BCLME

Benguela Current Large Marine Ecosystem Programme

INCEPTION REPORT

Project: BEHP/CEA/03/02:

Data Gathering and Gap Analysis for Assessment of Cumulative Effects of Marine Diamond Mining Activities on the BCLME Region

Prepared for

Benguela Current Large Marine Ecosystem Programme

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By

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Executive Summary

The overall project description and relationships between BCLME Projects BEHP/CEA/03/03 are summarised, and the specific objectives and terms of reference of Project BEHP/CEA/03/02 listed. The work plan, project team, project phases and schedule are summarised, and the expected outputs listed.

An initial list of known key impacts of marine and coastal mining is used to develop an initial list of potential data levels and categories useful for evaluating these impacts. These initial lists of mining impacts and data categories will be thoroughly reviewed at the planned Inception Workshop to be held in Windhoek in August 2004. The outcome of this workshop will be:

- A finalised project work program.
- Final task allocations to project team members.
- Identification of impacts to be addressed by the project.
- Initial evaluation of the cumulative nature and mechanisms of the identified impacts.
- Identification and description of data to be sought by the projects.
- Identification of potential sources and contact details for these data.
- Initial proposals for structure and content of the project database.

List of Acronyms, Symbols and Abbreviations

BCLME - Benguela Current Large Marine Ecosystem

DME - Department of Minerals and Energy, South Africa

IIM - Instituto de Investigação Marinha, Ministério de Pescas, Angola

MCM - Marine & Coastal Management: Department of Environmental Affairs and Tourism, South Africa

MDMA - Marine Diamond Mining Association, South Africa

MFMR - Ministry of Fisheries and Marine Resources, Namibia

MME - Ministry of Minerals and Energy, Namibia

A. PROJECT OVERVIEW

A.1 Background

Within the BCLME region, marine diamond mining activities occur along the west coasts of South Africa and Namibia from the shoreline out to depths of 150 m. Currently, no marine diamond mining activities take place off the coast of Angola, but alluvial diamonds have been recovered from Angolan river systems, and interest has been expressed in the possibility of marine mining of alluvial diamond deposits along the Angolan coast. Insufficient knowledge exists with respect the cumulative impacts of these diamond mining activities on the BCLME. The need to compile available information to assess cumulative impacts and highlight gaps in knowledge has been identified as a priority activity of the BCLME Programme. The marine diamond mining industry invest significantly in data sampling and monitoring, resulting in a host of data sources, formats and accessibility implications. The need exists to determine whether data are relevant, compatible and accessible. Only once such a study is completed, can the feasibility and costs of desired baseline and monitoring studies be determined.

The overall purpose of project BEHP/CEA/03/03 is to source all available information on these factors, and to summarise it into an easily accessible form suitable for publication. The emphasis will be on the potential of combined or cumulative effects (over space and over time) of all of the sources of sediment and chemical input and distribution within the near-shore (<40m) and offshore zones (>40m) where diamond mining takes place. Where available, information will include actual data which will be comparable as far as possible, to be included in a long-term data series accessible to interested parties in the region. All available and newly collected data will also be used to calibrate and improve modelling estimations of the quantities of sediment input into the system, and the transport and deposition patterns thereof.

A.2 Inter-Project Relationships

There is a close relationship between this project and project BEHP/CEA/03/03: *Assessment of the cumulative effects of sediment discharges from on-shore and near-shore diamond mining activities on the BCLME*. Essentially, these two projects constitute two complementary components of one project:

- ***To source and collate all available information and data on the impacts of marine diamond mining in the BCLME region; to use these data to assess the cumulative impacts of marine mining, particularly those impacts resulting from increased sediment discharge into the marine environment; and to make recommendations for improved monitoring and management of cumulative impacts of marine mining in the BCLME region.***

These two projects therefore need to be closely integrated, at least to the extent required to ensure that project BEHP/CEA/03/02 contributes the required data and information to project BEHP/CEA/03/03, and that the assessment results of the latter feed back into identifying shortcomings in data collection and monitoring programs under the former. The linkages and division of responsibilities between the two projects are as follows:

Project BEHP/CEA/03/02

- Locate and critically review all available reports (expert studies, baseline surveys, EIAs, EMPRs and environmental performance reports) containing information on potential or known impacts of marine diamond mining in the BCLME region.
- Review relevant information on impacts of sediments on marine communities in the international scientific literature.
- Locate, collate, geo-reference and capture all existing quantitative data on the baseline environment, impacts of marine diamond mining, and on natural variability in the factors concerned (particularly sediment input and movement), from the above reports and other sources.
- Identify, describe and rank the various potential or known impacts of marine diamond mining on the BCLME, and identify and describe the mechanisms by which such impacts occur.

- Provide all collected information and data on natural and mining-related sediment input to project BEHP/CEA/03/03 in a format suitable for use in quantitative assessment of these impacts.
- Interpret the outcomes of the assessment and modelling work of project BEHP/CEA/03/03, particularly related to shortcomings in the data required for assessment of cumulative impacts, and sensitivity of assessment results to coverage and uncertainty in these data.
- Identify gaps and shortcomings in monitoring and management of marine mining impacts, and make recommendations for revision of EMPRs and implementation of monitoring programs to improve these.

