

Texas Water

Development Board

OLA ID 880700

PIF No. Not Assigned Yet

Entity Name: North Harris Co Regional WA

Project Name: NHCRWA Distribution
Expansion

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Submittal

General Information

Project Information

Funding Type: SWIFT

Contact Information

County: Harris

Entity Contact Information	Engineering Firm Contact Information
Name of Entity: North Harris Co Regional WA	Name of New Entity:
Prefix: Mr.	Prefix: Mr.
First Name: Mark	First Name: Michael V.
Last Name: Evans	Last Name: Reedy
Addr 1: 3648 Cypress Creek Parkway	Addr 1: 10497 Town and Country Way
Addr 2: Ste 110	Addr 2: Ste 600
City: Houston	City: HOUSTON
State: TX	State: TX
Zip: 77068-3609	Zip: 77024-1133
Phone: (281) 440-3924	Phone: (713) 600-6828
Fax: (281) 440-4104	Fax: (713) 600-6801
Suffix:	Suffix: P.E.
OrgName:	OrgName:
DeptName:	DeptName:
Title: Planning & Governmental Affairs Director	Title: Vice President
Email: mevans@nhcrwa.com	Email: mvr@freese.com
	Firm Name: Freese and Nichols, Inc.
Make Changes: Y	Make Changes: Y
No Entity TxWISE Id	No Engineering TxWISE Id

Service Area

Population Served: 938,598

Project Description

Project Name: NHCRWA Distribution Expansion

Where can Project be found in the most recent Regional Water Plan?

Project listed on page: : See Attachment A

Capital costs on page: : See Attachment A

Region: H - REGION H

Phase(s) Applied For

Planning: Y

Acquisition: Y

Design: Y

Construction: Y

Emergency

Applicant/entity's water supply will last less than 180 days.: N

Applicant has received or applied for Federal emergency funding.: N

None of the above.: Y

Agricultural Efficiency Project?: N

Estimated average annual residential water bill: \$488

Annual Median Household Income: \$77,750

Project will produce water: Y

Project will conserve water: N

Please provide the volume of water anticipated to be produced or conserved by the project per decade:

2020	2030	2040	2050	2060	2070
74394	115942	143360	143360	143360	143360

Project will address water loss: N

Description of Proposed Project Components: The North Harris County Regional Water Authority (NHCRWA) has entered into contractual agreements with the City of Houston to purchase treated surface water from the City's Northeast Water Purification Plant (NEWPP) for use in complying with the Harris

Galveston Subsidence District (HGSD) regulatory conversion requirements as detailed in the NHCRWA's Updated Groundwater

Reduction Plan (GRP). The NEWPP is located adjacent to the western shoreline of Lake Houston near the Sam Houston Toll Road (Beltway 8). In addition to the expansion of the NEWPP, a shared transmission pipeline approximately 24.3 miles in length will be built from the NEWPP to a proposed NHCRWA SH 249 Regional Pump Station (SH 249 RPS) located west of SH 249 to provide treated surface water for various type water districts and cities (collectively called MUDs) to facilitate compliance with the HGSD regulatory conversion requirements. From the SH249 RPS, treated surface water will be distributed to MUDs via the NHCRWA's distribution system to serve MUDs located primarily in the west and northwest portions of the NHCRWA.

The initial phase of NHCRWA 2025 Distribution System was approved for funding by the TWDB during the first round of SWIFT applications in an amount of \$44,125,000 and subsequent Loan No. 51004. A second funding application was submitted during the second round of SWIFT funding for the addition of the NHCRWA SH 249 Regional Pump Station (SH 249 RPS). The second funding application was approved in an amount of \$107,820,000 and a second loan was approved (Loan No. 51004). A third funding application was submitted during the third round of SWIFT funding for the Second Phase of the NHCRWA 2025 Distribution System. The third funding application was approved in an amount of \$73,000,000 and a third loan was approved (Loan No. 51004). This funding application is being submitted for the fourth round of SWIFT applications and includes facilities required for the Remaining Phases of the NHCRWA 2025 Distribution System.

See Attachment B for further information and background for the NHCRWA, a summary table providing the Project Cost and Schedule for Final Phase of NHCRWA 2025 Transmission and Distribution System, and Exhibit 3 - Existing and Proposed Phased Water Distribution System Map.

ATTACHMENT C

REGIONAL PROJECT WORKSHEET

Texas Water Development Board

State Water Implementation Fund for Texas (SWIFT)

Abridged Application Regional Project Worksheet

Applicant: North Harris County Regional Water Authority

Project Name: NHCRA Distribution Expansion

Instructions: List all entities (aside from the applicant) that will be served by the proposed project. Use the "Rural" column to indicate the entities serving populations of 10,000 or fewer.

Press "Tab" to add new rows as needed.

Entity Name	Rural
1. Bammel UD	Yes
2. Bilma PUD	Yes
3. Bridgestone MUD	No
4. Charterwood MUD	Yes
5. City of Jersey Village	Yes
6. City of Tomball	No
7. City of Waller	Yes
8. CNP UD	No
9. Cy-Champ PUD	Yes
10. Cypress Creek UD	Yes
11. Cypress Forest PUD	Yes
12. Cypress Hill MUD 1	Yes
13. Cypress-Klein UD	Yes
14. Cypresswood UD	Yes
15. Dowdell PUD	Yes
16. Emerald Forest UD	Yes
17. Encanto Real UD	Yes
18. Faulkey Gully MUD	Yes
19. Fountainhead MUD	Yes
20. Grant Road PUD	Yes
21. Harris County FWSD 52	Yes
22. Harris County FWSD 61	No
23. Harris County ID 18	Yes
24. Harris County MUD 001	Yes
25. Harris County MUD 016	Yes
26. Harris County MUD 018	Yes
27. Harris County MUD 024	Yes
28. Harris County MUD 025	Yes
29. Harris County MUD 026	No
30. Harris County MUD 043	Yes

Texas Water Development Board

State Water Implementation Fund for Texas (SWIFT)

Abridged Application Regional Project Worksheet

31.	Harris County MUD 044	Yes
32.	Harris County MUD 048	Yes
33.	Harris County MUD 069	Yes
34.	Harris County MUD 082	No
35.	Harris County MUD 086	Yes
36.	Harris County MUD 104	Yes
37.	Harris County MUD 109	Yes
38.	Harris County MUD 118	Yes
39.	Harris County MUD 168	No
40.	Harris County MUD 170	Yes
41.	Harris County MUD 180	Yes
42.	Harris County MUD 191	Yes
43.	Harris County MUD 202	Yes
44.	Harris County MUD 211	Yes
45.	Harris County MUD 220	Yes
46.	Harris County MUD 222	Yes
47.	Harris County MUD 230	Yes
48.	Harris County MUD 231	Yes
49.	Harris County MUD 233	Yes
50.	Harris County MUD 248	Yes
51.	Harris County MUD 249	Yes
52.	Harris County MUD 273	Yes
53.	Harris County MUD 275	Yes
54.	Harris County MUD 280	Yes
55.	Harris County MUD 281	Yes
56.	Harris County MUD 282	Yes
57.	Harris County MUD 286	Yes
58.	Harris County MUD 316	Yes
59.	Harris County MUD 322	Yes
60.	Harris County MUD 354	Yes
61.	Harris County MUD 358	Yes
62.	Harris County MUD 360	Yes
63.	Harris County MUD 364	Yes
64.	Harris County MUD 365	Yes
65.	Harris County MUD 367	Yes
66.	Harris County MUD 368	No
67.	Harris County MUD 383	Yes
68.	Harris County MUD 387	Yes
69.	Harris County MUD 389	Yes
70.	Harris County MUD 391	Yes
71.	Harris County MUD 396	Yes

