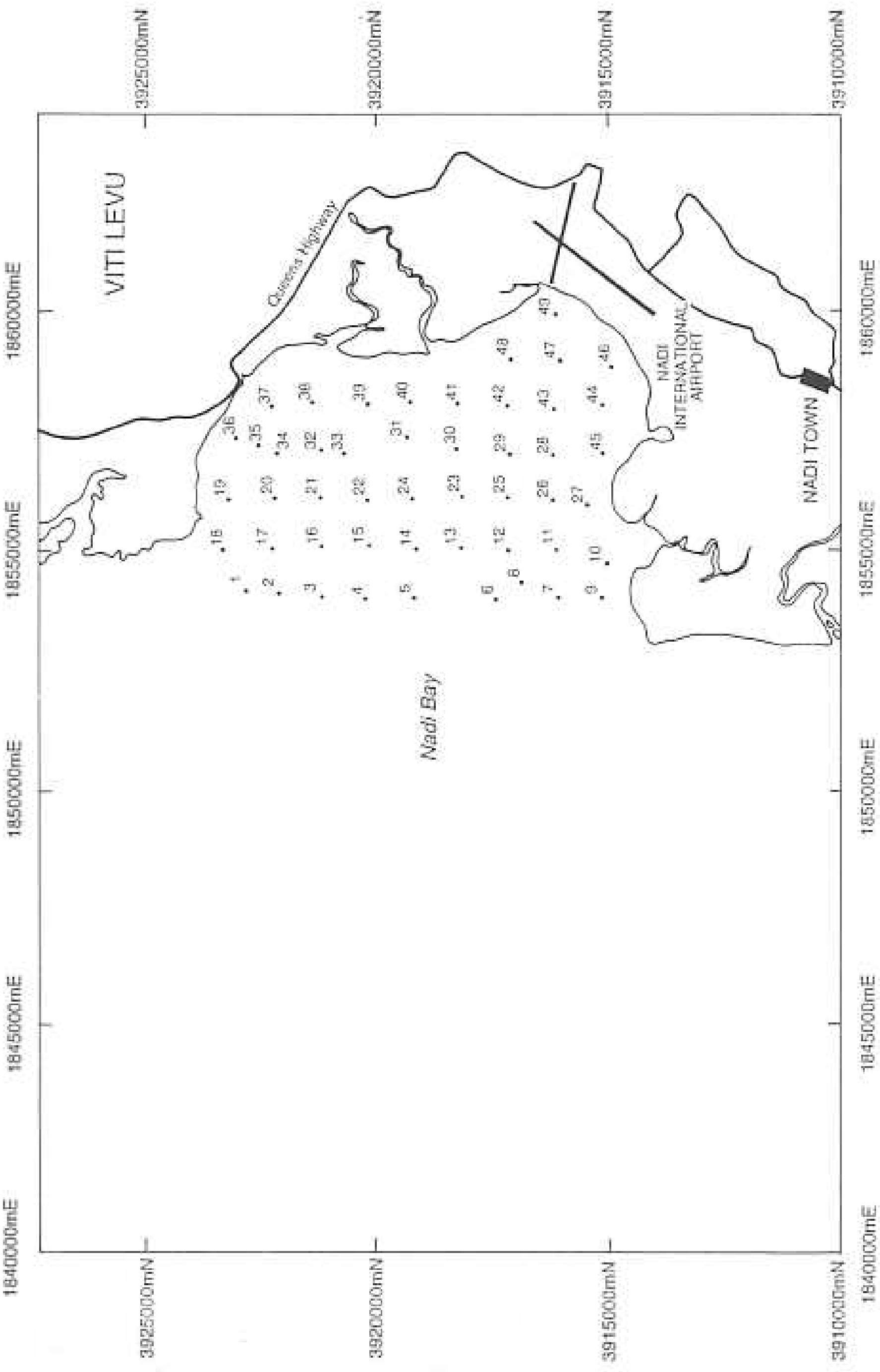

Figure 5. Sample locations map.

Ten years later, Consolidated Gold Fields after examining Crawford Marine's data acquired the right to prospect for alluvial gold in Nadi Bay. The increase in price of gold, from US$35/oz in 1970 to US$620 in 1980, was the reason for the company's interest in the area. Consolidated Gold Fields conducted beach-sand augering, offshore grab sampling and gravity coring. Beach augering was carried out at 35 stations at the mouths of the four major rivers and also at Momi Bay. The depth of the auger holes was limited by the water table. The gravity coring program consisted of 79 offshore stations and had a maximum penetration of 2 m. Samples were concentrated by panning and treated with diluted acid to remove shell fragments prior to gold analysis by fire assay.

The results of both the sand augering and the offshore gravity coring returned poor gold values. The highest gold assays were 0.313 ppm in a sand auger sample from the mouth of Vuda River, and 1.19 ppm in a gravity core sample taken from a site adjacent to the old Mistry gold mine.

DESCRIPTION AND GEOLOGICAL SETTING OF THE NADI BAY AREA

The geology of the Nadi area has been described by Geological Survey and Mineral Resources Department geologists: Houtz (1959), Batholomew (1960) and Rao (1983). Various parts of the Nadi and the Sabeto areas have been mapped in detailed by mining company geologists prospecting in the area. These reports are available in the Mineral Resources Department open file-library. Figure 6 illustrates the geology of the Nadi and Sabeto area.

The Nadi Bay alluvial plain extends some 6 km inland from the coast and rises 15 m above mean sea level. It is drained in the northern part by the Vuda River, Sabeto River, and Nasoso Creek; in the central and southern part by the Nadi River and its tributaries; and in the south by Nawaka and Masi Creeks. These rivers and creeks all form deltas. These rivers and creeks are typical ephemeral streams that deeply incise and underlying rocks of the Nadi Sedimentary Group, the Koromaivua Volcanic Group the early Pleistocene Meigunyah bed. Water deepens gradually offshore, typical of delta systems elsewhere.

Houtz (1959) first described the gravels of the Nadi River. Despite their youth and unconsolidated nature, they weather to material that simulates an older weathered conglomerate. Houtz also describe gravels from a former delta of the Nadi River. Batholomew (1960) noted two types of recent alluvial sediments in the Nadi area: (i) old sandy gravels, red clays, silts; and (ii) minor gravel forming small flat-topped terraces up to 40 m above sea level. In 1989, Gibb Australia, an engineering firm, conducted geotechnical investigations in southern Nadi Bay for a new hotel and commercial development. Twelve rotary holes and 375 vibro-core holes were drilled, Rotary holes were drilled to 18 m and vibro cores to 6m. The results of this work showed that the coastal plain was formed from a mixture of alluvial material and marine sediments 4 to 6 m thick

