3rd ADDENDUM TO THE

ENVIRONMENTAL IMPACT ASSESSMENT

for

Hulhule' – Hulhumale' Link Road Development Project, North Male' Atoll

Proponent:

Housing Development Corporation (HDC)

Consultant:

Amir Musthafa (EIA P01/2013)

November 2018

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Consultants Declaration

This EIA has been prepared according to the EIA Regulations. I certify that the statements in this Environmental Impact Assessment study are true, complete and correct to the best of my knowledge and abilities

Amir Musthafa (EIA P01/2013)

12th November 2018

بسم الله الرحمن الرحيم

HOUSING
DEVELOPMENT
CORPORATION

Letter no.: HDC(161)-PM/438/2018/9

November 12, 2018

Mr. Ibrahim Naeem,
Director General,
Environmental Protection Agency,
Ministry of Environment and Energy,
Malé,
Republic of Maldives

Dear Sir,

Project: Design and Construction of Link Road Connecting Hulhulé and Hulhumalé
Subject: 3rd Addendum to EIA - Proponents Declaration

As the proponent of the project, I guarantee that I have read this EIA addendum report and to the best of my knowledge, all non-technical information provided here are accurate and complete. I am aware that this report has been prepared in accordance with the EIA regulations.

Thank you.

Yours faithfully,

Nawaz Shaugee
Director

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Non Technical Summary

This report is the 3rd addendum to the EIA undertaken for the Development Hulhule' – Hulhumale' Link Road Development Project, North Male' Atoll, Maldives.

This addendum is based on the proposed dredging works of the area adjacent to the new road being developed, including a large portion of the existing road. The dredging is proposed in order to provide a new runway for sea planes using the area. The main justification for changing the sea plan runway area is provide an alternative route to sea planes such that they would not need to fly above hulhumale' residential and industrial areas, which therefore imposes height restriction to these structures.

An Environmental Impact Assessment was necessary for the works outlined in this report as they fall under the 'Jadhuvalu R' of the Environmental Impact Assessment Regulations 2012 of the Maldives as Dredging using heavy machinery is the main component. In addition to meeting the regulatory requirements, the report would further assist the proponent and important stakeholders to make decisions in an environmentally sound manner.

As this is an addendum for a more comprehensive EIA for the entire Hulhule'-Hulhumale' link road development project, this study is referred to for information regarding the general project, legislation, baseline existing environment, and environmental monitoring. Additional components are given for project specific details, additional environment parameters for both determining existing environment and environmental monitoring. Furthermore, specific impacts due to the proposed dredging works have been identified, and their significance assessed in addition to providing mitigation measures and alternatives. Stakeholder consultations have been carried out with relevant authorities regarding the specific dredging works in the proposed area.

The stakeholders generally did not have any major concern with regards to the specific works proposed for this study, mainly due to the fact that the area is already an established construction site. Disruption to existing seaplane operation was regarded as the major concern from the authorities. Furthermore, concern had been raised as to the stability of the road especially on the western side facing the sea plane area, which may need further protection. This can however be part of a future project and does not necessarily have to be implemented along with the proposed works.

The overall environmental impacts of the project have been assessed using frameworks found on literature and the results indicate that the proposed project has minimum negative impact and have an overall net neutral outcome. There is virtually no impact on existing

environment due to lack of significant receptors. However, it has been identified that impact for exiting sea plane operations could be a cause for concern. The most significant impact is due to floating objects and debris from the dredging area drifting and physically impacting the floating platforms of the sea plane harbour area. Apart from this, general sedimentation is assessed and their mitigation measures provided. Major mitigation measures proposed include to either have a floating pipeline demarcating the current seaplane runway area from the project area or to have a regular team established at site collecting waste materials both from the land and potentially from the lagoon. This is important to be added to the project planning and be incorporated to the project works before commencement.

Alternative options to dredging include using cutter suction dredgers instead of the proposed excavators. Alternative mitigation measures include use of silt screens or other floating barriers to prevent any solids from venturing into the sea plane harbour. Alternatives have generally been considered unfavourable to the proposed methodology and proposed mitigation measures. No project option such as opting to use the existing connecting road between Hulhule and Hulhumale is counter productive as already a new road has been developed under the project. Furthermore, not been able to change the sea plane runway path would possibly have some impact on upcoming development plans for Hulhumale' Phase 1.

It is recommended to follow the monitoring program given in the initial EIA. The monitoring program provides locations and parameters to gauge the impacts of the activities proposed in the initial EIA. Furthermore, some of the marine water assessment locations will act as a control for the location proposed in this project. Since it is a very confined area, regular assessment of turbidity from the one location proposed in the EIA is to be undertaken in addition to the initial monitoring program.

As this is part of ongoing works, and considering the justification of the project with respect to its impact on Hulhumale' development, and considering the fact that there are no known significant receptors in the area, it is thus recommended for the project to proceed as proposed, with the proposed mitigation measures in place.

ސާރާ ހުލާސާ

މި ރިޕޯޓަކީ ހުޅުލެ - ހުޅުމާލެ ގުޅޭ ސަރަހައްދުގައި ހިންގުމަށް ހަމަޖެހިފައިވާ އައު މަގު ހެދުމާއި ގުޅޭ ގޮތުން ތައްޔާރުކުރެވިފައިވާ އީ.އައި.އޭ ރިޕޯޓުގެ ތިންވަނަ އެޑެންޑަމް ރިޕޯޓެވެ. މިރިޕޯޓުގައި އަލި އަޅުވާލާފައިވަނީ މިމަޝްރޫޢުގެ ތެރެއިން އައު މަގަކީ އިންވެގެން ހުޅަނގުން އޮތް ސަރަހައްދު ހިއްކުމުގެ މަސައްކަތާއި އޭގެ ސަބަބުން މިސަރަހައްދަށް ކުރާނެ އަސަރުތަކެވެ. ތިމާވެށްޓަށް އަސަރު ފޯރާނެ މިންވަރު ބަލާފައިވާ ރިޕޯޓު ނުވަތަ 'އީ.އައި.އޭ' މި މަޝްރޫޢަށް ހަދަން ޖެހިފައިވާ މިމަޝްރޫޢުގެ ތިމާވެށްޓަށް އަސަރު ފޯރާނެ މިންވަރު ބައްލާފައިވާ ރިޕޯޓު ހުޅުމާލޭ ބާރު ފާއިތުވި 2012 ގެ 'ޖަދުވަލު ޑ'ގައި މިފަދަ ރިޕޯޓު ހަދަންޖެހޭ މަޝްރޫޢުތަކުގެ ލިސްޓުގައި މިމަޝްރޫޢު ހިމެނޭ ފަދަ ކަންތައްތަކުގެ މަސައްކަތް އެކުލެވިފައިވާތީއެވެ. މިމަޝްރޫޢު ތިމާވެއްޓާބެހޭ ޤަވާއިދާއި ޤާނޫނާ ފުއްދުމުގެ އިތުރުން، މި އީ.އައި.އޭގެ ސަބަބުން މިމަޝްރޫޢުގެ އެދިފައިވާ ކަމާބެހޭ އެހެން ފަރާތްތަކާއި މަޝްރޫޢުގެ ބާރު ނިންމުމުގެ އެހެން ވެސް ފާހަގަކުރެވޭތީއެވެ. އަދި ދަތުރުކޮށްދިނުމުގެ ގޮތުން މިމަޝްރޫޢު ކުރިއަށްދާ ފުރުޞަތުތަކެއް ވެގެންދާނެއެވެ.

މިމަޝްރޫޢުގެ މައިގަނޑު މަސައްކަތަކީ އެކްސްކަވޭޓަރ ބޭނުންކޮށްގެން ފަޅުތެރެއިން 2 މީޓަރު ފުނަށް 75000 އަކަމީޓަރުގެ ސަރަހައްދެއް ކޮނުމެވެ. މީގެ ތެރެއިން ފަޅުގެ ސަރަހައްދުތަކާއި، މިހާތަނަށް ހުޅުލޭއާއި ދެމެދު ދަތުރުކުރުމަށް ބޭނުން ކުރެވޭނެ މަގުގެ ބޮޑުބައެއް ހިމެނެއެވެ.

މިރިޕޯޓަކީ މިމަޝްރޫޢަށް ތައްޔާރުކުރެވިފައިވާ އެޑެންޑަމް ރިޕޯޓްތަކުން، ފުރަތަމަ ހުށަހެޅިފައިވާ އީ.އައި.އޭ ރިޕޯޓަށް ގެނެވުނު ބަދަލުތައް ކުރެވިފައިވާނެއެވެ. މީގެ ތެރެއިން، މަޝްރޫޢުގެ ތަފްސީލުތަކާއި، ގުޅޭ ޤާނޫނާއި ޤަވާއިދުތަކާއި، މިސަރަހައްދުގެ ތިމާވެށީގެ، އަދި ފެންބަލާ އަސާސީ ބަދަލުތަކާ ނަތީޖާތައް އެރިޕޯޓަށް ވެސް ރިއާޔަތް ކުރެވިފައެވެ. ނަމަވެސް މި ރިޕޯޓުގެ އަލިއަޅުވާލެވިފައިވާ ކަންކަމުގެ މަސައްކަތާއި ގުޅޭ އެންމެފަހުގެ މަޢުލޫމާތުތަކާއި، އޭގެ ސަބަބުން ވެށްޓަށް ކުރާނެ އަސަރުތަކާއި، އަދި މިއަސަރު ކުޑަކުރުމަށް ކުރެވޭނެ ކަންކަމާއި، ބަދަލުގައި ކުރެވޭނެ ކަންކަން ވަނީ ހުށަހަޅާފައެވެ. އަދި މީގެ އިތުރުން ކުރިން ހުށަހެޅިފައިވާ އީ.އައި.އޭ ރިޕޯޓުގައި ވެށީގެ ބަދަލުތަކާއި ދިރާސާކުރުމަށް އެކުލެވިފައިވާ ބާތިމެޓްރިކް ސާރވޭތަކުން ސަރަހައްދުގެ ފެނުގެ ބަދަލު ދިރާސާކުރެވުނު ވަނީ ހުށަހަޅާފައެވެ. މިމަސައްކަތާއި ގުޅޭގޮތުން، ކަމާބެހޭ ފަރާތްތަކާއި މަޝްވަރާ ކުރެވި، ހޯދުނު ހިޔާލުތައްވެސް ވަނީ ހުށަހަޅާފައެވެ.

މި ރިޕޯޓުގެ ހޯދުންތައް ބިނާވެފައިވަނީ މި މަޝްރޫޢުގެ ކޮންސަލްޓަންޓް، އާމިރު މުސްތަފާގެ ޓީމުން ކުރި ދިރާސާތަކުގައި މި މަޝްރޫޢުގެ ސަރަހައްދުގެ ތިމާވެށި ދެނެގަތުމަށް ކުރެވިފައިވާ ބަޔޮލޮޖިކަލް ބިނާކޮށްގެނެވެ. އާމިރު މުސްތަފާއާއި އެކު މިފަދަ

ދަށުގައިވާކަން ކަށަވަރުކުރެއްވުމަށް ތިލަ ކަނޑުގައި ތަކެއްޗާ ގުޅިގެން ދިގުމުދަތަށް ދަށަށް ދާ ގޮތަށް ބަލައި ބަލައި ދިއުމަށް ދަތި ވާ ގޮތަށް ހަދާ ކަނޑުގެ ބަދަލު (ROV) ގައި ވާ ގޮތަށް ކަނޑުގެ ބަދަލުތައް ބަދަލުކުރުން.

ކަނޑުގެ ބަދަލާ ގުޅިގެން ދަށުގައި ހުންނަ ބަދަލުތަކުގެ ތަކެތި، ފަދަށްވުރެ ބޮޑު ބަދަލުތަކުގެ ތަކެތި ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން.

ދ ދަށުގައިވާ ކަނޑުގެ ބަދަލުތަކުގެ ތެރެއިން ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން.

ދަށުގައިވާ ކަނޑުގެ ބަދަލުތަކުގެ ތެރެއިން ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން. ތަކެތި ދުރަށް ގެންގޮސް ކަނޑުގެ ބަދަލުތަކުގައި ބަހައްޓާ ގޮތަށް ބަދަލުތައް ބަދަލުކުރުން.

