Note / Memo

HaskoningDHV Vietnam Co. Ltd.
Water

To:	Quang Nam PPMU; TEDIPORT Consultant
From:	Huy Hoang
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Subject: **Review of Pre-Feasibility Report (February 2021)**

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1 Introduction

The 'Integrated Development Project- Quang Nam Province Sub-Project' aims among other aspects to develop climate resilient and future proof road and navigation infrastructure in the coastal zone of Quang Nam Province, in the basin of the Truong Giang. The project is implemented by TEDIPORT Consultant under supervision of the PPMU. The World Bank is the financing the project. The project is currently in the Pre-Feasibility phase.

The "Strategic advice to the Quang Nam Provincial People Committee on the integrated management and technical solutions for Truong Giang River Subcatchment" project financed by the Netherlands Enterprise Agency (RVO). This project provides (i) technical assistance to the abovementioned World Bank financed project, and (ii) supports Quang Nam Province with the development of an integrated river basin management approach.

In the framework of project goal (i), an initial review has been carried out of the Pre-Feasibility Report (dated February 2021) prepared by TEDIPORT Consultant. The results of the review is discussed hereafter.

2 General comments

The Pre-Feasibility Study (Pre-FS) is a very comprehensive and complete report, that will provide an excellent input for the Feasibility Study (FS). The Pre-FS report that has been made available and reviewed included the following parts:

1. Pre-Feasibility Study report (dated February 2021)
2. Overview map of Truong Giang project area
3. Designs of proposed road infrastructure
4. Designs of navigation channel, dredging measures (including disposal sites) and bank protection measures
5. Designs of new bridges across the Truong Giang, and connecting road infrastructure

Please note that our review has focused interventions in the Truong Giang itself concerning the dredging of the navigation channel and especially the design of the bank protection measures. No attention has been paid to the sections on road infrastructure and bridges at this stage.

The construction of the navigation channel is quite a big intervention in the Truong Giang river system. These interventions affect current land use in the narrower parts of the river. The interventions are also expected to – at least somewhat - change the dynamics of the river in terms of flood levels and salinity intrusion. Please note that the latter effects have not been proven by the current hydraulic model investigations conducted by the Pre-FS consultant.

The large interventions to transform the Truong Giang into a level IV navigation route that contributes to the further development of the area should be clearly justified in terms of cost-benefit and environmental impact.

3 Specific comments

3.1 Navigation channel

The Truong Giang will be upgraded to become a navigation route level IV. This target is based on the Decision 4360/QĐ-BGTVT issued by Ministry of Transportation on 10 December 2015, and approves the adjustment and addition to the master planning of development of inland waterway transport in Viet Nam until 2020, with an orientation towards 2030. The design criteria for upgrading to a navigation route level IV are prescribed the TCVN 5664 : 2009 - Rules for Technical Classification of Inland Waterways. The basic design criteria consist are included in the table below and compared with the application in the Pre-FS.

Design criteria	Selected in the Pre-FS	Requirement as in TCVN 5664 : 2009
Width of navigation route	30 m	30 m
Depth of navigation route	2.3 m	2.3 m
Radius of curvature	200 m	150 m
Design water level for navigation	- 0.7 m + MSL	Frequency 98% of hourly water level

The design conditions for the navigation channel are complying to the formal design rules for a level IV navigation channel.

3.2 Bank protection

The Pre-FS makes a number of choices regarding the design of the bank protection along the Truong Giang. The following aspects are advised to be reconsidered or further elaborated within the Pre-FS. They are proposed to be discussed with the PPMU and Pre-FS Consultant/

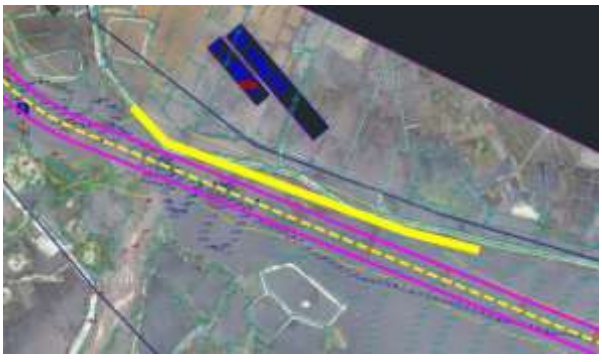
1. *Design conditions.* A flood frequency of 1% (1/100yr) has been selected to provide the design conditions for the proposed bank protection. This is relatively high considering that the flood flow seems overestimated due to the fact that the operation of the reservoirs has not been included in the hydraulic models. The computed and reported maximum flow velocities on the other hand are quite low (<0.6 m/s), which makes the risk of (bank) erosion limited. It is advised to reconsider the applied design conditions.