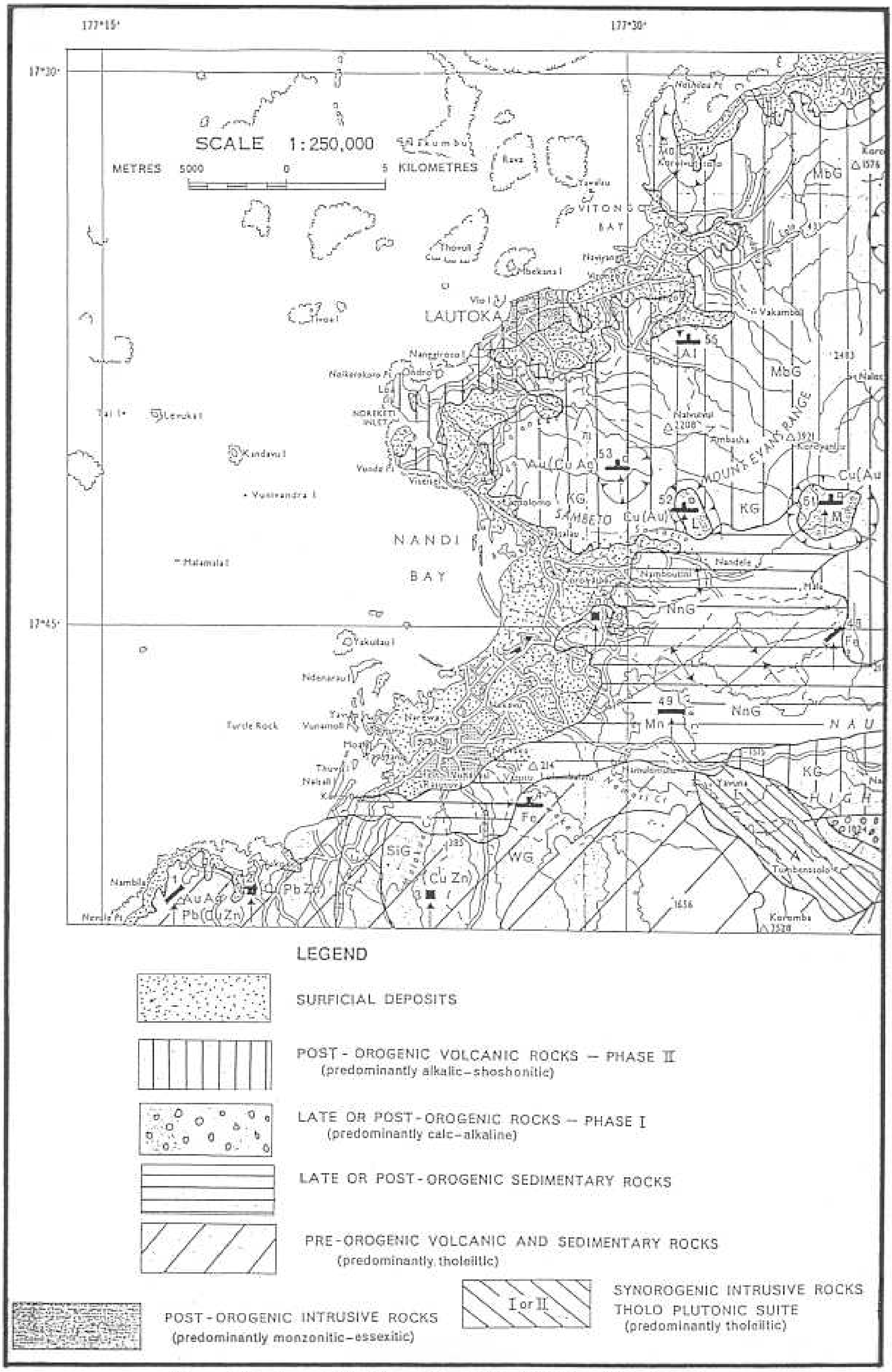

Figure 6. Geology of Nadi Bay. After Colley (1976) and Rao (1983).

underlain by a basement of silty brown clays derived from the weathering of a sedimentary rock. The alluvial material consists of silt, sand and gravel-sized rock fragments derived from volcanic and sedimentary rocks. Many of the rocks are weathered; they are and generally well sorted with little organic material present. These samples have not been tested for gold.

Marine sediments and beach deposits form the islands Denarau and Buabua, as well as numerous islands at the mouth of the Nadi River and within the mangrove swamp areas. These deposits were formed by reworking of older alluvial deposits by wave action and are usually 2 to 7 m in depth and occasionally up to 15 m in depth. They consist of unconsolidated fine and medium grained sand with shell fragments,

Highly flocculated, soft, grey-green marine silts on the ocean floor extend from just below low-tide level and to considerable distances offshore and vary in thickness from 3 m to 10 m. Shell fragments are common.

SOURCE OF GOLD

The source of gold is from the Vuda and Sabeto hinterlands (see Figure 6). In the Vuda area, gold tails up to 5 cm can be panned in the Vuda River, and gold values up to 20 g/t can be sampled in the Vuda valley from shoshonitic lava and agglomerate of the Koromaivua Volcanic Group which have been completely altered by fumarolic activity, This gold-bearing locality extends over an area of 6 to 8 km (see Figure 6). Gold mining took Volcanic Group place in the Vuda valley between 1938 and 1943, producing 670 oz of gold and 157 oz of silver, Mining ceased because of World War II restrictions. Since then, the entire Vuda valley has been intensely and vigorously explored by mining companies. Despite the long history of exploration and widespread gold mineralization in the Vuda area, no significant deposit has been defined. Indications are that mineralization is associated with zones of fracturing or faulting. Dickinson (1968) and Lawrence (1978) refer to the Vuda area as a collapsed caldera underlain at shallow depth by intrusive rocks. Usual last-moment comments by departing frustrated exploration geologists are "all the gold has been eroded away and is now in the bay" - the reason for no discovery after months of hard exploration in the Vuda area.

In the Sabeto area, the Sabeto River runs adjacent to Kingston Mine which operated periodically from 1906 to 1952. Closures of the mine were always due to flooding of the Sabeto River. Vein material from the old workings assays up to 97 ppm gold and 434 ppm silver.

BATHYMETRY

Figure 7 illustrates the bathymetry of Nadi Bay recorded by a Raytheon DE-719 precision depth recorder. A total of 3286 data points were collected during the survey. The accuracy of the equipment is estimated to be 0.1 m. All data were corrected to chart datum 0.0 m using the 1992 Nautical Almanac tide tables.

An eastward-trending topographic high cuts Nadi Bay (Figure 7) and extends some 7 km onshore, paralleling the shorter Nadi Airport runway. Because it separates different sedimentary environments, there is very gentle but continuous deepening of water depths in the southern bay compared to the northern bay. Water depths reach 20 m approximately 6 km from the mouth of the Vuda River. Except for the topographic high which cuts the bay, Nadi Bay is an archetypal bay showing gentle increasing of water depths towards the sea.

The mouths of the Vuda River, Sabeto River, Nasoso River and Nadi River are river-dominated deltas with low wave energy and low littoral drift, except for the Nadi River delta which appears to be have higher energy and stronger littoral drift, as indicated by lateral displacement of the delta lobe to the west of the river mouth (see Figure 7).

SEISMIC INTERPRETATION

The sub-bottom seismic profiles from the Datasonics Bubble Pulsar records (Figures 8 to 15)' show the following:

1. Numerous large buried channels
2. Three distinctive mildly-folded sedimentary layers
3. An angular unconformity showing considerable erosion
4. A thin veneer of marine silt covering the bay
5. A concentration of faults in the southern part of the bay
6. A general east-west direction of faulting

The profiles show layered sequences with a dipping depositional surface typical of delta deposits. The three distinctive layers identified in the seismic records relate very closely to the stratigraphy interpreted form drill cores in the vicinity of Nadi Bay. Oil exploration holes, Yakuilau Island No. 1, and Buabua Nos. 1 & 2 (drilled

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for figures 8 onward see after page 23