Project BEHP/CEA/03/03

- Liaise with project BEHP/CEA/03/02 regarding the descriptive information and data inputs required to conduct an assessment of the cumulative impact of sediments derived from marine diamond mining activities on the BCLME.
- Use available data and information provided by project BEHP/CEA/03/02 to compile as comprehensive a baseline data series as possible for sediment inputs and movement in the chosen demonstration area/s. These data should subsequently be used to make valid assumptions and parameter estimates required as inputs into the quantitative assessment and modelling process.
- Work in close collaboration with projects BEHP/CEA/03/02 and BEHP/CEA/03/04, as well as other existing monitoring programs in the chosen demonstration area, to try and implement immediate improvements to data collection for cumulative impact assessment purposes.
- Develop appropriate analysis and modelling approaches to quantitatively assess the potential cumulative impacts of sediments in the BCLME region, specifically evaluating the extent and magnitude of impacts such as reduced primary productivity, habitat alteration or loss through scouring or smothering, and changes in benthic community structure.
- Specifically assess the extent to which the potential impacts resulting from sediment deposition are predicted to occur in known rock-lobster fishing areas, nearshore reefs and kelp beds, and compare the relative contributions of natural (flood and wind event) and mining-related sediment inputs to these impacts.

- Conduct comprehensive exploratory assessments of sediment input and movement in the BCLME nearshore (<40m depth) region, evaluate the sensitivity of results of these assessments to coverage and uncertainties in the input data, and specifically identify critical shortcomings and gaps in these data.
- Cooperate with project BEHP/CEA/03/02 in the development of recommendations for improvement / implementation of monitoring programs to generate adequate data for reliable assessment of the cumulative impacts of sediment inputs resulting from marine mining operations.
- Conduct exploratory predictive assessments of alternative tailings discharge management strategies to mitigate against impacts on rock lobster resources. Develop recommendations for management of tailings discharges to minimize impacts.

Although, both of these projects are specifically aimed at recommendations for improved monitoring of cumulative impacts of mining, limited time has been given for BCLME involvement (project BEHP/CEA/03/02 - 6 months, project BEHP/CEA/03/03 - 1 year). Most of the monitoring programs that are likely to be recommended will, as a result of the characteristics of the region, and of the mining operations themselves, be long-term in nature. This has important implications:

- Within the limited time available, these two projects will only be able to collate, review and assess existing information. This will lay the foundation for longer-term monitoring work, but no additional fieldwork or monitoring will be feasible during the duration of the projects themselves.

- Close collaboration between these two projects will require a sequential exchange of information and assessment results. Data from project 02 will need to be collated, captured and fed into the assessment project before assessments can be conducted by project 03. Similarly, recommendations for monitoring programs to fill gaps in data collection to be developed by project 02 will depend on results of modelling conducted in project 03.

B. PROJECT DESIGN, PHASES AND OUTPUTS

B.1 Project Objective

The objective of Project BEHP/CEA/03/02 is:

- ***To review all available information and gather quantified data that can be used to assess the cumulative effect of marine diamond mining activities on the Benguela Current Large Marine Ecosystem, to identify gaps in these data sources and to make recommendations for additional data gathering and/or monitoring programmes.***

The Terms of Reference developed to address this objective are:

1. Locate, collate, update and compile information and data on all past, present and future diamond mining activities and techniques used, convert these to GIS compatible format (as far as possible) and capture these into a GIS compatible database. Information / data to be collected should include:
   - Areas of operation over time across the entire BCLME area.
   - Technological advancements over time.
   - Operational tailing discharges.

2. For the BCLME Inshore (sub-littoral and near-shore shallow water diamond mining activities) and Offshore (deepwater diamond mining activities) regions:
   Conduct a critical review (with comprehensive reference list) of relevant reports, including all:
   - Existing expert studies, baseline & monitoring surveys and impact assessments within the entire BCLME in the scientific and grey literature.
   - Environmental Management Programme Reports and Environmental Performance Reports for existing operations.

3. Extract data on biological, physical and chemical elements in the marine environment most likely to be affected by diamond mining activities at sites of operation, including information on natural inputs, baseline levels and variability in these factors.

4. Identify all potential or known impacts of marine diamond mining activities on the BCLME, describe the mechanisms of impact and rank impacts in terms of likely effect on marine fisheries resources and other ecosystem components.

5. Considering the outcome of assessments conducted by project BEHP/CEA/03/03, conduct a gap analysis and make recommendations with regard to essential baseline information required to accurately assess the impacts of diamond mining activities on the marine environment and ecosystem in the BCLME region.

B.2 Project Work Plan

B.2.1 Project Inauguration Meeting: Windhoek

A project coordination meeting will be held in Windhoek at the start of the meeting. The purposes of this meeting will be:

- To hold project initiation discussions with principal team members and capacity building participants from the three BCLME countries.
- To discuss and agree on details of specific task requirements, and to finalise task allocations and timeframes between members.
- To provide an opportunity for briefing / training / guidance in the objectives and details of how to approach the various work plan components for capacity building participants.
- To set up and ensure efficient communications channels between team members.

Representatives of the main marine diamond mining companies will be invited to attend, and participate actively in, this workshop, at their own expense.

B.2.2 Review of Relevant Local Studies, Baseline Reports, EIAs and EMPRs

This is the central and most important component of the project, under which all of the descriptive information and quantitative data needed to identify and describe impacts of

marine diamond mining operations in the BCLME region will be conducted. Specific attention will be given to:

- Review and extraction of descriptive information and data from all recent, upgraded or updated EIAs and EMPRs for marine diamond mining operations in Namibia and South Africa, particularly those for operations by De Beers Marine, Transhex Operations, Namagroen, Alexkor, Namdeb, De Beers Marine: Namibia and Diamond Fields International.
- Obtaining information on potential for, and current interest in, development of marine diamond mining operations along and off the Angolan coast.
- Extraction of actual quantitative date and reference values from all locally available reports.
- Specific evaluation of the potential cumulative nature of known or potential impacts of marine diamond mining activities, and the mechanisms by which such impacts might be expected to accumulate.
- Comparative information on other man-made impacts on benthic marine communities in the diamond concessions areas (particularly demersal trawl fishing), as well as natural disturbances and variability in the system, in order to provide a context within which to evaluate mining-related impacts.

