

TABLE OF CUNTENTS

Page No.

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LETTER OF TRANSMITTAL	
PAST AND FUTURE WATER DEMANDS	1
NEW BRAUNFELS WATER RIGHTS	4
LUCATION OF SURFACE WATER TREATMENT FACILITIES	7
WATER TREATMENT PROCESS	21
DISTRIBUTION SYSTEM OPERATION PLAN	29
LEGAL REQUIREMENTS	35
PROJECT COST ESTIMATES	36
APPENDIX	

HUNTER ASSOCIATES MARCH, 1987 SUPPLEMENTAL REPORT HUNTER ASSOCIATES JULY, 1985 PRELIMINARY REPORT

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RICHARD G. FAGIN, P.E. J. TRAVIS ROBERTS, JR., P.E. PAUL S. BOEDEKER, P. E. SAM C. MCKENZIE, JR., P.E. DAVID J. PREWETT, P.E. CHARLES W. SCHELER, P.E. RICHARD K. ST. JOHN, P.E. ROLEN D. SNOWDEN, P.E. DAVID G. PULLIAM, P.E.

June 13, 1988

Board of Trustees New Brauntels Utilities P.G. Box 315289 New Braunfels, TX 78131-5289

Dear Sirs:

Three years ago you began in earnest to investigate the development of a surface water supply, as an alternate to ground water from the Edwards Aquifer.

A preliminary engineering report was submitted for your review dated July, 1985, comparing the relative merits of joining the GBRA and others in the development of a water treatment plant on Lake Dunlap. After comparing costs and other factors, it was determined that the New Braunfels Utilities should consider developing a treatment plant themselves.

In March, 1987 a supplemental engineering report was submitted to indicate needs and costs of various size units from a plant delivering 6 MGD, 8 MGD, 10 MGD and 12 MGD.

Over the past year, the New Braunfels Utilities has received support of many service organizations to continue with the development of the plant.

We are pleased to submit this report which deals with the details and specific actions taken to date for the completion of this alternate water supply to assist in preserving the Edwards Aquifer and giving the City of New Braunfels a means of survival should the Aquifer run dry or become polluted.

Yours very truly,

HUNTER ASSOCIATES, INC. Consulting Engineers

Sam C. McKenzie, Jr., \.E. Senior Vice President

David J. Prewett, P.E. Vice President

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PAST AND FUTURE WATER DEMANDS

Historically, total water demands within the New Braunfels Utilities service area have increased at an average rate of 3-4% per year, with significant variations due to seasonal precipitation and temperature variations. During the period of January, 1984 through December, 1987, the total number of water customers served by the NBU increased from 9,100 to 10,366, for an average annual increase of 3.48%. Table 1, which follows herein, shows the projected water demands for New Braunfels, from 1987 through 2020, based on a projected average annual increase of 3.5% per year. Figure 1, which also follows herein, shows a graphical representation of the historical and projected water demands for the following conditions:

- A. Minimum monthly average demand
- B. Annual average daily demand
- C. Maximum monthly average demand
- D. Peak daily demand

Based on the historical and projected water demands for New Braunfels, we have recommended that a 6 MGD plant should be considered as the least capacity required to provide for base-load demand for 1990, which would be the earliest that a new facility could be placed in service. However, in order to meet a reasonable future projection of 5-7 years beyond the completion of plant facilities, a plant capacity of 8 MGD would most closely match the projected base demand. Therefore, both alternatives will be considered, though the NBU has agreed that the 8 MGD alternative appears to be most advantageous.

TABLE 1

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NEW BRAUNFELS, TEXAS

PROJECTED WATER DEMANDS

(1987 - 2020)

Year	Total Annual Water Demand (MG)	Avg. Monthly Water Demand (MGD)	Nin. Monthly Water Demand
1987	2,438	6.68	5.35
1990	2,703	7.41	5.93
1995	3,210	8.80	7.05
2000	3,813	10.45	8.37
2005	4,529	12.41	9.94
2010	5,379	14.73	11.80
2015	6,388	17.50	14.02
2020	7,587	20.80	16.

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New Braunfels Water Rights

The following table indicates water rights held by the New Braunfels Utilities and the City of New Braunfels on the Comal River. Certified Filing No. 135 in the amount of 5658 acrefeet per year (a.f./yr.) equals the average of 5.04 million galions per day. It is desired that these rights be transferred to the Guadalupe River to be withdrawn at the site of the water plant for use in the NBU system. These rights would be available as long as the Comal River is discharging this amount in the Guadalupe. Should the Comal River cease to flow, there would be <u>no</u> rights for the NBU from the Guadalupe.

Should this severe drought occur, the only source of supply for the water treatment plant would be from storage in Canyon Lake. Therefore, consideration should be given for the base loaded plant to rely entirely on Lake Canyon water and purchased from the G.B.R.A.

The Certified Filing 411 held by the City of New Braunfels, in the amount of 1,289 a.f./yr., equals 1.15 M.G.D. and would continue to be held by the City of New Braunfels for irrigation of the Municipal Golf Course.

(Preliminary) Major Guadalupe-Blanco River Basin Water Rights

(Use of 5,000 acre feet or more per annum)

Listed by Priority Date

NOTE: Information shown is not based on results of adjudication proceedings except for New Braunfels Utilities and City of New Braunfels

Water Right No.	County	River Order No.	Appropriator	Stream	Purpose	Amount Authorized (a.f./yr.)	Priority Date
A21	Guadalupe	642500	G-B R A TP1	Guad.	Hydro.	941,161	4/01/14
A21	Guadalupe	623500	G-B R A TP3	Guad.	Hydro.	941,161	4/01/14
A21	Guadalupe	610000	G-B R A TP4	Guad.	Hydro.	941,161	4/01/14
A21	Guadalupe	582500	G-B R A TP5	Guad.	Hydro.	941,161	4/01/14
*(CF135	Comal	702500	New Braunfels Utilities	Comal	Ind.	141,438(5658)	6/01/14
			•		Hydro.	124,870	6/01/14
č					Irr.	200	6/01/14
CF571 A	Gonzales	320000	City of Gonzales	Guad.	Hydro.	796,363	6/16/14
CF802 B	Guadalupe	600500	Seguin Municipal Utilities	Guad.	Hydro.	300,448	6/24/14
CF803 B	Guadalupe	597500	Seguin Municipal Utilities	Guad.	MunDom.	7,000	6/24/14
* CF411	Comal	715000	City of New Braunfels	Comal	MunDom.	1,289	6/27/14
* CF294	Comal	700000	City of New Braunfels	Comal	Rec.	-0-	6/29/14