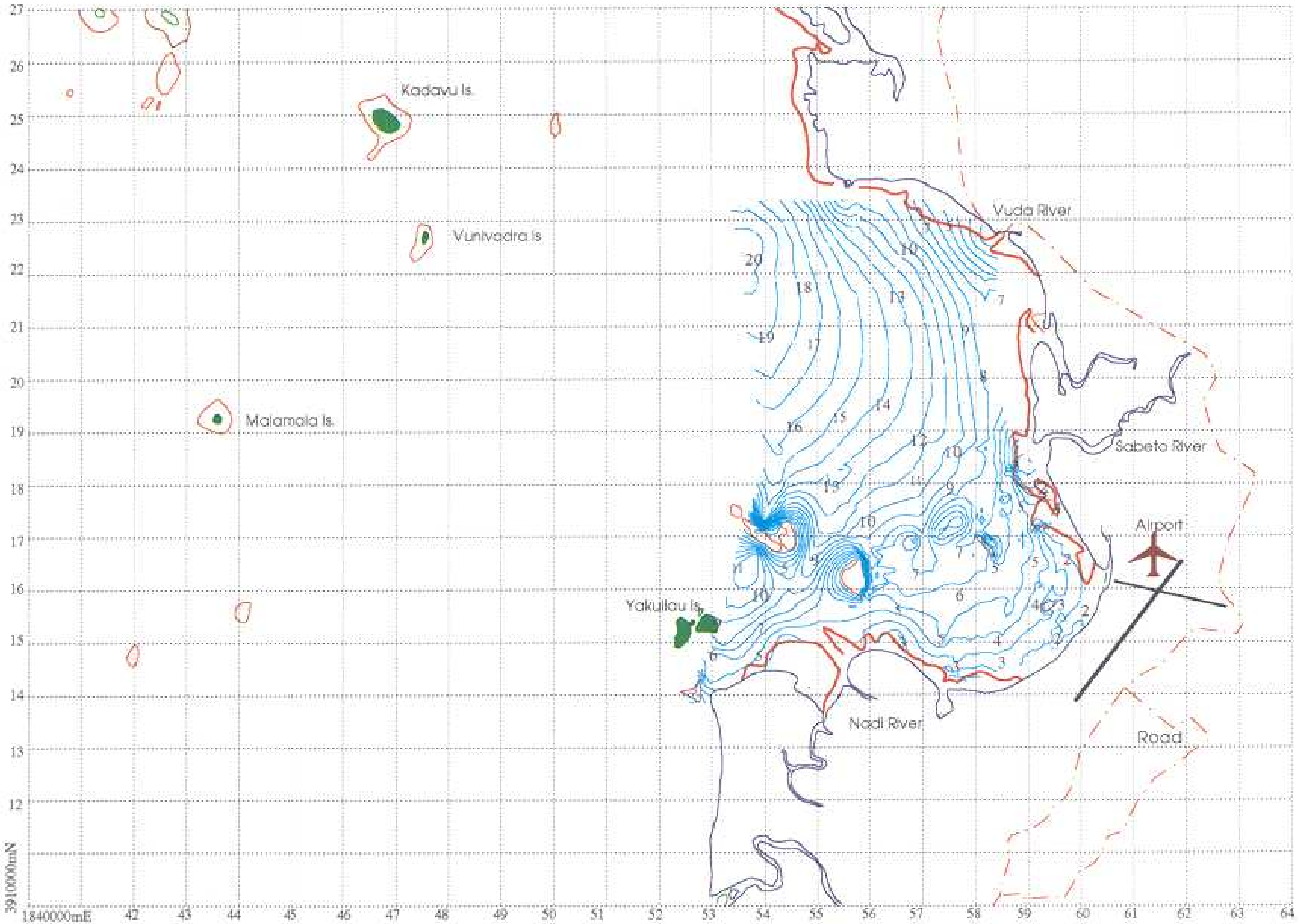


Figure 7. Bathymetry map of Nadi Bay.

to depths of 300m), and several hydrogeological holes drilled to depths of 180 m, were used to correlate geological units. The upper unit is reflection free and interpreted to be the soft grey-green marine clay with abundant fossils found in surface samples. This unit has a variable thickness of approximately 3 m onshore to 10 m offshore, and blankets the entire bay.

The second unit has chaotic reflections and is interpreted as channel fill and fan material. Onshore, this consists of loose beach sand, coral fragments and fluvial material.

Underlying this unit are very distinctive and gently dipping reflections probably associated with the early Pleistocene Meigunyah beds. Oil-exploration drill holes intersected this unit relatively near the surface and it was described as brown, sticky mud (70%) with medium sand (30%) containing variable abundances of fossils. Gale (1981) interpreted this unit as an earlier Nadi Bay deposit probably containing both shallow-marine and fluviatile material. The apparent dip angle of the Meigunyah beds decreases offshore. The dipping strata have been interpreted by some gold-exploration geologists as block tilting of the Nadi Bay area. However, the present authors believe that these dips reflect primary deposition on a sloping surface rather than the result of tilting. The contact between this unit and the one above is an angular unconformity showing considerable erosion (see Figures 9, 10, 11, 12, 13, 14 and 15).

The seismic records also show growth faults and small diapiric intrusions in the upper Sedimentary units, probably caused by rapid sedimentary loading. Faults are generally east-trending and appear to be concentrated in the southern part of the bay.

Gentle folds are observed in many areas. These were interpreted by Crawford Marine (1969) as an evidence of mild tectonism, The present authors feel that these gentle folds are results of differential compaction during sedimentation rather than results of tectonics.

The angular unconformity may relate to a lowstand of sea level of 60-175 m below present occurring about 15-17 000 years ago (Shorten 1992). Drilling in the Cuvu area some 60 km away from Nadi Bay (Prasad 1992) showed that sea level there was at one time more than 80 m below present MSL. Subsequent erosion and the reworking of the unconformity surface, by wind, waves and meandering streams, resulted in the scour and fill and the buried channels.

PALEO-CHANNELS

Seismic profiles indicate the existence of numerous buried channels associated with the old fluvial system predating the upper soft grey-green clay unit. Some channels appear to be at least 150 m wide and 10 m in depth. These channels have yet to be tested for gold. At least 5 m of marine clay must be penetrated in order to obtain samples for testing. Figure 17 places these paleo-channels in perspective using a block diagram. Several features are apparent:

- the thickening of channel fill material in the seaward direction
- the channels farthest from the shore tend to be broad and continuous
- the thickening of marine silts in the seaward direction
- the northem part of the bay contains more channels than the southern part

These observations suggest a lower sea level in the recent past. Chappell (1983) suggests that sea level has fallen at least eight times during the last 160,000 years. The last major low sea-level fall indicated by Chappell was some 20,000 years ago. The depositional environments would have been very different from at present, with the coastline being well seaward of the present limits of Nadi Bay. The thickening of both edges, interpreted to be old delta systems, in all the profiles suggests that the shape of the bay was probably very similar to its present shape. Old river mouths would be close to where the sediment is thickest. The broad and continuous channel in the profile furthest from the shore (Figure 8, profile 16) indicates a depositional environment possibly recording a composite of more than one sea-level fall.

The northern part of the bay contains relatively more channels than the southern part of the bay. This can be explained by the greater number of river systems in the northern part of the bay. Three river systems, the Vuda River, Sabeto River and Nasoso River empty into the northem part whilst the southern part only reviews by the Nadi River. In addition, the topographic high that bisects the bay may have prevented the movement of sediments to the south.

Although paleo-channels have been identified in this study, little additional information can be derived from the current seismic lines, i.e. structures within the channels are unclear. This is further discussed under recommendations.

GOLD ANALYSIS

Twenty of the 49 samples from the current survey were analyzed for gold by fire assay (see Figure 5 for sample locations). Gold values were below detection limits (see Table 1) for all samples except sample NB19, which assayed 0.007 ppm. This low value does not warrant any follow-up work. Gold analysis was conducted by fire assay due to the high content of organic carbon in the samples. Prior to the analysis, there was a slight chance that these samples may contain some gold because previous explorations did not consider the possibility of interference by organic carbon during their gold analysis. It is now known that organic carbon interferes with gold analysis, and in samples containing as little as 5 percent organic carbon, gold values may be reduced by some 95 percent if carbon was not removed from the samples before analysis (Lum 1990).

The results confirm the analysis of Consolidated Gold Fields where 79 gravity core samples were panned and the concentrates fire-assayed by the company in 1981. No gold was reported in any of their 79 samples.

Table 1. Gold analyses.