In sourcing information and data on mining related impacts, fisheries resources, benthic communities, ecosystems, natural disturbances and variability in the BCLME region, close liaison will be maintained with the following companies, agencies and individuals, all of whom have had substantial experience and involvement in the issues and concerns related to impacts of marine diamond mining, and have access to information or data on such impacts:

- The Marine Diamond Mining Association (MDMA) and environmental staff and mine engineers at marine diamond mining companies, particularly De Beers Marine South Africa and Namibia, Namdeb, Transhex Operations, Alexkor and Diamond Fields International.
- The South African fisheries department, Marine & Coastal Management, and particularly the Inshore Resources, Whole Systems and Seaweed Sections (Dr L. Hutchings, Dr A. Cockcroft, Dr R. Anderson).

- The Namibian fisheries Department, Ministry of Fisheries and Marine Resources, and particularly the rock lobster and physical oceanography sections (K. Grobler) at Lüderitz.

B.2.3 Review of International Scientific Literature on Impacts of Sediments

Available international scientific publications on the effects of sediments on marine resources and ecosystems will be located and reviewed. Particular attention will be paid to:

- Publications on the impacts and natural recovery rates of sediments derived from marine dredging and sand-mining operations on benthic communities and marine ecosystems.
- Publications on the extent, impacts and natural recovery rates of other marine mining activities, such as deepwater manganese nodule mining.
- Publications on known impacts and recovery rates of other man-made seabed disturbances.
- Publications on the potential cumulative nature of impacts on benthic and marine ecosystems, recovery rates and processes, recovery facilitation options, active rehabilitation options and effective measures to monitor cumulative impact and recovery.

B.2.4 Collation, Geo-Referencing and Capture of Quantitative Data

All quantitative data available in past studies, reports, EIAs and EMPRs will be extracted, geo-references and captured onto a GIS compatible database.

- Options for the most efficient capture, storage and dissemination of these data will be considered. It is likely that data will primarily be captured onto a Microsoft Access ® database.
- Extraction facilities can then be provided to extract data for import into Microsoft Excel ® spreadsheets (for basic use by persons without access to a GIS package), and for import into ArcView ®.

B.2.5 Description of Impacts and Impact Mechanisms

A thorough understanding of actual impact mechanisms (as opposed to the "perceived" nature of impacts, which is often totally incorrect) is required before impacts can be quantitatively assessed. From the above review of all available information (local and international) and data, all known or potential mining-related impacts will be interpreted to provide:

- Identification and description of all impacts, with ranking in terms of known magnitude and extent of impact.
- Characterisation in terms of potential cumulative nature, where and how this is likely to occur, and over what time periods.
- Description of mechanisms of impact, and mechanisms of impact accumulation, as far as they are understood.

B.2.6 Exchange of Information and Data with BCLME Project BEHP/CEA/03/03

Information gap analysis and development of recommendations for improved long-term monitoring and environmental management programs under this project will require some quantitative assessment of the areas, magnitudes and durations of mining-related impacts. The most important, and least understood, issue will certainly be the impact of sediments, and the relative contribution of mining and natural processes to sediment input and movement in the BCLME region. This aspect will be dealt with by project BEHP/CEA/03/03. Evaluation of uncertainties during quantitative assessment will also provide clear indications of the importance of various data types for effective evaluation of cumulative impacts.

- This project will liaise with BEHP/CEA/03/03 to ascertain what information and data are required for quantitative assessment of the impact of sediments on marine resources and ecosystems in the BCLME.
- All of the descriptive information, quantitative data and evaluation of impact mechanisms will be made available to project BEHP/CEA/03/03 for use in quantitative assessment of impacts of sediments.

B.2.7 Interpretation of Assessment Results of Project BEHP/CEA/03/03

The outcomes of the quantitative assessment work of project BEHP/CEA/03/03 will be reviewed to ascertain:

- What information and data are critical or important for assessment of impacts of sediments on marine resources and ecosystems in the BCLME.
- How sensitive the assessment results are to the geographic coverage, precision, resolution and duration of data available for assessment of impacts.

This information will then be used during gap analysis to identify shortcomings in available information and data, and to support recommendations for effective monitoring programs to provide the required data in the areas, over the time frames and at the necessary resolution and precision for effective assessment of cumulative impacts.

B.2.8 Gap Analysis Workshop: Windhoek

A second 2 day gap analysis workshop will be held prior to drafting of the report sections on gap analysis and recommendations for improved long-term monitoring and environmental management programs. This workshop will provide an opportunity to:

- Conduct further specific briefing sessions for capacity building participants, to explain any unclear issues and answer questions they may have regarding the project process or outcomes.
- Actually conduct the gap analysis in discussion with other project team members, capacity building participants and representatives of the main marine diamond mining companies.
- Obtain initial suggestions from project team members and mining company representatives on how to address identified gaps in existing monitoring or management programs.

Representatives of the main marine diamond mining companies will be encouraged to attend, and participate actively in, this workshop, at their own expense.

