

Independent Reviews

Port of Hay Point Sustainable Sediment Management
assessment for maintaining navigational infrastructure

▶ **Summary report**
March 2018

PORT OF
HAY POINT

PEER REVIEW

Port of Hay Point Sustainable Sediment Management assessment for maintaining navigational infrastructure



SYNOPSIS

North Queensland Bulk Ports (NQBP) engaged **Dr Paul Erfteimeijer** to undertake a thorough peer review of the Port of Hay Point Sustainable Sediment Management (SSM) assessment for maintaining navigational infrastructure.



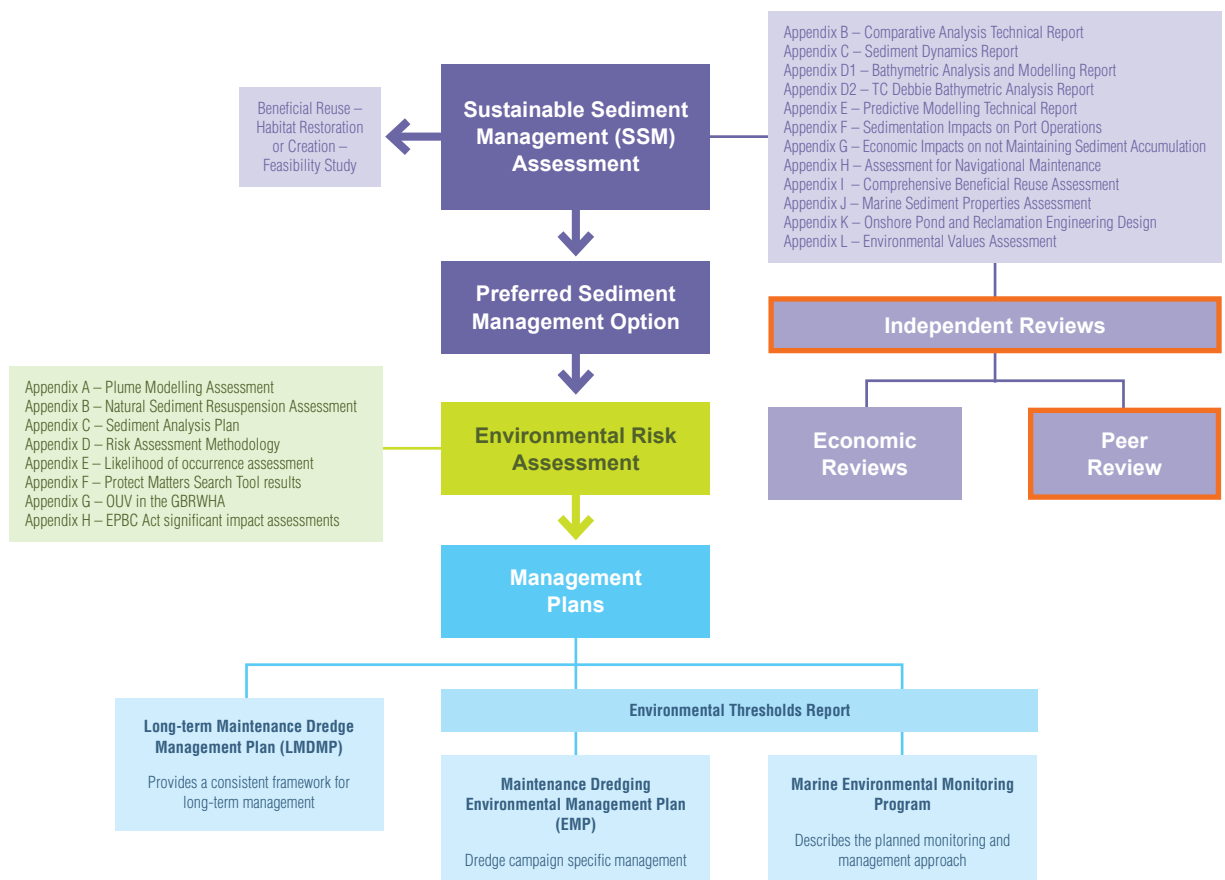
Dr Paul Erfteimeijer

Dr Paul Erfteimeijer was selected from a list of potential reviewers provided by the Great Barrier Reef Marine Park Authority (GBRMPA) as the commonwealth regulator.