މި މަޝްރޫޢުގެ ސަބަބުން ތިމާވެށްޓަށް ލިބިގެންދާނެ ގެއްލުންތަކަށްވުރެ، މިމަޝްރޫޢުއިން މިސަރަހައްދުގެ ތަރައްޤީއަށް ލިބޭނެ ފައިދާބޮޑުވޭ. މިމަޝްރޫޢުގެ މަސައްކަތްތަކަކީ މިޒާތުގެ ގިނަގުނަ ބޭޓި ސަރަހައްދުތަކުން އިތުރު ނުކުރާ އަސަރުތަކާއި ކުރިމަތިލާ މަސައްކަތްތަކާއި ގުޅުމުގައި ޖުމުލަގޮތެއްގައި ނުބައިވާނެއެވެ. މިރިޕޯޓުގައިވާ ކަންކަމަށް ރަނގަޅަށް ބަލައި ހުރިހާގަވާއިދާ މަޝްރޫޢުގައި އިތުރަށް ހިމަނަން ހުރިހާގަވާއިދާ ފުރިހަމަ އަދި، ރަށްވެހި މަސްއޫލިއްޔަތު ޕްރޮޖެކްޓާއި އެކީ ކުރިއަށް ގެންދިއުމަކީ ކަމާކަމެވެ. މިރިޕޯޓުގައި ހުރިހާގަވާއިދާ މި މަޝްރޫޢު މިރިޕޯޓުގައި ފާހަގަ ކޮށްފައިވާ ގޮތަށް، ތިމާވެށްޓަށް ލިބިދާނެ ގެއްލުން އެންމެ ކުޑަކޮށް ކުރިއަށް ގެންދިއުމަށެވެ.

1. Introduction

1.1 Background

This Addendum to the Environmental Impact Assessment (EIA) report has been prepared in order to meet the requirements of Clause 5 of the Environmental Protection and Preservation Act of the Maldives to assess the impacts of the proposed dredging as part of the on-going Hulhule' – Hulhumale' link road development project.

The report will look at the justifications for undertaking the proposed dredging works and it will identify and determine the significance of the potential impacts of the proposed works. Alternatives to proposed components or activities in terms of location, design and environmental considerations would be suggested along with measures to mitigate any negative impact on the environment. Environmental monitoring programme is vital in order to demonstrate the long-term sustainability of the proposed project as well as to undertake mitigation measures before any impact leads to long-term significant effects. Long term monitoring helps to understand uncertainties in impact analysis improving future impact predictions and project implementation. Therefore, a building monitoring and management plan would be suggested.

The major findings of this report are based on qualitative and quantitative assessments undertaken during July and August 2018.

1.2 Literature Review

Existing studies undertaken for similar projects were reviewed. These include the following:

- Environmental Impact Assessment for the proposed resort development at Maadhoo Finolhu, Kaafu Atoll Maldives – Water Solutions (2014)
- Environmental Impact Assessment for the proposed Coastal Developments at K. Funadhoo, - Musthafa (2016)
- Environmental Monitoring reports for the expansion and modernisation of Ibrahim Nasir International Airport - Sandcays Pvt. Ltd 2012

Both these projects involve limited excavation and dredging works similar to those proposed in this project. Therefore, they have been referred to. The third report was referred to with respect to getting more information on the existing environment.

1.3 Aims and Objectives of the EIA

This report addresses the environmental concerns of the building construction works and also those that will occur during the operational stage of the development. The report attempts to achieve the following objectives.

- Describe the additional project components to the relevant authorities and to the public
- Allow better project planning and decision-making based on sustainable development.
- Identify environmental impacts that will occur and gauge their significance for such a project undertaken in the particular location.
- Mitigating impacts caused due to the works outlined in the project
- Promote informed and environmentally sound decision making
- Ensure environmental compliance of the facility
- To demonstrate the commitment by the proponent on the importance of environmental protection and preservation.

1.4 Methodologies

This EIA has been prepared by Amir Musthafa, a registered permanent EIA consultant with years of experience in Environmental Impact Assessment in the Maldives and has been involved in numerous coastal protection projects, and water works projects undertaken in the country.

Internationally recognized and accepted methods have been used in this environmental evaluation and assessment. This EIA is based mainly on data collected during a field investigation on July 2018. The data collection methods are described in detail under the following Section.

1.5 Methods of data collection

Conditions of the existing environment of the study area were analysed by using various surveying techniques and scientific methods. Field surveys were carried out to get a further understanding of the existing conditions at the project location. Most of the general data had been already collected in the previous studies done for the project.

The following investigations were carried out on site.

- Marine water quality

1.5.1 Water Quality Measurement

Water quality measurement of both ground water and marine water was undertaken by collecting 1500 ml water samples in plastic bottles from the project site. Marine water samples were taken from the lagoon by dipping the water bottles in the water at about 1m below the surface.

All the samples were then sent to MWSC water laboratory for water quality testing within 12 hours of sample collection.

1.6 Institutional Arrangements

Once the EIA has been submitted it is expected that the review process will not take more than 1 week. The review process may result in the request for additional information before issuing a decision statement. However, all efforts have been made to ensure that adequate information has been provided with specific attention paid to meet all requirements of the Terms of Reference (TOR). The TOR for this EIA is given in Annex 1.

1.7 The Proponent

The project is being proposed by Housing Development Corporation (HDC). There has not been any change to the proponent.

1.8 The Project Location

The general location of the project is the same, as this is part of the Hulhule' – Hulhumale connecting road development works. However, the specific location in which the proposed dredging is to take place is important and is presented in the image below.

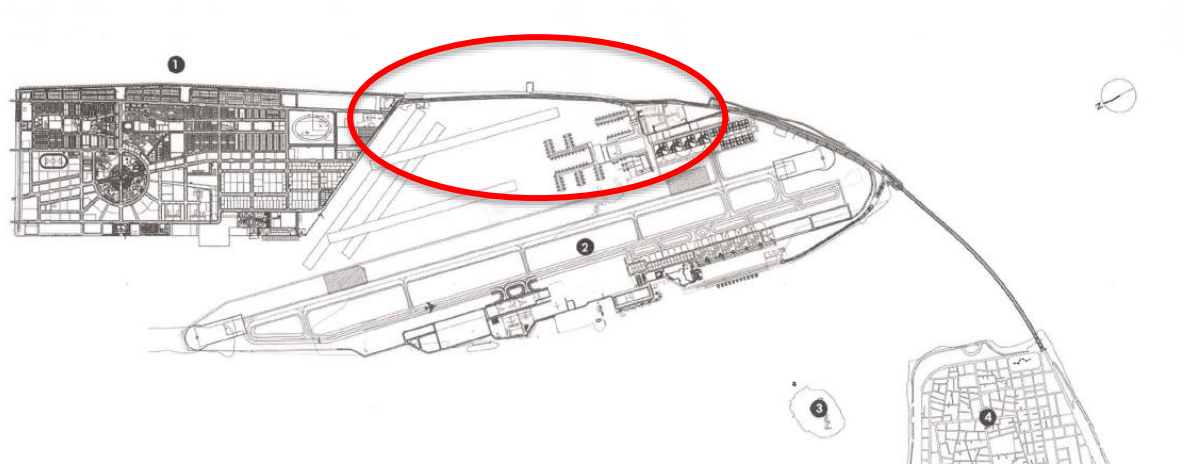

Figure 1 Project location and Impact area (highlighted in red)

1.9 Need and Justification

As part of the Hulhule' – Hulhmale' link road development project, there has been some changes to the proposed sea plane operations. Under the proposed plan, sea planes are not to enter Hulhumale' air space, as is currently the case. To enable this, sea plane runway orientation needed to change such that flight takeoff and landing will be away from Hulhumale' residential area.

Dredging the proposed area is important to ensure there is sufficient depth for a safe runway area for sea planes. Therefore, in order to implement the current plans for Hulhumale', there is a great need to carry out this proposed dredging works.

From a project financial and environmental perspective, undertaking this work is important at this stage as the area is already undergoing other construction works by the same contractor who has mobilised relevant equipment and machinery there. Therefore, excavating utilising the same resources will be cost effective.

2. Project Description

The proposed works are only the dredging of the defined area near the Hulhule' – Hulhumale' link road to develop a safe runway area for sea planes. All other works related to the Hulhule' – Hulhumale' link road have previously been studied under the previous EIAs.

The construction works have been awarded to the Chinese group, Hunan No. 6 Engineering Corporation. The methodology and relevant information for the dredging works is extracted from the method statement prepared by the sub contractor for the project, SASe Construction Pvt. Ltd.

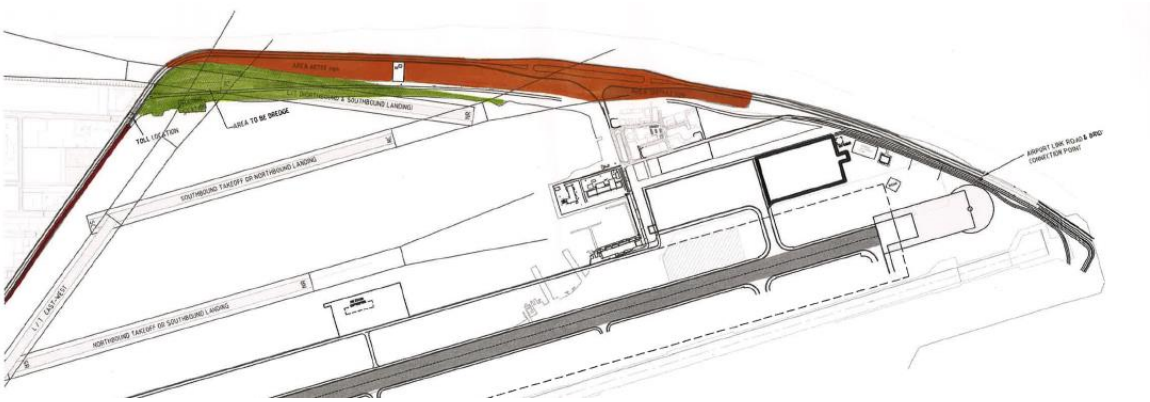

Figure 2 Schematic of the Project works. Excavation and dredging area highlighted in Green

2.1 Earthworks

Major works to be undertaken as part of the project are Earth works. This includes dismantling or breaking of existing road, dredging the defined area, and disposal of dredging material.

Earthworks consist of the following items;

- In-survey and setting out
- Preparation to start work
- Protection and preventive actions
- Dismantling and break of existing road
- Dredging by excavator to -2m from MSL

- Removal of debris from dismantling of road as required.
- Removal of dredged material as required
- Out survey and handing over of works

The total dredging area is 75,169.49 sqm as highlighted in green in Figure 2. It is estimated that over 150,000 cbm of sand will be collected from this area.

The works will be carried out in a restricted zone. Any material or Equipment brought in or taking out, proper approved procedure will be followed.

The existing Hulhule' to Hulhumale' road, which has previously been used can be dismantled now since new road has been approved and currently in use.

Regular coordination with MACL will be in place in order to have access to site. To ensure smooth workflow, unhindered access to site will be crucial.

MACL, Civil aviation Authority and sea plan operators approved guidelines and procedures will be strictly followed.

All mechanical plant will be in good working order and subject to a regular maintenance regime. Only suitably qualified and experienced personnel will be allowed to operate plant and equipment. The dredging works will be carried out with excavator by making sand bund for transportation of dredging material to require location with the use of dump truck. Excavator, bulldozer and the wheel loaders will be used for transportation.

Excavator sand will be transferred to Hulhumale' Phase 2 area on Dump trucks.

2.1 Temporary Works and site setup

The site is mostly setup since the project is still in the construction phase. For the proposed project areas, temporary light post will be fixed to illuminating working area.

The surrounding area will be barricaded to avoid unnecessary movement of workmen and also to restrict the entry of unauthorized persons into the dredging site for safety purposes. Site setup will be undertaken by the proposed sub contractor.

Land survey will be conducted with accuracy to find out the exact location of the proposed excavation and dredging as per engineering drawing.

2.2 Project Management

The project is managed by the contractor, Hunan No. 6 Engineering Corporation, with

supervision from the proponent, HDC. All physical works proposed in this addendum will be undertaken by sub-contractor SASe Construction group.

The team from the proponent side would regularly monitor the works in coordination with MACL.

2.3 Work Schedule

The project is expected to commence soon after the approval of this EIA report, which should take approximately 1 weeks from submission.

Initially all the layout and cross sectional drawings have been completed and methodology.

It is anticipated that the total duration for the project shall be 7 weeks. A tentative work schedule is given in the Annex.

2.4 Hazards Prevention and Safety on site

All precautions will be taken for safety of workers during the construction stage (providing safety gears and supervision by experienced and competent construction managers).