2. *'Grey' or 'green' river bank protection?* The maximum flow velocities in Truong Giang – even the chosen under design conditions - are relatively low. This would support the case for applying soft/green bank protection solutions for the most river sections. Only in case the bank protection

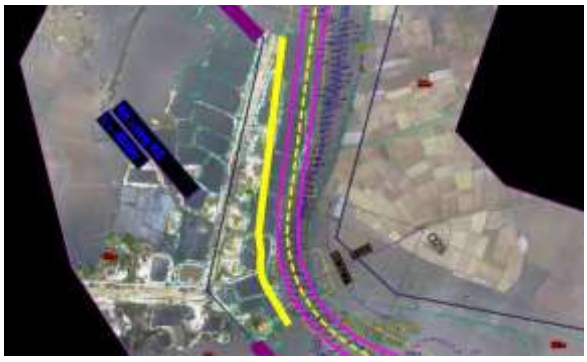
needs to also act as a retaining wall, hard structures seem more appropriate. Soft/green solutions need more space but are low tech and generally cheaper in case no land acquisition is required. They are also easier implemented (and maintain!) by local contractors. It is suggested to critically review these choices in the FS stage of the project. We realize that this may require a change of mindset and appreciation of stakeholders. Successful examples of implementation of nature based solutions can for example be found in Vietnam in the Mekong Delta.

3. *Choosing appropriate nature-based solutions.* The Pre-FS proposes Nypa Fruticans for use as nature based riverbank protection, in combination with Vetiver grass on the lower slope. The Nypa Frutican can be planted in wet and brackish conditions, and is regularly applied in Vietnam as river bank protection. It is expected that only planting this species would provide sufficient protection against bank erosion. The Vetiver grass is more suitable for dry conditions or short-term inundation areas. It is suggested to conduct some more in-depth research to investigate whether this species can actually survive the hydraulic conditions at the proposed sites in terms of inundation duration and salinity conditions. Please note that although the salinity intrusion modelling suggests that the central part of the Truong Giang is fresh or mildly brackish, we expressed our doubt whether that is actually true under low flow conditions. This needs to be verified in order to be able to choose a sustainable nature based solution. Please note that the Netherlands funded project could assist with selecting and designing an adequate green bank protection.

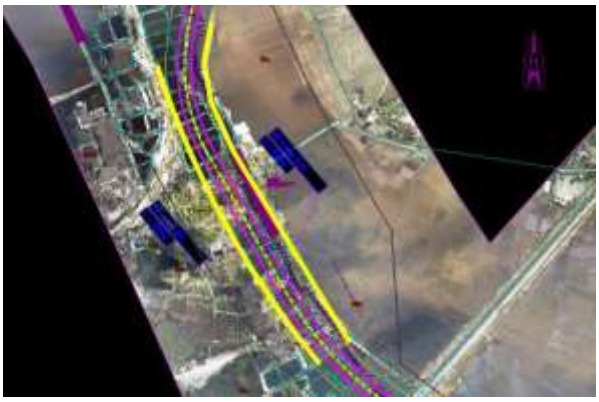
4. *Location of revetments in river.* The Pre-FS proposes to construct 'hard' revetments in the actual river at quite a number of examples. See situation sketches below for locations such as K3, K9, k10, and K12. We would suggest to reconsider this and only locate hard revetments, where needed, in the actual riverbank.
   We propose to as much as possible comply to the principle of room for the river, and maintain and protect the current floodplain to remain flexible for future adaptation to trends like climate change. In case revetments need to be built in the floodplain of the river because of the presence of for example shrimp ponds, farms or houses that cannot be removed, we propose to choose for constructing green solutions. These green solutions are cheaper and more flexible to changing future conditions.
   For communication purposes, it would be beneficial to clearly mark the boundaries of the original river system (including floodplains) in the plan designs like shown below.



K3



K9



K10

K12