The initial review of the SSM included the summary report and 11 associated technical reports.

Dr Paul Erfteimeijer presented the outcome of his peer review in a technical report that included 141 detailed comments on the various SSM project reports.

A number of supporting studies have been undertaken to inform this assessment



Dr Paul Erftemeijer's concluding remarks from his initial peer review (March 2017) were:

Notwithstanding some of the weaknesses and omissions pointed out in this peer review, the SSM project constitutes a commendable effort by NQBP, setting a high bench-mark (even internationally) for the way maintenance dredging is approached and managed in the years to come, not only at the Port of Hay Point but possibly also in other parts of the GBR region and potentially elsewhere in Australia. There is no doubt that this project (and its outcome, as summarised in the twelve SSM reports), has provided NQBP with a well thought-through, long-term strategic framework and a set of practical tools and conceptual designs for a range of priority options for the wise use and sustainable management of sediment at the Port of Hay Point.

NQBP addressed all 141 comments and suggestions made by Dr Paul Erftemeijer in the various SSM reports.

Dr Paul Erftemeijer's final remarks (October 2017) following NQBP's response were:

'I acknowledge that I am satisfied with the way in which you have responded to my review comments and incorporated my suggestions in revised versions of project documents. I consider the work to have been undertaken thoroughly, to a high technical level and in line with best industry practice. In conclusion, I confirm that the work detailed in the twelve reports that I have reviewed is acceptable for its intended purpose'.

The following information is included:

1. Final peer review letter from Dr Paul Erftemeijer (3 October 2017)
2. Extract of initial peer review report from Dr Paul Erftemeijer (March 2017)
3. Peer review cited references
4. Dr Paul Erftemeijer curriculum vitae



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Perth, 3 October 2017

Attn: Kevin Kane
Senior Manager Environment
North Queensland Bulk Ports Corporation
PO Box 3340 North
Mackay QLD
Australia

Peer Review of Port of Hay Point Sustainable Sediment Management (SSM) Project Reports

Hi Kevin,

As you are aware, earlier this year I conducted an independent peer review of the twelve reports that constitute the Port of Hay Point Sustainable Sediment Management (SSM) Project'. My review focused on the technical aspects of the project reports, including an evaluation of their strengths, weaknesses and omissions. I presented the outcome of my peer review in a technical report that included 141 detailed comments on the various SSM project reports.

You subsequently responded to my review in a detailed 'Peer Review Comments Response Table' that specifies how the various comments and suggestions of my review have been addressed. You also provided me with revised versions of two of the main SSM project report documents (project summary report and comparative analysis).

I have now gone through all of your responses and report revisions. On the basis of the above, I acknowledge that I am satisfied with the way in which you have responded to my review comments and incorporated my suggestions in revised versions of project documents. I consider the work to have been undertaken thoroughly, to a high technical level and in line with best industry practice. In conclusion, I confirm that the work detailed in the twelve reports that I have reviewed is acceptable for its intended purpose.

Yours sincerely,

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Peer Review of Port of Hay Point Sustainable Sediment Management (SSM) Project Reports



Technical Report

Client: North Queensland Bulk Ports Corporation (NQBP)

Author: Dr Paul L.A. Erftemeijer

Perth, March 2017

1. INTRODUCTION

1.1 Background to the SSM Project

North Queensland Bulk Ports (NQBP) have conducted a strategic assessment of the ongoing management of marine sediments at the Port of Hay Point. The project is called the Port of Hay Point – Sustainable Sediment Management (SSM) Assessment for Navigational Maintenance ('The SSM Project'). The aim of the SSM Project is to develop long term solutions for the management of marine sediments at the Port by investigating:

- Where sediment at the Port comes from (e.g. onshore sources, marine sources)
- How it influences Port operations (e.g. by reducing depth within the Port navigational areas)
- Whether it can be eliminated or reduced before it influences Port operations (e.g. through mitigation and management measures)
- What options are available at the Port for the disposal of sediments that might have accumulated and need to be dredged (e.g. beneficial reuse, onshore disposal, offshore disposal)

The SSM project was initiated by NQBP during a time of growing concerns in society over potential environmental impacts from dredging and disposal on the Great Barrier Reef Marine Park & World Heritage area, further reflected in a political response (a ban on offshore disposal of capital dredged material within the GBRWHA), delays and a legal challenge by an environmental group during the permit application process for maintenance dredging at the Port of Hay Point.

Following completion of the various studies that make up the SSM project, NQBP commissioned DAMCO Consulting to conduct an independent peer review of all 12 project reports (i.e. 11 technical reports plus an overall summary report), the findings of which are summarised in the present report.

1.2 Background to the Peer Review

This review constitutes an independent¹, critical expert² end-of-project evaluation of the project reports of the Sustainable Sediment Management (SSM) Project, conducted prior to their public release. The review was carried out in February 2017 over a four-week period, and included a site visit to Mackay, allowing for a guided tour of the Port of Hay Point area, a face-to-face meeting with the Senior Environment Manager of NQBP (who gave a Power-point overview presentation of the SSM project) and a skype interaction with one of the key project consultants and co-author of the final project summary report (Tom Kaveney, from Adaptive Strategies).

The methodology of the peer review was inspired by a number of handbooks and guidelines on project evaluation (e.g. NORAD, 1993; Robinson & Thin, 1993; Davidson, 2005; IFAD, 2012). The review was essentially an appraisal of the technical aspects of the project reports, including an evaluation of their quality (e.g. soundness of methodology and assumptions, appropriate consideration of available data and information), relevance and effectiveness in addressing the overall aims of the SSM project, and

¹ The review was independent, as the reviewer (Dr Paul Erfteimeijer) has had no previous involvement in any of the studies that make up the SSM project or any other projects related to the issue of (maintenance) dredging at the Port of Hay Point that could pose a conflict of interest or potentially bias his views on the project.

² The reviewer is considered well-qualified to undertake this review, having significant experience in the area of environmental aspects of dredging and several other technical/scientific areas of direct relevance to the SSM project. It is noted that the scope of the review is confined to the limits of the reviewer's specific skills and expertise. See Appendix 1 for a brief biography of the reviewer.

a note of any potential omissions that may be of direct relevance to the project report objectives. Particular effort was made to ensure that the review was concise, factual, clear and constructive. The findings of the review are presented for the overall project (all reports together, primarily guided by the summary report), as:

- Strengths (aspects that were particularly good or exemplary)
- Weaknesses (including errors/bias, inconsistencies and shortcomings)
- Omissions (gaps, information missing)

The review also considered the internal coherence of the various studies (repetition, inconsistencies, appropriate cross-referencing etc.) - in as far as this appears from the reports - and the potential wider implications of the SSM project's outcomes. In addition, detailed technical comments are provided for each of the individual reports separately. Additional independent technical input into the review (especially with regards to the sediment dynamics and sediment properties assessments) was provided by Dr Garnet Hooper of Marine Ecological Services Pty Ltd.