Texas Water Development Board

State Water Implementation Fund for Texas (SWIFT)

Abridged Application Regional Project Worksheet

72.	Harris County MUD 397	Yes
73.	Harris County MUD 401	Yes
74.	Harris County MUD 416	Yes
75.	Harris County MUD 454	Yes
76.	Harris County MUD 468	Yes
77.	Harris County MUD 480	Yes
78.	Harris County WCID 091	Yes
79.	Harris County WCID 092	Yes
80.	Harris County WCID 099	Yes
81.	Harris County WCID 109	Yes
82.	Harris County WCID 110	Yes
83.	Harris County WCID 113	Yes
84.	Harris County WCID 114	Yes
85.	Harris County WCID 116	Yes
86.	Harris County WCID 119	Yes
87.	Harris County WCID 132	Yes
88.	Harris County WCID 136	Yes
89.	Harris County WCID 155 (Partial)	Yes
90.	Harris Montgomery County MUD 386	No
91.	Heatherloch MUD	Yes
92.	Hunter's Glen MUD	Yes
93.	Inverness Forest ID	Yes
94.	Klein PUD	Yes
95.	Kleinwood MUD	Yes
96.	Lake Forest UD	Yes
97.	Louetta North PUD	Yes
98.	Louetta Rd. UD	Yes
99.	Malcomson Road UD	Yes
100.	Meadowhill Regional MUD	Yes
101.	Memorial Hills UD	Yes
102.	Mills Road MUD	Yes
103.	North Park PUD	Yes
104.	Northampton MUD	Yes
105.	Northgate Crossing MUD 1	Yes
106.	Northgate Crossing MUD 2	Yes
107.	Northwest Freeway MUD	Yes
108.	Northwest Harris County MUD 05	No
109.	Northwest Harris County MUD 06	Yes
110.	Northwest Harris County MUD 09	Yes
111.	Northwest Harris County MUD 10	Yes
112.	Northwest Harris County MUD 15	Yes

Texas Water Development Board

State Water Implementation Fund for Texas (SWIFT)

Abridged Application Regional Project Worksheet

113.	Northwest Harris County MUD 19	Yes
114.	Northwest Harris County MUD 20	Yes
115.	Northwest Harris County MUD 21	Yes
116.	Northwest Harris County MUD 22	Yes
117.	Northwest Harris County MUD 23	Yes
118.	Northwest Harris County MUD 24	Yes
119.	Northwest Harris County MUD 28	Yes
120.	Northwest Harris County MUD 29	Yes
121.	Northwest Harris County MUD 30	Yes
122.	Northwest Harris County MUD 32	Yes
123.	Northwest Harris County MUD 36	Yes
124.	Northwest Park MUD	Yes
125.	Oakmont PUD	Yes
126.	Ponderosa Forest UD	Yes
127.	Post Wood MUD	Yes
128.	Prestonwood Forest UD	Yes
129.	Reid Road MUD 1	Yes
130.	Reid Road MUD 2	Yes
131.	Richey Road MUD	Yes
132.	Shasla PUD	Yes
133.	Spring Creek Forest PUD	Yes
134.	Spring West MUD	Yes
135.	Tattor Road MUD	Yes
136.	Terranova West MUD	Yes
137.	Timber Lane UD	No
138.	Timberlake ID	Yes
139.	West Harris County MUD 01	Yes
140.	West Harris County MUD 09	Yes
141.	West Harris County MUD 10	Yes
142.	West Harris County MUD 11	Yes
143.	West Harris County MUD 15	Yes
144.	West Harris County MUD 21	Yes
145.	Westador MUD	Yes
146.	White Oak Bend MUD	Yes
147.	Woodcreek MUD	Yes

Readiness to Proceed to Construction

Preliminary planning or design work (30% of total project) has been completed or is not required.:
N

Applicant is prepared to begin implementation or construction within 18 months of application
deadline.: Y

Applicant has acquired all water rights associated with the proposed project, or none will be
required.: Y

Estimated Costs

TWDB Requested Amount

Low-Interest Loan Amount: \$601845000.00

Deferred Loan Amount:

Board Participation Amount:

Local Contribution Amount: \$29626500.00

Other Amount: \$224945000.00

Other Desc: Prior SWIFT Commitments

Total Estimated Project Costs: \$856416500.00

Anticipated Debt Service for 2018 Loan Closing is anticipated to be:: LEVEL

ATTACHMENT D

PROJECT FUNDING DETAILS

PROJECT BUDGET - Final Phase of NHCROWA 2025 Transmission and Distribution System