B.2.9 Gap Analysis and Recommendations

Results of the gap analysis workshop will be used to develop a suite of recommendations on the following:

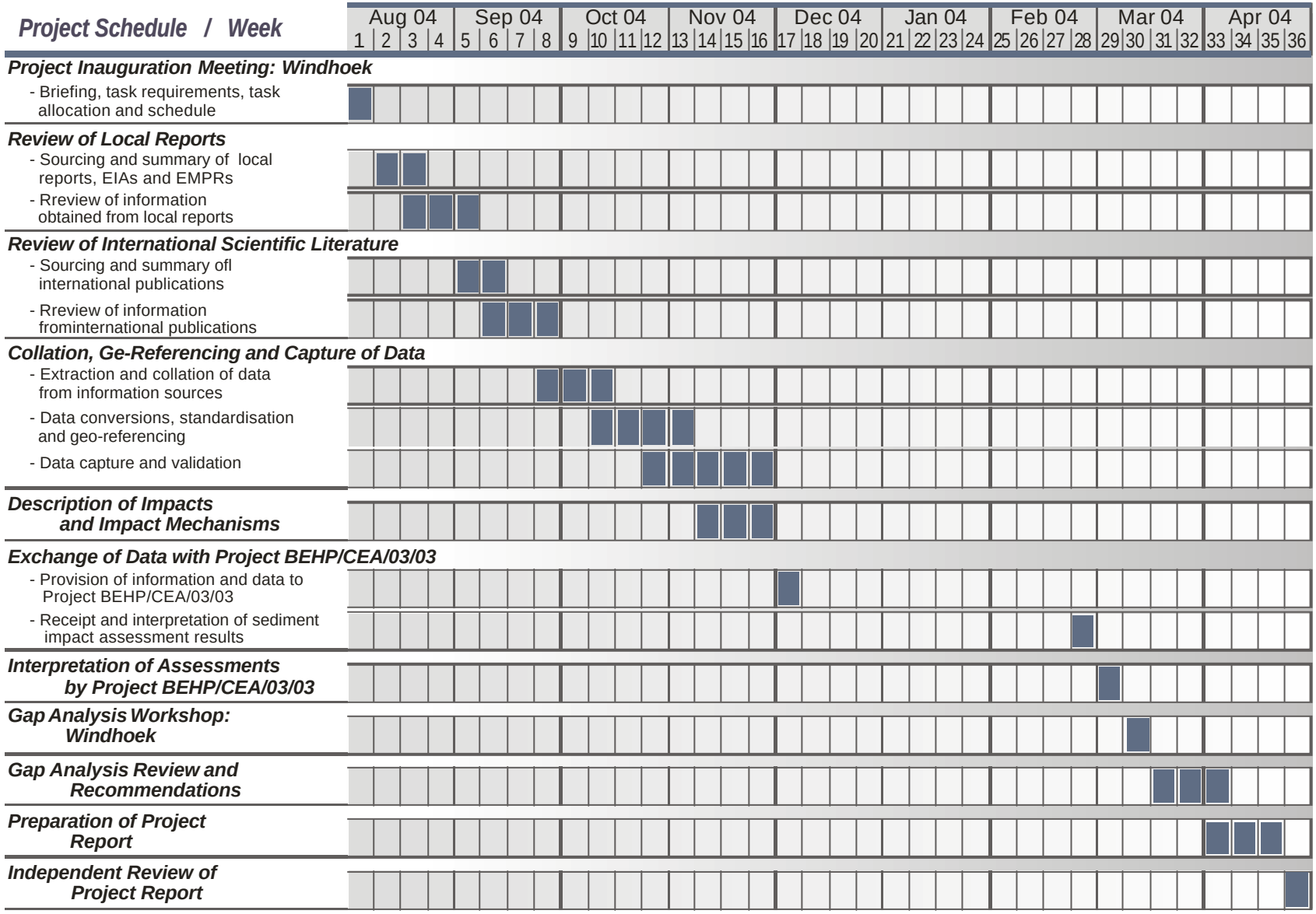
- Implementation or improvement of monitoring programs to address shortcomings and provide the information and data needed for quantitative assessment of the cumulative impacts of marine diamond mining.
- Improvements or additions to existing EMPRs and environmental reporting requirements to minimise, and improve management of, impacts resulting from marine diamond mining operations.
- Proposals for cumulative impact monitoring and management for inclusion in future marine mining EMPRs and environmental reporting requirements.

B.2.10 Final Project Report

A comprehensive project report, suitable for publication as required by the BCLME, will be prepared as the main output from this project. This report will include specific sections presenting all of the information, reviews, analyses and conclusions conducted under the sections above, specifically addressing all of the key questions, and making specific recommendations for future implementation / improvement in mining impact monitoring and management programmes. The report will be made available in printed format, and as electronic (Microsoft Word ® and Adobe Acrobat ® Portable Document) formats. The project team will liaise with the BCLME office to ensure the report is produced in the required format. In addition to the project report, the final database containing all geo-referenced mining impact and natural context data will be provided in electronic format, in Microsoft Access® and/or ArcView® formats, depending on the characteristics of the various data types.

B.2.11 Project Timetable

The project phases and work schedule are shown in the chart below.


Project Schedule / Week
Aug 04
Sep 04
Oct 04
Nov 04
Dec 04
Jan 04
Feb 04
Mar 04
Apr 04
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Project Inauguration Meeting: Windhoek
- Briefing, task requirements, task allocation and schedule
Review of Local Reports
- Sourcing and summary of local reports, EIAs and EMPRs
- Rreview of information obtained from local reports
Review of International Scientific Literature
- Sourcing and summary ofl international publications
- Rreview of information frominternational publications
Collation, Ge-Referencing and Capture of Data
- Extraction and collation of data from information sources
- Data conversions, standardisation and geo-referencing
- Data capture and validation
Description of Impacts and Impact Mechanisms
Exchange of Data with Project BEHP/CEA/03/03
- Provision of information and data to Project BEHP/CEA/03/03
- Receipt and interpretation of sediment impact assessment results
Interpretation of Assessments by Project BEHP/CEA/03/03
Gap Analysis Workshop: Windhoek
Gap Analysis Review and Recommendations
Preparation of Project Report
Independent Review of Project Report

B.4 Project Outputs

The main output of this project will be a comprehensive descriptive final report, suitable for publication, directly addressing the project objectives, and including:

- Sections specifically addressing all of the components of the proposed terms of reference and the products of the various components of the proposed work plan.
- Information and specific advice to support decision making with respect to the management of the impacts of all types of marine diamond mining
- Recommendations for implementation or improvement of data collection and monitoring programs for impacts of marine diamond mining, with proposals on potential indicators of adverse environmental impact on the ecosystem.

