LLOYD
ENGINEERING, INC.

August 22, 2016

Mr. Tony Galt
Marine Operations Manager
Freeport LNG

Subject: FLNG Marine Basin Sedimentation Study
Freeport, Texas

Dear Tony,

Lloyd Engineering, Inc. (LEI) is pleased to present our findings, in accordance with our proposal, dated 02/18/16, to study the naturally occurring sedimentation within the FLNG marine basin. LEI has evaluated existing (observed) sedimentation patterns, and developed and analyzed existing current diversion structure and/or conceptual dredging solutions that may reduce sedimentation within the basin. The FLNG terminal is located on the Freeport Harbor Channel, at the Lower Turning Basin, approximately 1,500 feet from the Gulf Intracoastal Waterway (GIWW). This study was completed in conjunction with the modeling capabilities of Mott MacDonald.

Figure 1 - Project Location

Assumptions:

The following assumptions were made during the development of this study:

- LEI will utilize existing historical pre and post dredging hydrographic surveys from within the basin and the adjacent channel.
- LEI will utilize historical dredging records within the FLNG basin including volume dredged, date of dredging, and design dredging template.
- LEI will provide a dredging solution on a conceptual level only, as part of this scope.
- No new data will be collected as part of this scope. LEI will use the proposed berth/expansion layout in this study.
- No model validation will be performed. However, sedimentation volumetric rates will be reviewed and compared with the observed rates to ensure the simulations are sufficiently accurate to provide recommendations.

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- No vessel maneuverability analysis will be performed related to the current diversion structure as part of this scope of work.

Basin Sedimentation Analysis

A sedimentation analysis of the Freeport LNG basin was conducted by comparing historical hydrographic surveys of the basin collected from May 22, 2009 through October 23, 2015. The surveys were categorized into 5 comparisons (to ideally capture the period from a post-dredge to a pre-dredge event when possible) throughout the survey timeline. The analysis was conducted between each successive survey to determine the average sedimentation between each survey. Table 1 shows the dates of the surveys analyzed.

Table 1: Information on Historical Dredging Activities and Survey Schedules

Year	Month/Day	Purpose of Survey	Comparison
2009	May 22	Condition	Comparison 1
	November 05	Condition	
2010	March 04	**Pre-Dredge**	
	October 13	**Post-Dredge**	Comparison 2
2011	March 08	Condition	
	July 13	Condition	
	November 02	**Pre-Dredge**	
	November 28	**Post-Dredge**	Comparison 3
2012	June 07	Condition	
	November 14	Condition	
2013	January 07	Condition	
	April 12	**Pre-Dredge**	
	May 06	**Post-Dredge**	Comparison 4
	November 01	Condition	
2014	May 19	Condition	
	November 25	Condition	
2015	February 06	**Pre-Dredge**	
	March 03	**Post-Dredge**	Comparison 5
	May 19	Condition	
	October 23	Condition	

The common overlapping area for all the available surveys was identified and used as the analysis basin area to compute the depth difference between each successive survey. The average depth difference within the basin area was then calculated to determine the average sedimentation within the basin for that time period. Figure 2 shows a contour difference plot of the LNG basin between November 28, 2011 and June 7, 2012.