Uses	TWDB 2018 Funds	TWDB 2019 Funds	TWDB 2020 Funds	TWDB 2021 Funds	TWDB 2022 Funds	TWDB 2023 Funds	TWDB 2024 Funds	TWDB 2025 Funds	TWDB 2026 Funds	TWDB 2027 Funds	TWDB 2028 Funds	TWDB 2029 Funds	TWDB 2030 Funds	Total TWDB Cost	Other Funds	Total Cost
Construction																
Construction	\$0	\$0	\$10,780,000	\$0	\$7,337,000	\$12,019,000	\$53,682,000	\$0	\$30,514,000	\$12,861,000	\$114,806,000	\$38,733,000	\$51,474,000	\$332,206,000	\$0	\$332,206,000
Subtotal Construction	\$0	\$0	\$10,780,000	\$0	\$7,337,000	\$12,019,000	\$53,682,000	\$0	\$30,514,000	\$12,861,000	\$114,806,000	\$38,733,000	\$51,474,000	\$332,206,000	\$0	\$332,206,000
Basic Engineering Fees																
Planning +	\$262,000	\$0	\$353,000	\$462,000	\$2,252,000	\$0	\$1,182,000	\$603,000	\$4,204,000	\$1,382,000	\$2,073,000	\$0	\$0	\$12,773,000	\$0	\$12,773,000
Design	\$385,000	\$0	\$0	\$519,000	\$679,000	\$3,314,000	\$0	\$1,585,000	\$887,000	\$6,186,000	\$2,034,000	\$3,050,000	\$0	\$18,639,000	\$0	\$18,639,000
Construction Engineering	\$0	\$0	\$119,000	\$0	\$160,000	\$210,000	\$1,024,000	\$0	\$490,000	\$274,000	\$1,912,000	\$629,000	\$943,000	\$5,761,000	\$0	\$5,761,000
Basic Engineering Other	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Basic Engineering Fees	\$262,000	\$385,000	\$472,000	\$981,000	\$3,091,000	\$3,524,000	\$2,206,000	\$2,188,000	\$5,581,000	\$7,842,000	\$6,019,000	\$3,679,000	\$943,000	\$37,173,000	\$0	\$37,173,000
Special Services																
Application	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50,000	\$0	\$50,000
Environmental	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Water Conservation Plan	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
UI Studies/Sewer Evaluation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Surveying	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Geotechnical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Testing	\$0	\$0	\$205,000	\$140,000	\$229,000	\$1,023,000	\$0	\$581,000	\$245,000	\$2,188,000	\$738,000	\$980,000	\$6,329,000	\$0	\$6,329,000	
Permits	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Inspection	\$0	\$0	\$513,000	\$349,000	\$572,000	\$2,556,000	\$0	\$1,453,000	\$612,000	\$5,471,000	\$1,844,000	\$2,451,000	\$15,821,000	\$0	\$15,821,000	
O&M Manual	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Project Management (by engineer)	\$145,000	\$0	\$381,000	\$162,000	\$915,000	\$315,000	\$1,817,000	\$173,000	\$2,345,000	\$859,000	\$3,700,000	\$1,014,000	\$1,348,000	\$13,174,000	\$0	\$13,174,000
Pilot Testing	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Water Distribution Modeling	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Special Services Other	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Special Services	\$195,000	\$0	\$1,099,000	\$162,000	\$1,404,000	\$1,116,000	\$5,396,000	\$173,000	\$4,379,000	\$1,716,000	\$11,359,000	\$3,596,000	\$4,779,000	\$35,374,000	\$0	\$35,374,000
Other																
Administration	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Land/Easements Acquisition	\$0	\$402,000	\$0	\$1,431,000	\$1,121,000	\$8,573,000	\$0	\$3,777,000	\$2,397,000	\$11,371,000	\$3,470,000	\$7,630,000	\$0	\$40,172,000	\$0	\$40,172,000
Water Rights Purchase (If Applicable)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Capacity Buy-In (If Applicable)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Project Legal Expenses	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other **	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Other Services	\$0	\$402,000	\$0	\$1,431,000	\$1,121,000	\$8,573,000	\$0	\$3,777,000	\$2,397,000	\$11,371,000	\$3,470,000	\$7,630,000	\$0	\$40,172,000	\$0	\$40,172,000
Fiscal Services																
Financial Advisor	\$7,150	\$11,400	\$161,800	\$34,900	\$172,300	\$337,250	\$825,250	\$84,450	\$582,050	\$459,000	\$1,838,950	\$727,900	\$776,050	\$6,018,450	\$0	\$6,018,450
Bond Counsel	\$7,865	\$12,540	\$177,980	\$38,390	\$189,530	\$370,975	\$907,775	\$92,895	\$640,255	\$504,900	\$2,022,845	\$800,690	\$853,655	\$6,620,295	\$0	\$6,620,295
Issuance Cost	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$650,000	\$0	\$650,000
Bond Insurance/Surety	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fiscal/Legal	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$650,000	\$0	\$650,000
Capitalized Interest	\$45,760	\$79,800	\$1,213,500	\$279,200	\$1,464,550	\$3,035,250	\$7,839,875	\$844,500	\$5,820,500	\$4,590,000	\$18,389,500	\$7,279,000	\$7,760,500	\$58,641,935	\$0	\$58,641,935
Bond Reserve Fund	\$38,610	\$63,156	\$925,496	\$205,561	\$1,044,138	\$2,104,440	\$5,298,105	\$558,215	\$3,847,351	\$3,033,990	\$12,155,460	\$4,811,419	\$5,129,691	\$39,215,630	\$0	\$39,215,630
Loan Origination Fee	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other ** Contingency	\$10,615	\$8,104	\$16,224	\$1,949	\$9,482	\$22,065	\$148,995	\$9,940	\$54,844	\$42,110	\$168,245	\$65,991	\$70,104	\$628,690	\$0	\$628,690
Subtotal Fiscal Services	\$210,000	\$275,000	\$2,595,000	\$660,000	\$2,980,000	\$5,970,000	\$15,120,000	\$1,690,000	\$11,045,000	\$8,730,000	\$34,675,000	\$13,785,000	\$14,690,000	\$112,425,000	\$0	\$112,425,000
Contingency																
Contingency	\$48,000	\$78,000	\$1,234,000	\$256,000	\$1,297,000	\$2,523,000	\$6,121,000	\$617,000	\$4,289,000	\$3,380,000	\$13,566,000	\$5,367,000	\$5,719,000	\$44,495,000	\$0	\$44,495,000
Subtotal Contingency	\$48,000	\$78,000	\$1,234,000	\$256,000	\$1,297,000	\$2,523,000	\$6,121,000	\$617,000	\$4,289,000	\$3,380,000	\$13,566,000	\$5,367,000	\$5,719,000	\$44,495,000	\$0	\$44,495,000
TOTAL COSTS	\$715,000	\$1,140,000	\$16,180,000	\$3,490,000	\$17,230,000	\$33,725,000	\$82,525,000	\$8,445,000	\$58,205,000	\$45,900,000	\$183,895,000	\$72,790,000	\$77,605,000	\$601,845,000	\$0	\$601,845,000

Other ** description must be entered

* For Planning applications under the EDAP Program, please break down Planning costs as follows:

Category	Amount
Category A	0
Category B	0
Category C	0
Category D	0
Total Planning Costs	0

Additional Attachments

The following documents are attached after this page:

Attachment A_020218.pdf

Attachment B_020218.pdf

ATTACHMENT A

**SECTION 1. APPLICANT INFORMATION
REFERENCES TO 2016 REGION H REGIONAL WATER PLAN**

SECTION 1. APPLICANT INFORMATION

The applicant project can be found in the 2016 Region H Regional Water Plan in the following:

Chapter 5 – Water Management Strategies

Table 5-4 WMS and Key Project Relationships – page 5-18

Table 5-5 Key Project Overview – page 5-20

Appendix 5-A – Water Management Strategy Tables

Table 5-A3 Scoring for Key Projects – page 5-A-9

Table 5-A4 Water Management Strategy and Project Relationships - pages 5-A-26 and 5-A-27

Table 5-A10 Project Costs Summary - page 5-A-115

Table 5-A11 Project Cost Summary (Unit Cost) - Page 5-A-134

Appendix 5-B – Project Technical Memoranda

North Harris County Regional Water Authority Distribution Expansion – pages 5-B-CONV-008-1 through 5-B-CONV-008-6.

Appendix 5-DB – DB17 Reports

Recommended Projects Associated with Water Management Strategies – page 17 of 23

Capital costs associated with the applicant project can be found in the 2016 Region H Water Plan in the following:

Chapter 5 – Water Management Strategies

Table 5-5 Key Project Overview – page 5-20

Appendix 5-A – Water Management Strategy Tables

Table 5-A10 Project Costs Summary - page 5-A-115

Appendix 5-B – Project Technical Memoranda

North Harris County Regional Water Authority Distribution Expansion – pages 5-B-CONV-008-1 and 5-B-CONV-008-3.

Appendix 5-DB – DB17 Reports

Recommended Projects Associated with Water Management Strategies – page 17 of 23

Water Management Strategy*	WMS Project Name
New / Expanded Contract With BRA	Allens Creek Reservoir
	BRA System Operation Permit (Region G Project)
New / Expanded Contract With BWA	BWA Treatment Plant Expansion
New / Expanded Contract With BWA - Brackish Groundwater	BWA Brackish Groundwater
New / Expanded Contract With CLCND	CLCND West Chambers System
New / Expanded Contract With COH	City of Houston GRP
	City of Houston Treatment Expansion
	COH Northeast Water Purification Plant Expansion
	Luce Bayou Interbasin Transfer
	San Jacinto Basin Regional Return Flows
	TRA to COH Transfer
New / Expanded Contract With GCWA	GCWA Reclaimed Water from COH
New / Expanded Contract With LNVA	WUG Infrastructure Expansion (WUG-level projects)
New / Expanded Contract With SJRA	Lake Livingston to SJRA Transfer
	San Jacinto Basin Regional Return Flows
	SJRA GRP
NFBWA Grand Lakes Reuse	Grand Lakes Reclaimed Water System
NFBWA GRP	City of Houston Reuse
	COH Northeast Water Purification Plant Expansion
	Luce Bayou Interbasin Transfer
	NFBWA GRP
	NFBWA Phase 2 Distribution Segments
	San Jacinto Basin Regional Return Flows
	TRA to COH Transfer
	WHCRWA/NFBWA Transmission Line
NHCRWA GRP	City of Houston Reuse
	COH Northeast Water Purification Plant Expansion
	COH, NHCRWA, and CHCRWA Shared Transmission
	Luce Bayou Interbasin Transfer
	NHCRWA Distribution Expansion
	NHCRWA GRP
	NHCRWA Transmission Line
	San Jacinto Basin Regional Return Flows
	TRA to COH Transfer
Old Galveston Road Transmission Improvements	Old Galveston Road Transmission Improvements
Panorama Village And Shenandoah Joint GRP	Panorama Village and Shenandoah Joint GRP
Pearland SWTP	Allens Creek Reservoir
	GCWA Reclaimed Water from COH
	Pearland Surface Water Treatment Plant
Porter SUD Joint GRP	City of Conroe Reuse
	Porter SUD Joint GRP