1.3 List of SSM Project documents reviewed

The following project documents were reviewed:

- Port of Hay Point – Sustainable Sediment Management Assessment for Navigational Maintenance (project summary report) (Kaveney et al., 2017)
- Appendix B: Comparative Analysis Technical Report (Hemphill et al, 2016)
- Appendix C: Hay Point Sediment Dynamics – Sediment Budget (Gibbs et al., 2016)
- Appendix D: Hay Point Port: Bathymetric Analysis and Modelling (Symonds & Donald, 2016)
- Appendix E: Hay Point Bathymetric Analysis – Predictive Model (Symonds & Loehr, 2016)
- Appendix F: Port Operations and the Effect of Sedimentation (Smith, 2016)
- Appendix G: Economic Impact of Not Managing Sediments at DBCT (DBCT, 2016)
- Appendix H: Port of Hay Point - Assessment for Navigational Maintenance (Symonds et al., 2016)
- Appendix I: Comprehensive Beneficial Reuse Assessment (Stalley & Boylson, 2016)
- Appendix J: Marine Sediment Properties Assessment (Kochnieff et al., 2016)
- Appendix K: Onshore Pond and Reclamation Engineering Design (Symonds, 2016)
- Appendix L: Environmental Values Assessment (Powlett et al., 2016)

[Note: Appendix A is a list of TACC members, and as such did not require peer review]

2. GENERAL COMMENTS

2.1 General comments on the overall SSM Project

- *Has the SSM project accomplished its objectives for a long-term strategic framework for sustainable sediment management at the Port of Hay Point?*

The outcome of the various studies that made up the SSM project - as presented in eleven individual study reports and one main summary report - provide answers to the key questions as they were formulated at the start of the project, i.e. where sediment at the Port comes from (described in Appendix C), how it influences Port operations (described in Appendices D, E, F and G), whether it can be eliminated or reduced before it influences Port operations (described in Appendix H), and what options are available at the Port for the beneficial reuse and/or disposal of sediments (described in Appendices I, J, K). The study has also presented a transparent and comprehensive comparative analysis (described in Appendix B) to aid in the selection of best options for the short-term and long-term management of sediments at the Port of Hay Point, based the outcome of the various technical studies, an analysis of environmental values (described in Appendix L) and stakeholder consultation (as explained in Appendix B). As such, there is no doubt that the SSM project has successfully accomplished its objectives and provided NQBP with a well thought-through, long-term strategic framework, conceptual designs and practical decision-support tools for the sustainable management of sediment at the Port of Hay Point. While several of the findings and conclusions of the SSM Project are limited to the specific circumstances and conditions of the situation at the Port of Hay Point, the overall approach of the project can be used to support and inspire future sediment management and (maintenance) dredging approaches at other ports in Australia and beyond.

- *Has the SSM project followed Best Practice Guidelines and Methodologies?*

The SSM Project has followed national and international best practice guidelines and methodologies for its assessments, including application of National Assessment Guidelines for Dredging (NAGD), relevant USACE and PIANC Best Management Guidelines (on dredging & disposal, prevention of siltation of ports, and options for beneficial re-use), industry standard data-processing software (Matlab, GUI), the internationally recognised GHG Protocol for the calculation of greenhouse gas emissions, the hierarchy of waste management under the London Protocol, and Australian Standards & Technical Specifications for geotechnical investigations, soil classification, concrete materials, road construction materials and geosynthetic liners (i.e. ASTM, AS, TMR and MRT). The individual studies comprising the SSM project have been conducted by capable institutions and consultants applying appropriate and replicable methodologies. The modelling methodology adopted to develop a decision-support tool for predicting sediment levels is acceptable and has followed 'good modelling practices' (STOWA/RIZA, 1999). Apart from a few critical notes on the methodology used for the classification and determination of sediment grain-size (Appendix J), the methodologies adopted in the various SSM studies appear sound and common best practice. This is further supported by the fact that the many aspects of the approach followed in the SSM Project have been incorporated in the recently published 'Maintenance Dredging Strategy for Great Barrier Reef World Heritage Area Ports'.

- *Has the SSM project made adequate use of the latest available insights, data and information?*

The SSM reports are generally well-resourced, with proper reference to the latest and most relevant literature, data (including spatial data derived from Queensland and Commonwealth databases; e.g. see Appendix L), and other available information. Where appropriate, the current peer review has indicated additional references of particular relevance for this project.