Sample Number	Gold (ppm)	Sample Number	Gold (ppm)
NB1	<0.005	NB18	<0.005
NB5	<0.005	NB19	0.007
NB6	<0.005	NB22	<0.005
NB7	<0.005	NB23	<0.005
NB9	<0.005	NB24	<0.005
NB10	<0.005	NB25	<0.005
NB11	<0.005	NB27	<0.005
NB14	<0.005	NB32	<0.005
NB15	<0.005	NB34	<0.005
NB16	<0.005	NB35	<0.005

Analysis Method - Fire Assay

Detection Limit - 0.005ppm

CONCLUSIONS

1. The survey defined numerous large buried channels in offshore Nadi Bay associated with old fluvial systems active during previous lowstands of sea level. These buried channels developed by scour and fill are excellent targets for gold exploration. It is not unreasonable to expect enriched placer gold deposits in these channels because the hinterland is known for gold deposits within 20 km of the coast. Rivers and streams would have carried both fine and coarse-grained gold into the delta system, and subsequent reworking during sea-level regressions and transgressions, would have helped to enrich placer gold deposits.

2. Gold was not recorded in any of the surface samples collected -this was expected but sampling and testing was essential as Crawford Marine in 1969 noted gold of up to 3740 mg/m in the surficial samples. There are reservations about the validity of the Crawford Marine results. The results of the present survey are in agreement with the investigations carried out by Manganex and Consolidated Gold Fields that anomalous gold does not exist in the upper top marine silt unit.

3. A topographic high divides the bay into two portions. With the Sabeto and Vuda Rivers incising areas of known gold mineralization and gold being present in these rivers, the northern part of the bay is therefore more prospective for gold exploration than the southern part, i.e. the channels in the northern bay are better targets for drilling than the ones in the southern bay.

4. The water of Nadi Bay gradually deepens offshore, making the bay an ideal setting for a dredging operation should a large gold placer deposit be discovered.

5. Interpretation of seismic profiles suggests that at least one sea-level fall affected the bay in the past. Nadi Bay was probably similar in shape during the sea-level lows to what it is now.

RECOMMENDATIONS

1. Sub-bottom profiles show excellent seismic cross-sections up to 190 m in depth. For future work, a recording scan rate of 125 ms is recommended as it would provide better resolutions of the shallow depths, thus allowing better identification of channels. Since conditions are ideal for good penetration (absence of biogenic gas), the datasonic 3.5-kHz sub-bottom profiler which was used successfully in the Ba River survey would provide better resolution and much sharper and finer details of the channel fill material.

2. A deep sampling program of buried channels is vital to complete the program. Deep sampling by vibrocorer or coring drill is recommended. The vibro air-lift allows penetration of 15 m into unconsolidated sediments. The vibro air-lift system drills very rapidly and is capable of completing five or more holes per day. This would require at least 10 days of field work and the use of a larger vessel. An alternative to the vibro air-lift system is Acker ace core drill capable of drilling to depths of 100 m or so. This equipment is also available at SOPAC. However, with this system, if the sediments are unconsolidated, low recovery is anticipated. Furthermore, drilling will take a longer time due to the nature of drilling and the depth of drilling in comparison to vibro-coring. In the event that channel-fill material returns interesting gold values and sediments are consolidated, the use of the Acker ace core drill should be seriously considered.

A sampling program with 80-m drilling grid spacing, consisting of at least 30 holes, is recommended.

3. Since the Vuda River and the Sabeto River both deeply incise gold-bearing rocks, more seismic and bathymetry lines should be concentrated around these river mouths.

4. An onshore sampling program is recommended to examine the present active stream channel deposits such as lag gravels, surficial beach sand, point bars, braid bars, flood plains, and terraces in Vuda and Sabeto Rivers. These samples can be panned and the concentrate fire assayed for gold. Onshore sampling is independent of the offshore work and can be carried out separately. Cores from holes drilled for groundwater and engineering studies, available from the Mineral Resources Department, should also be analyzed for gold content.

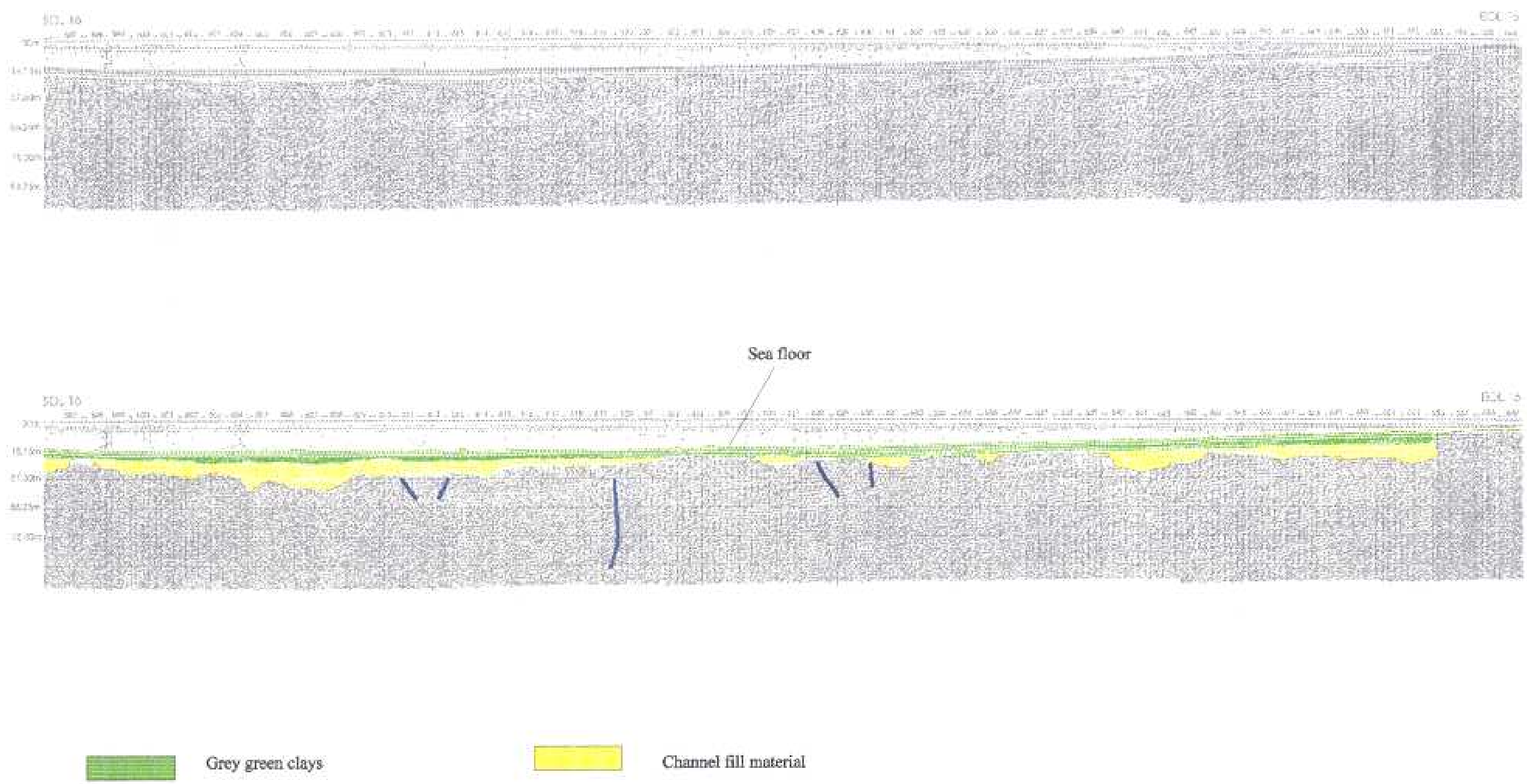


Figure 8. Seismic reflection profile 16 and interpretative cross-section showing fluvial channels.