Project	Potential Volume ¹ (ac-ft)	Capital Cost (\$)	Unit Cost (\$/ac-ft)		Start Decade
			Start Decade	2070	
Contractual Transfer					
TRA to COH Transfer	150,000	\$0	\$5	\$5	2020
Conveyance					
CHCRWA Transmission and Distribution Expansion	4,682	\$23,207,659	\$409	\$44	2020
COH, NHCRA, and CHCRWA Shared Transmission	148,042	\$150,325,381	\$83	\$9	2020
East Texas Transfer	250,000	\$388,064,210	\$145	\$15	2040
Lake Livingston to SJRA Transfer	50,000	\$166,710,892	\$311	\$32	2050
Luce Bayou Interbasin Transfer	450,000	\$360,004,806	\$143	\$23	2020
NFBWA Phase 2 Distribution Segments	62,496	\$65,450,062	\$95	\$7	2020
NHCRA Distribution Expansion	143,360	\$922,549,086	\$307	\$50	2020
NHCRA Transmission Line	143,360	\$155,993,406	\$86	\$6	2020
Old Galveston Road Transmission Improvements	24,300	\$99,886,253	\$322	\$25	2020
WHCRA Distribution Expansion	91,896	\$293,290,000	\$299	\$32	2020
WHCRA/NFBWA Transmission Line	154,392	\$642,986,052	\$340	\$34	2020
Groundwater Development					
Brackish Groundwater Development ³	Varies	Varies by project	\$278-1,557	Varies	2020
BWA Brackish Groundwater	3,136	\$34,016,950	\$600	\$346	2020
Conroe Brackish Groundwater Desalination	5,600	\$40,691,342	\$857	\$323	2020
Expanded Use of Groundwater ³	30,000+	Varies by WUG	Varies by WUG	Varies by WUG	2020
Groveton Groundwater Expansion	161	\$2,195,000	\$1,277	\$136	2020
SJRA Catahoula Aquifer Supplies	7,840	\$10,980,367	\$213	\$96	2020
Groundwater Reduction Plans					
CHCRWA GRP ⁴	4,682	\$0	\$0	\$0	2020
City of Houston GRP ⁴	130,544	\$0	\$0	\$0	2020
City of Missouri City GRP	12,656	\$50,959,636	\$329	\$33	2020
City of Richmond GRP	1,465	\$32,167,109	\$1,761	\$146	2020
City of Rosenberg GRP	826	\$12,469,012	\$1,242	\$131	2020
City of Sugar Land GRP	20,160	\$148,650,964	\$900	\$283	2020
Fort Bend County MUD 25 GRP	744	\$2,148,043	\$282	\$40	2030
Fort Bend County WC&ID No. 2 GRP	6,720	\$36,668,844	\$800	\$343	2020
NFBWA GRP ⁴	62,496	\$0	\$0	\$0	2020
NHCRA GRP ⁴	143,360	\$0	\$0	\$0	2020
Panorama Village and Shenandoah Joint GRP	472	\$1,619,114	\$399	\$112	2040
Porter SUD Joint GRP	2,240	\$22,061,536	\$1,250	\$426	2020
River Plantation and East Plantation Joint GRP ⁵	92	\$0	\$0	\$0	2030
SJRA GRP	100,000	\$834,931,018	\$245	\$81	2020
WHCRA GRP ⁴	91,896	\$0	\$0	\$0	2020

Table 5-A3 – Scoring for Key Projects

WMS Project		Cost	Location	Water Quality	Environmental Land & Habitat	Impacts on Environmental Flows	Local Preference	Institutional Constraints / Risk of Implementability	Development Timeline	Sponsorship	Vulnerability	Impacts on Other WMS
Conservation												
CNSV-001	Industrial Conservation	5	5	3	5	3	4	5	5	3	5	3
CNSV-002	Irrigation Conservation	5	5	3	4	3	3	5	5	3	5	3
CNSV-003	Municipal Conservation	4	5	3	5	3	4	5	5	3	5	2
Contractual Transfer												
CNTR-001	TRA to COH Transfer	5	2	3	5	2	3	3	5	5	4	4
Conveyance												
CONV-001	CHCRWA Transmission and Distribution Expansion	4	4	3	3	3	4	3	4	5	5	3
CONV-002	COH, NHCRA, and CHCRWA Shared Transmission	5	4	3	3	3	4	3	4	5	5	3
CONV-003	East Texas Transfer	5	1	3	2	2	3	1	3	3	2	4
CONV-004	GCWA Treated Water from LNVA	1	1	3	2	3	2	2	4	2	2	3
CONV-005	Lake Livingston to SJRA Transfer	4	2	3	2	2	4	2	4	4	4	4
CONV-006	Luce Bayou Interbasin Transfer	5	2	3	3	2	4	5	5	5	4	5
CONV-007	NFBWA Phase 2 Distribution Segments	5	4	3	3	3	4	3	4	5	5	3
CONV-008	NHCRA Distribution Expansion	3	4	3	3	3	4	3	4	5	5	3
CONV-009	NHCRA Transmission Line	5	4	3	3	3	4	3	4	5	5	3
CONV-010	Old Galveston Road Transmission Improvements	4	5	3	5	3	5	3	5	5	5	5
CONV-011	WHCRA Distribution Expansion	4	4	3	3	3	4	3	4	5	5	3
CONV-012	WHCRA/NFBWA Transmission Line	5	4	3	3	3	4	3	4	5	5	3
Groundwater Development												
GWDV-001	Aquifer Storage and Recovery	3	5	3	4	4	4	3	5	3	3	5
GWDV-002	Brackish Groundwater Development	3	5	3	4	4	3	3	5	3	4	4
GWDV-003	BWA Brackish Groundwater	3	3	3	3	4	4	4	5	5	4	5
GWDV-004	Conroe Brackish Groundwater Desalination	2	5	3	4	4	4	3	5	4	4	4
GWDV-005	Expanded Use of Groundwater	1	5	3	4	4	4	3	5	3	5	3
GWDV-006	Forestar Houston County Project	3	2	3	2	4	3	2	5	2	3	3