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Water No.	Right	County .	River Order No.	Appropriator	Stream	Purpose	Amount Authorized	Priority Date
*(CF326 ((and	A	Coma l	685000	West Point Pepperell, Inc. et al. and	Guad.	Ind.	3,388(339)	6/29/14
*(A2050 /	A	Comal	685000	New Braunfels Utilities	Guad.	Ind.	5	6/29/14
CF324		Comal	687500	Camp Warnecke, Inc.	Comal	Hydro.	144,794	6/30/14
A1163		Gonzales	520000	G-B R A (H-5)	Guad.	Hydro.	941,200	9/10/28
A1163		Gonzales	537500	G-B R A (H-4)	Guad.	Hydro.	941,200	9/10/28
A1163		Gonzales	537900	G-B R A (H-3)	Guad.	Hydro.	941,200	9/10/28
A1163		Guadalupe	538200	G-B R A (H-2)	Guad.	Hydro.	941,200	9/10/28
A1163		Guadalupe	548500	G-B R A (H-1)	Guad.	Hydro.	941,200	9/10/28
A1469		Calhoun	100000	Union Carbide, et al.	Guad.	Irr.	42,615	5/14/45
A1469 (3	Calhoun	007500	Union Carbide, et al.	Guad.	Irr.	8,632	1/26/48
A1578 I	3	Victoria	150000	E I DuPont De Nemours	Guad.	Ind.	198,000	10/05/48
A1713		Calhoun	070530	West Side Calhoun N D	Guad.	Irr.	9,944	6/21/51
A1723		Victoria	170000	Central Power & Light Co.	Guad.	Ind.	209,189	8/15/51
A1736 E	5	Calhoun	115000	Union Carbide, et al.	Guad.	Ind.	12,600	1/7/52

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LUCATION OF SURFACE WATER TREATMENT FACILITIES

Previous reports indicated several possible locations, along the Guadalupe River, for the construction of the water plant. A more in-depth investigation of specific sites was required, so the New Braunfels Utilities engaged a real estate firm to study seven (7) tracts of land. A map follows showing the location of those seven tracts. The resulting report by this tirm gave the following information on each site:

A. Acreage

B. Zoning

C. Relationsnip to the area flood plain

D. Access to

1. Guadalupe River

2. Cities' water, sewer and electrical systems

E. Availability

F. Cost

After analyzing all the sites, it was agreed that site two (2) would best meet the criteria established in the preliminary report of July, 1985, page 7.

The following information was presented by the real estate report on the preferred site No. 2:

A. 12.38 acres of land located at 388 East Austin Street.

B. Zoning is R2-Duplex.

C. The flood plain is Zone B, a part of which is within the 500 year flood plain.

D. Access to:



1. The Guadalupe River is only 1,500 feet from the site, following the route of a local creek, referred to as German Creek.

2. Utilities:

a) A six inch (6") sewer line flows along the northeasterly property line to a sewage lift station at the northerly property corner. The force main parallels the northwesterly property line to Austin Street.

Six inch (6") water lines are located in Austin b) Street to the West and Albert Street to the East. Unly six hundred feet (600') away in East Torry Street there is a major water transmission line, eighteen inches (18") in diameter, that carries water across the Guadalupe River to the service areas the on northeasterly side of the City of New Braunfels. This is the largest of several major water lines crossing the River.

3. Electric service is available with three phase service in Austin Street.

C. The property was available for sale, with a listed price of \$400,000.

The following maps of Tract 2 follows:

Local neighborhood area map with 500 year flood plain in
 Zone B.

2. Boundary map of the 12.38 tract.

3. Water line map of the area.

4. Sewer line map of the area.









In order to determine a market value of the property, the New Braunfels Utilities engaged a Real Estate Appraisal Consultant to evaluate the desired property. The entire track consists of 12.374 acres. However, .4325 acres is located on a high bluff, with a small residential home adjacent to Austin Street, which would be unusable for the water plant. Therefore, the remaining property would be 11.9415 acres to be evaluated. A copy of the transmittal letter to the New Braunfels Utilities follows, indicating that the market value of the subject property to be \$238,830.00.

The Owner of the property has signed an earnest money contract with the New Brauntels Utilities in the amount of \$258,830, \$20,000 greater than the appraised value. A copy of the earnest money contract follows:

The site is now being investigated for yeological, archeological and historical considerations.

CURTIS W. BREMER, S.R.A., R.M., C.R.A. RONNY W. JOHNSON

> CURTIS W. BREMER, INC. Prod Colate Appension & Consultants 409 N. SEGUIN ST. NEW BRAUNFELS, TEXAS 78130 512 625-7522

> > March 30, 1988

Mr. Roger Biggers New Braunfels Utilities P.O. Box 289 New Braunfels, Texas 78130

> Re: 11.9415 Acres City of New Braunfels

Dear Mr. Biggers:

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In accordance with your request, we have personally made a complete inspection of the above referenced property for the purpose of estimating its market value. Market value may be defined to mean: "the most probable price in terms of money which a property should bring in competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably, and assuming the price is not affected by undue stimulus."

The subject property is legally described as being 11.9415 acres of land out of the J.M. Veramendi Two League Survey No. 1, Comal County, Texas. It is further described by an attached acquisition deed.

Based upon a study of comparable sales and other pertinent factors, which are attached in the appraisal report that follows, it is the appraisers' opinion that the estimated market value of the subject property as of March 14, 1988 was:

TWO HUNDRED THIRTY EIGHT THOUSAND EIGHT HUNDRED THIRTY DOLLARS (238,830.00).