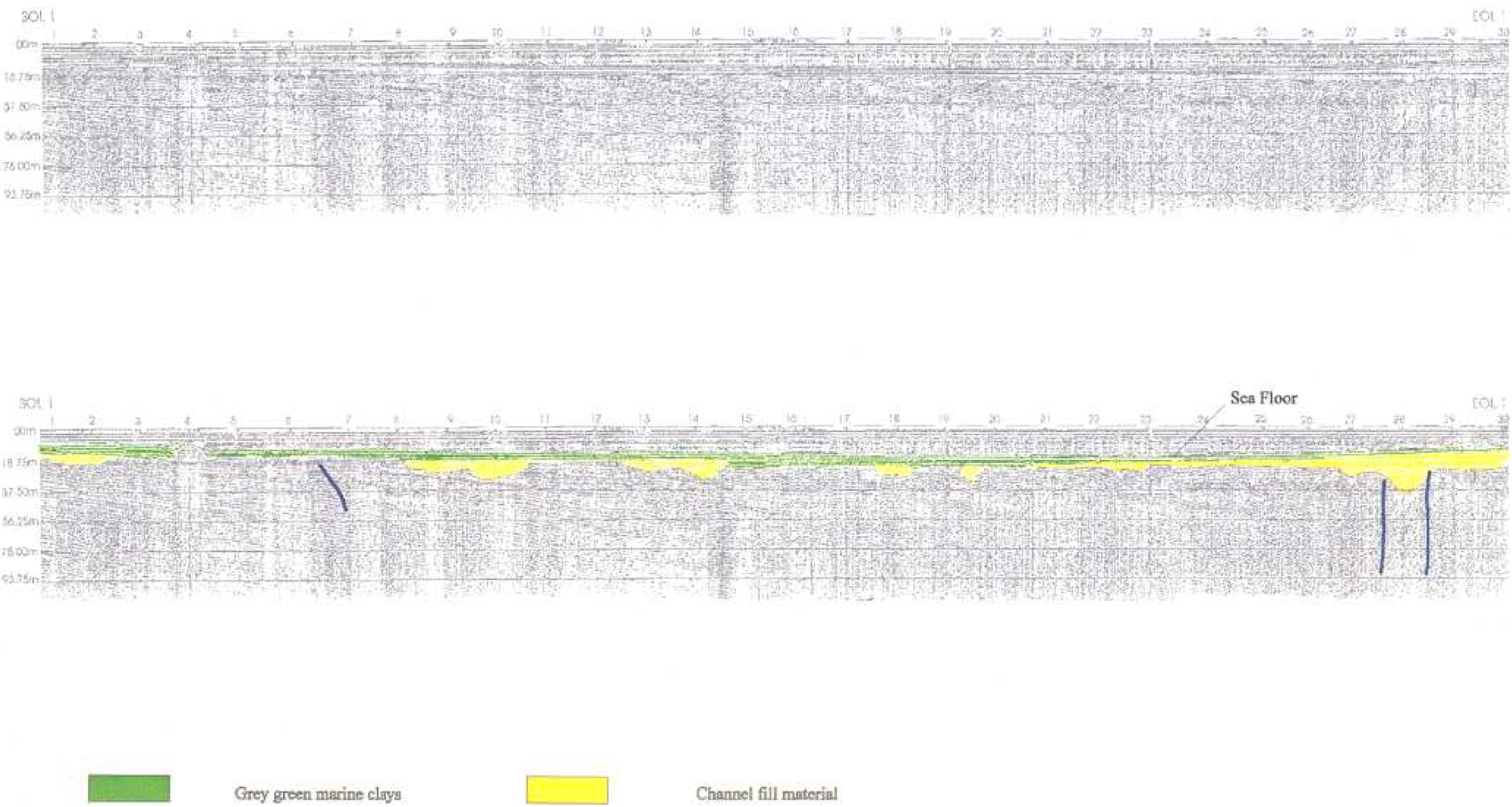


Figure 9. Seismic reflection profile 1 and interpretative cross-section showing fluvial channels.

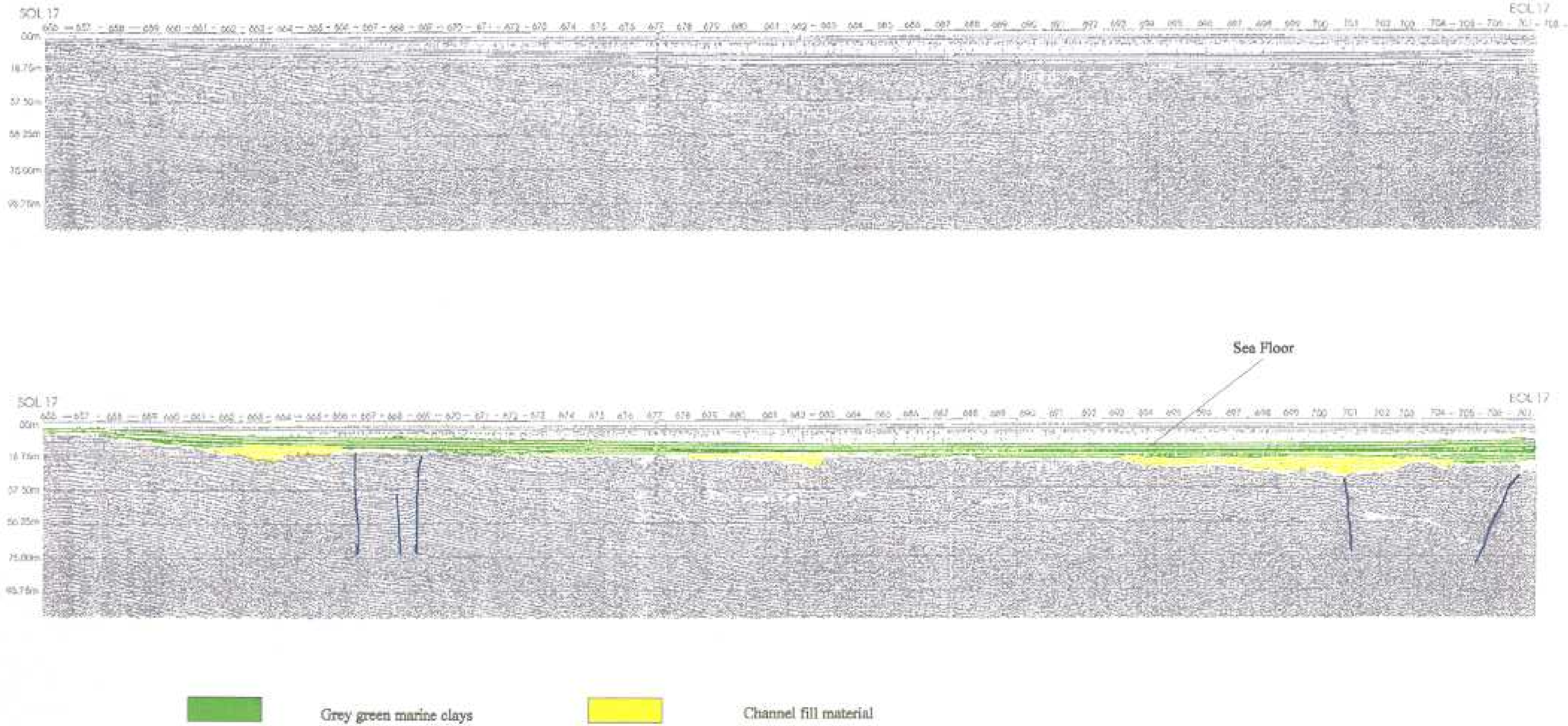


Figure 10. Seismic reflection profile 17 and interpretative cross-section showing fluvial channels.