Project	Project Type	Associated WMS
NEW / EXPANDED CONTRACT WITH GCWA - MINING, BRAZORIA COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MINING, GALVESTON COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MISSOURI CITY	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - SANTA FE	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - SIENNA PLANTATION	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH LNVA - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	NEW / EXPANDED CONTRACT WITH LNVA
NEW / EXPANDED CONTRACT WITH LNVA - IRRIGATION, CHAMBERS COUNTY	WUG	TRANSFER TO REGION H (SAM RAYBURN)
NEW / EXPANDED CONTRACT WITH LNVA - IRRIGATION, LIBERTY COUNTY	WUG	TRANSFER TO REGION H (SAM RAYBURN)
NEW / EXPANDED CONTRACT WITH LNVA - MINING, GALVESTON COUNTY (NT)	WUG	NEW / EXPANDED CONTRACT WITH LNVA
NEW / EXPANDED CONTRACT WITH SJRA - BENDERS LANDING WATER SYSTEM	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - COUNTY-OTHER, MONTGOMERY COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH SJRA SJRA CATAHOULA AQUIFER SUPPLIES
NEW / EXPANDED CONTRACT WITH SJRA - EAST PLANTATION UD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - INDIGO LAKE WATER SYSTEM	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - MANUFACTURING, MONTGOMERY COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - MONTGOMERY	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - MONTGOMERY COUNTY MUD #18	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - PANORAMA VILLAGE	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - RIVER PLANTATION MUD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - SHENANDOAH	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - STAGECOACH	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - STANLEY LAKE MUD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - STEAM ELECTRIC POWER, MONTGOMERY COUNTY (SJ)	WUG	SJRA CATAHOULA AQUIFER SUPPLIES
NEW / EXPANDED CONTRACT WITH SUGAR LAND - FORT BEND MUD 25	WUG	FORT BEND MUD 25 GRP
NFBWA GROUNDWATER REDUCTION PLAN	WMS	NFBWA GRP
NFBWA PHASE 2 DISTRIBUTION SEGMENTS	WMS	NFBWA GRP
NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	WMS	NHCRWA GRP

Project	Project Type	Associated WMS
NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	WMS	NHCRWA GRP
NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	WMS	NHCRWA GRP
NHCRWA GROUNDWATER REDUCTION PLAN	WMS	NHCRWA GRP
NHCRWA TRANSMISSION LINES	WMS	NHCRWA GRP
OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	WMS	OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS
PANORAMA AND SHENANDOAH GRP INFRASTRUCTURE	WMS	PANORAMA AND SHENANDOAH JOINT GRP
PEARLAND REUSE INFRASTRUCTURE	WMS	CITY OF PEARLAND REUSE
PEARLAND SURFACE WATER TREATMENT PLANT DEVELOPMENT	WMS	PEARLAND SWTP
PORTER SUD GRP INFRASTRUCTURE	WMS	PORTER SUD JOINT GRP
REGIONAL RETURN FLOWS DEVELOPMENT	WMS	CHCRWA GRP
		CITY OF HOUSTON GRP
		NEW / EXPANDED CONTRACT WITH COH
		NEW / EXPANDED CONTRACT WITH SJRA
		NFBWA GRP
		NHCRWA GRP
		SJRA REUSE SUPPLIES FOR MANUFACTURING
WHCRWA GRP		
RICHMOND GRP INFRASTRUCTURE	WMS	RICHMOND GRP
RIVER PLANTATION REUSE EXPANSION	WMS	RIVER PLANTATION AND EAST PLANTATION JOINT GRP
ROSENBERG GRP INFRASTRUCTURE	WMS	ROSENBERG GRP
SJRA CATAHOULA AQUIFER SUPPLIES	WMS	SJRA CATAHOULA AQUIFER SUPPLIES
SJRA CONROE REUSE PROJECT	WMS	SJRA REUSE SUPPLIES FOR MANUFACTURING
SJRA GROUNDWATER REDUCTION PLAN - 2025 PHASE	WMS	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA GRP
SJRA GROUNDWATER REDUCTION PLAN - 2035 PHASE	WMS	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA GRP

Project Name	Proj. Level	Sponsor	Capital Cost (\$)	Annual Cost (\$/year)					
				2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH SJRA - STAGECOACH	WUG	SAN JACINTO RIVER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		STAGECOACH	\$-	\$-	\$-	\$-	\$-	\$-	\$-
NEW / EXPANDED CONTRACT WITH SJRA - STANLEY LAKE MUD	WUG	SAN JACINTO RIVER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		STANLEY LAKE MUD	\$-	\$-	\$-	\$-	\$-	\$-	\$-
NEW / EXPANDED CONTRACT WITH SJRA - STEAM ELECTRIC POWER, MONTGOMERY COUNTY (SJ)	WUG	SAN JACINTO RIVER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		STEAM ELECTRIC POWER, MONTGOMERY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
NEW / EXPANDED CONTRACT WITH SUGAR LAND - FORT BEND MUD 25	WUG	FORT BEND COUNTY MUD #25	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		SUGAR LAND	\$-	\$-	\$-	\$-	\$-	\$-	\$-
NFBWA GROUNDWATER REDUCTION PLAN	WMS	NORTH FORT BEND WATER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
NFBWA PHASE 2 DISTRIBUTION SEGMENTS	WMS	NORTH FORT BEND WATER AUTHORITY	\$65,450,062	\$5,934,717	\$5,934,717	\$457,900	\$457,900	\$457,900	\$457,900
NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	\$537,692,455	\$43,957,902	\$43,957,902	\$4,393,550	\$4,393,550	\$4,393,550	\$4,393,550
NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	\$373,353,219	\$-	\$30,244,283	\$30,244,283	\$2,772,300	\$2,772,300	\$2,772,300
NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	\$11,503,412	\$-	\$-	\$905,141	\$905,141	\$58,700	\$58,700
NHCRWA GROUNDWATER REDUCTION PLAN	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
NHCRWA TRANSMISSION LINES	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	\$155,993,406	\$12,358,768	\$12,358,768	\$880,500	\$880,500	\$880,500	\$880,500
OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	WMS	HOUSTON	\$99,886,253	\$8,963,415	\$8,963,415	\$605,000	\$605,000	\$605,000	\$605,000
PANORAMA AND SHENANDOAH GRP INFRASTRUCTURE	WMS	PANORAMA VILLAGE	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		SHENANDOAH	\$1,619,114	\$-	\$-	\$188,486	\$188,486	\$53,000	\$53,000
PEARLAND REUSE INFRASTRUCTURE	WMS	PEARLAND	\$5,895,808	\$154,751	\$596,982	\$468,137	\$103,625	\$103,625	\$103,625
PEARLAND SURFACE WATER TREATMENT PLANT DEVELOPMENT	WMS	PEARLAND	\$112,947,347	\$9,402,243	\$14,604,574	\$8,500,389	\$5,153,215	\$5,153,215	\$5,153,215
PORTER SUD GRP INFRASTRUCTURE	WMS	PORTER SUD	\$22,061,536	\$2,800,465	\$2,800,465	\$954,371	\$954,371	\$954,371	\$954,371
REGIONAL RETURN FLOWS DEVELOPMENT	WMS	HOUSTON	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
		SAN JACINTO RIVER AUTHORITY	\$-	\$-	\$-	\$-	\$-	\$-	\$-
RICHMOND GRP INFRASTRUCTURE	WMS	RICHMOND	\$32,167,109	\$2,580,112	\$2,580,112	\$213,200	\$213,200	\$213,200	\$213,200