Your attention is invited to review the attached appraisal report which is an integral part of this letter.

It should be clearly understood that this letter and attached appraisal report constitute only a statement of the final value estimate, but that this value has been based upon a written appraisal report. This report, although in rough form, has been prepared and retained in our files, and is available to you for review should you desire. Should you require a more detailed narrative report, the same is available to you upon request. The report in our files is incorporated herein by reference and is an integral part of the report.

We trust that the previous information will serve your purpose at this time. Should you need any additional detailed information or assistance, please contact us.

Respectfully submitted,

PREMON

Curtis W. Bremer, S.R.A., R.M.

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Ronny W. Johnson

CWB;RWJ/fk

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THIS CC COUNSE	EAKNEDI MUNEI UUNIKALI-UUMMERUKU DIMIMI KUVEDI KUI EKII
OF COM	TRACT FORM HAS BEEN TREPARED FOR USE BY MEMBERS OF THE HOUSING BOARD OF REALFORD IN THE EDAL ,, AN ATTORNEY AT LAW LICENSED IN TEXAS, AND APPROVED FOR USE IN A TRANSACTION INVOLVING THE SALE RECIAL UNIMPROVED PROFERTY THIS FORM HAS NOT BEEN DRAFTED FOR A SPECIFIC TRANSACTION. THEREFORE THES ARE ADVISED TO CONSULT THEIR ATTORNEYS BEFORE SIGNING.
I. PAR	ES: HOWARD D. SPANDAU, TRUSTEE (Selice
agree (Buve cond	to sell and convey to <u>DEW DEWORPERS</u> UTILITIES) and Buyer agrees to buy from Seiler the toilowing property for the consideration and upon and subject to the terms, provisions, an ions hereinafter set forth.
2. PRO with and/c desi/ SURV know	ERTY: A met of land situated in COMAL County, Texas, togethed limprovements and tixtures, privileges, and appurtenances pertaining thereto hereinafter collectively called "Property," described as follow as set out on Exhibit "A" attached hereto and incorporated herein: Approximately 12.374 acree tract as nated by survey attached less approximately .4 acres more or less. SEE ATTACHED Y. Purchase to exclude property that is included in the yellow highlighted area as 388 E. Austin St., a residence and approximately .4 acres more or less.
The in th	etes and bounds description determined by the survey of the Property hereinafter provided for will replace Exhibit "A" attached herei event it should differ from the attached exhibit.
3. CON A. (B. 9 C. 9 D. (RACT SALES PRICE: \$_258,830,00 Jums of all notes described in Paragraph 4 below \$
	The sales price shall not be based upon the number of acres/square feet comprising the Property as determined by the survey. If the survey of the Property required by Paragraph 19 reflects that the number of total () acres () square feet comprising the Property is more or less than () total acres or () total square feet ("Total Area"), the Sales Price and the cash payable at closing shall be increased or reduced by the product of S multiplied by the amount o increase or decrease of the total area.
) If the survey of the Property required by Paragraph 19 reflects that the number of net () acres () square feet comprising the Property is more or less than () net acres or () net square feet ("Net Area"), the Sales Price and the cash payable at closing shall be increased or reduced by the product of $S_{}$ multiplied by the amount of increase or decrease of the net area.
4. FINA	NCING: . SUBJECT TO: Buyer takes subject to, and does not assume payment of, the unpaid balance of that promissory note to
	does not assume those obligations imposed by the Deed of Trust recorded in the county where the Property is situated. Buyer shall
	pay the installment payment due after the date of closing. The principal balance at closing will be \$, allowing for an agreed \$
	pay the installment payment due after the date of closing. The principal balance at closing will be \$
	pay the installment payment due after the date of closing. The principal balance at closing will be \$
	pay the installment payment due after the date of closing. The principal balance at closing will be \$
	pay the installment payment due after the date of closing. The principal balance at closing will be \$
	pay the installment payment due after the date of closing. The principal balance at closing will be \$

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(4) The Note shall provide for no personal or corporate liability in the event of a default, it being understood that the holder of the Note may look only to the security provided by the Dred of Trust and retained vendors lien to entrace the payment of the indeftedness.

Any Seller trianced note may be prepaid in whole or in part at any time without penalty. Any prepayments are to be applied toward the payment of the installments of principal last maturing, but interest shall immediately cease upon amount of principal prepaid. The lien securing payment of such note will be interior to any lien securing any loan assumed, taken subject to or given in connection with third party tinancing. For note herein provided shall be secured by Vendor's and Deed of Trust liens. A Vendor's Lien and Deed of Trust to secure any assumpt Buyer's performance if taken subject to shall be required, which lien shall be automatically released on execution and delivery of a time by noteholder. In case of dispute as to the form of the Deed, Notets), or Deed of Trust(s), forms prepared by the State Bar of Texas shall be

by noteholder. In case of dispute as to the form of the Deed, Noteis), or Deed of Trustis), forms prepared by the State Bar of Texas shall be used. Each note herein provided shall contain provision for acceleration of maturity in the event of default and for the payment of reasonable attorney's fees if the note is placed in the hands of an attorney for collection.

5. EARNEST MONEY: <u>\$2,500.00</u> is herewith tendered and is to be deposited as Earnest Money with Land-Tex Title as Escrow Agent, and placed in an interest bearing account, upon execution of the Contract

by both parties.

- - A. At the closing, Seller shall deliver to Buyer, at Seller's sole cost and expense, the following:
 - (1) A duly executed and acknowledged General Warranty Deed conveying good and indefeasible title in fee simple to all of the Property, free and clear of any and all liens, encumbrances, conditions, easements, assessments, reservations and restrictions, except as permitted herein and/or approved by Buyer in writing;
 - (2) An Owner's Policy of Title Insurance (the "Title Policy") issued by _____ Land-Tex Title Co.

in the full amount of the Sales Price, dated as of closing, insuring Buver's fee simple title to the Property to be good and indefeasible subject only to those title exceptions permitted herein, or as may be approved by Buyer in writing, and the standard printed exceptions contained in the usual form of the Title Policy, provided, however:

(b) the exception as to restrictive covenants shall be endorsed "None of Record";

(c) the exception as to taxes shall be limited to taxes for the current year and subsequent years, and subsequent assessments for prior years due to changes in land usage or ownership;

- (3) Furnish evidence of its capacity and authority for the closing of this transaction;
- (4) Execute all other necessary documents to close this transaction.
- B. At the closing, Buyer shall perform the following:
 - (1) Pay the cash portion of the Sales Price;
 - (2) Execute the note(s) and deed(s) of trust provided for herein;
 - (3) Furnish evidence of its capacity and authority for the closing of this transaction;
 - (4) Furnish to Seller and/or Third Party Lender, at Buyer's expense, a mortgagee's policy issued by title company for the deed(s) of trust 1 11
 - (5) Execute all other necessary documents to close this transaction.