In addition to the final report, progress reports will be submitted after each major data collection phase of the project, coinciding with the milestone invoices for these phases. The project will also produce a GIS compatible database incorporating all located information and data on cumulative impacts of marine diamond mining operations, together with data on the natural context within which these occur.

Deliverable	Delivery Date
Inception Report.	15 July 2004
Report on results of the Project Inception Workshop, and workshop recommendations on database components.	31 July 2004
First Progress Report: Results of sourcing, collation and review of regional and international information, reports and papers on impacts of marine mining activities. Submission of first Financial Report.	31 August 2004
Second Progress Report: Database design and standards; identification and evaluation of data sources; description of impact mechanisms; first database of mining impact data. Submission of second Financial Report.	30 October 2004
Final Report: Comprehensive review of all available information on impacts of marine mining; evaluation of mechanisms of cumulative impact; final database of mining impact and related data; results of gap analysis workshop and recommendations for monitoring and management. Submission of final Financial Report.	30 April 2006

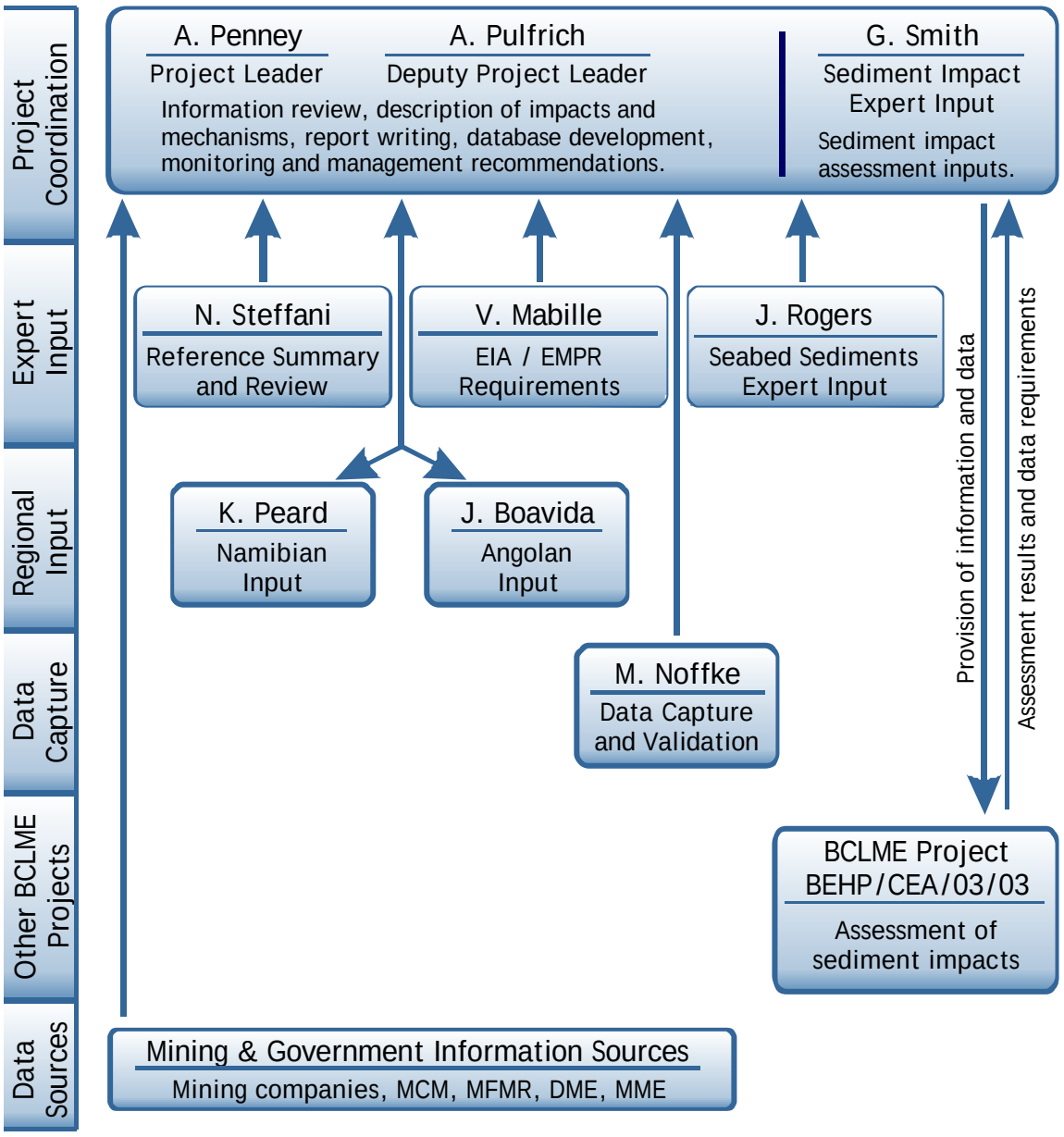
B.5 Capacity Building and Training

Contributions by this project to regional capacity building will include:

- The final report will serve as a comprehensive baseline description and review of all that is currently known of the impacts of marine diamond mining, the natural context within which they occur, and the most effective options for monitoring and managing such impacts in the BCLME region.
- This report will provide essential international reference information, against which to compare understanding of local impacts, and will be available to all BCLME countries for use in training and as a guideline to improve environmental monitoring and management of marine mining operations.
- The final report should help to clear up misconceptions, improve understanding and focus future initiatives by all BCLME member countries on the most cost-effective monitoring and management of the main cumulative impacts of marine diamond mining activities.
- The descriptive and quantitative database to be developed by this project will be available for use by BCLME countries. This will provide a quantitative baseline for comparison with data collected in future, and for integration into future analyses of cumulative impacts. The data on natural processes and variability will provide essential context against which to compare mining-related impacts.
- Project team members from all BCLME countries will contribute regional information, and learn enough from assistance and association with the project to be able to efficiently interpret and assist with implementation of the project recommendations for improvements in environmental impact monitoring and management in their respective countries.
- Specific introduction, briefing and feedback sessions will be held during the two proposed workshops. The object of these sessions will be to ensure that all team members can contribute successfully to the provision of information for their regions, and that they are in a position to interpret and implement the outcomes of the project.
- The project recommendations for implementation or improvement of long-term monitoring and environmental management programs are expected to provide substantial opportunities for involvement of environmental management trainees from all BCLME countries in such future programs.

C. PROJECT TEAM

The project team members and working relationships are shown in the organogram below:



The specific team member designations and individual project responsibilities are detailed in the table below.

Name & Nationality	Affiliation	Designation	Responsibilities
Mr Andrew Penney (South Africa)	Pisces Environmental Services	Project leader	Project supervision, data and information interpretation, report writing and development of recommendations.
Dr Andrea Pulfrich (South Africa)	Pisces Environmental Services	Deputy project leader	Review and interpretation of information, report writing and development of recommendations.
Mr Geoff Smith (South Africa)	CSIR Environmentek	Sediment impact expert	Collation, summary and review of information on seabed sediment distribution and movement in the BCLME region.
Dr Nina Steffani (South Africa)	Environmental Consultant	Benthic community expert	Local and international information sourcing, abstraction, review and report writing.
Dr John Rogers (South Africa)	Department of Geology, University of Cape Town	Seabed sedimentology expert	Review of seabed sediment distribution and transport in the BCLME region.
MS V. Mabille	Pro Earth Consulting	Marine mining impacts and EMPR expert	Identification of concerns related to marine mining; recommendations on improvements in EIAs and EMPRs; Liaison with Angolan Ministry officials.
Ms. K. Peard (Namibia)	Ministry of Fisheries & Marine Resources, Lüderitz	Namibian representative	Provision of information on impacts on Namibian resources and ecosystems, and gap analysis.
Dr Joaquim Boavida, or nominated student (Angola)	Department of Geophysics, Universidade Agostinho Neto, Luanda	Angolan representative	Provision of information on Angolan nearshore fishing activities, and potential for marine diamond mining.
Mr Mark Noffke (South Africa)	Noffke Environmental & Technical Services	Data coordinator	Data preparation, capture and validation.

Much of the required information and data for this project will need to be provided by government Departments of Mining and Fisheries in the three BCLME countries, and by the environmental management sections of principal marine mining companies active in South Africa and Namibia. In addition to the actual formal team members listed above, there will therefore be close collaboration with key personnel at marine mining companies in South Africa and Namibia, the Marine Diamond Mining Association (MDMA) as well as Departmental officials in the fisheries and mining Departments in South Africa, Namibia and Angola.

D. IDENTIFICATION OF MINING IMPACTS

Most of the impacts resulting from marine or coastal mining operations have been identified and evaluated to some extent in the many existing baseline studies, specialist studies, EIAs and EMPRs done for these mining operations. The key impacts of concern that have been highlighted are:

Onshore Mining

- Discharge of sediments into the nearshore area, with resultant scouring or inundation of nearshore reef systems.
- Establishment of sea-walls, modification of shoreline and erosional input of sediments into nearshore area.
- Degradation of nearshore reef communities and potential reduction of rock-lobster recruitment.

Nearshore Mining

- Kelp cutting and reef disturbance through movement of boulders and mining hoses.
- Disposal of tailings into intertidal and subtidal areas, with resultant reef scouring and smothering.

Offshore Mining

- Excavation of seabed sediments and degradation of benthic faunal communities.
- Creation of fine tailings plumes with risk of pollutant and organic material release and oxygen depletion.

This brief list of impacts will be thoroughly reviewed at the Inception Workshop (see draft agenda in Appendix A), and the potential cumulative nature of each impact evaluated, as a basis for choosing data sources to be included in the project.

E. DATA LEVELS AND CATEGORIES

E.1 Data Levels

Various levels in available information / data useful for evaluating cumulative impacts of mining and placing within the context of natural variability, are recognised:

1. Descriptive Information: This will generally already have been published in local and international papers, reports, EIAs and EMPRs. All relevant information will be sourced, summarised and used to identify, describe and evaluate potential cumulative impacts of marine mining. Additional descriptive information will be extracted from information summaries, analyses and modelling results generated from data collected during the projects.