Project Name	Proj. Level	Unit Cost (\$/ac-ft)					
		2020	2030	2040	2050	2060	2070
LNVA IRRIGATION SYSTEM EXPANSION	WMS	\$0	\$0	\$435	\$435	\$360	\$360
LUCE BAYOU TRANSFER	WMS	\$143	\$143	\$23	\$23	\$23	\$23
MISSOURI CITY GRP INFRASTRUCTURE	WMS	\$329	\$329	\$33	\$33	\$33	\$33
MONTGOMERY COUNTY MUDS #8 AND #9 REUSE	WMS	\$1,360	\$1,360	\$595	\$595	\$595	\$595
NFBWA GROUNDWATER REDUCTION PLAN	WMS	\$0	\$0	\$0	\$0	\$0	\$0
NFBWA PHASE 2 DISTRIBUTION SEGMENTS	WMS	\$95	\$95	\$7	\$7	\$7	\$7
NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	WMS	\$307	\$307	\$31	\$31	\$31	\$31
NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	WMS	\$0	\$211	\$211	\$19	\$19	\$19
NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	WMS	\$0	\$0	\$6	\$6	\$1	\$1
NHCRWA GROUNDWATER REDUCTION PLAN	WMS	\$0	\$0	\$0	\$0	\$0	\$0
NHCRWA TRANSMISSION LINES	WMS	\$86	\$86	\$6	\$6	\$6	\$6
OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	WMS	\$369	\$369	\$25	\$25	\$25	\$25
PANORAMA AND SHENANDOAH GRP INFRASTRUCTURE	WMS	\$0	\$0	\$399	\$399	\$112	\$112
PEARLAND REUSE INFRASTRUCTURE	WMS	\$493	\$517	\$406	\$90	\$90	\$90
PEARLAND SURFACE WATER TREATMENT PLANT DEVELOPMENT	WMS	\$839	\$652	\$379	\$230	\$230	\$230
PORTER SUD GRP INFRASTRUCTURE	WMS	\$1,250	\$1,250	\$426	\$426	\$426	\$426
REGIONAL RETURN FLOWS DEVELOPMENT	WMS	\$0	\$0	\$0	\$0	\$0	\$0
RICHMOND GRP INFRASTRUCTURE	WMS	\$1,761	\$1,761	\$146	\$146	\$146	\$146
RIVER PLANTATION REUSE EXPANSION	WMS	\$0	\$0	\$0	\$0	\$0	\$0
ROSENBERG GRP INFRASTRUCTURE	WMS	\$1,242	\$1,242	\$131	\$131	\$131	\$131
SJRA CATAHOULA AQUIFER SUPPLIES	WMS	\$213	\$213	\$96	\$96	\$96	\$96
SJRA CONROE REUSE PROJECT	WMS	\$0	\$0	\$0	\$0	\$0	\$0
SJRA GROUNDWATER REDUCTION PLAN - 2025 PHASE	WMS	\$245	\$245	\$28	\$28	\$28	\$28
SJRA GROUNDWATER REDUCTION PLAN - 2035 PHASE	WMS	\$0	\$971	\$971	\$113	\$113	\$113
SJRA GROUNDWATER REDUCTION PLAN - 2045 PHASE	WMS	\$0	\$0	\$594	\$594	\$69	\$69
SJRA GROUNDWATER REDUCTION PLAN - 2055 PHASE	WMS	\$0	\$0	\$0	\$971	\$971	\$113
SUGAR LAND GRP	WMS	\$0	\$0	\$0	\$0	\$0	\$0

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	North Harris County Regional Water Authority Distribution Expansion
Project ID:	CONV-008
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	143,360 ac-ft/yr (128 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years (per phase)
Project Capital Cost:	\$922,549,086 (Sept. 2013)
Unit Water Cost (Rounded):	\$518 per ac-ft (during loan period) \$50 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Harris County Regional Water Authority (NHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, NHCRWA is developing a phased expansion of the distribution infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water.

PROJECT ANALYSES

The project analyses for the NHCRWA Distribution Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and is receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its Groundwater Reduction Plan (GRP) program, increasing its supply reservation and planning for large

scale transmission to its service area. In order to utilize this expanded supply in order to meet future required phases of conversion, NHCRWA will engage in a phased expansion of the distribution infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water. The year 2025 expansion will include development an expanded distribution pipeline network and two new pump station facilities, one near the Hardy Toll Road and Richey Road, and the other west of SH 249 near the Heron Lakes subdivision. The existing Louetta Regional Water Plant will be expanded, and two groundwater wells will be added to the system. The year 2025 expansion will bring the total number of districts in the NHCRWA surface water service area to 105. A subsequent 2035 expansion of the distribution pipeline system will allow surface water to be conveyed to an additional 36 districts. Other infrastructure measures implemented in this phase will include three additional wells, a new West Regional Water Plant, and enhancements to the Spears Road Pump Station, Louetta Regional Water Plant, and SH 249 Regional Pump Station. The 2045 conversion phase will involve limited expansion of infrastructure and add an additional seven districts receiving surface water.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

NHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded distribution infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Planning-level capital cost estimates for the NHCRWA Distribution Expansion project were included in the NHCRWA GRP. The primary capital components of the project were pump station and pipeline development, with additional cost for contingency, engineering, legal costs, land acquisition, and environmental studies and mitigation. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Other cost components not included in the GRP, such as interest during construction, annualized debt service, and annualized operations and maintenance costs, were assumed using standard Regional Planning costing assumptions. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – NHCRWA Distribution Expansion Project Costs

OPINION OF PROBABLE CONSTRUCTION COST						January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL	
PROJECT COST SUMMARY						
1	CONSTRUCTION (CAPITAL) COST	1	LS	\$494,200,000	\$494,200,000	
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	\$254,690,000	\$254,690,000	
3	LAND AND EASEMENTS	1	LS	\$77,160,000	\$77,160,000	
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	\$790,000	\$790,000	
5	INTEREST DURING CONSTRUCTION	1	LS	\$95,709,086	\$95,709,086	
PROJECT COST					\$922,549,086	

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	\$39,564,352	\$67,036,335	\$28,318,425	\$846,441	\$0	\$0
2	OPERATION AND MAINTENANCE (O&M)	\$4,393,550	\$7,165,850	\$7,224,550	\$7,224,550	\$7,224,550	\$7,224,550
3	PUMPING ENERGY COSTS	\$0	\$0	\$0	\$0	\$0	\$0
4	PURCHASE COST OF WATER	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL ANNUAL COST		\$43,957,902	\$74,202,185	\$35,542,975	\$8,070,991	\$7,224,550	\$7,224,550

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	\$43,957,902	\$74,202,185	\$35,542,974	\$8,070,991	\$7,224,550	\$7,224,550
2	YIELD	143,360	143,360	143,360	143,360	143,360	143,360
3	UNIT COST	\$307	\$518	\$248	\$56	\$50	\$50
TOTAL UNIT COST		\$205					

PROJECT EVALUATION

Based on the analysis provided above, the NHCRWA Distribution Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	The project unit cost is slightly over \$500/ac-ft during debt service but declines sharply after debt service completion.
Location	4	Reflects distribution infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.

CRITERIA	RATING	EXPLANATION
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

The NHCRWA Distribution Expansion includes up to 155 miles of pipelines. The majority of this impact will be in urbanized areas with limited impacts to habitat. The NHCRWA Distribution Expansion will not directly impact environmental flows and is not anticipated to impact agricultural land or production.