7. FEASIBILITY STUDY: Buyer 2015 Is not granted the right to conduct an engineering, and/or market and econimic feasibility study ("Feasibility Study") of the Property. In the event Buyer is granted such right, Buyer shall have <u>Gmos</u> growtrom the effective date hereof to perform such study, and in this regard, Buyer or his designated agents may enter upon the Property for purposes of such analysis, core drilling, or other tests and inspections which may be deemed necessary by Buyer. If Buyer determines, in his sole judgment, that the Property is not suitable for any reason for Buyer's intended use or purpose, then Buyer may, on written notice to Seller on or before <u>BILOS</u> digit from the effective date hereof, terminate this agreement, and it shall be null and void for all purposes and the Earnest Money shall be returned to Buyer. If the written notice is not given to Seller within such period, this condition and any and all objections with respect to the Feasibility Study shall be deemed to have been waived by Buyer for all purposes. In the event this Contract shall not close, through no fault of Seller, Buyer shall restore the Property to its original condition, if changed due to the contract shall not close, through no fault of Seller, Buyer shall a copy of the results of any tests and inspections made by Buyer, excluding any market and economic feasibility studies.

8. BROKER'S FEE:	JACK OHLRICH REALTY, INC.	Listing
Broker (_6%) and		Comal

Co-Broker (______%) (collectively the "Broker"), as Broker, has negotiated this sale and Seller agrees to pay Broker in **JOGM** County, Texas, on consummation of this sale or on Seller's default (unless otherwise provided herein) a total cash fee of _______ of the total Sales Price, which Escrow Agent shall pay from the sales proceeds.

9. POSSESSION: The possession of the Property shall be delivered to Buyer at funding.

10. SPECIAL PROVISIONS:

It is the agreement of the parties that Buyer shall have the right, during the pendency of the contract, to conduct such tests and secure such approvals from third parties as Buyer may deem necessary to assure the suitability of the property to Buyer's intended use. If Buyer determines not to close this transaction for whatever reason, Buyer shall return the property to its original condition. If Buyer does not close this transaction for reaother than Sellers default under the terms hereof, the earnest money described herein sha be paid to Seller.

3.

Seller shall have the right, at his sole descretion, to remove, prior to closing, all barns, outbuildings and other structures from the property.

(Insert factual statements and business details applicable to this sale.)

documents, reconditions, includes the end of a second second second second by Buser under other provisions of this Contract reservations, or conditions, interting the Property, and expenses stipulated to be paid by Buser under other provisions of this Contract

- 12. PRORATIONS: Insurance (at Buyer's option), interest on any assumed or subject to debt, assessments, current taxes, and any rents and maintenance tees shall be prorated to the date of closing. If ad valorem taxes for the year in which the sale is closed are not available on the Closing Date protation of taxes shall be made on the basis of taxes assessed in the previous year, with a subsequent cash adjustment of such promition to be made between Seiler and Buyer, it necessary, when actual tax figures are available. If Buyer is assuming payment of or taxing subject to any existing loan on the Property, all reserve deposits for the payment of taxes, insurance-premiums, or other changes shall be transferred to Buyer by Seiler and Buyer shall pay to Seiler the amount of such reserve deposits.
- 13. TITLE APPROVAL: Seller shall deliver to Buver within twenty (20) days from the date of this Contract a Commitment for Title Insurance (the "Commitment") and, at Buver's request, legible copies of all recorded instruments affecting the Property and recited as excertions in the Commitment. If Buyer has an objection to items disclosed in such Commitment or survey. Buyer shall have fourteen (14) days after receipt of such instruments to make written objections to Seller. If Buyer or a third party lender makes such objections or if objections are disclosed in the Commitment, survey, or by the issuer of the Title Policy. Seller shall have thirty (30) days from the date such objections are disclosed to cure the same, and the Closing Date shall be extended, if necessary. If the objections are not satisfied by the extended Closing Date, this Contract shall terminate and the Eamest Money refunded to Buyer, unless Buyer delects to waive the unstatisfied objections and complete the purchase.
- 15. ATTORNEY'S FEES: Any signatory to this Contract who is the prevailing party in any legal proceeding against any other signatory brought under or with relation to this Contract or transaction shall be additionally entitled to recover court costs and reasonable attorney's fees from the non-prevailing party.
- 16. ESCROW: The Earnest Money is deposited with Escrow Agent with the understanding that Escrow Agent (i) does not assume or have any liability for performance or non-performance of any party and (ii) has the right or require the written release of Escrow Agent, the termination of this Contract, and the authorization from all parties to disburse the Earnest Money. At closing, Earnest Money and accrued interest shall be applied to any cash down payment required, next to Buyer's closing costs and any excess refunded to Buyer. In preparation for closing, the Escrow Agent or Broker may incur actual expenses on behalf of Seller or Buyer; therefore, any refund or payment of the Earnest Money, and the Escrow Agent will be the to the creditors entitled thereto. To the extent that the Seller's share of the Earnest Money is insufficient to pay such expenses, the same will be deducted from the Broker's share of the Earnest Money.
- 17. REPRESENTATIONS: Seller hereby represents and warrants to Buyer as follows, which representations and warranties shall be deemed made by Seller to Buyer also as of closing date and such representations and warranties shall survive closing:
 - A. There are no parties in possession of any portion of the Property as lessees, tenants at sufferance, or trespassers;
 - B. There is no pending or threatened condemnation or similar proceeding or assessment affecting the Property, or any part thereof, nor to the best knowledge and belief of Seller is any such proceeding or assessment contemplated by any governmental authority;
 - C. Seller is the fee simple owner of the title to the Property and is July authorized and empowered to sell said Property;
 - D. Seller has paid, through the current year, all taxes, charges, debts, and other assessments due by the Seller with respect to the Property;
 - E. The Property is not in a flood plain or water district, except as follows: 500 year flood plain
 - E. All loan(s) assumed or taken subject to will not be in default;

. . . .