First aid kit will be provided in the temporary office where all safety gears will be kept. Workers carrying out machinery works emitting high levels of noise will be provided with safety ear muffs. All workers and personnel entering the premises will be provided with florescent vests, hard hats and safety shoes.

The works will be undertaken in a restricted zone strictly monitored by MACL. Any material or Equipment brought in or taking out, proper approved procedure must be followed. Proper approved safety and security measures in accordance with MACL standards will be in place.

Adequate site security must be in place to prevent unauthorized access. The site can be accessed only with the approval of MACL. Even after MACL grants approval, further approval will be required from the contractor.

Precautionary notices and adequate lighting should be in place throughout the period of construction works to minimize any unwanted incidents.

2.5 Project Inputs and Outputs

Each component of the project has inputs and outputs based on human resources, economics, and the environment. However, since the operation is carried out by utilising a small team, project inputs and outputs are greatly conserved and limited. It is also important to note that most of the equipment and labourers required to undertake the works, except for specialised equipment and personal for dredging works are already on site.

The major inputs and outputs associated with the project as a whole, encompassing all the components, are tabulated below. Table 1 highlights the main inputs, while Table 2 highlights the major outputs.

Table 1 Main inputs from the proposed project

Input resource(s)	Estimated Quantity	Main sources of resource
Construction workers	Project Manager Project Engineer Supervisor Surveyors Machinery Operators General Workers	Permanent staff of the sub-contractor
Machinery and equipment	2 Excavators 2 Loaders 2 Dumptruck Welding Plant Lighting Generator Mobile Generator for welding Survey equipment	Equipment already procured and in use by the contractor and subcontractor
Materials	No specific material is required for the	Procured and already available on site.

	works Fuel, Enginer oil, hydraulic oil required for vehicles Maintenance tools and spare parts Contractor mobile office including computers, tables and chairs Office stationaries.	

Table 2 Major outputs from the proposed project

Products and waste materials	**Anticipated quantities**	**Method of disposal**
Waste generated during construction	Variable and minute quantities	Collected and sorted at the waste management site at the site. Disposal of any type of waste to the lagoon area will be strictly prohibited. Regular monitoring will be undertaken as part of the project.
Dredged Sand	150,000 cbm	Stockpiled at site, and transferred to Hulhumale' Phase 2 on Dump trucks.
Waste oil and grease	Variable and minute quantities	Any waste oil and grease will be collected, stored and transfered to Thilafushi in barrels.

Noise pollution	70 – 80 dBA	No special mitigation would be taken. Ear muffs will be used by workers exposed to continuous levels of high noise.

3. Description of the Existing Environment

This section covers the existing environmental conditions of the project site. Since this is an addendum to the original EIA, most the of the environmental conditions on site has already been discussed and provided.

Important parameters that were studied in the EIA include:

- Topography and Island elevation (Chapter 10.3)
- Coastal Environment (Chapter 10.4 and 10.8)
- Coral Reef System (Chapter 10.5)
- Existing marine system (Chapter 10.6)
- Existing social economic environment (Chapter 10.7)

Since this is a small project, which only includes dredging nearby a heavily reclaimed and dredged area, the key components with respect to the project are few. Therefore, as per the TOR, the sea water quality of the area is discussed.

It was instructed by the TOR to provide data collected during the monitoring program only. However, since the water testing during the monitoring was not undertaken, and also due to the fact that the locations provided in the monitoring program does not really represent an area of impact for this particular scope, a new sample was collected. The location of data collection sites have been marked using handheld GPS. The following Figure 3 shows the study area, data collection and sampling locations.

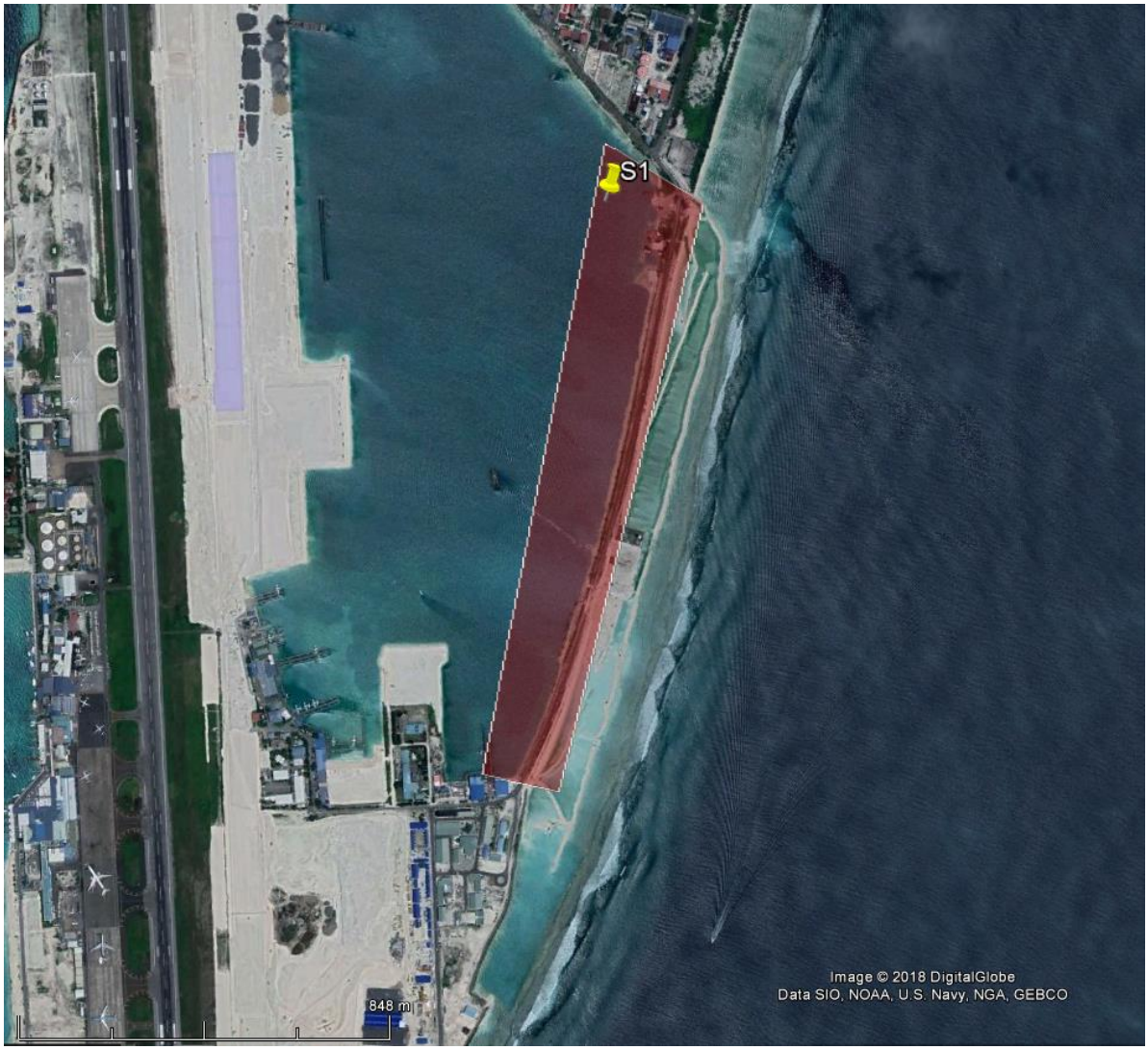

Figure 3 Study area and survey location

3.1 Marine Water

Condition of marine water can only be observed at the site. The quality of the water within the lagoon area as identified in Figure 3 is generally good. Turbidity is higher than normal at 1.88. Turbidity is the most critical parameter with respect to this project since sedimentation is among the c. which is a very good indicator of quality intake water. The EC conductivity is high along with salinity.

Table 3 Marine water quality test results (S1)

Location	**S1 (4°11'59.80"N, 73°32'21.52"E)**
pH	8.12
Turbidity	1.88
Electronic Conductivity	54000
Salinity	35.66
Total Suspended Solids	5

4. Impacts and Mitigation Measures

This section is based on the potential environmental impacts due to dredging in the proposed area.

The section further describes the mitigation measures for each identified impact.

Methods of identification of potential impacts and assessing the significance of the impacts are described in the following sections.

4.1 Identification of Impacts and their Significance

Impacts on the environment from various activities of the proposed project have been identified through:

- Using decision frameworks for assigning significance to impacts
- Existing environmental studies carried out similar developments in other similar environments
- Research data that has been accumulated specific to the Maldivian context.
- Baseline environmental conditions collected.
- Past experience of the consultants with similar projects.

Possible negative impacts on the environment have been considered in worst-case scenario to recommend mitigation measures in the best possible ways so that these impacts would be minimized and perhaps eliminated in the implementation phase.

The impacts highlighted in the TOR for this EIA has been used as a guideline in identifying important impacts. However, this was not used as a strict instruction for the identification. Once new impacts not highlighted in the TOR were foreseen, they were given equal importance.

Following are the major types of possible negative impacts foreseen due to the proposed dredging works.

- Loss of visual amenity during excavation
- Decrease in water quality (increase in turbidity)
- Impact on marine life
- Health and safety of workers

4.2 Impact Evaluation

This section provides a summation of the impacts of the project components discussed above. The impacts of the project have been evaluated based on the criteria proposed by Posford Haskoning (2004). The decision framework is given in Figure 5.

In order to make the evaluation quantitative, the framework proposed by Haskoning has been modified. Spatial distribution of impact is also added in order to make the significance of the impacts more realistic. Scores are given for each impact once it is identified that the resource is vulnerable to the impact. Scores are based on the following factors.

- Sensitivity of Receptor
- Recoverability of Receptor
- Importance of Receptor
- Spatial Distribution of impact

The scales associated with the above criteria are given in the Table 6.

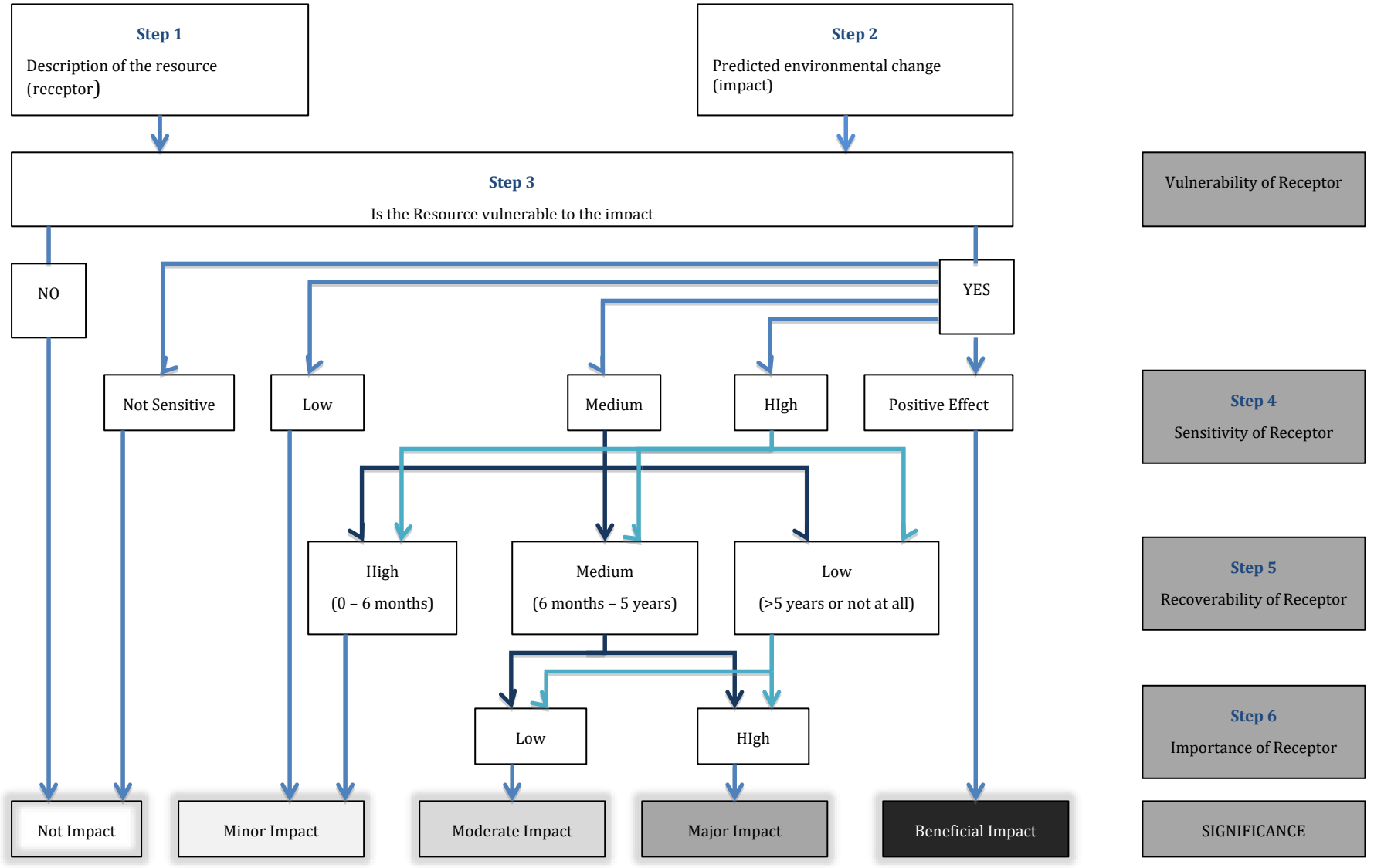

Figure 5 Decision framework to assess the significance of impacts

Table 4 Impact Evaluation Criteria

Criteria	Scale	Attribute
Sensitivity *How sensitive the receptor is to the impact*	-1	Positive Effect
	0	Not sensitive
	1	Low
	2	Medium
	3	High
Recoverability *How long it would take for the receptor to recover from the impact*	1	Short
	2	Medium
	3	Non-recoverable
Importance *The importance of the receptor to the environment*	1	Low
	2	Medium
	3	High
Spatial Distribution *Distribution of impact*	1	local scale
	2	regional scale
	3	global scale

If the impact receives a -1, it deems the impact to have a positive effect on the receptor and the other criteria is then not applied. The impact is referred to as a Beneficial impact as is done by the Haskoning framework.