- *Are the conclusions of the SSM project sufficiently justified?*

While there will always remain room for different interpretations in any study program, the majority of conclusions drawn in the various SSM study reports are well-justified and supported with valid arguments, quantitative evidence, data and results. The criteria for the comparative analysis (which included environmental, cultural heritage, economic, health & safety, social, innovative and World Heritage-related issues) were identified and selected through a participatory process involving a diversity of views of the main stakeholders (actively engaged in the process), and were appropriate and sufficiently comprehensive for the purpose of the analysis. Ratings given to each option in the comparative analysis have a potential degree of subjectivity (and they always will). However, since they were based on the interpretation of detailed project findings and the views of a significant representation of stakeholder groups in the area, they are considered sound and appropriate. The sensitivity analysis that was done to allow for the testing of the effect of stakeholder bias and competing views on the outcome of the comparative analysis (by applying a 75% weighting to a selected sub-set of performance measures that represent a particular stakeholder focus) was particularly powerful and transparent. The conclusion by the SSM project that there is a requirement to undertake maintenance dredging in the next 1-3 years and in the longer term every 5 years is agreeable and supported with appropriate arguments and evidence. This also holds true for the conclusion by the project that the only option available for that first campaign is sea disposal as there is need for a sufficient lead-time to explore the feasibility, gather further information and complete the complex approval requirements of the alternative disposal or reuse options.

- *Does the summary report adequately summarise the key points and findings of each of the 11 technical reports?*

The main summary report provides an adequate and succinct summary of the main points from all the underlying 11 technical reports (Appendices B-L), without unnecessary repetition of their contents, which must not have been an easy task. Wherever there is need for some additional clarification or detail, this has been highlighted in the comments below.

- *Has there been adequate stakeholder engagement (participatory process) during the SSM project?*

There has been a significant level of transparency and **stakeholder engagement** in the project (including opponents and critics), most notably in the identification process of criteria and performance indicators, as well as in the scoring and weighting process for the comparative analysis of alternative disposal options.

Concluding remarks

Notwithstanding some of the weaknesses and omissions pointed out in this peer review, the SSM project constitutes a commendable effort by NQBP, setting a high bench-mark (even internationally³) for the way maintenance dredging is approached and managed in the years to come, not only at the Port of Hay Point but possibly also in other parts of the GBR region and potentially elsewhere in Australia. There is no doubt that this project (and its outcome, as summarised in the twelve SSM reports), has provided NQBP with a well thought-through, long-term strategic framework and a set of practical tools and conceptual designs for a range of priority options for the wise use and sustainable management of sediment at the Port of Hay Point.

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Dr Paul Erftemeijer

PRINCIPAL MARINE SCIENTIST – DAMCO CONSULTING

Summary of competencies

Paul has 25 years of international experience as a specialist consultant and applied scientist focusing on human impacts, management, recovery and restoration of critical marine and coastal ecosystems around the world. He has extensive working experience in a consulting role with industry and other clients as technical advisor to address environmental concerns related to coastal and marine development projects, including dredging operations. He frequently provides expert advice in relation to seagrasses, coral reefs, mangroves, water quality and environmental aspects of dredging. He holds an adjunct position as Research Professor at the Oceans Institute, University of Western Australia. Since September 2015, Paul operates as independent private consultant.

Paul's work on environmental aspects of dredging includes the development of water quality thresholds and management triggers for reactive monitoring programs of several large-scale dredging operations in (Western) Australia, Dredging and Spoil Disposal Management Plans and Environmental Impact Assessments of dredging projects in Australia, Arabian Gulf, Red Sea, Mediterranean and Dutch Wadden Sea. Paul has been serving on two expert working groups for the World Association for Waterborne Transport Infrastructure (PIANC) on developing best practice guidelines for dredging and port construction near coral reefs (2007-2010) and coastal plant habitats (2011-present). Recently, he was invited by GBRMPA and AIMS to participate in an Expert Panel to draft a synthesis of the effects of dredging and dredged spoil on the Great Barrier Reef. He is the lead author of two milestone scientific papers reviewing the environmental impacts of dredging on seagrasses (2006) and corals (2012).