- G. There will be no unrecorded liens or Uniform Commercial Code liens against any of the Property which will not be satisfied out of the Sales Price; [11]
- H. Seller knows of no existing condition with respect to the Property of its operation which violates any government code or regulation;
- 1. Seller has no knowledge that the Property is subject to any surface or sub-surface ground faults;
- J. The Property is not being used and Seller has no knowledge that it has ever been used for the storage or disposal of any hazardous or toxic materials;
- K. To the best of Seller's knowledge, no fact or condition exists which would result in the termination of the current access from the Property to any presently existing highways and/or roads adjoining or situated on the Property, or to any existing sewer or other utility facilities servicing, adjoining, or situated on the Property;
- L. Seller shall not further encumber, or allow the encumbrance of, the title to the Property, or modify the terms or conditions of any existing encumbrances, if any, without the written consent of Buyer.

If any representation above is untrue, this Contract may be terminated by Buyer and Earnest Money shall be refunded to Buyer, excluding (D), (F) and (G) which shall be remedied by Seller prior to closing.

18. USE OR PROPERTY: Seller I has I than not claimed the benefit of laws permitting a special use valuation for the purposes of payment of ad valorem taxes on the Property, and if so, Seller represents that he was legally entitled to claim such benefits. If Seller claimed such benefit and after the purchase is closed, Buyer changes the use of the Property and the same results in the assessment of additional taxes, such additional taxes will be the obligation of the Buyer. The representation herein shall survive closing.

and shall be calculated to the nearest one-thousandeth (1000th) of an acre. All easements and rights-of-way shall be referenced to the recording information applicable to the documents creating such easements or rights-of-way which have been recorded with the Guinty Clerk of the County in which the Property is located. The survey shall locate and mark all corners and angles of the Property's perimeter on the ground with permanent, butted into surveyor's stakes.

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below the signature of such party hereto.		

- 8 This Contract shall be construed under and in accordance with the laws of the State of Texas, and all obligations of the parties created hereunder are performable in 1968. County, Texas. Comal This Contract shall be binding upon and inure to the benetit of the parties hereto and their respective heirs, executors, administration,
- C. legal representatives, successors, and assigns.
- D. In case any one of more of the provisions contained in this Contract shall for any reason be held to be invalid, illegal, and unenforce in any respect, such invalidity, illegality, or unentorceability shall not affect any other provision hereof, and this Contract shall be construed as if such invatid, illegal, or unentorceable provision had never been contained herein.
- E. This Contract constitutes the sole and only agreement of the parties hereto and supersedes any prior understandings or written or oral agreements between the parties respecting the within subject matter and cannot be changed except by their written consent.
- F. Time is of the essence of this Contract.
- G. Words of any gender used in this Contract shall be held and construed to include any other gender, and words in the singular number shall be held to include the plural, and vice versa, unless the context requires otherwise.
- H. In accordance with the requirements of the Texas Real Estate License Act, Buver is hereby advised by Broker: (1) that it should be furnished with or obtain a policy of title insurance or have the abstract covering the Property examined by any attorney of its own selection, and (2) that unless otherwise agreed to in writing by the parties hereto, Broker and Co-Broker are being paid by Seller and are representing Seller in this transaction.
- 22. ASSIGNMENT:
 - 🕸 A. Buyer may not assign this contract.
 - B. Buver may assign this Contract and all rights hereunder and shall be relieved of any future liability under this Contract provided the assignce shall assume in writing all the obligations of Buyer hereunder.
- 23. TERMINATION OF OFFER: Unless accepted by Seiler, as evidenced by Seiler's signature hereto and delivered to Buyer by 5-00 P.M., the May ., 19.88..., this offer to purchase shall be null and void and all parties hereto shall stand <u>_18th</u> day of ___ relieved and released of any and all liability or obligations hereunder and all Earnest Money shall be returned to Buyer.
- 24. CONSULT YOUR ATTORNEY: This is intended to be a legally binding contract. READ IT CAREFULLY. NO REPRESENTATION OR RECOMMENDATION IS MADE BY BROKER OR ITS AGENTS OR EMPLOYEES AS TO THE LEGAL SUFFICIENCY, LEGAL EFFECT, OR TAX CONSEQUENCES OF THIS DOCUMENT OR THE TRANSACTION RELATING THERETO. THESE ARE QUESTIONS FOR YOUR ATTORNEY. CONSULT YOUR ATTORNEY BEFORE SIGNING. The Broker cannot give you legal advice - only factual and business details concerning land and improvements.

BRUCE BOYER - SELLER'S ATTO	RNEY	S. T.BURRUS - BUYER'S A	FTORNEY
Jack Chlrich Realty, Inc.	308623-00		
Listing Broker	License No.	Seiler Howard D. Spandau,	, Trustee
By <u>Toya Ohlrich Lindsey</u>		C U	
		1272 Discours Courses	
		New Braunfels, Tx 78130	(512) 625-7772
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Page 4 of 4

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WATER TREATMENT PROCESS

A. Water Quality

As discussed in previous reports, the quality of the water in the Guadalupe River is generally very good. Minimal treatment would be required for this water; the only requirements would be treatment facilities to allow for the removal of turbidity (silt and colloidal organic materials), control of taste and odor, and disinfection.