The significance of the negative impacts will be given based on the following range:

- 1 – 5 : Minor Impact
- 6 – 9 : Moderate Impact
- 10 – 12: Major Impact

4.3 Justification for Impact Evaluation Method

The framework was chosen as it provides a comprehensive methodology to evaluate impacts, which is not overly technical. The advantage of this is that it will be easily understandable to the public and especially the client, who are not well versed in environmental management jargons and methodologies. Furthermore, such a framework is useful for a small project such as this, where an overall quantitative assessment is not necessary. It had also been successfully used in many other projects in the Maldives.

Table 5 Analysis of potential impacts and for the impacts

Potential Impact	**Sensitivity**	**Recoverability**	**Importance**	**Spatial Distribution**	**Significance**
Noise Pollution from dredging activities	2	1	1	1	5 (Minor)
Sea water degradation	2	1	3	2	8 (Moderate)
Impact on seaplane operation due to floating debris and/or rubbish	3	2	3	1	9 (Moderate)
Impact on marine life	2 -1	2	3	2	9 (Moderate) -1 (Beneficial)

Health and safety of workers.	1	1	1	1	4 (Minor)
Loss of visual amenity during construction	1	0	1	1	3 (Minor)
Generation of waste during construction	2	1	2	1	6 (Moderate)

It is important to note that the dredging will not have any new long term impact due to the existing nature of the environment in which the works are proposed to take place.

The major impact from dredging activities in the Maldives lagoons is the negative effects it has on the coastal hydrodynamics and on the marine life. In this case, coastal hydrodynamics is not an issue due to the fact that the entire adjacent areas are protected with either rocks or sheet piles. Furthermore, the area is enclosed and thus would not have an impact on the shorelines, and there will not be any issues of erosion acceleration due to this.

Marine environment impact is insignificant due to the lack of significant receptors in the area. As identified in previous EIAs, there isn't any notable marine life in the area that the dredging is proposed. The only significant area is the reef edge east of the of the project site. However, the dredging is required to occur on the western side of the road. The road would thus act as a sand bund, preventing any sedimentation to the other side.

Visual impact could be an issue and is perhaps the only notable impact; the main receptors being the sea plane operators. They had however informed that there will not be any issues for their sea planes engines due to increase in turbidity. Furthermore, for landing there are markers in place, which would continue to assist the sea plane pilots to land in the proper areas. There will thus not be any navigation issues during take off or landing. They did however inform that increase in airborne particles will be an issue. However, as this project proposes to use excavators, this will not have a major impact. It could have been a major impact if practices such as rain-bowing from dredgers were done as part of the project. However this is not the case.

A more serious issue had been noted during the stakeholder consultation with regards to floating debris during the excavating process, as there may be significant levels of rubbish in the area. This impact would be on the high side, considering its impact on sea plane operations. However, due to easy recoverability it is not considered as a major impact in the analysis.

Other general impacts exists such as impact on workers, waste management, noise pollution during the works. These will be generally moderate impacts.

The project, by its scope, is very small compared to most projects for which an EIA is normally required, and the environment is heavily modified with generally insignificant receptors. Therefore, it can be concluded that there will not be any significant impact from the execution of this project.

4.4 Uncertainties in Impact Prediction

The impact prediction has been carried out based on existing similar projects, literature and tested methods. However, the prediction relies heavily on the judgement of the consultant, and would therefore lead to uncertainties.

The uncertainties are not as much as it is for some major projects.

Uncertainties will be further reduced by undertaking the monitoring program and re-analysing impacts, after comparing the monitoring data with the baseline data provided in this report and previous recent environmental studies done for the same site.

5. Mitigation Measures

Mitigation measures are proposed where significant impacts are expected. Once an impact is identified to have 'moderate' or 'major' impact, appropriate mitigation measures are given for the project. Successful implementation of the measures given would lead to a major reduction and/or nullification of the impacts on the environment and thereby ensuring that the project is environmentally sustainable.

Potential Impact	**Mitigation and/or Details**	**Responsible Personnel**	**Costs**
Noise Pollution from dredging activities	- Ear Muffs for construction workers - Warning signs for other staff that construction is taking place. - Properly service and maintain dredging machinery to reduce noise generation.	Project Manager (Contractor)	In project cost (~7500 MVR)

Decrease in water quality	Ensure all contractor's machinery are properly tuned and maintained before construction commencement No further mitigation such as sand bunds or silt screens are recommended to prevent sedimentation as they may cause additional impacts in this area.	Project Engineer (contractor)	0
Disruption to sea plane takeoff and landing	Have in place a floating barrier such as a floating pipeline demarcating the seaplane runway area such that all floating debris will be collected. Alternatively, have in place a separate team collecting potential rubbish and debris before they get dispersed. Two teams, each with 2 staff may be	Project Manager and Engineer (Contractor)	~30,000 MVR - 100,000 MVR

	required, one on the land and one on a motorized dinghy.		
Construction waste management	Ensure waste is not deposited in the lagoon under any circumstances Regular clean up of the lagoon during the works	Project Engineer	5,000 – 10,000 MVR Costs can be shared with mitigation measure to prevent floating debris as same team can be involved.
Health and safety of workers	All construction staff should ensure his/her own safety individually Dredging site should be fenced out to control access to area Provide protective equipment and clothing for all construction staff Provide fully equipped first aid kit and services at site All staff operating equipment and machinery should be trained and hold	Project Manager	Built in to the project costs.

	relevant license. Confirm transport passage/routes to a health facility in case of an emergency		

6. Alternatives

6.1 No project option

The no project analysis is not as relevant for this report as this is part of a bigger project and the study is an addendum.

Initially the no project option is discussed in order to hypothesise whether the project should be taking place first of all. Carrying out this practice is important to avoid implementation of unnecessary projects and to ensure that undertaking this project at this stage makes good socio-economic sense without causing significant long term impact to the environment.

The main justification for the project is the need for the project as stated in Section 1. There has been many other works that has been approved and being undertaken related to this work. The justification for this specific work is to ensure sea planes are provided an alternative area as the runway in order to relocate sea plan take-off and landing directions and/or orientations. This ensures Hulhumale' Phase 1 do not have height restrictions imposed by flight control. Not undertaking this dredging work would mean sea plane operations would go business as usual and Hulhumale' developments near this area would have the current height restrictions in place.

Therefore, considering the fact that many other works that are part of the bigger project has already been undertaken, and since this work is important for Hulhumale' development, the no project option is not favourable in this situation.

6.2 Dredging methodology

As the scope of works only includes dredging, the alternatives are with respect to dredging methodology. There cannot be any change in location, as the current location is a compulsory part of the project. Therefore, alternative locations are not relevant.

The proposed method is dredged using excavators. The main alternatives are to dredge using cutter suction dredger. The main benefits of using cutter suction dredger (CSD) are given below.

- Project can be completed within a shorter duration.

This has the following 2 main advantages; Impacts on the environment will not be prolonged as the project will be completed soon. Furthermore running costs of the project will be less due to less time on site.

The main disadvantages of the CSD are given below:

- The cost of mobilising and using CSD is much more expensive than mobilising excavators. Moreover, excavators and loaders are already mobilised at site.
- Sedimentation of a larger area is more probable, and therefore environmental impacts with respect to sedimentation will be more during the time of dredging.
- Will not be able to breakdown larger structures on land, which would require excavators to be present at site anyway.

Therefore, considering the fact that the only major advantage of using the CSD is regarding project expediting, and there are many significant advantages of using the proposed excavator options, it is recommended to proceed with excavators.

7. Stakeholder Consultations

Stakeholder consultations were carried out with the major stakeholders for this project including Housing Development Corporation (HDC), Construction team, Trans Maldivian Airways (TMA), Maldives Airports Company (MACL) and Civil Aviation Authority.

Most of the consultation were carried out with one to one meetings arranged with the stakeholders and the meetings had taken place at their respective offices.

Name	Post	Office	Contact
Mr. Mohamed Shamnoon Fuad	Aerodrome Inspector	Civil Aviation Authority	7779656
Mr. Adam Haneef	Manager, SafetyAssuarance	Trans Maldivian Airways	9988700
Mr. Wong	Owner	Hunan No. 6 Engineering, China	7598297
Mr. Mohamed Solih	Deputy Chief Officer	Maldives Airports Company Ltd.	7774154
Mohamed Yameen	Civil Engineer	Housing Development Corporation (HDC)	7782166

7.1 Housing Development Corporation (HDC)

Discussions were originally held with project team at HDC was held during the scoping meeting and via email exchanges initiated on 25th July 2018.

It was requested to share the findings of the environmental monitoring as per the instruction from EPA. However, HDC informed that environmental monitoring had

actually not taken place. They informed that it was not included as part of their regular project monitoring setup.

Further discussions were hold on the need for the project and other alternatives. They had informed that under the current setup, if the project does not proceed, it would limit the plans they currently have for Hulhumale' development. Therefore the need for the project was stressed. HDC also informed that they do envisage major issues due to the project and that they believe impacts would be minimal as the area generally has a high development footprint.

7.2 Construction Team

The construction team from China, Hunan no. 6 Engineering Corporation was met with on 26th July 2018.

They had ensured that project progress will go according to schedule as soon as they receive all necessary approvals. They informed that they are willing to incorporate any mitigation measures as demanded by the EIA and the proponent. The major dredging works will be subcontracted to SASe Construction, who will deploy their own machineries.

7.3 Trans Maldivian Airways (TMA)

Discussion with TMA officials had taken place via phone on 30th July 2018.

They had informed that they do not generally have issues with respect to the dredging works. They believe it would be more convenient once the sea plane terminal is established.

Sediment dispersion due to dredging will not cause much of an issue to the sea plane operations. However, they had stated there should not be any case of floating debris approaching the runway area.

7.4 Maldives Airports Company Ltd. (MACL)

Email communication was undertaken with Maldives Airports Company Ltd. (MACL), which subsequently led to a face to face meeting with senior project officials on 8th August 2018.

MACL had informed that their marine station is located in the proposed dredging area, and this should not be disrupted at this time. Once they are able to setup a new

fire station with the marine station components, they can then undertake the dredging themselves according to the factors stated in this EIA.

They had expressed their concern with respect to the design. They inform that proper shore protection should be setup on the lagoon ward side as well as they had observed erosion of the current road as well. They stated that this is likely due to the waves generated by frequent sea plane take off and landing. If shore protection is not part of the proposed project, it is important to be included in a subsequent phase.

The biggest concern expressed by MACL is that they believe there may be some disruption to sea plane operations during dredging works. Specifically, their concerns were with respect to lose solids that may float in the area once dredging commences. They informed that there were plenty solid rubbish that had deposited in the existing road. Therefore, any dredging of this area will lead to these objects getting loose and dispersed into the lagoon area. The officials informed that it is very important that the proponent and/or contractor have measures in place to trap these solids via a physical barrier from the current sea plane runway area.