CURRENT POSITION

Independent Private Consultant

QUALIFICATIONS

M.Sc. degree in Biology, Nijmegen University (1988)

Ph.D. degree in Marine Ecology, Nijmegen University (1993)

Graduate Diploma in NGO Management, University of London (1999)

PROFESSIONAL MEMBERSHIPS AND AFFILIATIONS

Research Professor (adjunct), University of Western Australia

World Seagrass Association (board)

IUCN Seagrass Specialist Group

PIANC Working Group 157

"Dredging, Port & Waterway Construction around Coastal Plant Habitats" (chair)

EXPERTISE

- Seagrasses
- Coral reefs
- Mangroves
- Water Quality
- Dredging

Recent project experience (dredging)

PROJECT | Monaco Environmental Management (2015-16)

Client: Jan de Nul

Summary: Expert advice on environmental aspects of dredging operations – including establishment of thresholds and triggers, modelling interpretation and development of a reactive monitoring plan - for land reclamation works in Monaco (Mediterranean) near sensitive marine habitats and species (for Jan de Nul). 2015-ongoing

PROJECT | Environmental Aspects of Dredging, Port and Waterway Construction around Coastal Plant Habitats - PIANC WG157 (2012-16)

Client: World Association for Waterborne Transport Infrastructure (PIANC)

Summary: Review and summarise international environmental best practices for dredging operations and port and waterway construction near coastal plant habitats, such as seagrass meadows, macroalgal communities, mangroves and salt marshes (PIANC EnviCom Working Group WG157).

PROJECT | Synthesis of the Effects of Dredging and Dredged Spoil Disposal on the Great Barrier Reef (2014)

Client: Great Barrier Reef Marine Park Authority (GBRMPA) and Australian Institute of Marine Science (AIMS)

Summary: Invited to participate in an Expert Panel workshop to synthesize

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current knowledge and understanding of the effects of dredging and dredged spoil disposal on the Great Barrier Reef.

PROJECT | Chevron Dredging Guidelines (2014)

Client: Chevron

Summary: Development of three environmental best practice guidelines reports on dredging for Chevron's global operations, including dredging management, receptor thresholds & management triggers, and monitoring.

PROJECT | Anadarko Pipeline Corridor Dredging & Trenching, Palma Bay, Mozambique – Seagrass Mitigation Plan (2014)

Client: Van Oord

Summary: Evaluation of potential strategies to mitigate impacts from dredging & post-trenching for pipeline installation on seagrass habitat; review cost-effectiveness of methodologies for seagrass relocation & restoration.

PROJECT | Port Hedland South West Creek Dredging & Reclamation project, WA Australia (2014)

Client: Port Hedland Port Authority (PHPA)

Summary: Technical lead for mangrove and sedimentation monitoring studies as part of the Environmental Monitoring Program (Phase II dredging).

PROJECT | Browse SAR: Response to Dredging Queries (2014)

Client: Department of State Development (DSD) (secondment)

Summary: Review of implications of contemporary information regarding the proposed Browse Liquefied Natural Gas processing precinct at James Price Point, including adjusted dredge volumes, residual flows, impact buffer width and model refinements, in response to EPA queries.

PROJECT | ICHTHYS LNG Development, Darwin, NT Australia (2011-13)

Client: INPEX (10-month secondment)

Summary: Specialist environmental services for a large-scale capital dredging program in Darwin Harbour, including interpretation of plume modelling results to predict environmental impacts, and assistance with development of a detailed Dredging and Spoil Disposal Management Plan.

PROJECT | Wheatstone LNG Dredging Program, WA Australia (2011-14)

Client: Chevron

Summary: Development of water quality threshold criteria, management triggers and design of environmental monitoring program for a large capital dredging program. Served as Technical Director for the Upstream Marine Environmental Monitoring Program, which included water quality monitoring, benthic primary producer habitat surveys and coral spawning assessments.