2. Single Value Quantitative Estimates: The descriptive information above will contain certain single value quantitative estimates from previous local or international studies. Examples of such estimates would include conversion ratios (e.g. from sediment weights to sediment volumes), averages (e.g. average mining rates, average sediment discharge rates, average trawl speeds, average fish processing raising factors) or estimates (e.g. current directions and speeds in an area, estimates of sediment transport at certain river flow rates). A number of these values will be useful in raising, quantifying or estimating values generated during the projects, or as inputs to the modelling procedures to be used to evaluate sediment transport dynamics in the region. These quantitative values will be specifically extracted from available sources and, wherever possible, some evaluation made of the accuracy and uncertainty of these estimates. Useful quantitative estimates will then be used, where appropriate, to derive data required to evaluate impacts.

3. Overview Maps of Information: Where actual geo-referenced time series data are not available for environmental impacts or characteristics of interest, overview maps of certain parameters may still be available from previous studies. Examples could include maps of typical seabed oxygen concentrations, maps of average current directions and velocities, maps of seabed sediments from past surveys or maps of fisheries information for which raw data no longer exist. As with the single quantitative estimates, these maps can be useful as inputs to other analyses or

modelling trials, or as a basis for estimating other values of interest over the mapped areas. Appropriate maps will be sourced from past publications, their reliability and uncertainty evaluated, and the information used to estimate geographic distribution of parameters of interest to the projects.

4. Geo-Referenced Time series of Quantitative Data: The highest resolution, and most valuable data sets, will consist of quantitative estimates of important parameters by time and area. Examples include areas mined at particular times, sediment volumes excavated or dumped by time and area, distribution of fishing catch and effort by time and area and estimates of time series of sediment discharge by various rivers per year. These geo-referenced data time series will be incorporated into the database to be developed by the projects, and will be used as the basis for most of the analyses and modelling exercises to be conducted. It is therefore these data series that will be the primary focus of the Inception Workshop.

E.2 Data Categories

An initial identification of the main data types to be incorporated into projects BEHP/CEA/03/02 and BEHP/CEA/03/03 is shown in the tables below:

E.2.1 Mining Data

Direct Mining Impacts Direct mining impacts result from the actual mining excavation processes themselves.		
Time Resolution	**Area Resolution**	**Description**
By year	By Actual Lat/Lon Position (point) or Area (polygon)	By Mining Method: • Surface area excavated on land, in the coastal zone or at sea (m^2). • Volume of sediment excavated (m^3 or tons). • Particle size distribution of excavated sediments.
Indirect Mining Impacts Indirect impacts result from processes subsequent to mining excavation, usually related to processing and discarding of mined overburden, spoils and tailings.		
Time Resolution	**Area Resolution**	**Description**
i) By Month (if possible) or ii) By Year	By Actual Lat/Lon Position (point) or Area (polygon)	• Surface area affected by tailings dumps on land (m^2). • Volume of tailings dumped on land (m^3 or tons). • Volume of tailings discharged, or lost through erosion, to sea (m^3).

E.2.2 Natural Environmental Data

Natural Sediment Inputs

Rivers and winds annually discharge vast quantities of sediment into the BCLME nearshore regions.

Time Resolution	Area Resolution	Description
By year	By Actual Lat/Lon Position (point) By Actual Lat/Lon Area (polygon)	• Estimated volume of sediments discharged to the sea per year by major rivers, particularly the Orange and Kunene Rivers (m^3). • Particle size distribution of sediments discharged to the sea by these rivers. • Estimated volume of sediments transported to sea by offshore wind events (m^3). • Particle size distribution of sediments blown to sea by winds.

Organic Input and Oxygen Depletion

Natural productivity is responsible for input of vast quantities of organic material into the Benguela system each year. Organic material settling to the seabed is, in turn, the substratum for seabed decomposition processes which deplete oxygen and generate H_2S..

Time Resolution	Area Resolution	Description
By Year	By Actual Lat/Lon Area (polygon)	• Estimated weights of organic input into the system, particularly to the seabed (tons) • Estimated seabed oxygen levels in various areas.

E.2.3 Fisheries Data

Fisheries Interaction / Conflict Information

Data are required to facilitate identification of areas / seasons of interaction and conflict between the marine mining and fishing industries. In addition, these data can then be used in estimating the fisheries impact information below.

Time Resolution	Area Resolution	Description
By year	i) By Actual Lat/Lon Position; or ii) By 20‘ Lat/Lon Block; or iii) By 1° Lat/Lon Block.	• Rock lobster effort (No. of traps) • Rock lobster catch (kg) • Trawl effort (No. of trawls; Duration of trawls) • Trawl Catch by species (kg) • Purse-seine effort (No. of sets) • Purse-seine catch by species (kg)

Fisheries Impact Information

In addition to the obvious impact on the targeted marine resources, fishing results in direct impact as a result of damage to the seabed by bottom gears, and indirect impacts as a result of discarding of processing offal and unwanted by-catch species.

Time Resolution	Area Resolution	Description
By Year	i) By Actual Lat/Lon Position; or ii) By 20‘ Lat/Lon Block; or iii) By 1° Lat/Lon Block.	• Estimates of the area of seabed damaged or disturbed by fishing (from fishing effort distribution, particularly for bottom trawl fisheries) • Estimates of discards of processing offal (kg) (from catch by species information and processing raising factors) • Estimates of discards of non-retained by-catch species (kg)

The Project Inception Workshop will critically review these proposed data requirements, and expand them to include all relevant and obtainable data that may be useful in characterising and evaluating cumulative impacts of marine mining operations (see draft Inception Workshop Agenda in Appendix A).

F. ACKNOWLEDGEMENTS

The Marine Diamond Mining Association, and particularly Dr P. Wickens of De Beers Consolidated Mines, are thanked for their active involvement in developing the initial proposals and motivations for this project.