7.5 Civil Aviation Authority

Telephone conversation was carried out with Civil Aviation Authority senior staff tasked with aerodrome regulations and standard on 5th August 2018.

They had informed that CAA does not have any particular issue with the project. With respect to sea plane runway standards, they had informed that they are still at a draft stage and yet to be published.

However, with respect to the dredging, they had informed that it is generally done upto -2m from Mean Sea Level. Dredging beyond that will not be any issue as far as CAA is concerned. But shallower could lead to issues.

8. Environmental Monitoring

This section deals with the Environmental Management and Monitoring plan with respect to the developments proposed in this EIA.

Undertaking environmental monitoring is essential for several reasons including:

- To ensure that potential impacts are minimized and to mitigate unanticipated impacts.
- To aid in impact management,
- To improve impact prediction and mitigation methods.
- To gather long term data to minimise uncertainty
- To ensure sustainable development

A comprehensive EIA monitoring plan was provided in the initial EIA.

As this is only a small addition to the original scope of work, there is only one parameter that is required to be added due to this work.

In the **Table 20** given under the initial EIA, would need to include the locations M1 and M2 given under this EIA under the following monitoring schedule given:

- Turbidity at monitoring locations, weekly during reclamation phase of the project.

The cost of the entire monitoring program was given in the EIA as 35000 USD per year.

These additional 2 locations to be tested for turbidity would cost only an addition of approximately 750 MVR/week, including both sampling and testing at the laboratory.

The proponent expressed their full commitment to carry out the monitoring program outlined in this report. The proponent's commitment to undertake the environmental monitoring and mitigation measures is given in the **Proponents Declaration.**

8.1 Monitoring Report

Monitoring report should be compiled based on the baseline data collected. This report should be submitted to the Ministry of Tourism and any other relevant government agencies for compliance. The report structure may include but not limited to;

- Introduction
- Details of the site at the time of investigation,
- Data collection and analysis,
- Details of methodologies and protocols followed
- Quality control measures,
- Sampling frequency and monitoring analysis
- Conclusion and recommendations

A separate monitoring report need not be produced for this particular scope.

The only addition to the previously proposed monitoring is to carry out the water sampling and testing in the new location given in this report, S1.

9. Conclusion

Hulhule'-Hulhumale' link road works have been on going for a few months. The initial EIA had been approved on 3rd August 2018. Subsequently another addendum was submitted and approved on 24th May 2018. As this has been an area with heavy construction for a considerable amount of time, the scope of works presented in this is relatively small.

The main impact from such a project is impacts related to sedimentation. These include mainly the deterioration of water quality due to increase in turbidity and the subsequent consequences faced by marine life in the area. An impacts significance is only with respect to the receptors in an area. If there are no significant receptors, and no potential for receptors, as is the case in this project, the impact is of no significance. Other impacts include general impacts from heavy construction such as those during mobilisation and health and safety of workers. For these as well, since the equipment and machinery are already mobilised, and work has been ongoing for about an year without any significant incidences, such impacts are expected to be low as well.

A significant impact was discussed during the stakeholder consultations. As noted by the seaplane operators, and MACL officials, there is potential for floating debris during the dredging works. This may disrupt the sea plane operations at site. Under such circumstances, this would be a major impact. It is therefore recommended among the mitigation measures to have in place a floating physical barrier to stop any such materials from entering the runway area. A floating pipeline can be used effectively for this purpose. Alternatively, the contractor can also engage a specific team for collecting such materials at the point of excavation, and a separate team on a motorized dinghy to monitor and collect any potential wastes. This will be a more cost effective option.

Regarding further monitoring, it is recommended to add the location in which the dredging is proposed to take place to the existing monitoring program. It is important to determine the changes in turbidity in such an enclosed area, for further analysis. Furthermore, it is stressed to actually undertake the monitoring program as outlined in the initial EIA.

With regards to concerns from stakeholders, there were no major concerns from any stakeholder apart from the issue previously discussed. MACL requires prior clearances to be obtained before dredging works commences. Civil Aviation

Authority does not have strict guidelines to the requirements of seaplane runways. However, general practice is to carry out dredging to about -2m from MSL.

Therefore, considering the small scale of works, it is recommended for this additional work to be undertaken at the proposed location in this time, especially when the construction works are currently on going in the area.

10. References

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Annex 1 – Terms of Reference

No: 203-EIARES/161/2018/20

Terms of Reference for the 3rd Addendum to the EIA for Hulhule' - Hulhumale' Link Road Development Project, North Male' Atoll

The following is the Terms of Reference (ToR) following the scoping meeting held on *25th July 2018* for the 3rd Addendum to the EIA for Hulhule' - Hulhumale' Link Road Development Project, North Male' Atoll. The proponent of the project is Housing Development Corporation (HDC). The EIA consultant of this project is Mr. Amir Musthafa.

This TOR addresses the revised project components. While every attempt has been made to ensure that this TOR addresses all of the major issues associated with development proposal, they are not necessarily exhaustive. They should not be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them, or matters currently unforeseen, that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIA report.

1. **Introduction and rationale** – Identify the new or revised components for the proposed Hulhule' – Hulhumale' Link Road Development Project to be assessed. Explain the executing arrangement for the environmental assessment. Describe the rationale for the proposed revisions.

2. **Study area** – Submit a minimumA3 size scaled plan indicating the study area which encompasses the additional or revised works.

3. **Scope of work** – Identify and number tasks of the project.

Task 1. Description of the proposed project – Provide a full description and justification of the changes to the concept design using maps at appropriate scales where necessary. Information on the following activities should be provided where appropriate.

Dredging:

- Location and size of sand burrow areas (s) on a map;
- Justification for the selection of this location;
- Quantity, quality and characteristics of fill material;
- Duration of dredging activity;
- Labour requirements and (local) labour availability;
- Housing of temporary labour, and
- Emergency plan in case of spills (diesel, grease, oil)
- Details on where the dredged material will be deposited.

Details of the current status of the project including the work progress and timeline need to provide.

Task 2. Description of the environment – Identify if any further parameters which need to be studied with respective to the proposed changes to the EIA for Hulhule' – Hulhumale' connecting link road development project. Records on the current monitoring undertaken as part of the project need to be provided. EIA report mentions weekly records of turbidity and satellite images being taken (page 91) of the report. These needs to be

presented in this section. This section should highlight the methodology used for data collection, including equipment and resources used.

Task 3. Potential impacts (environmental and socio-cultural) of proposed project, incl. all stages –

Identify and assess any additional impacts which were not covered in the EIA report for Hulhule' – Hulhumale' connecting link road development project due to the additional or revised components.

The methods used to identify the significance of the impacts shall be outlined. One or more of the following methods must be utilized in determining impacts; checklists, matrices, overlays, networks, expert systems and professional judgment. Justification must be provided to the selected methodologies. The report should outline the uncertainties in impact prediction and also outline all positive and negative/short and long-term impacts. Identify impacts that are cumulative and unavoidable.

Task 4. Alternatives to proposed project

Describe alternatives including the *"no action option"* should be presented. No action option in this case applies to the proposed changes in this Addendum. Determine the best practical environmental options for the proposed additions and/or revisions. Alternatives examined for the proposed project that would achieve the same objective including the "no action alternative". This should include but not limited to alternative borrow sites (if required), alternative equipment/machinery for dredging, alternative disposal sites and alternative containment measures.. All alternatives must be compared according to international standards and commonly accepted standards as much as possible. The comparison should yield the preferred alternative for implementation. Mitigation options should be specified for each component of the proposed project.

Task 5. Mitigation and management of negative impacts – Identify possible new measures to prevent or reduce significant negative impacts to acceptable levels due to the change in scope. These will include both environmental and socio-economic mitigation measures with particular attention paid to sedimentation control and future changes in coastal processes. Cost any such mitigation measures, equipment and resources required to implement those measures. The confirmation of commitment of the developer to implement the proposed mitigation measures shall also be included. In cases where impacts are unavoidable arrangements to compensate for the environmental effect shall be given.

Task 7. Development of monitoring plan (see appendix)– Identify the critical issues requiring monitoring with regards to the change in scope to ensure compliance to mitigation measures and present impact management and monitoring plan.

Task 8. Stakeholder consultation, Inter-Agency coordination and public/NGO participation) – Identify appropriate mechanisms for providing information on the development proposal and its progress to all stakeholders, government authorities that is required due to the change in scope and has not been consulted in the original EIA. Particularly views of the following stakeholders need to be provided:

1. Maldives Airports Company Limited
2. Maldives Civil Aviation Authority
3. Seaplane operators

__Presentation__ - The environmental impact assessment report, to be presented in digital format, will be concise and focus on significant environmental issues. It will contain the findings, conclusions and recommended actions

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Email: secretariat@epa.gov.mv
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supported by summaries of the data collected and citations f or any references used in interpreting those data. The environmental assessment report will be organized according to, but not necessarily limited by, the outline given in the Environmental Impact Assessment Regulations, 2012 and subsequent amendments.

Timeframe for submitting the EIA report – The developer must submit the completed Addendum to the EIA report within 6 months from the date of this Term of Reference.

……………………………………………

25th July 2018

Annex 2 – Project Area Approved Drawings

HOUSING DEVELOPMENT CORPORATION LTD

AIRPORT LINK ROAD DEVELOPMENT

MALE' - HULHULE' - HULHUMALE'

HOUSING
DEVELOPMENT
CORPORATION

AIRPORT **LINK ROAD** DEVELOPMENT

CONTENT

AIRPORT **LINK ROAD** DEVELOPMENT

INTRODUCTION

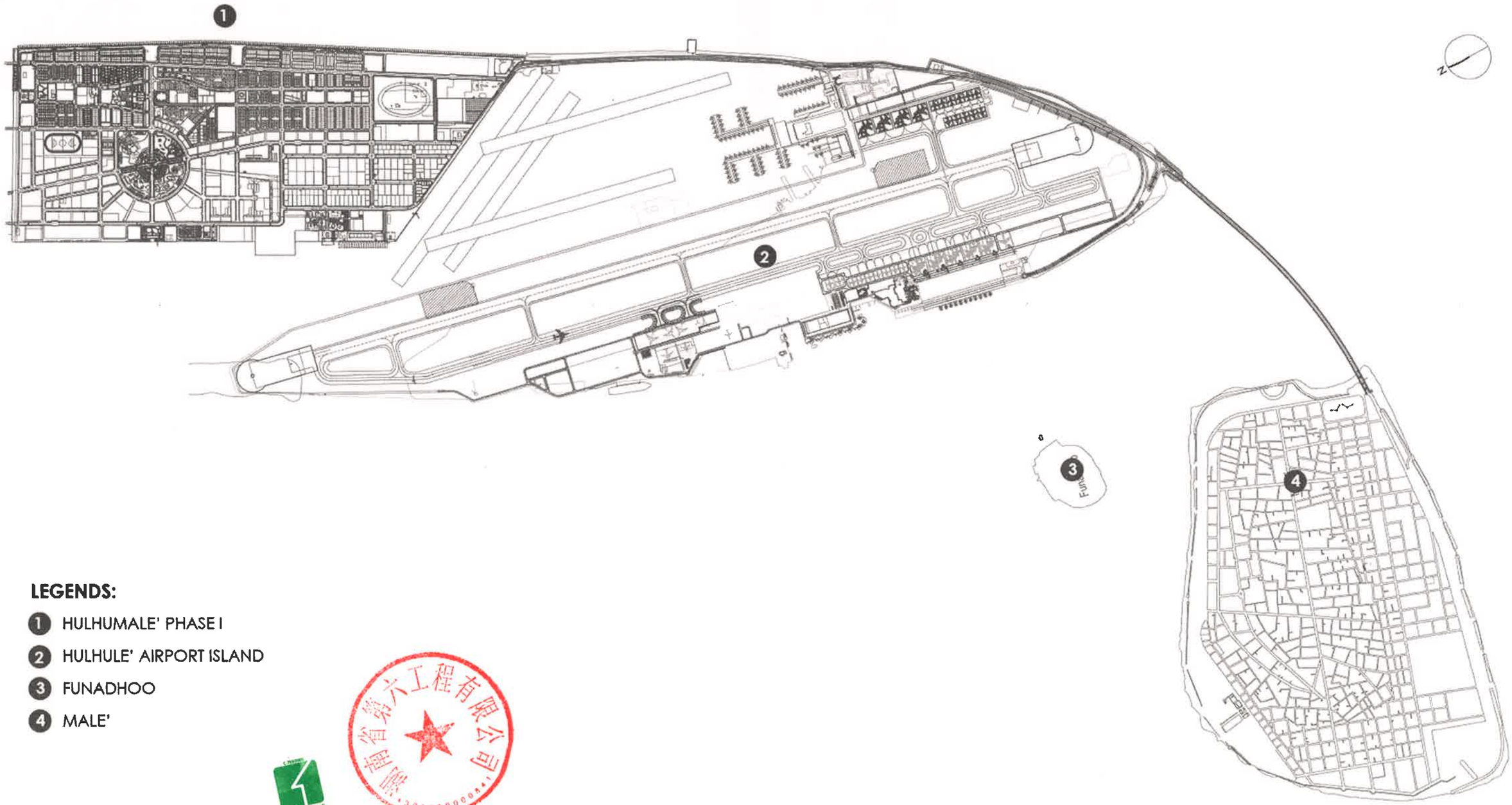
The capital city of Male' is home to about one third the population and is one of the most congested cities in the World.

