

City of Brisbane

Agenda Report

TO: Honorable Mayor and City Council

FROM: Randy Breault, Director of Public Works/City Engineer via City Manager

SUBJECT: Supplemental Appropriation for Marina Dredging Project

DATE: April 16, 2015

City Council Goals: To maintain and improve infrastructure. (#3)

Purpose:

To obtain a supplemental appropriation to complete the marina dredging project.

Recommendation:

Approve a supplemental appropriation in the amount of \$700,000 for the dredging project.

Background:

On April 16, 2015, the City Council approved a dredging contract with The Dutra Group for \$3,653,500. The City borrowed \$4M in 2015 to pay for this project based on the following estimates received by the Engineer:

Direct construction cost	\$3,401,200
Construction Management	\$384,000
Permit fees	\$114,800
TOTAL	\$3,900,000

The City entered into a Construction Management contract with Anchor QEA on 3/5/15 for \$384,000. This dollar amount is not expected to change. Permit fees are paid to the permitting agencies after the dredge material has been placed in the disposal area; the unit price of the fees has remained the same, but as dredge quantities exceed the forecast amount, the total of permit fees will also increase.

Discussion:

The two primary factors driving the requested supplemental appropriation are an initial contract in excess of the planned for amount (i.e., \$3,653,500 - \$3,401,200 = \$252,300), and

unanticipated shoaling. The attached Anchor QEA 7/1/16 memorandum is a technical memo responding to staff's inquiries regarding the shoaling. In general terms, the unanticipated rate of shoaling (the process by which a body of water becomes shallower, in this case through sediment deposition) was exceptionally greater than historical rates. While not yet completely understood, dredging practitioners are attributing this recent phenomenon to the overlap of a drought period and the 2015/16 El Nino. As noted in Anchor's memo, the Brisbane Marina's experience was not unique; in fact, the Oakland Outer Harbor experienced a shoaling rate 700% greater than average.

The end result is that instead of a maximum payable sediment removal of 139,400 cubic yards, we are now planning for a maximum removal of an additional 17,300 cubic yards¹. At the contract price of \$26.50/cubic yard, the increased payable to the contractor is estimated to be \$458,450.

The requested supplemental appropriation is calculated as follows:

1. "True up" engineer's estimate to awarded contract amount	\$252,300
2. Increase removal quantity due to shoaling	\$458,450
3. Increased permit fees due to increased disposal	\$16,000
4. Change Order issued to replace damaged piles in approach	\$53,000
5. Delete Bid Item 6 from contract	<\$34,000>
6. Assume decrease in idle days charges	<\$30,000>
TOTAL	\$715,750

Items 1-3 have been previously explained. Item 4 is a change order issued to replace multiple approach channel markers. The final determination of the need to replace these markers was completed as a result of a Dive Inspection and Permitting agreement Council approved 7/16/15. When these services were approved, the fiscal impact noted that the cost for replacement would be sourced in a future supplemental appropriation request.

Item 5 includes the removal of a difficult to access dredge area in the Marina; staff's present analysis is that dredging this rarely used area is not worthy of the cost to do so. (The area in questions is the northeast corner of the marina, and can be seen on Figure 1 (Revised Acceptance Area and Dredging Depth).

Item 6 assumes that now more than halfway through the project, with none of the eleven "idle day charges" that could be assessed by the contractor due to delays caused by the city in moving boats, our maximum exposure would be five (5) days of delay, thus, six (6) delay days at \$5,000/day are assumed to not be used.

¹ Dredging contracts incorporate a payable quantity that includes excavation to the design depth, plus an additional one foot. This additional foot provides the contractor some necessary flexibility in achieving the desired depths while allowing for payment of additional material due to the very nature of working underwater with the current equipment technology. As not all of the overdepth is typically taken, these estimates tend to be slightly on the high side.

ALTERNATIVES:

Before this discussion, it is important to note that the cubic yards of removal and additional cost are based on the attached Figure 1 - Revised Acceptance Areas and Dredging Depths, which changes the dredging requirement from -8 ft Mean Low Low Water (MLLW) to -7 in the slips as identified in blue, but retains the -8 requirement in all of the fairways. City staff is confident that this is an appropriate depth for the marina. Based on the unanticipated shoaling seen, proceeding forward with a slightly less aggressive dredging, and then completing bathymetric surveys on a 3-5 year interval to develop a better understanding of future shoaling rates is deemed to be the most responsible approach.