In general, the chemical quality of the Guadalupe River water is very good, and very similar to the Edwards Aquifer water at the Comal Springs. Both waters have a relatively high hardness, and the Utilities may want to consider converting to a softening process to decrease the hardness content of the city water. The relative chemical characteristics of the two waters are as follows:

Chemical Constituent	Guadalupe River	<u>Comal Springs</u>
Iron (Fe)		0.02-0.03
Calcium (Ca)	40-80	65- 80
Magnesium (Mg)	10- 14	15- 20
Sodium (Na)	3- 8	6- 8
Potassium (K)	1- 3	0.5- 3
Carbonate (CO3)		
Bicarbonate (HCU3)	170-280	260-290
Sulfate (SO4)	11- 18	20- 30
Chloride (Cl)	6- 14	9- 14
Total Dissolved Solids	180-290	260-300
Hardness as CaCO3	160-260	240-280
pH	7.3-7.5	6.8-7.8

B. Proposed Treatment Facilities

It is presently anticipated that the first phase of the NBU Water Treatment Plant should be sized to adequately treat 8 mgd of water from the Guadalupe River, for storage and distribution in the NBU system. However, due to the potential for growth in New Braunfels, and the possible future participation of other water. supply and distribution entities, some of the components of the system should be designed to accommodate the future needs. The treatment process proposed for this project would be composed of the following facilities:

> <u>Raw Water Intake and Pump Station</u>: For pumping water from the Guadalupe River to the site of the surface water treatment facilities.

a) Raw Water Intake Structure - to be designed for screening of large solids, such as tree limbs, etc., and sized to accommodate a future maximum intake capacity of approximately 20 mgd.

b) Pump Station Facilities - to be designed to pump 8 mgd at present with one (1) additional pump as a standby unit; pump station to be designed to accommodate additional pumps and/or larger pumps, as needed to match future demands.

2. Phase I - Water Treatment Unit

To be designed to treat 8 mgd (5,600 gpm) of raw water; facilities to be designed for removal of turbidity, adjustment of pH, control of tastes and odors, and disinfection; and to accommodate the future conversion

to a lime or lime/soda softening process if an when desired by NBU. The treatment unit will include: a) Inlet Rapid Mix Basin - for mixing chemicals with the water for removal of the silt and organic materials. b) Flocculation Basins (2 Ea.) - for providing reaction time to build the size of the particles and particulate matter for subsequent settling.

c) Settling Basins (2 Ea.) - for settling of the flocculated particulate matter.

d) Filter Unit (10 Filter Cells) - for filtering of any residual fine organic or colloidal-type particulate materials. To be designed as dual media (sand and anthracite) for high rate filtering with air/water gravity backwashing.

3. Clearwell Storage and High-Service Pumping Facilities

a) Clearwell Storage Tank - covered ground level storage situated to fill by gravity from the treatment unit; to be sized for 1.5-2.0 mg total storage capacity (4.5-6.0 hours of plant production).

b) High Service Pump Station - to pump finished water
 for storage and distribution in the eastern end of New
 Braunfels.

c) Low Service Pump Station - to transfer finished water to the existing ground storage tanks at the Water Plant and Well #5 locations, for subsequent pumping into high service for the central and west portions of the City.

4. Backwash Decant Basin/Sludge Thickener

For separating the filtered and settled materials for thickening and removal of water from the sludge with facilities to recycle the water portion back to the head end of the treatment plant.

5. Sludye be-watering Facilities

For ae-watering the sluage to consistency of approximately 12% to 15% sludge to be subsequently removed to the lanafill.

6. Chemical Storage and Feeding Facilities

For feeding alum and/or polyelectrolyte for flocculation, and soda ash for pH adjustment of the water, chlorine for disinfection, and hydrotluosilicic acid for fluoridation.

7. <u>Plant Administration, Laboratory and Control Building</u> To provide plant administrative offices, plant control laboratory facilities, and primary motor controls necessary for plant operation.

C. Incremental Facility Sizing

As previously discussed, we feel that the first phase water treatment facilities should be sized to treat 8.0 mgd (5,600 gpm), as this capacity should provide for the projected base demand for the year 1995. The sizing of subsequent increments would depend upon future projections of water demands for New Braunfels, and for any and all other entities which may participate in future additions. Considering the water rights presently held

by the New Braunfels Utilities plus the volume of water available through the GBRA from storage at Canyon Reservoir, we feel that ultimately this plant could be required to treat as much as 20-24 mgd. Thus we have included a preliminary site plan of the proposed plant site, which follows herein, showing three (3) incrementally sized 8.0 mgd treatment units, thus indicating the capability of the site to accommodate such an overall plan.

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WATER THEATMENT

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DISTRIBUTION SYSTEM OPERATION PLAN

A. Existing System

The New Braunfels water system is supplied by six wells located generally along the Balcones Fault. Wells 1, 2 and 3 are located at the water plant on Central Avenue; Well 5 is located in Landa Park; Well 4 is near State Highway 46 on Laurel Lane; Well 6 is on Moss Rock Drive near Wald Road. These relatively high capacity wells provide the system with good quality water from the Edwards Aquifer at varying capacities.

All of the wells, except Well 6, pump directly into ground storage reservoirs near the wells, then high-service booster pumps pump from the ground storage reservoirs, through the piping network and into elevated storage reservoirs at various locations throughout the City. The water level in these elevated reservoirs is maintained at an elevation to supply the City with water of sufficient quantity and adequate pressure.

Due to the variation in ground elevation in the City, the water system has been divided into five pressure zones. The majority of the City of New Braunfels is located in Pressure Zone 2-3 at an elevation of 795. Pressure Zones 1, 4 and 5 serve the customers who live in the higher elevations of the City, which is located above the Edwards Aquifer recharge zone. A new pressure zone is being established in the northerly area of the City to serve the industrial area long IH-35, to be referred to as Pressure Zone 6 at elevation 900.

All of the higher zones are being supplied by high service booster pumps from the storage tanks in Pressure Zone 2-3. Each of these higher pressure zones are supplied from at least two sources of water from Pressure Zone 2-3.

B. Proposed System Plan

when the surface water treatment plant is completed, it will supply the City of New Braunfels with eight (8) million gallons of water daily. The following map indicates the proposed improvements necessary to supply the distribution system with this alternate water supply.