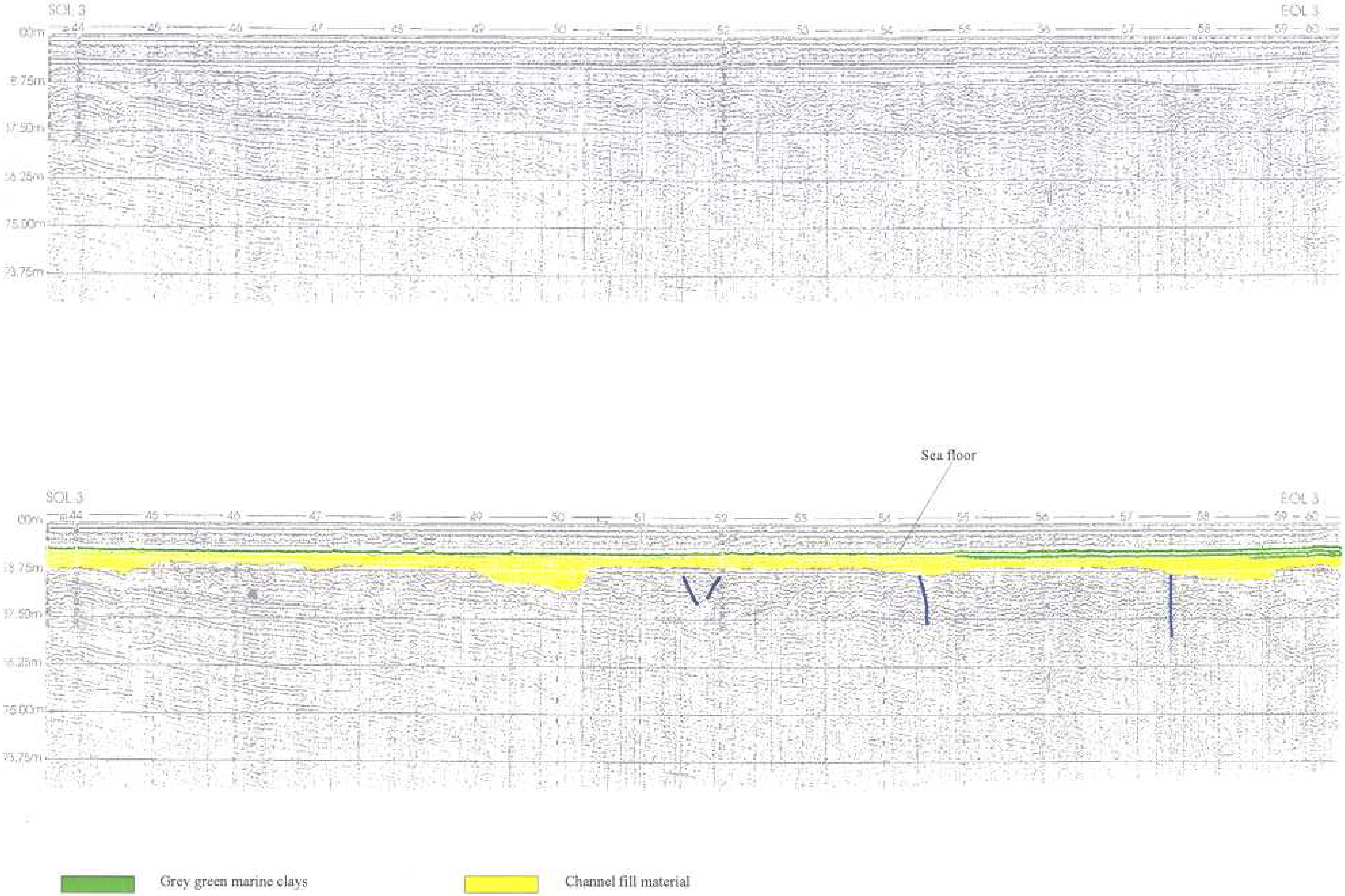


Figure 11. Seismic reflection profile 3 and interpretative cross-section showing fluvial channels.

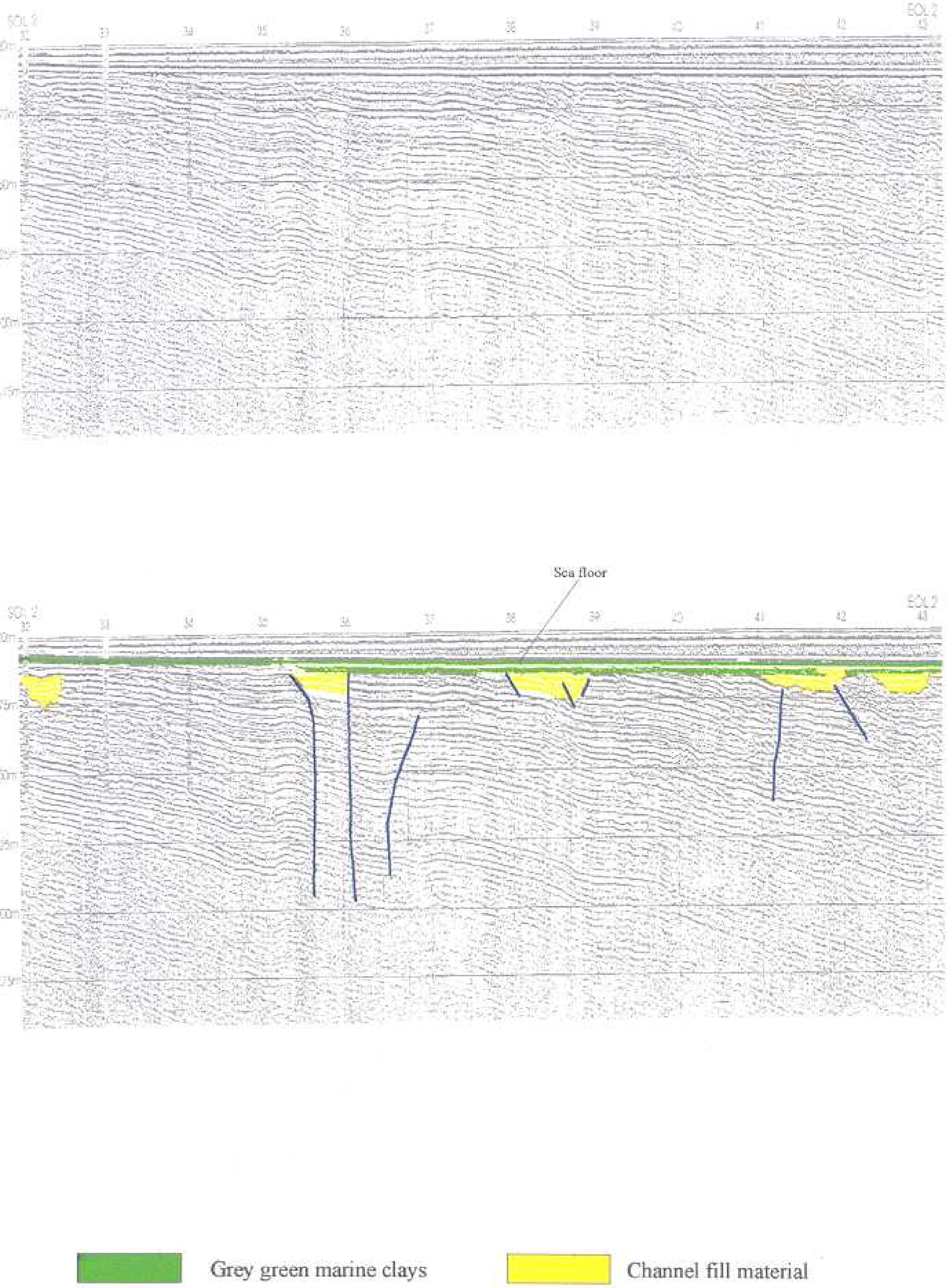


Figure 12. Seismic reflection profile 2 and interpretative cross-section showing fluvial channels.