Neither of the alternatives discussed below is recommended.

1. One alternative for Council to consider would be to fund a project to allow the entire marina to be dredged to -8 MLLW as originally planned. The approximate cost for this is \$1.1M. This alternative is not recommended due to its very high cost. In particular, the northern slips in the marina do not typically berth vessels requiring the -8 MLLW depths. Another note to consider is that in an effort to contain costs, staff has already directed the contractor to modify the dredge depths. The bold black line on Figure 1 represents the estimated limits of dredging and dredge depths the contractor will have obtained by the time Council meets. Even if the council were to choose to dredge the entire marina to -8 MLLW, the areas in blue south of the black line would remain at -7 MLLW because the contractor would not be able to remobilize and change those dredge depths this season. Asking the contractor to go after these depths next season would add significant additional costs to the \$1.1M quoted above.
2. A second alternative would be to minimize costs to stay as close as possible to the \$4M for which the city has previously bonded. This alternative would effectively require the contractor to cease work and demobilize now, leaving the fairways and slips for half of dock 3 and all of dock 4-6 undredged. Additionally, due to the need to "true up" the difference between the engineer's estimate and the awarded amount, and the need to pay for channel marker replacement, there would still be a required supplemental appropriation in the \$300k order of magnitude. As many of the marina's current customers are challenged by existing shallow depths in these slips, this alternative is not recommended.

Fiscal Impact:

The City borrowed \$4M in June of 2015 to pay for the dredging project. The loan is scheduled to be paid back in May of 2027 and the interest rate is 3.12% a year. It would be fiscally prudent to have any loan made for the remainder of the project coterminous with the existing loan. This would mean the term of the loan would be for 10 years. If the Council chooses to approve the \$700K supplemental appropriation the annual payment would be \$82,565 a year. If the Council chooses to approve the \$1.1M (estimated) supplemental appropriation, the annual payment would be \$129,745 a year. To pay for this additional

appropriation, the annual payment would be \$129,745 a year. To pay for this additional expense the Marina rates would need to go up 4.33% for the \$700K appropriation, or 6.8% for the \$1.1M appropriation.

Staff recommends the City use available cash in other funds to make the loan to the Marina. The two funds that have enough available cash are the General Fund and the Utility Fund. The current interest earned in either fund is less than 1% so this loan would benefit either Fund. If the loan is made from the General Fund, the interest earned can be used for the widest array of uses and programs that would be most beneficial to the community.

Measure of Success:

A marina restored to appropriate dredge depths.

Attachments:

Anchor QEA 7/1/16 Memorandum

Figure 1 - Revised Acceptance Area and Dredging Depth



Director of Public Works/City Engineer



City Manager

MEMORANDUM

To:	Randy Breault, City of Brisbane	Date:	July 1, 2016
From:	Jaclyn Gnusti, P.E., and Josh Burnam, MPH, D.Env., Anchor QEA	Project:	141103-01.03
Re:	Evaluation of Recent Shoaling at Brisbane Marina		

This memo is intended to answer a number of the City of Brisbane (the City)'s recent questions about shoaling at Brisbane Marina.

QUESTION 1

When was the discrepancy in the estimated dredge amount discovered?

Answer 1

An increase in the historical shoaling rate was first observed in the Phase 1 pre-dredge survey (Spring 2015), prior to El Nino. The shoaling and resulting increased volume from El Nino became evident in the February 2016 condition survey and the Phase 2 pre-dredge survey (May 2016). Further discussion is below.

Shoaling was always anticipated between the design period and initiation of Phase 1 dredging, and was included in the bid volume. Prior to Phase 1 dredging, Anchor QEA compared the design survey (2014) to the Phase 1 pre-dredge survey (Spring 2015), finding that actual shoaling rates were somewhat higher than expected. To verify findings, Anchor QEA required Dutra's surveyor and the City's original surveyor to complete a QC survey, which consisted of surveying a specified area on the same date and time, comparing methods, and peer reviewing each other's data. Anchor QEA confirmed the readings of shoaling were accurate. The shoaling rate observed between 2014 and 2015 was a mild to moderate increase from prior rates, and projections indicated that even with this increased rate, the total project volume would remain within or very close to design volume.