WATER USER GROUP APPLICATION

The NHCRWA Distribution Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

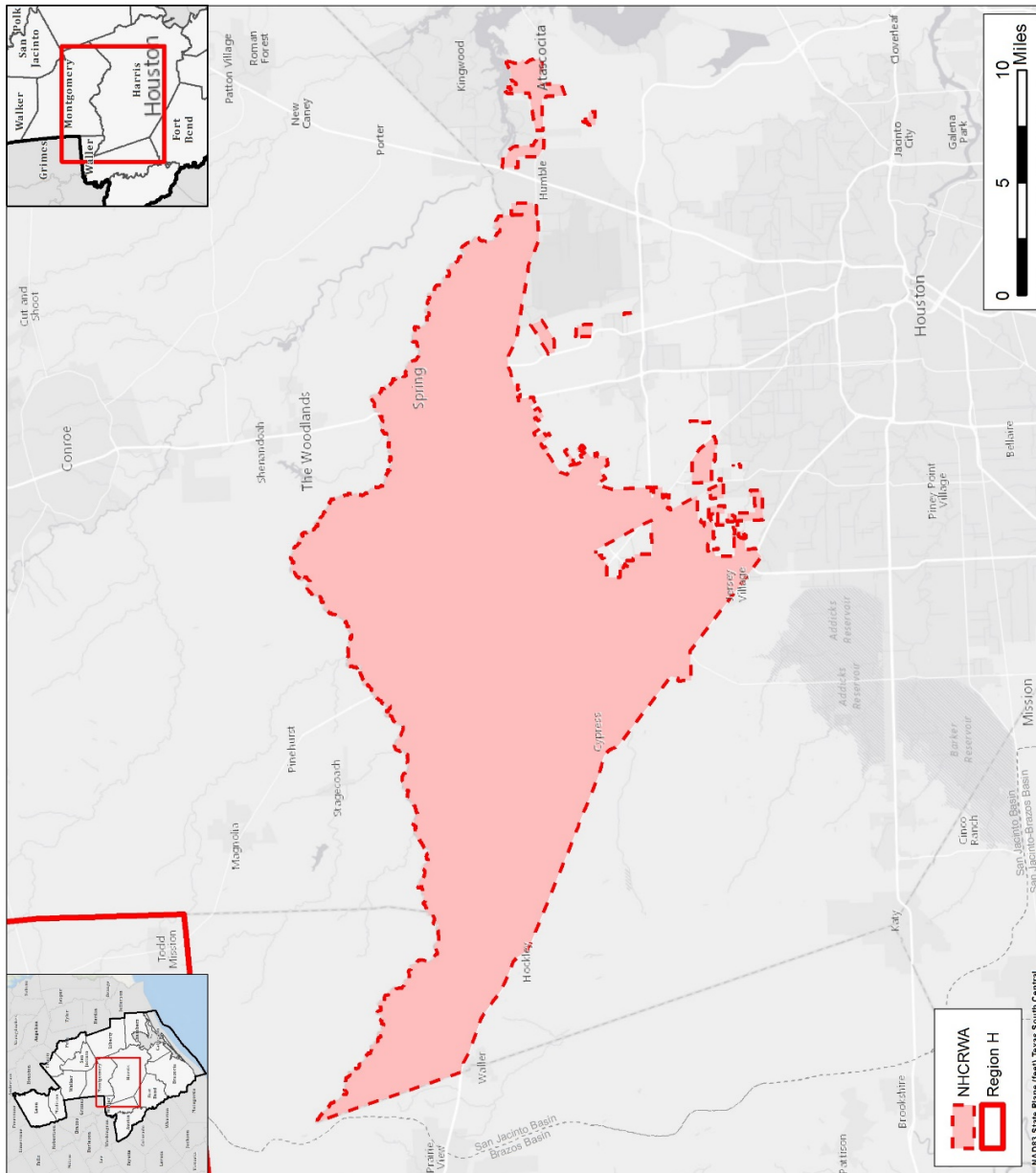
CRITERIA	WUG SUITABILITY
Proximity	Distribution infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.
Unit Cost	Reflects a portion of the overall cost to implement NHCRWA's surface water conversion.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

AECOM. 2014 *North Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for NHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013..

LOCATION MAP



NHCRWA Distribution Expansion Location Map



Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
NORTH GREEN MUD	N	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH GREEN MUD	MULTIPLE WELLS/WELL FIELD	\$1,567,843	2030
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	COH NORTHEAST WATER PURIFICATION PLANT EXPANSION	WATER TREATMENT PLANT EXPANSION	\$462,850,625	2021
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	COH, NHCRWA, AND CHCRWA SHARED TRANSMISSION	CONVEYANCE/TRANSMISSION PIPELINE	\$107,089,958	2025
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	MUNICIPAL CONSERVATION, NHCRWA	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$59,468,460	2020
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NHCRWA	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT	\$6,067,108	2030
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	CONVEYANCE/TRANSMISSION PIPELINE	\$537,692,455	2025
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	CONVEYANCE/TRANSMISSION PIPELINE	\$373,353,219	2035
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	CONVEYANCE/TRANSMISSION PIPELINE	\$11,503,412	2045
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	NHCRWA TRANSMISSION LINES	CONVEYANCE/TRANSMISSION PIPELINE	\$155,993,406	2025
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	WATER LOSS REDUCTION, NHCRWA	WATER LOSS CONTROL	\$132,740,570	2020
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	WUG INFRASTRUCTURE EXPANSION - NHCRWA DISTRICTS 2025	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	\$106,821,318	2025
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	Y	WUG INFRASTRUCTURE EXPANSION - NHCRWA DISTRICTS 2035	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	\$83,858,688	2035
NORTHWEST PARK MUD	N	MUNICIPAL CONSERVATION, NORTHWEST PARK MUD	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$1,455,250	2020
NORTHWEST PARK MUD	N	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTHWEST PARK MUD	MULTIPLE WELLS/WELL FIELD	\$5,130,247	2030
OAK RIDGE NORTH	N	MUNICIPAL CONSERVATION, OAK RIDGE NORTH	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$208,910	2020
OAKWOOD	N	MUNICIPAL CONSERVATION, OAKWOOD	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$5,890	2040
OLD RIVER-WINFREE	N	WATER LOSS REDUCTION, OLD RIVER-WINFREE	WATER LOSS CONTROL	\$361,100	2020
OLD RIVER-WINFREE	N	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 1	SINGLE WELL	\$1,080,966	2020
OLD RIVER-WINFREE	N	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 2	SINGLE WELL	\$1,080,966	2070
ONALASKA	N	WATER LOSS REDUCTION, ONALASKA	WATER LOSS CONTROL	\$1,511,450	2020
OYSTER CREEK	N	MUNICIPAL CONSERVATION, OYSTER CREEK	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$129,490	2020
OYSTER CREEK	N	WATER LOSS REDUCTION, OYSTER CREEK	WATER LOSS CONTROL	\$283,260	2020
OYSTER CREEK	N	WUG INFRASTRUCTURE EXPANSION - OYSTER CREEK	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	\$1,832,010	2020
PANORAMA VILLAGE	N	MUNICIPAL CONSERVATION, PANORAMA VILLAGE	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$227,300	2020
PANORAMA VILLAGE	N	WUG INFRASTRUCTURE EXPANSION - PANORAMA VILLAGE	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT; PUMP STATION	\$6,493,814	2025
PARKWAY UD	N	MUNICIPAL CONSERVATION, PARKWAY UD	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	\$224,720	2020

ATTACHMENT B

**ADDITIONAL INFORMATION AND BACKGROUND ON NHCRWA AND
EXHIBIT 3 – EXISTING AND PROPOSED PHASED WATER DISTRIBUTION SYSTEM MAP**