The raw water intake structure (1) will be located on a tract of land owned by the City of New Braunfels, north of the Comal County Fair Grounds. The water level in the Guadalupe River at this location is relatively constant due to the small concrete dam located just upstream at Common Street.

Raw water from the intake structure will be pumped through a raw water pipeline 2 to the water treatment plant 3, which will be located at the selected site. Treated water will then be stored in a ground storage reservoir 4 and pumped into the distribution system by booster pumps.

The majority of the water used in the distribution system is provided from the main water plant and the plant in Landa Park. At each of these locations there is a 1/2 million gallon storage reservoir, with high service booster pumps that deliver water to the distribution system.

The eight million gallons of surface water will be divided into three systems, as follows:

Two million gallons to be delivered to the existing 18"
 pipeline in Torrey Street through a 12" high pressure main (5)
 This water will be transmitted across the Guadalupe River
 to the northeasterly area of the City and the newly developed
 Pressure Zone 6.

2. A twenty-four inch (24") pipeline (b) will be installed from the treatment plant along Torrey Street to Elizabeth Street. Six (6) million gallons will be pumped by booster pumps through the 24" pipe at a low pressure.

3. From the 24" pipeline, fourteen inch (14") low pressure pipelines (7) will be installed to deliver three (3) million gallons of water to each of the storage tanks at the water plant and in Landa Park. The existing high service booster pumps will then pump this six million gallons per day into the distribution system.

This plan will reduce the use of Wells 1, 2, 3 and 5, which now pump water from the Edwards Aquifer.

During peak demands, ground water from the Edwards will be pumped from Wells 4 and 6 and delivered into the distribution system to supplement the surface water.

In future years, as the demand for surface water becomes greater, this plan can be extended to assist in reducing the demand on the Edwards Aquifer from Wells 4 and 6. The future expansion would consist of the following:

> 1. Previous development plans for the New Braunfels Utilities included a ground storage water reservoir and high service pumps to be installed on the property of the old LCRA power plant (8b), now controlled by the NBU.

> 2. A twenty inch (20") pipeline (Ba) at low pressure would be installed from the 24" pipeline at Elizabeth Street to furnish surface water to the storage reservoir.

3. The high service pumps would deliver water into the westerly distribution system through two separate twelve inch (12") mains (8c), along Wald Road to Well 6 and the other along a route to the Coll Street Standpipe.

This overall plan will provide the New Braunfels Utilities an alternate source of a water supply and aid in the protection of the Edwards Aquifer.


LEGAL REQUIREMENTS

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The New Braunfels Utilities has employed the firm of Hooper, Robinson, Moeller and Hoag to assist the Utilities' attorney Tom Burrus in providing legal services required for the following:

- G.B.R.A. water purchase contract to specify the amount of Canyon Lake water that NBU will acquire on a take-or-pay basis, establish a procedure for NBU to receive water when needed and obtaining acceptance by both Boards of Trustees of NBU and G.B.R.A.
- 2. Contract with City of San Marcos, specifying operations and maintenance cost of water treatment to be paid NBU, as well as transmission costs to point of delivery for the San Marcos supply and other legal requirements in the agreement between the two parties.
- 3. Amend the existing Comal River water rights through the Texas Water Commission, to change use from industrial to municipal use.
- 4. Amend the water rights from the present point of diversion from the Comal River to the Guadalupe River.
- 5. Prepare applications and represent NBU at all public hearings called by the Texas Water Commission.

PROJECT CUST ESTIMATES

Overall project cost estimates, for both the 6.0 MGD and 8.0 MGD alternatives, are shown on the Table which follows herein. The estimated costs shown include itemized costs for the various phases of construction required to furnish the complete system capable of delivering treated water to the existing distribution system as discussed herein. Some of the costs shown reflect a slight increase over the costs estimated in the previous reports, which is generally attributable to two factors:

A. Site Requirements - now that the plant and intake sites have been located, a more accurate estimate can be made.

B. Unit Component Oversizing - to allow for the future inclusion of additional facilities.

NEW BRAUNFELS, TEXAS

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SURFACE WATER SUPPLY

CAPITAL COSTS

	Item Description	Alt. "A" (b.U MGD)	Alt. "B" (8.0 MGD)
1.	Raw Water Intake/Pump Station	\$ 450,000	\$ 500,000
2.	Raw Water Piping	\$ 100,000	\$ 100,000
3.	Water Treatment Facilities	\$2,800,000	\$3,500,000
4.	Sludge Handling/Dewatering Facility	\$ 600,000	\$ 700,000
5.	Clearwell Storage and High Service Pump Facilities	\$ 550,000	\$ 650,000
6.	Treated Water Transmission Piping to Distribution System	<u>\$ 450,000</u>	\$ 650,000
	Sub-Total for Construction	\$4,950,000	\$6,100,000
	Contingencies (10%)	\$ 495,000	\$ 610,000
	Engineering, Surveying and Inspection (10%)	\$ 495,000	\$ 610,000
	Land and Easements	\$ 260,000	\$ 260,000
	Administration	\$ 20,000	<u>\$ 20,000</u>
	Total Capital Cost	\$6,220,000	\$7,600,000
	Annual Debt Service (20 years @ 7.0%)	\$ 587,100	\$ 717,400

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APPENDIX

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SUPPLEMENTAL ENGINEERING REPORT

for

DEVELOPMENT OF SURFACE WATER SUPPLY

AND WATER TREATMENT FACILITIES

HUNTER ASSOCIATES, INC. AUSTIN, TEXAS

March, 1987

Hunter Associates CONSULTING ENGINEERS

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	DESCRIPTION	PAGE NO.
Ι.	INTRODUCTION	1
II.	WATER DEMAND/PRODUCTION	2
	Table 1 - 1984 Water Production	4
	Table 2 - 1985 Water Production	5
	Table 3 - 1986 Water Production	6
	Table 4 - Estimated Plant Operating Efficiencies	7
III.	WATER RIGHTS/AVAILABILITY	8
IV.	LOCATION OF SURFACE WATER TREATMENT FACILITIES	10
	Water Project Key Map	12
۷.	WATER TREATMENT PROCESS	13
VI.	PROJECT COST ANALYSIS	14
	Table 5 - Surface Water Supply Capital Costs	16
	Table 6 - Surface Water Supply Annual Production Costs	17
VII.	SUMMARY AND RECOMMENDATIONS	18

Hunter Associates

I. INTRODUCTION

In July, 1985 Hunter Associates, Inc. prepared a Preliminary Engineering Report for Development of Surface Water Supply and Treatment Facilities for the New Braunfels Utilities. This preliminary report examined the feasibilities of the New Braunfels Utilities developing a second source of water supply for the City of New Braunfels. Assumably, this second source of supply would come from a surface water source, from either the Guadalupe or Comal Rivers. The project examined under this report could be developed either by the New Braunfels Utilities acting independently, or in concert with the GBRA, and one or more of the several water supply corporations in the outlying areas around New Braunfels, as a regional supply system.