However in late 2015, predictions for an El Nino winter were generally confirmed by weather experts, so Anchor QEA and the City initiated steps for predicting potential impacts.

An additional unplanned condition survey was performed in late February 2016 to estimate the impact of the storm season to date. At this time, Anchor QEA met with the City and discussed plans to reduce design templates to remain within project budgets. Results of that discussion, as well as Anchor QEA attempts to develop multiple design revisions with Dutra, led us to conclude that significant compromises to the project would be required if the City is not able to obtain funds to offset the 2015/2016 El Nino effects.

For an overall picture of shoaling in the Phase 2 project area, Figure 1 presents shoaling between the design survey (2014) and the post-El Nino Phase 2 pre-dredge survey (May 2016). Between 0.5 and 1.0 foot of shoaling is evident in almost all of the Phase 2 basin, with over 1.0 foot of shoaling under many of the berths. Accumulations in these high spots are approximately 5 to 10 times greater than the average rate defined by the prior 15 years.

QUESTION 2

Where in the marina was the majority of the unexpected sedimentation found?

Answer 2

In the northern part of the basin, in Phase 2 dredging areas, with the highest concentration directly under the berths (see Figure 1). It is assumed that suspended sediment is brought in with the tidal flow, then gets trapped in the central and northern marina when the tide retreats.

A similar example occurred during this same time period in the Oakland Outer Harbor. The inner/protected portion experienced shoaling that was over 700% greater than average, while shoaling in the exposed parts of the project was less intense.

QUESTION 3

Do we have any explanation for this event? Any anecdotal info from nearby marinas?

Answer 3

The general consensus from the dredging community is that a drought period followed by the 2015/2016 El Nino appears to have disrupted normal sedimentation rates throughout the Bay.

A similar example, albeit more extreme, occurred during this same time period in the Oakland Outer Harbor (referenced in Question 2 above). The inner/protected portion experienced shoaling that was over 700% greater than average (approximately 75,000 cubic yards vs. the typical 10,000 cubic yards).

QUESTION 4

Do we have any data from episode 2 survey that would tell us if we had another unexpected winter load deposition in the episode 1 area? If no, can we compare Dutra's episode 2 survey to our design estimate survey, and try to see if we had only the one bad winter?

Answer 4

We have some data. Comparison of the Phase 1 Condition Survey (February 2016) to the Phase 2 post-dredge surveys (June and September 2015) show that during the El Nino winter events, the entrance channel experienced little shoaling, while the Phase 1 marina basin showed moderate to high shoaling (see attached Figures 2 and 3). There is no data from the May 2016 survey for the Phase 2 area; however, it is expected that shoaling in the marina would show even higher, as El Nino continued to impact weather patterns for several months after the Phase 1 Condition Survey (February 2016).

QUESTION 5

What do we expect for the future?

Answer 5

Shoaling is a normal process for all coastal marinas. As stated above, the effects of prolonged drought followed by a heavy El Nino winter greatly exacerbated sediment flows in the marina. In addition, newly dredged areas tend to shoal more rapidly than areas already at higher elevation (deeper depths act as a basin for fine materials). In the future, we can anticipate that shoaling will continue, initially at a higher rate, then leveling back to historical averages over time.

The marina should conduct periodic condition surveys every 3 to 5 years to identify potential problem areas early and develop a better understanding of future shoaling patterns, particularly if the recent pattern of drought and unanticipated heavy winter storms continue.