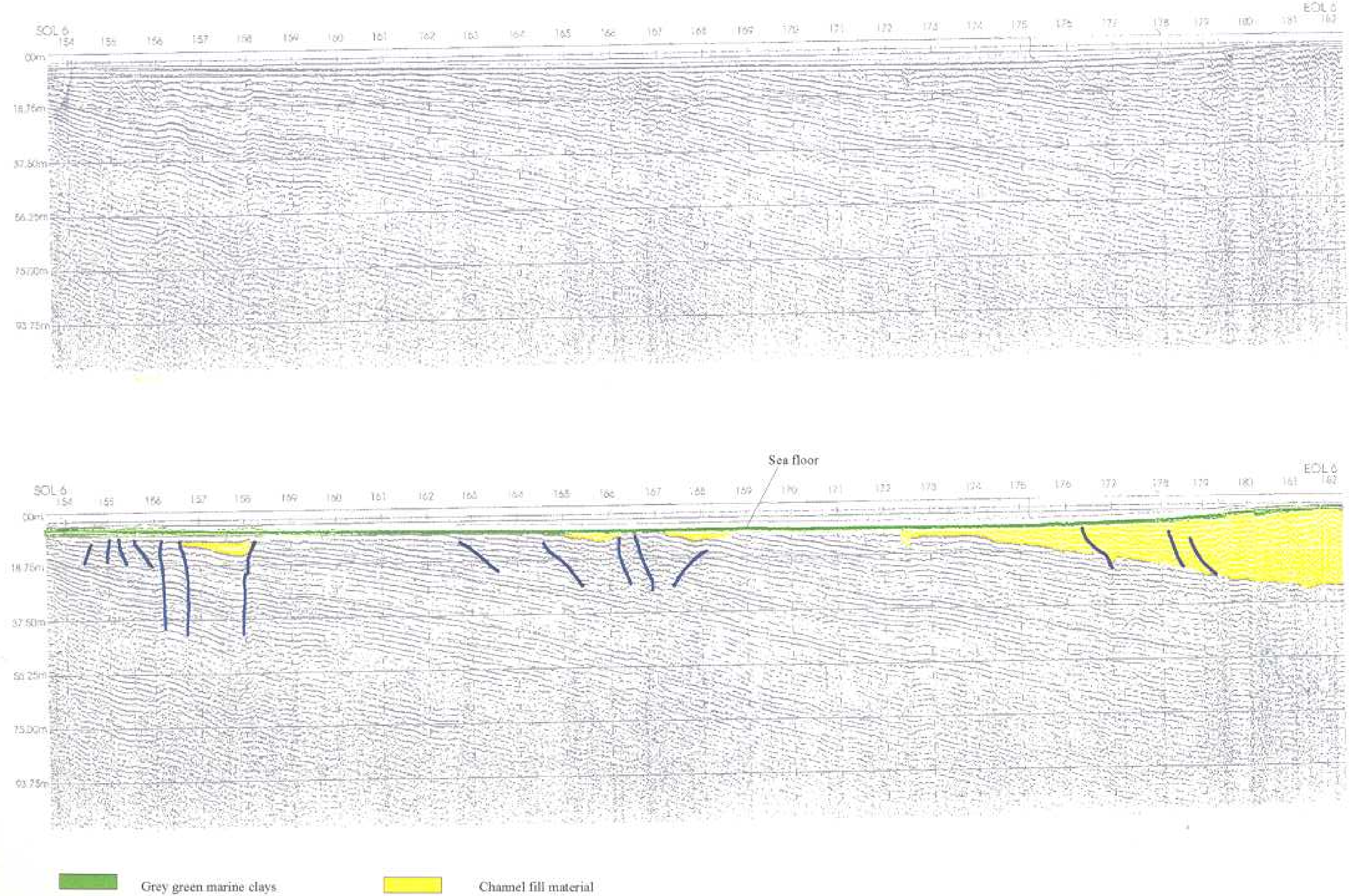


Figure 13. Seismic reflection profile 6 and interpretative cross-section showing fluvial channels.

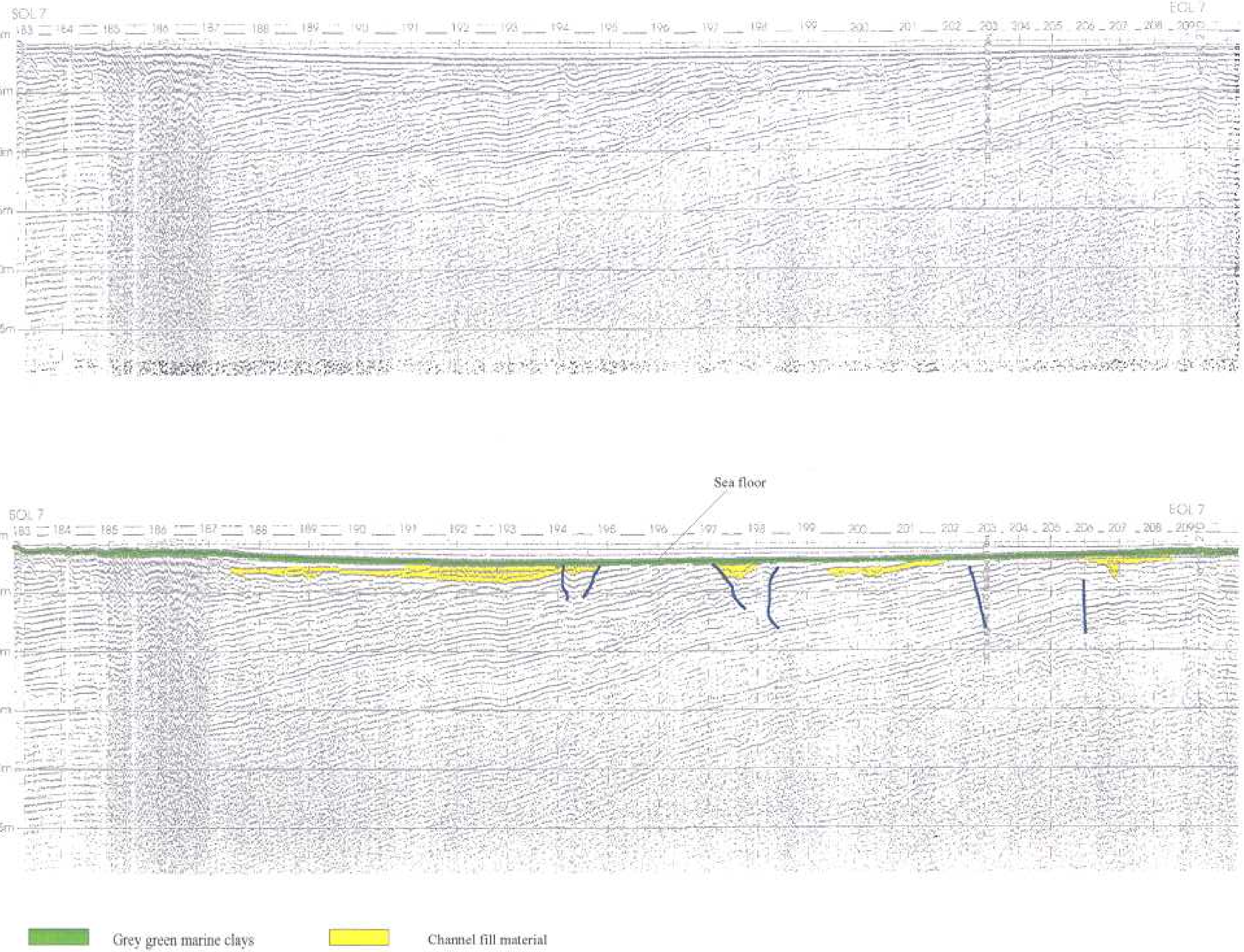


Figure 14. Seismic reflection profile 7 and interpretative cross-section showing fluvial channels.