PROJECT | Port Hedland Outer Harbour Development, Western Australia (2011)

Client: BHP Billiton

Summary: Critical review of requirements for infauna monitoring at dredged spoil disposal grounds, based on literature study and cost-benefit analysis.

PROJECT | Impacts of dredging and infrastructure development on seagrass and coral reef ecosystems in Singapore, 2008-2012

Client: Applied research programme funded by Singapore-Delft Water Alliance (SDWA), in collaboration with the National University of Singapore

Summary: Large-scale field- & mesocosm shading experiments (design and

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coordination) and supervision of two PhD students.

PROJECT | Seagrass recolonization after trench backfilling, MEDGAZ pipeline, Spain (2008)

Client: Boskalis

Summary: Evaluation of potential hampering of natural seagrass recolonization by over-backfilling of dredged trench for installation of MEDGAZ gas pipeline and recommendations for mitigation

PROJECT | Dredging and Port Construction near Coral Reefs (2006-09)

Client: World Association for Waterborne Transport Infrastructure (PIANC)

Summary: Compile and summarise international environmental best practices for dredging operations and port construction near coral reefs (PIANC EnviCom Working Group WG108).

PROJECT | Environmental impact study of industrial developments and associated dredging works on coral reefs at Yanbu, Saudi Arabia (2006)

Client: Saudi Consulting Services (for the Royal Commission of Yanbu)

Summary: Threshold development, plume model interrogation, impact prediction and mitigation measures.

PROJECT | Sub-suction dredging: feasibility study, Netherlands (2005)

Client: Delft Hydraulics R&D in collaboration with Cubic Square & Van Oord

Summary: Evaluation of the environmental performance of a new dredging technique (sub-suction dredging) and its feasibility for application in seagrass habitats. Included a field trial experiment (Ketelmeer).

PROJECT | Environmental impact assessment of dredging operations for coastline modifications at Yanbu, Saudi Arabia (2004)

Client: Royal Commission of Yanbu

Summary: Compared impacts of various dredging scenarios & spill budgets and contributed to technical specifications (RfP) for the dredging operations.

PROJECT | Environmental impact assessment and field monitoring (BACI) of waterbirds, intertidal eelgrass and mussel beds during pipeline dredging in the Ems Estuary (Netherlands), 2002-2003

Client: N.V. Nederlandse Gasunie

Summary: Desk evaluation and a two-year field monitoring of environmental impacts of dredging on intertidal eelgrass, mussel beds and waterbirds.

Selected publications (dredging)

Erfteimeijer, P.L.A., A. Bougher, R.R. Lewis III, M.J. Jury, J.M. Machin and D.J. Shafer, 2016. Environmental impacts of dredging on mangroves: a review. *Marine Pollution Bulletin* (to be submitted).

Juri, M., P.L.A. Erfteimeijer, B. Gabe, J.A. Juanes de la Pena, D. Leggett, J. Dijkstra and D.J. Shafer, 2016. Environmental aspects of dredging, port- and waterway construction around coastal plant habitats. *The World Association for Waterborne Transport Infrastructure, PIANC EnviCom Report No.157* (under review).

McCook, L.J., B. Schaffelke, S.C. Apte, R. Brinkman, J. Brodie, P.L.A. Erfteimeijer, B. Eyre, F. Hoogerwerf, I. Irvine, R. Jones, B. King, H. Marsh, R. Masini, R. Morton, R. Pitcher, M. Rasheed, M. Sheaves, A. Symonds and M.St.J. Warne, 2015. Synthesis of

Dr Paul Erfteimeijer

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current knowledge of the biophysical impacts of dredging and disposal on the Great Barrier Reef: Report of an Independent Panel of Experts, Great Barrier Reef Marine Park Authority, Townsville, 187 pp.

Junjie, R.K., N.K. Browne, P.L.A. **Erfteimeijer** and P.A. Todd, 2014. Impacts of sediments on coral energetics: partitioning the effects of turbidity and settling particles. PLoS ONE 9(9): e107195. doi:10.1371/journal.pone.0107195.

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