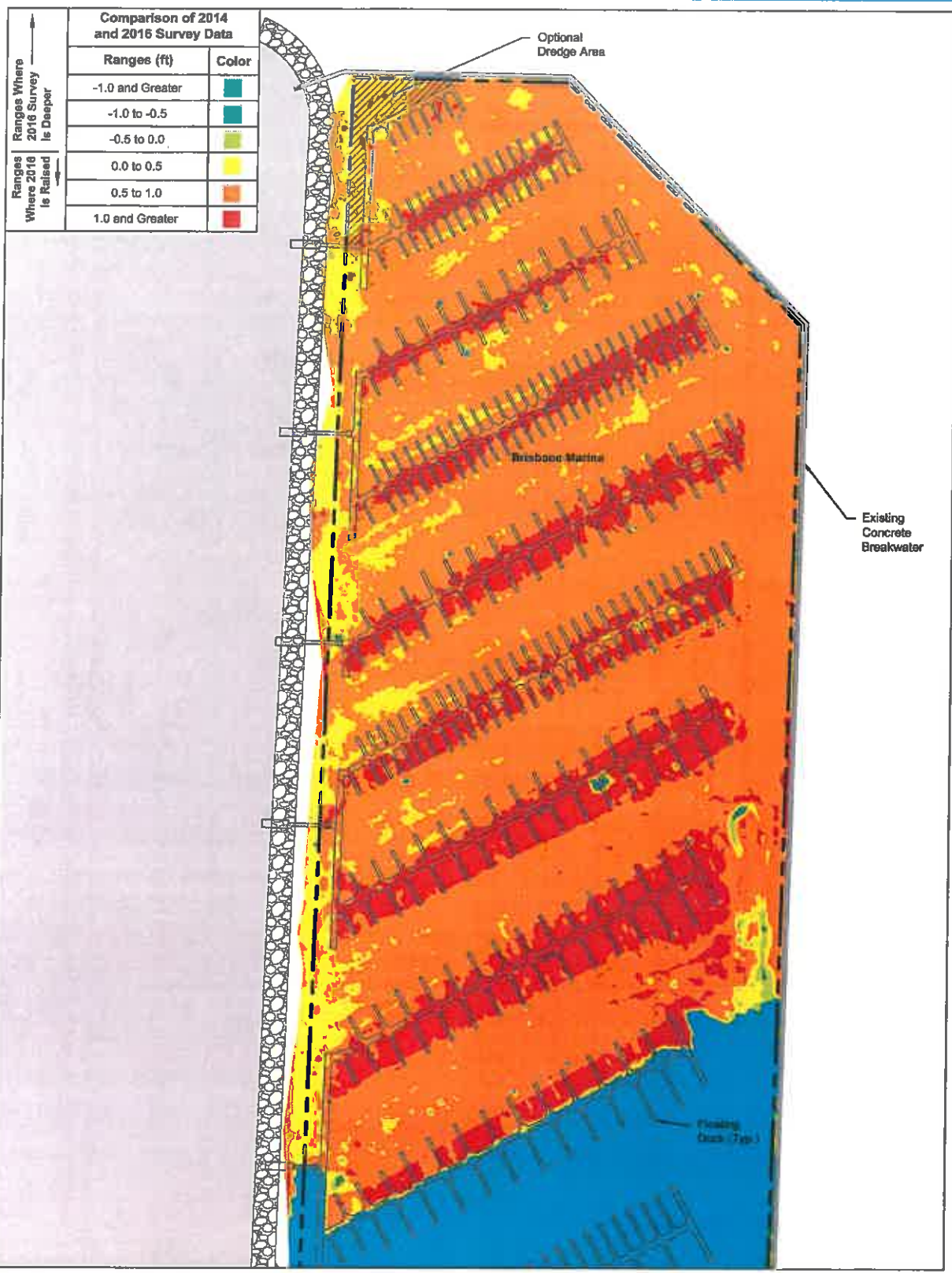
Attachments:

Attachment A: Bathymetric Comparison Figures

ATTACHMENT A

BATHYMETRIC COMPARISON FIGURES

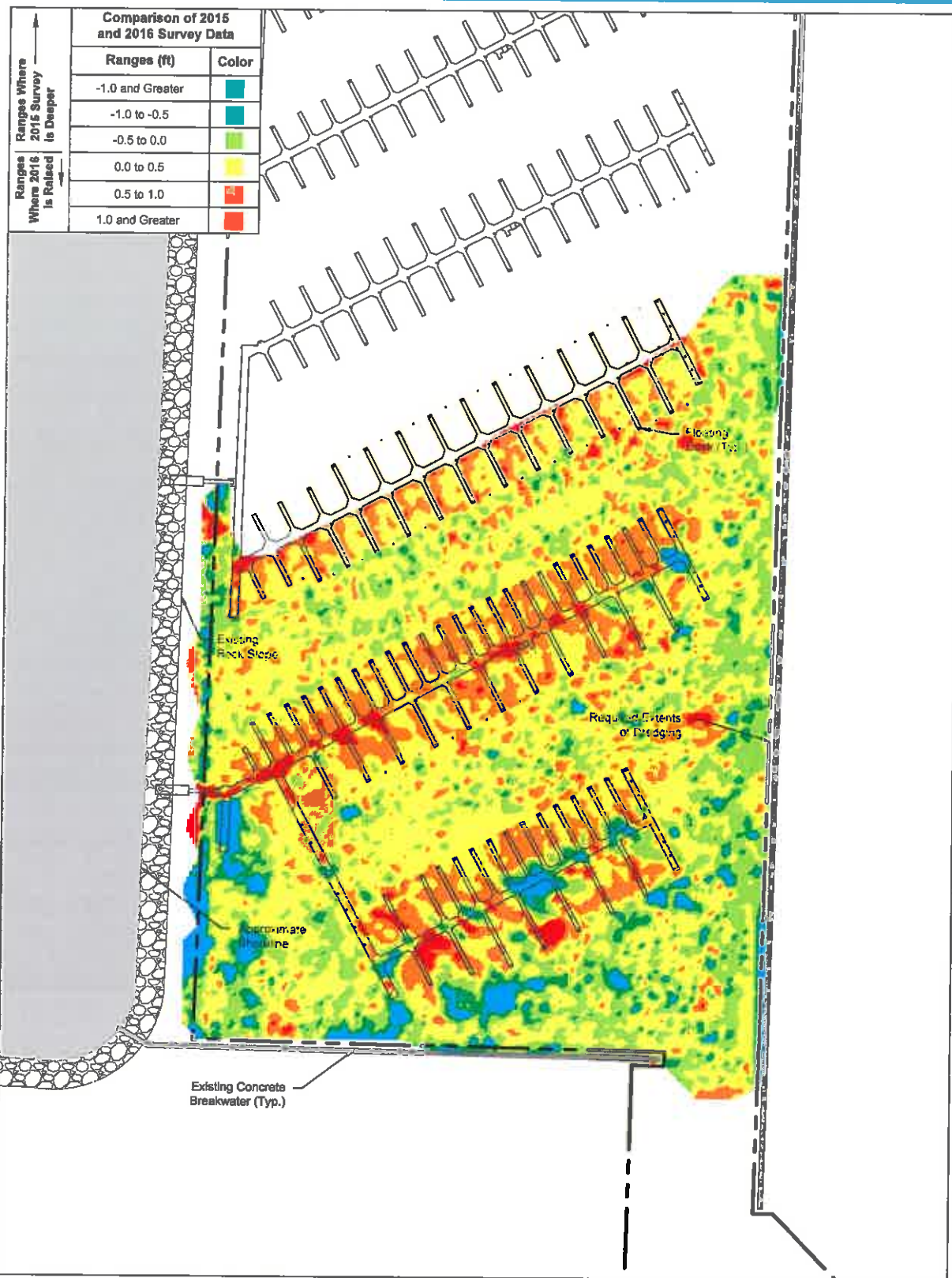
L:\Misc\CAD Project Files\Brisbane\Brisbane Marina\Brisbane Marina Dredging\103-BR-045 2014 CLE vs PRE 2016.dwg FIG 1
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SOURCE: Bathymetric data from CLE Engineering survey dated September 30, 2014 and Dutra survey dated May 2, 2016.
 HORIZONTAL DATUM: California State Plane, Zone 3, NAD83, U.S. Feet.
 VERTICAL DATUM: Mean Lower Low Water (MLLW).