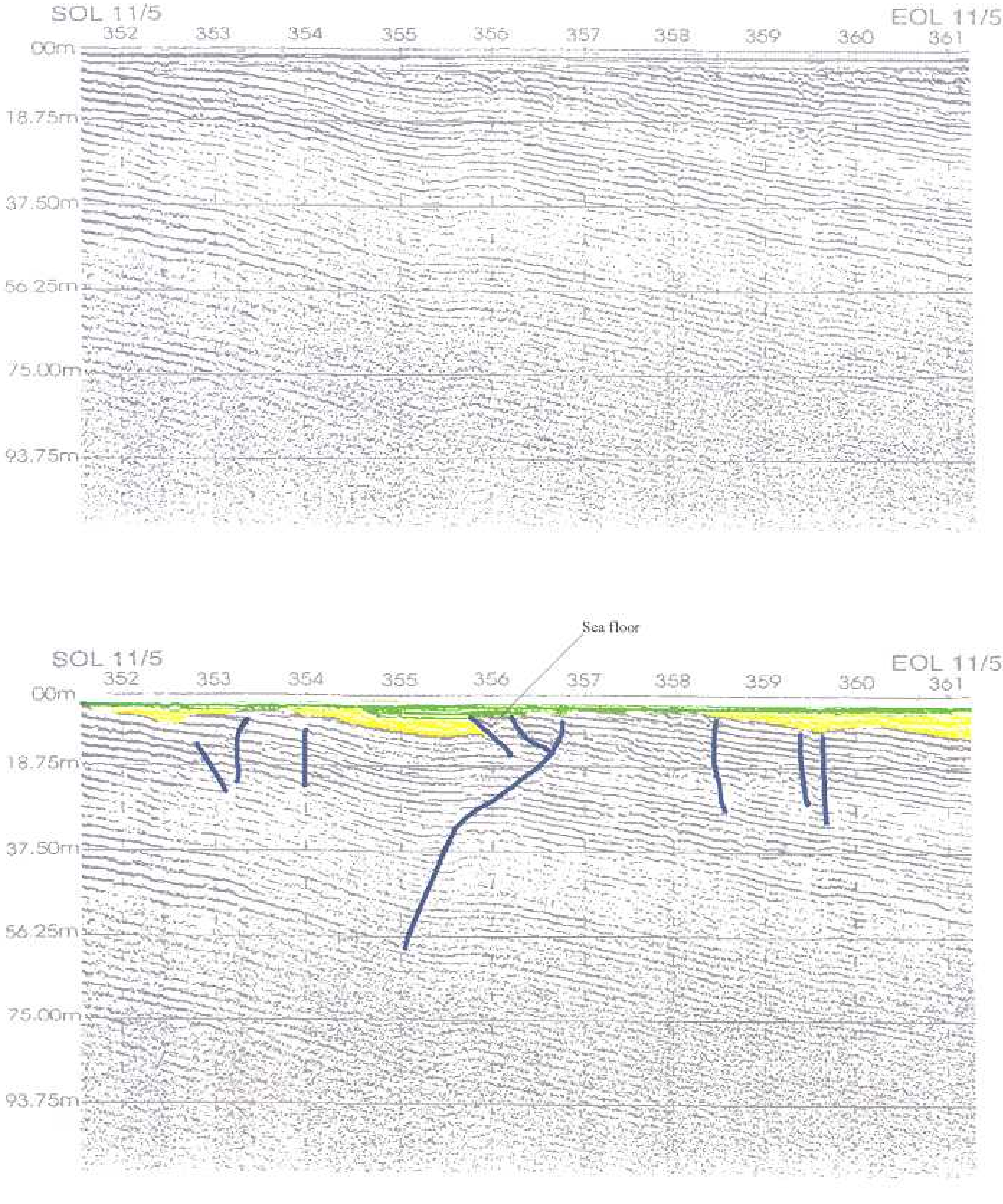
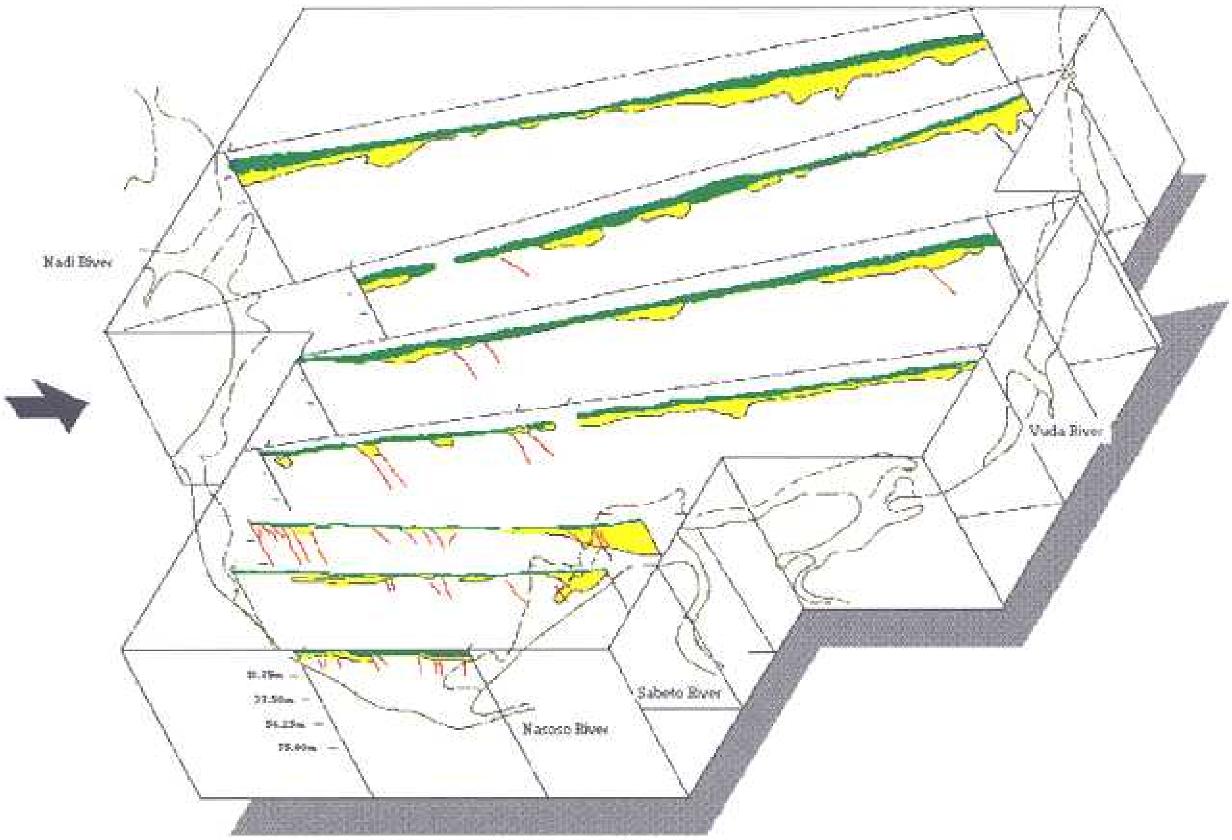


Figure 15. Seismic reflection profile 11/5 and interpretative cross-section showing fluvial channels.



Grey green marine clays   Channel fill material

Figure 16. Block diagram of Nadi Bay with seismic lines in perspective.

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APPENDIX 1

Daily Log

OPERATIONS SCHEDULE

Monday, 13 July
Weather : clear
-Loaded gear in Suva and drove to Nadi.
-Boat was towed to Nadi.

Tuesday, 14 July
Weather : clear
-Held Sevusevus at Lautoka and Sabeto
-Rigged equipment and fuelled boat

Wednesday, 15 July
Weather : clear, SE winds to 15kts, seas building fm 1200hrs
-Set up trisponder locations
-Tested equipment

Thursday, 16 July
Weather : clear, SE winds to 20kts, seas building fm 1000hrs
-Set up Malamala station to leave for 3 days
-Ran line 1 and 2

Friday, 17 July
Weather : clear, SE winds to 15kts, seas building fm 800hrs
-Ran line 3 - 8
-Refuelled boat

Saturday, 18 July
Weather : clear, seas building form 1000hrs
-Ran lines 9-13 thus completing runway extension area

Sunday, 19 July
-Report writing

Monday, 20 July
Weather : clear, seas building from 1200hrs, SW winds 10kts
-Finished lines 14-19 thus completing seismic operations
-Demobilised seismic gear

Tuesday, 21 July
Weather : clear, seas calm
-Sampling operations
-Removed all gear from vessel

Wednesday, 22 July
-Pack gear and prepare for transport to Suva on Thursday

Appendix 2

Navigation Log

Appendix 4

Sample Log