The North Harris County Regional Water Authority (NHCRWA) is a special purpose political subdivision of the State of Texas created in 1999. The NHCRWA has jurisdiction over an approximately 338 square mile area, largely comprised of County-Other as defined by the Texas Water Development Board (TWDB), located in northwest Harris County. The NHCRWA has the statutory power to conserve, preserve, protect, recharge, and prevent waste of groundwater including, but not limited to, the power to acquire or develop surface water supplies; to acquire, construct, operate, and maintain a water treatment or supply system; to store, transport, treat, and sell water to others; to allocate water among participants in its Groundwater Reduction Plan (GRP); to coordinate water services; and to exercise the power of eminent domain. Based on the Region H Regional Water Plan, the NHCRWA area is expected to experience significant growth throughout the planning cycle, from approximately 750,000 people in 2020 to approximately 940,000 by 2070. This growth in population will result in significant increased water demands. The NHCRWA was created to develop and implement the strategies for complying with the Harris-Galveston Subsidence District's Regulatory Plan. The NHCRWA's GRP establishes the framework and plans for the implementation of projects to optimize groundwater and surface water supplies and ensuring a sustainable water supply for the population served by the NHCRWA.

Project Cost and Schedule for Final Phase of NHCRWA 2025 Transmission and Distribution System

Project Description/Districts Served	Preliminary Engineering Start	Final Design Start	Construction Start	Project Complete	Total	Line Size	Linear Feet
84" WL along Gessner Road	1/1/2018	1/1/2019	4/1/2020	8/31/2021	\$ 12,387,679	84-inch	4,250
Faulkey Gully WP	2/1/2020	2/1/2021	2/1/2022	8/31/2023	\$ 2,641,334	16-inch	4,470
NWHCMUD 5	2/1/2020	2/1/2021	2/1/2022	8/31/2023	\$ 3,174,991	16-inch	6,500
NWHCMUD 32	2/1/2020	2/1/2021	2/1/2022	8/31/2023	\$ 3,595,761	16 & 30-inch	5,920
WHCMUD 11	2/1/2021	2/1/2022	2/1/2023	8/31/2024	\$ 7,362,494	12, 16, 24 & 30-inch	11,410
WHCMUD 10	2/1/2021	2/1/2022	2/1/2023	8/31/2024	\$ 2,476,497	16 & 24-inch	2,960
WHCMUD 9	2/1/2021	2/1/2022	2/1/2023	8/31/2024	\$ 3,694,676	16 & 24-inch	3,150
HCMUD 168 & NWHCMUD 29	2/1/2022	2/1/2023	2/1/2024	8/31/2025	\$ 7,915,629	16, 20 & 24-inch	12,030
HCMUD's 69 & 222	2/1/2022	2/1/2023	2/1/2024	8/31/2025	\$ 5,258,395	16, 20 & 24-inch	6,910
HCFWSD 61 & HCMUD 248	2/1/2022	2/1/2023	2/1/2024	8/31/2025	\$ 2,801,058	16-inch	5,080
Louetta Regional Water Plant Expansion	8/31/2022	8/31/2023	8/31/2024	8/31/2026	\$ 8,911,558	60-inch	950
City of Tomball	8/31/2022	8/31/2023	8/31/2024	8/31/2026	\$ 37,358,839	24 & 54-inch	67,230
Enchanted Valley WSC	2/1/2024	2/1/2025	2/1/2026	8/31/2027	\$ 3,530,095	16 & 48-inch	2,860
HCWCID 113	2/1/2024	2/1/2025	2/1/2026	8/31/2027	\$ 3,826,695	12 & 48-inch	5,390
HCMUD 365	2/1/2024	2/1/2025	2/1/2026	8/31/2027	\$ 14,691,528	16 & 48-inch	12,650
HCMUD's 360, 364 & 389	2/1/2024	2/1/2025	2/1/2026	8/31/2027	\$ 9,924,637	12, 16 & 24-inch	16,160
NWHCMUD 5	2/1/2025	2/1/2026	2/1/2027	8/31/2028	\$ 5,733,497	16 & 24-inch	9,800
Stable Gate	2/1/2025	2/1/2026	2/1/2027	8/31/2028	\$ 2,281,000	16-inch	6,640
NWHCMUD 10	2/1/2025	2/1/2026	2/1/2027	8/31/2028	\$ 6,050,960	16 & 48-inch	10,170
Cypress Hill MUD 1	2/1/2026	2/1/2027	2/1/2028	8/31/2029	\$ 15,070,624	16, 24, 42 & 48-inch	20,120
HCMUD 391	2/1/2026	2/1/2027	2/1/2028	8/31/2029	\$ 7,096,398	16 & 36-inch	6,480
HCMUD 358, 322, 354 & 396	2/1/2026	2/1/2027	2/1/2028	8/31/2029	\$ 12,103,161	24 & 36-inch	12,190
Hardy Regional Pump Station	2/1/2026	2/1/2027	2/1/2028	8/31/2030	\$ 42,963,220	N/A	0
Hardy Transmission Line	8/31/2026	8/31/2027	8/31/2028	8/31/2030	\$ 34,327,600	54-inch	26,000
Hardy Connector	2/1/2027	2/1/2028	2/1/2029	8/31/2030	\$ 13,711,383	60-inch	11,030
North Park PUD North	2/1/2027	2/1/2028	2/1/2029	8/31/2030	\$ 5,426,858	16 & 42-inch	6,080
North Park PUD South	2/1/2027	2/1/2028	2/1/2029	8/31/2030	\$ 4,042,708	16 & 42-inch	4,050
Richey Road MUD	2/1/2027	2/1/2028	2/1/2029	8/31/2030	\$ 4,908,053	24-inch	7,460
Inverness Forest ID	2/1/2027	2/1/2028	2/1/2029	8/31/2030	\$ 5,823,672	16 & 36-inch	7,280
CNP UD	2/1/2027	2/1/2028	2/1/2029	8/31/2030	\$ 2,276,726	16-inch	6,000
Bridgestone MUD	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 6,360,017	16 & 20-inch	11,930
Meadowhill Regional MUD South & NWHCMUD 28	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 4,028,313	12, 24 & 36-inch	5,900
Meadowhill Regional MUD Central	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 6,437,356	12 & 36-inch	8,590
Meadowhill Regional MUD North & Shasla PUD	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 4,791,070	16 & 36-inch	4,410
CNP UD	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 7,627,691	16, 24 & 42-inch	11,320
HCID 18	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 6,723,087	20 & 36-inch	12,800
HCWCIDs 110 & 99	2/1/2028	2/1/2029	2/1/2030	8/31/2031	\$ 4,476,228	16-inch	7,750
36" Transmission Main Interconnect	2/1/2028	2/1/2029	2/1/1930	8/31/2031	\$ 8,930,636	36-inch	10,450
Totals					\$ 340,742,124		374,370

Escalation: \$ 104,182,876
 Fiscal Services: \$ 112,425,000
 Contingency: \$ 44,495,000
 Grand Total: \$ 601,845,000

Submittal

I, Michael V. Reedy, Vice President, as the designated authorized representative of the North Harris Co Regional WA, hereby approve and authorize the submission of this project information form to the Texas Water Development Board. I certify that all information contained herein is true and correct to the best of my knowledge. I understand the failure to submit a complete project information form by the stated deadlines may result in the withdrawal of the form without review.

Submitted by: Michael V. Reedy, Vice President

Telephone Number: (713) 600-6828

Submitted date: 2018-02-01 11:00:55.577