As part of an effort to alleviate the congestion issue facing the capital, the goverment reclaimed the shallow lagoon of the airport island to create a new island known as Hulhumale'.

The vision of the project is to physically link the islands of the Greater Male' region. This would establish a continous road between Hulhumale', Hulhule' and Male'.

AIRPORT **LINK ROAD** DEVELOPMENT

LOCATION

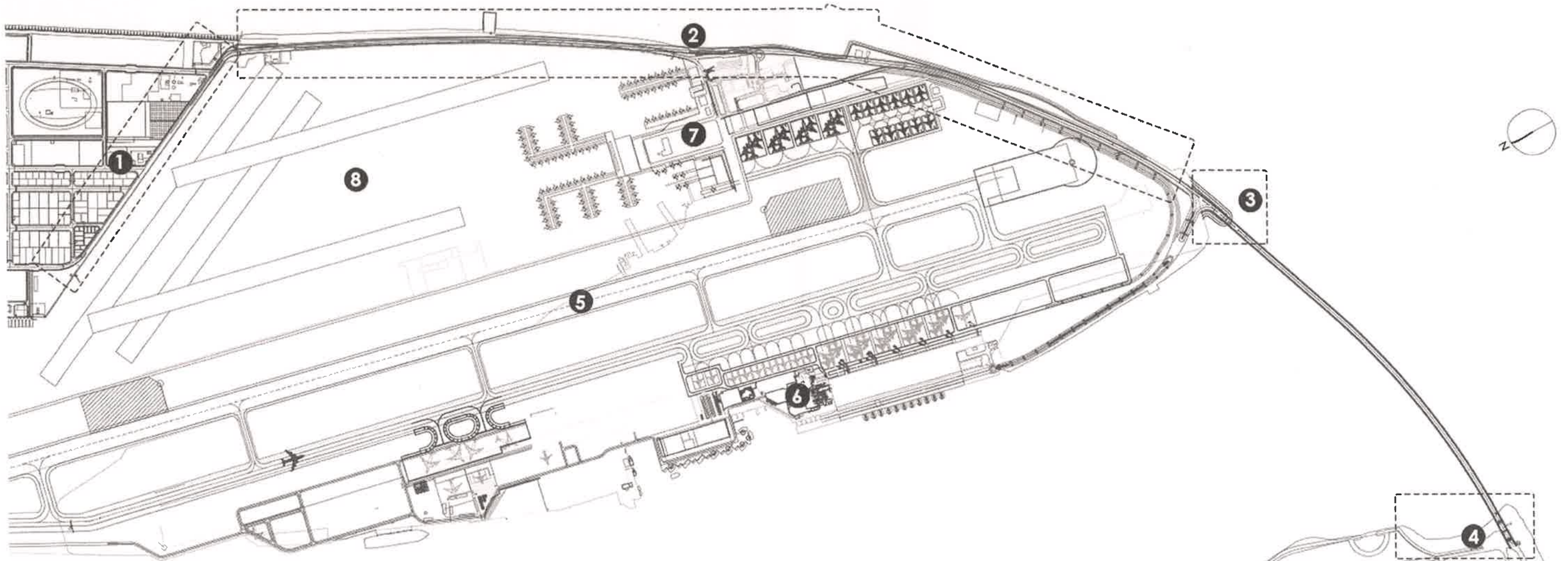


LEGENDS:

1. HULHUMALE' PHASE I
2. HULHULE' AIRPORT ISLAND
3. FUNADHOO
4. MALE'

AIRPORT **LINK ROAD** DEVELOPMENT

EXISTING DEVELOPMENTS

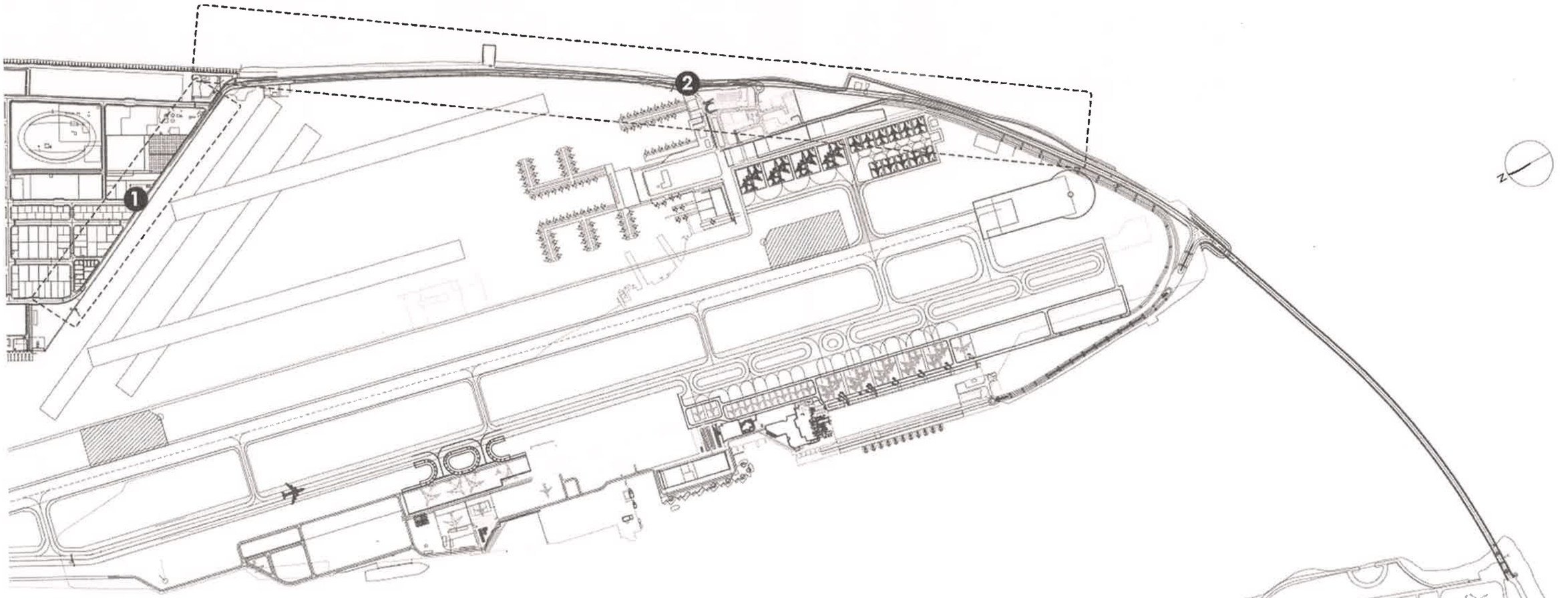


LEGENDS:

1. HULHUMALE' PHASE 1 SOUTH SIDE
2. LINK ROAD (HULHULE'-HULHUMALE')
3. BRIDGE CONNECTION POINT
4. RAALHUGANDU AREA
5. AIRPORT RUNWAY
6. INTERNATIONAL TERMINAL
7. SEA PLANE TERMINAL
8. SEA PLANE RUNWAY

AIRPORT **LINK ROAD** DEVELOPMENT

ZONING AREAS

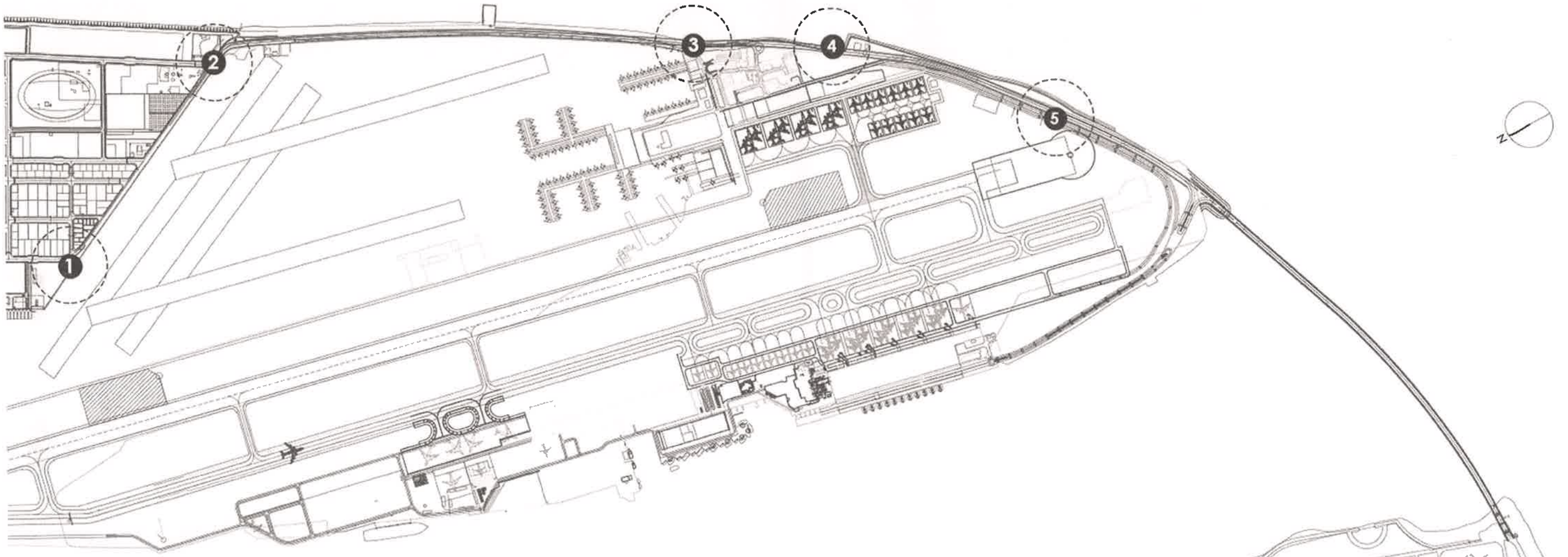


LEGENDS:

1. HULHUMALE' PHASE 1 SOUTH SIDE
2. ACCESS ROAD (HULHUMALE'-HULHULE') TO BRIDGE LINK

AIRPORT **LINK ROAD** DEVELOPMENT

KEY INTERSECTION

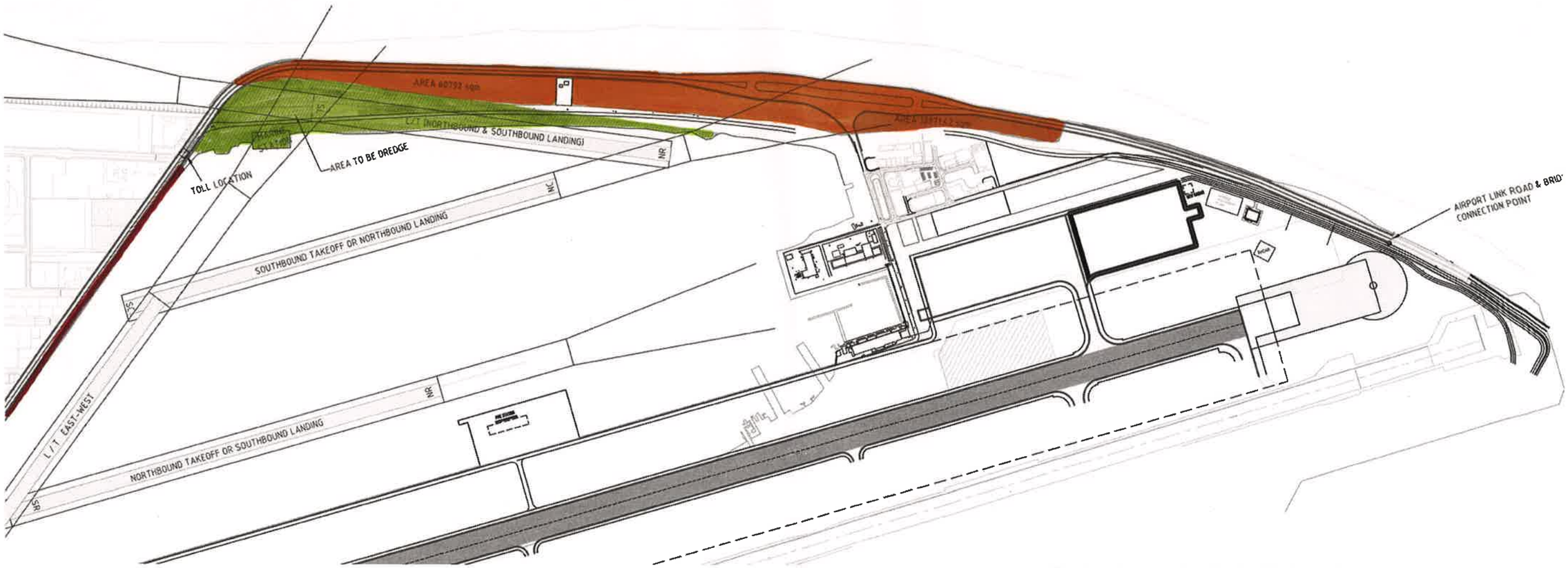


LEGENDS:

1. MNDF & INDUSTRIAL ZONE INTERSECTION
2. NIROLHU MAGU & LINK ROAD INTERSECTION
3. LINK ROAD & HULHULE INTERSECTION
4. DREDGED LAGOON EAST OF NEW MNDF SITE
5. BRIDGE CONNECTION

AIRPORT **LINK ROAD** DEVELOPMENT

RECLAMATION AREA & DREDGING AREAS



ZONE 1: HULHUMALE' PHASE I SOUTH SIDE

ESTIMATED AREA TO BE RECLAIMED = 9,928.84 SQM
ESTIMATED VOLUME TO BE RECLAIMED = 18,467.64 CBM

ESTIMATED AREA OF ROAD = 17,391.07 SQM

ZONE 2: ACCESS ROAD FROM HULHUMALE' AIRPORT to BRIDGE LINK

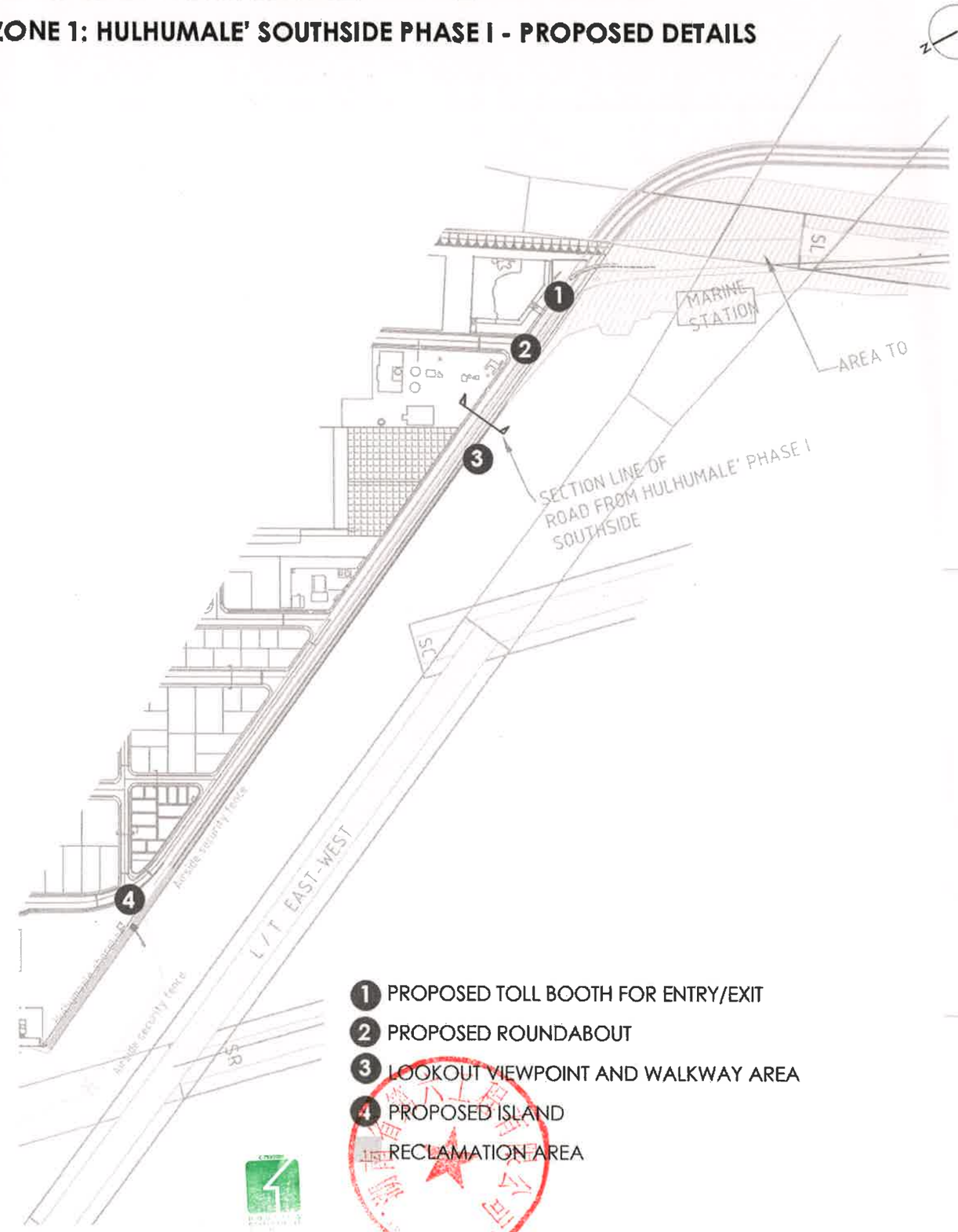
ESTIMATED AREA TO BE RECLAIMED = 146,672.83 SQM
VOLUME TO BE RECLAIMED = 264,011.10 CBM

ESTIMATED AREA TO BE DREDGED = 75,169.49 SQM

AREA OF ROAD = 78,589.02 SQM

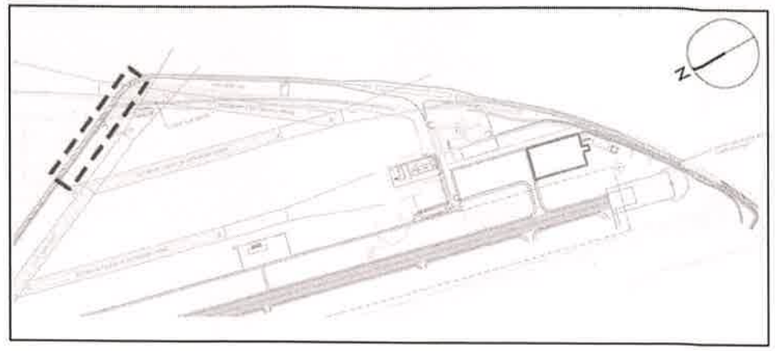
AIRPORT **LINK ROAD** DEVELOPMENT

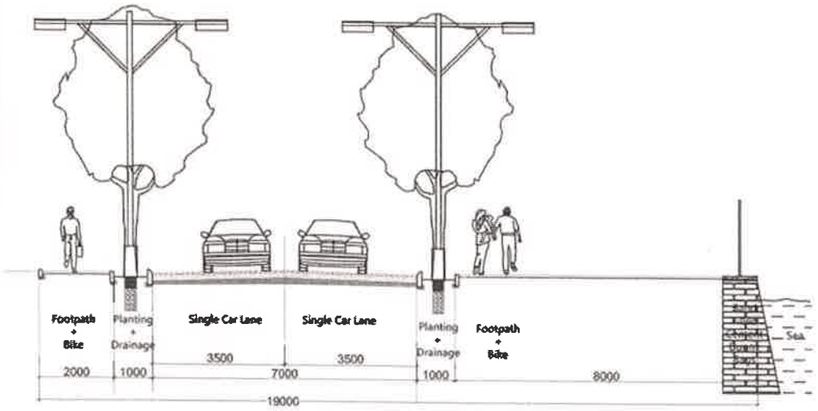
ZONE 1: HULHUMALE' SOUTHSIDE PHASE I - PROPOSED DETAILS



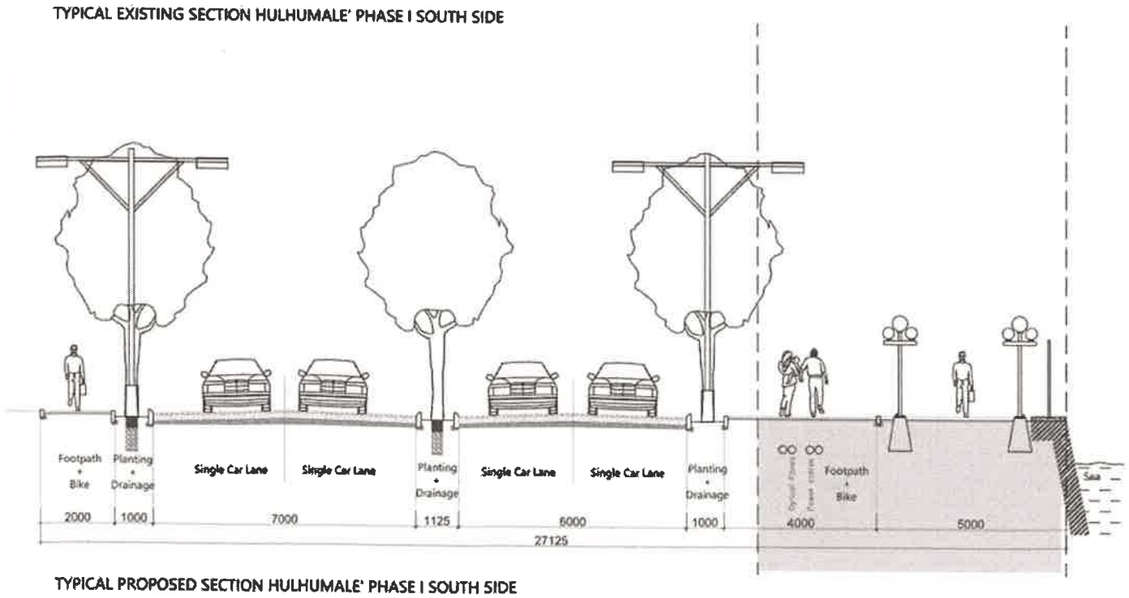
1. PROPOSED TOLL BOOTH FOR ENTRY/EXIT
2. PROPOSED ROUNDABOUT
3. LOOKOUT VIEWPOINT AND WALKWAY AREA
4. PROPOSED ISLAND

RECLAMATION AREA





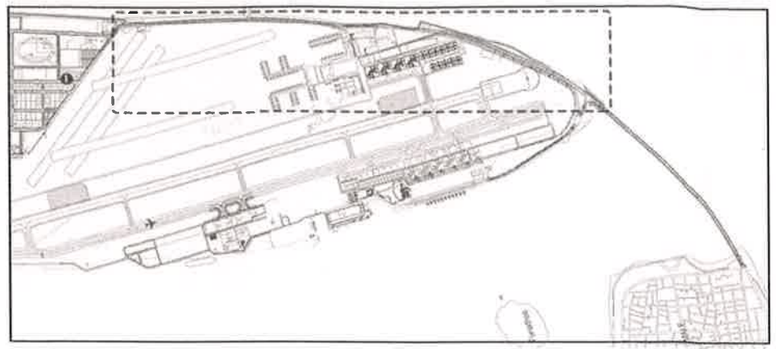
TYPICAL EXISTING SECTION HULHUMALE' PHASE I SOUTH SIDE