G. Appendices

Appendix A: Draft Agenda for Joint Project Inception Workshop: Projects BEHP/CEA/03/02 & BEHP/CEA/03/03

Purpose ? To identify potential cumulative impacts of marine mining, to select suitable data sources for evaluating such impacts and to finalise work plans for the above projects

Where ? 4th Floor Conference Room, Namdeb Centre, 10 Dr Frans Indongo Street, Windhoek, Namibia

When ? 16 – 17 August 2004

Inception Workshop Participants

A relatively small number of people will be involved in this workshop. These should include key regional project team members and representatives of the main companies involved in marine mining. The workshop will focus on marine mining impact and related data sources, and options for obtaining the required data. Non project-team participants in the workshop will be expected to have the capacity, authority and mandate to facilitate or provide data input to the projects. Unfortunately the project budgets will not be able to cover any expenses of the non project-team participants. Proposed workshop participants will include:

Project Team Members

Andrew Penney - Project 02 Team Leader
Geoff Smith - Project 03 Team Leader
Joaquim Boavida - Angolan Representative, UAN, Luanda
Kathi Peard - Namibian Representative: MFMR, Lüderitz
Nico Willemse - Namibian Representative, UNam, Windhoek

Mining Industry Representatives

The mining industry will be invited to send representatives to the workshop. This invitation will be extended through the Marine Diamond Mining Association, and directly to the main companies currently involved in marine mining in South Africa and Namibia. (No marine mining is currently being conducted in Angola).

Minerals and Fisheries Departmental Representatives

Most of the necessary interaction with Departments of Fisheries and Minerals in the BCLME countries will be conducted during the course of the project, by project team members specifically delegated to do so. However, as the workshop will be held in Windhoek, representatives of Namibian Departments represented in Windhoek will also be invited to attend, should they wish to do so.

BCLME Representatives

As the BCLME Programme Coordination Unit is also based in Windhoek, they will also be invited to attend, should they wish to do so.

Draft Workshop Agenda

The intention is to spend much of day 1 of the workshop sketching the background to the projects, identifying and listing environmental impacts resulting from marine mining activities and evaluating the potential cumulative nature of these impacts. Much of day 2 will then be spent in identifying information and data sources potentially useful for evaluating cumulative impacts of mining, ascertaining how best to obtain these data and allocating project team responsibilities related to sourcing, summarising and reviewing relevant information and data.

Workshop Day 1	
09h00 – 10h30	Introduction *(The workshop participants and other project team members will be introduced and their affiliations, expertise and roles in the projects explained.)*
	Introduction of Projects *(The objectives, key questions, work plans and timetables of the two projects will be presented and explained by the project team leaders.)*
	Relationship between Projects 02 and 03.

	(These two projects form two components of a broad project to evaluate marine mining impacts. The relationships between the two projects, particularly relating to data input requirements and exchange of results, will be explained by the project team leaders.)
10h30 – 11h30	Tea
11h30 – 13h00	Review of Mining Operations and Impacts. *(A brief description will be presented of past and present marine mining activities, and their known or potential environmental impacts. The purpose of these discussions is to ensure that all workshop participants have a clear understanding of potential impacts of, and particularly their potential cumulative nature (over time or area) before starting discussion of the data required to evaluate these impacts. Workshop participants will be expected to actively contribute to ensuring all important impacts have been identified and described.)*
13h00 – 14h00	Lunch
14h00 – 15h30	Identification of Mining Impacts *(All impacts identified in the morning's discussions will need to be characterised and described. In particular, their mechanisms (how?) and targets (where?) of impact need to be understood, and their potential cumulative nature identified. All workshop participants will be expected to contribute to these discussions, the outcome of which will form the basis for choosing data types to be included in the projects.)*
15h30 – 16h00	Tea
16h00 – 17h30	Identification of Mining Impact Data Sources. *(Marine mining information and data necessary to describe and quantify the impacts identified in preceding discussions will need to be identified. Data types, availability, quantities, sources, locations and contact persons will be documented. Mining industry and Departmental representatives are expected to contribute much of the discussion under this section. The listed data will form the basis of the projects, and efforts after the workshop will focus on obtaining these data from the identified sources.)*
Workshop Day 2	
09h00 - 09h30	Workshop Review *(A summary of the results of the Day 1 discussions will be presented, particularly the list of agreed mining data sources. These will be finalised and agreed as the basis for the projects.)*
09h30 – 10h30	Natural Environmental and Fisheries Impacts *(Impacts of marine mining cannot be objectively evaluated without placing them in context of natural variability and impacts by other users in the BCLME region. Natural processes play a substantial role in sediment input and transport, organic input and generation of low-oxygen water. Interactions with fisheries are the main driving force behind the call to evaluate mining impacts, and the fisheries sector itself has a substantial impact on resources and ecosystems in the region. The role of these factors will be briefly outlined by project team leaders.)*
10h30 – 11h30	Tea
11h30 – 13h00	Environmental and Fisheries Data Sources *(Discussion will be held regarding the natural environmental and fisheries data required to place marine mining impacts in context. Potential sources of environmental and fisheries data will be identified and options for obtaining and using these data to place mining impacts in context will be discussed. Data types and sources to be used by the*

	projects will be finalised and agreed.)
13h00 – 14h00	Lunch
14h00 – 15h30	Project Team Planning Discussions *(The project team members will discuss the outcomes of the workshop. Work plans, capacity building components and project schedules will be finalised. Non project team participants are not required to participate in these discussions.)*
15h30 – 16h00	Tea
16h00 – 17h30	Project Team Task Allocation *(Final discussions between project team members to decide on final allocation of project tasks, responsibilities and time schedules. Non project team participants are not required to participate in these discussions.)*