L:\AutoCAD Project Files\Project\1103-Brisbane\Brisbane Dredging\1103 RP-044 POSIT 2015 vs PRE 2016.dwg FIG 2
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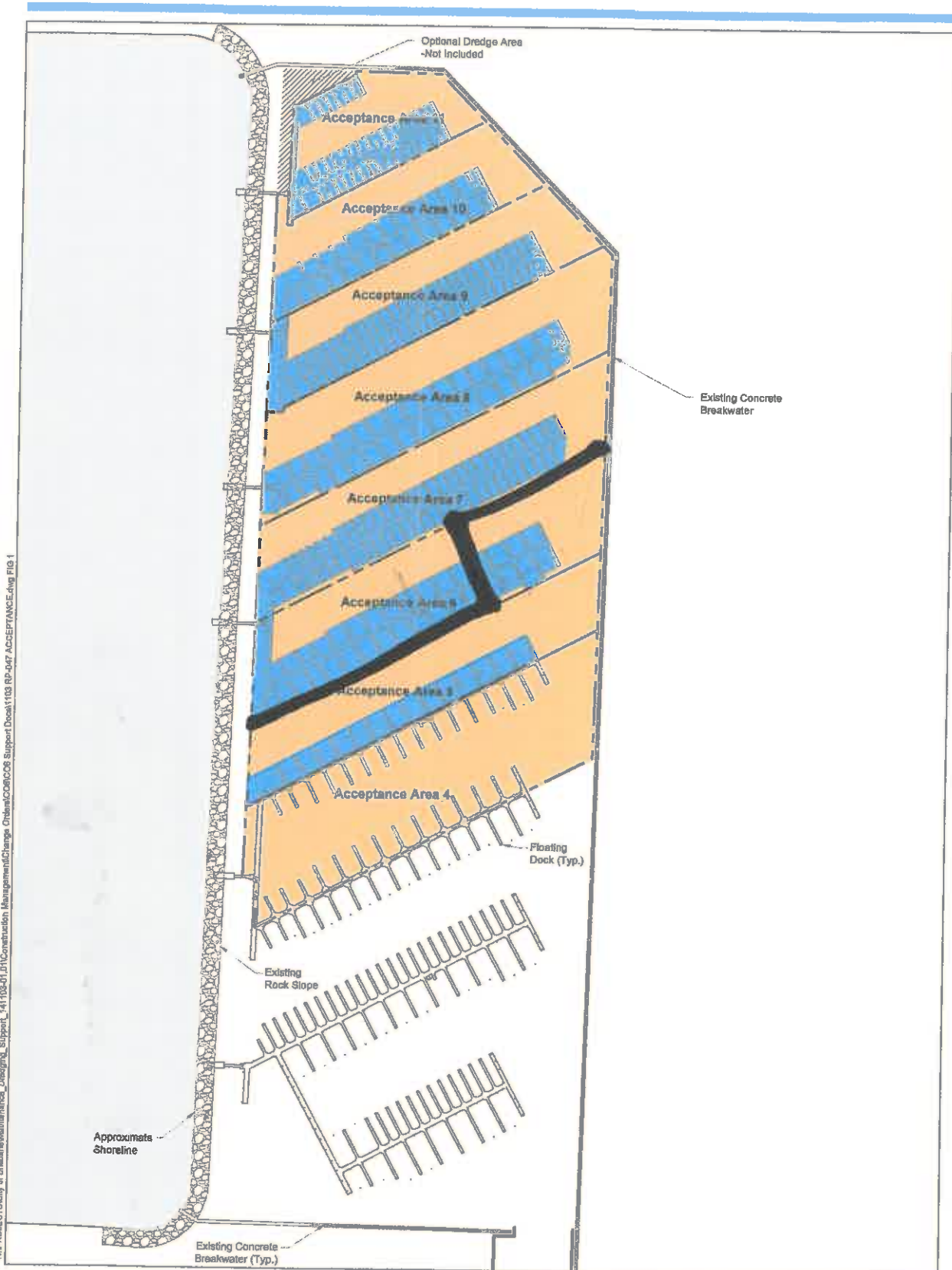
SOURCE: Bathymetric data from eTrac Inc., surveys dated September 8, 2015 and February 22, 24, 2016.
HORIZONTAL DATUM: California State Plane, Zone 3, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).





Figure 3
Comparison of 2015 Post-Dredge and 2016 Pre-Dredge Bathymetry
Brisbane Marina Sediment Characterization

N:\PROJECTS\City of Brisbane\Maintenance_Dredging_Support_141103-01\Construction Management\Change Order\CO6\CO6 Support Docs\1103 RP-047 ACCEPTANCE.dwg FIG 1



HORIZONTAL DATUM: California State Plane, Zone 3, NAD83, U.S. Feet.

VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge to -8 ft (MLLW)
- Dredge to -7 ft (MLLW)
- Acceptance Area Boundary

Scale in Feet

0 160

↑

estimated dredging complete 7/14/16



Figure 1
 Revised Acceptance Areas and Dredging Depths (Change Order #6)
 Brisbane Marina Dredging Project