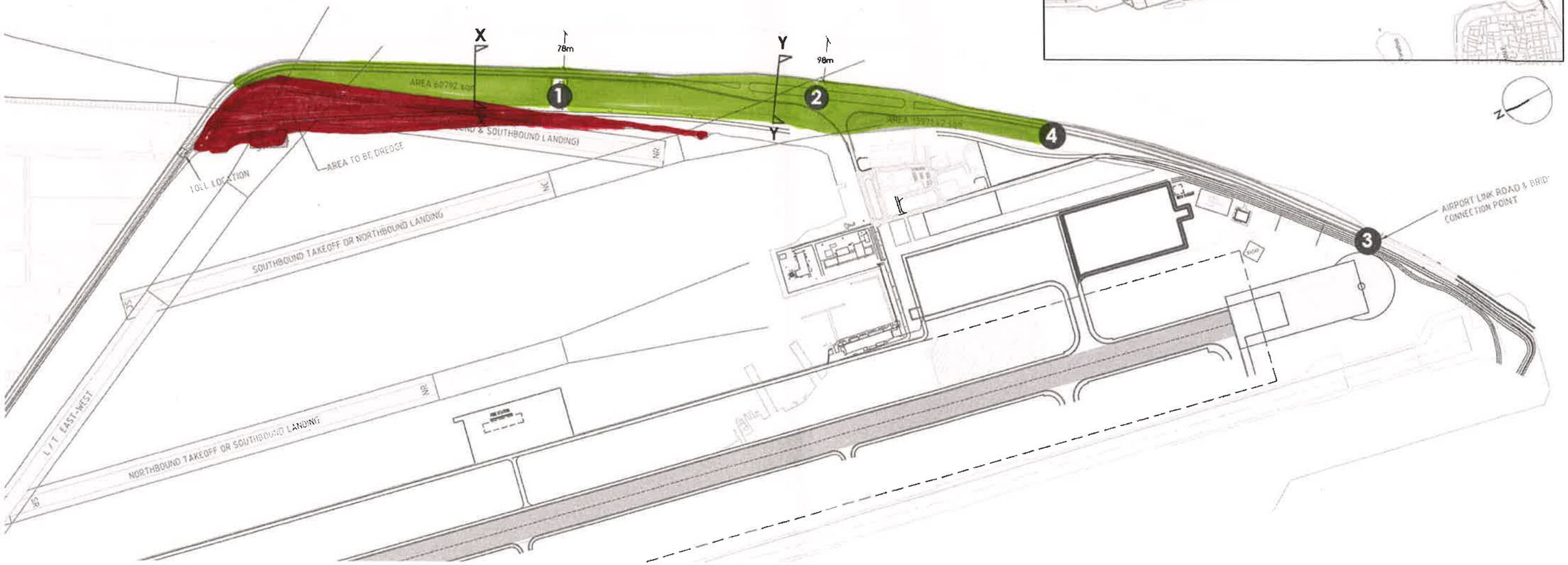


TYPICAL PROPOSED SECTION HULHUMALE' PHASE I SOUTH SIDE

AIRPORT **LINK ROAD** DEVELOPMENT

ZONE 2 : ACCESS ROAD TO HULHUMALE' - HULHULE' (TO BRIDGE CONNECTION POINT)





CURRENT ROCK REVETMENT LENGTH OF
DREDGED LAGOON EAST OF NEW MNDF SITE-AIRPORT MAIN ROAD = 876m

CURRENT SHEET PILING AT DREDGED LAGOON EAST OF NEW MNDF SITE = 433m

ESTIMATED RECLAMATION AREA FROM ZONE 2 **= 146,672.83 SQM**
ESTIMATED RECLAMATION VOLUME FROM ZONE 2 **= 264,011.10 CBM**

ESTIMATED AREA TO BE DREDGED FROM ZONE 2 **= 75,169.49 SQM**

AREA OF THE PROPOSED ROAD **= 78,589.02 SQM**

1. WEATHER DETECTION CENTER
2. PROPOSED ISLAND FOR LINK ROAD - HULHULE' INTERSECTION
3. CONNECTION POINT OF BRIDGE & AIRPORT LINK ROAD
4. DREDGED LAGOON EAST OF NEW MNDF SITE

RECLAIMATION AREA

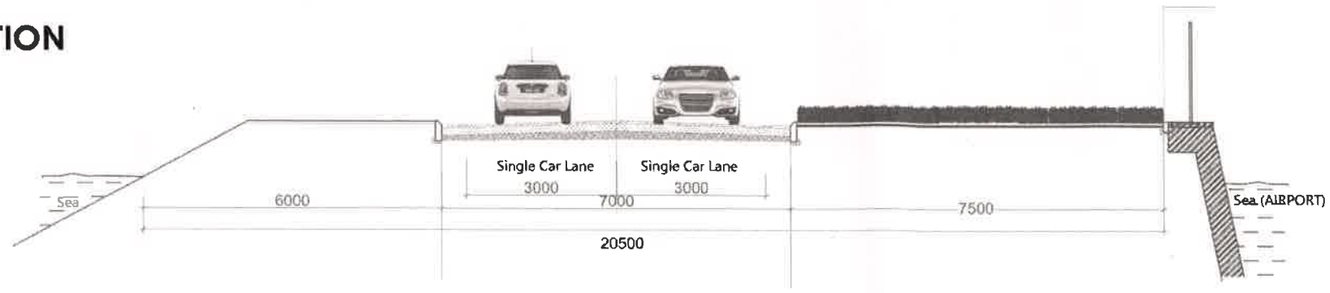
AREA TO BE DREDGED

SECTION LINE

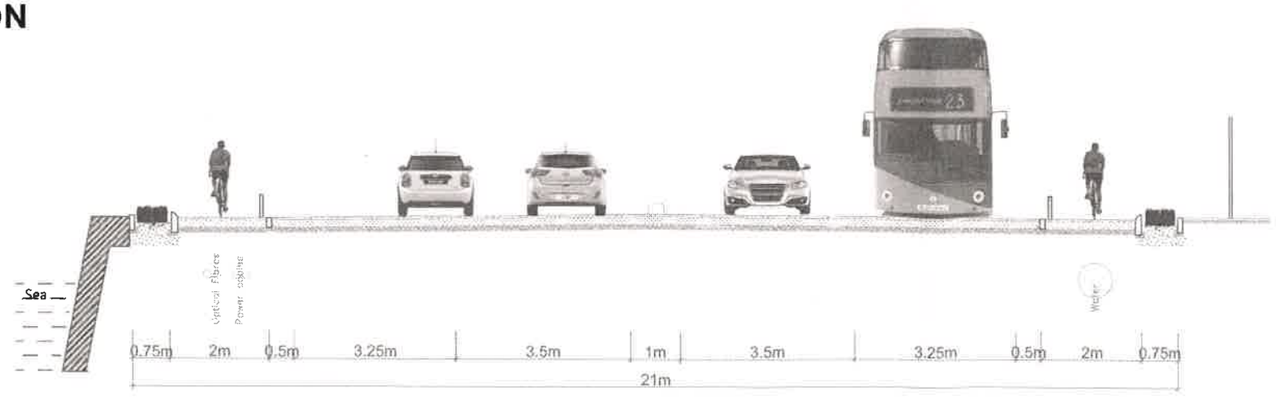
AIRPORT **LINK ROAD** DEVELOPMENT

ZONE 2 :
SECTION X-X : TYPICAL HULHUMALE' - HULHULE' ROAD SECTION

EXISTING ROAD SECTION



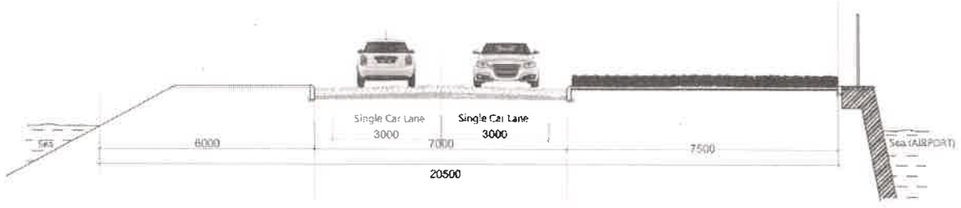
PROPOSED SECTION



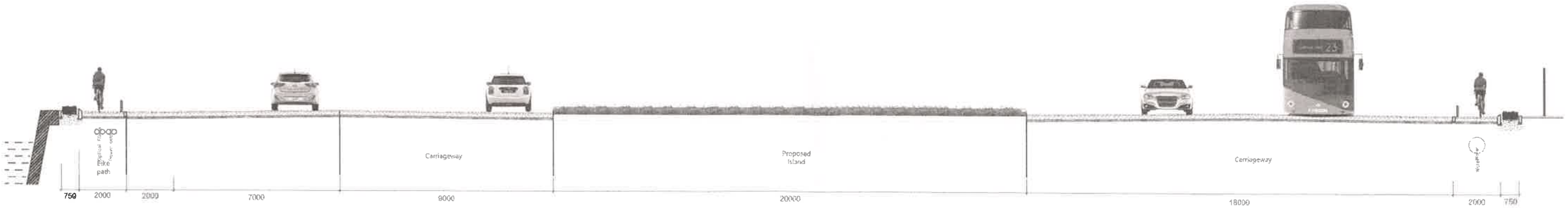
AIRPORT **LINK ROAD** DEVELOPMENT

ZONE 2 :
SECTION Y-Y: SECTION OF ISLAND AT INTERSECTION POINT TO SEA PLANE TERMINAL

EXISTING ROAD SECTION



PROPOSED SECTION



Annex 3 – Water Test Results

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
FEN Building 5th Floor, Machangoalhi, Ameenee Magu, Male', Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

WATER QUALITY TEST REPORT

Report No: 500180404

Customer Information:
Amir Musthafa
Flat 11-02-03

Hulhumale', Maldives

Report date: **05/08/2018**
Test Requisition Form No: **900184872**
Sample(s) Recieved Date: **02/08/2018**
Date of Analysis: **02/08/2018 - 02/08/2018**

Sample Description	Hulhumale' Connecting Road	**TEST METHOD**	**UNIT**
Sample Type	Sea Water		
Sample No	83199652		
Sampled Date	02/08/2018		
PARAMETER	**ANALYSIS RESULT**		
Physical Appearance	Clear with particles		
Conductivity	54000	Method 2510 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	µS/cm
pH	8.12	Method 4500-H+ B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	-
Salinity	35.66	Method 2520 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	‰
Temperature	27.0	Electrometry	°C
Total Suspended Solids	5	Method 8006 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Turbidity	1.88	HACH Nephelometric Method (adapted from HACH 2100N Turbidimeter User Manual)	NTU

Keys: µS/cm : Micro Seimen per Centimeter, ‰ : Parts Per Thousand, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter, **NTU** : Nephelometric Turbidity Unit

Checked by

Aminath Sofa
Assistant Laboratory Executive

Approved by

Mohamed Eyman
Assistant Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory
This report shall not be reproduced except in full, without written approval of MWSC
This test report is ONLY FOR THE SAMPLES TESTED.
~ Information provided by the customer

********** END OF REPORT **********

Annex 4 – Proponent Commitment

بسم الله الرحمن الرحيم

HOUSING
DEVELOPMENT
CORPORATION

Letter no.: HDC(161)-PM/438/2018/8

November 12, 2018

Mr. Ibrahim Naeem,
Director General,
Environmental Protection Agency,
Ministry of Environment and Energy,
Malé,
Republic of Maldives

Dear Sir,

Project: Design and Construction of Link Road Connecting Hulhulé and Hulhumalé
Subject: 3rd Addendum to EIA - Proponents Commitment for Monitoring and Mitigation

As the proponent of the project, I would like confirm our financial commitment to undertake all mitigation measures and give my commitment to finance the environmental monitoring program to the costs given and as outlined in this EIA addendum.

Thank you.

Yours faithfully,

Nawaz Shaugee
Director

Housing Development Corporation
HDC Building, Hulhumalé, Rep. of Maldives
T. +(960) 335 3535, F. +(960) 335 8892, E. mail@hdc.com.mv, W. www.hdc.com.mv

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ހުޅުދޫ، ދިވެހިރާއްޖެ

Annex 5 – Work Schedule

HULHULE HULHUMALE LINK ROAD - DISMANTLING AND DREDGING WORKS

				Weeks											
Description	**start**	**end**	**duration(days)**	1	2	3	4	5	6	7	8	9	10	11	12
Insurvey and setting out	1.12.18	3.12.18	2												
Preparation to start work	3.12.18	8.12.18	5												
Protection and Preventions	8.12.18	12.12.18	4												
Dismantling of existing road	12.12.18	12.01.19	30												
Dredging by excavator	12.01.19	30.02.19	45												
Removal of debris from dismantling	10.02.19	05.03.19	21												
Removal of dredged material	10.02.19	05.03.19	21												
Outsurvey and handing over works	05.03.19	08.03.19	3												
Demobilisation	08.03.19	11.03.19	3												