Subsequent to the preparation of this preliminary report, GBRA preceeded to initiate design and construction of water treatment facilities to be located below the City of New Braunfels, near Lake Dunlap. This plant would supply water to the Green Valley Water Supply Corporation and perhaps also Springs Hill Water Supply Corporation. However, no action has been taken regarding providing a second source of potable water for the City of New Braunfels, subsequent to the preparation of this preliminary report.

The results and recommendations generated in the preliminary report were that the New Braunfels Utilities would gain no major benefits from being a part of such a regional system as discussed in this report. In terms of economics, the costs for delivery of treated water were essentially the same for the New Braunfels Utilities, whether acting independently or as a part of the regional system. Thus, the primary reason for the New Braunfels Utilities to maintain an interest in developing a surface water supply was to have a second source, other than the Edwards Aquifer Wells, in the event of catastrophic failure or contamination of the Edwards supply.

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II. WATER DEMAND/PRODUCTION

Historical water demands and total water production from the Edwards Aquifer Wells, by the New Braunfels Utilities, were reported in the New Braunfels Water System Analysis prepared by Hunter Associates, Inc. in July, 1982, and updated in a Preliminary Engineering Report for Surface Water Supplies prepared in July, 1985. Tables 1, 2, and 3, which follow herein, update the water production figures and include total water production for the years 1984, 1985 and 1986, respectively.

In general, the total water demands for 1984 through 1986 averaged between 7 and 8 MGD through the course of the year. Minimum demands during the winter months of the year generally averaged in the neighborhood of 6 MGD, with peak summer demands averaging between 10 and 12 MGD.

When considering facilities to provide an alternate source of water supply for a project such as this, the design capacity for the alternate source should be sized so as to provide a minimum or base demand in the event of total failure of the primary water supply. To this end, we would recommend that a surface water treatment plant and supply should have the capabilitiy of providing a minimum of 6 MGD to the citizens of New Braunfels, in order to maintain the current level of service for water demands during the base usage months as indicated on Tables 1 through 3.

Table No. 4, which also follows herein, compares the 1986 total water demands, on a month by month basis, with the operating efficiencies available for various sized water treatment facilities, ranging from 6 MGD through 12 MGD. Based on the 1986 total demands, a 6 MGD water plant could operate at very nearly 100% efficiency through the course of the year, whereas the 12

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MGD plant would operate at best in the range of about 60% efficiency through the course of a year. As a result, we feel that in all probability, either the 6 or 8 MGD alternatives would be the most likely candidates for consideration by the New Braunfels Utilities, to provide an alternate source of supply to the customers of the New Braunfels Utilities.

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NEW BRAUNFELS, TEXAS

1984 WATER PRODUCTION

Month	Total Demand (MG)	% of Annual Total	Daily Average (MGD)	Monthly Total <u>(Ac-Ft)</u>
January	179.8	6.2	5.80	552
February	193.0	6.6	6.89	592
March	215.3	7.4	6.95	661
April	315.1	10.8	10.50	967
May	262.4	9.0	8.46	805
June	280.9	9.7	9.36	862
July	304.9	10.5	9.83	936
August	312.6	10.7	10.08	959
September	234.7	8.1	7.82	720
October	203.4	7.0	6.56	624
November	198.1	6.8	6.61	608
December	210.9	7.2	6.80	647
Annual Total	2911.1	100.0		8933
Monthly Average	242.6		7.98	744

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NEW BRAUNFELS, TEXAS

1985 WATER PRODUCTION

Month	Total Demand (MG)	% of Annual <u>Total</u>	Daily Average (MGD)	Monthly Total <u>(Ac-Ft)</u>
January	218.2	8.3	7.04	670
February	181.6	6.9	6.49	557
March	204.4	7.7	6.60	627
April	209.8	7.9	6.99	644
May	209.8	7.9	6.77	644
June	219.2	8.3	7.31	673
July	238.2	9.0	7.68	731
August	325.5	12.3	10.50	999
September	234.9	8.9	7.83	721
October	206.5	7.8	6.66	634
November	193.1	7.3	6.44	593
December	198.3	7.5	6.40	609
Annual Total	2639.5	100.0		8102
Monthly Average	220.0		7.23	675.2

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NEW BRAUNFELS, TEXAS

1986 WATER PRODUCTION

Month	Total Demand (MG)	% of Annual Total	Daily Average (MGD)	Monthly Total <u>(Ac-Ft)</u>
January	172.0	6.3	5.55	528
February	128.1	4.7	4.58	393
March	172.3	6.3	5.56	529
April	199.6	7.3	6.65	613
May	213.7	7.8	6.89	656
June	238.5	8.7	7.95	732
July	350.5	12.8	11.31	1076
August	303.7	11.1	9.80	932
September	237.8	8.7	7.93	730
October	246.0	9.0	7.93	755
November	232.4	8.5	7.75	713
December	249.2	9.1	8.04	765
Annual Total	2743.8	100.0		8421
Monthly Average	228.6		7.52	701.7

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NEW BRAUNFELS, TEXAS

ESTIMATED PLANT OPERATING EFFICIENCIES

Month	Total Daily Avg. Demand (MGD) (1986)		Estima Operating f for Plant (ted Plant Efficiencies Capacities (of:
		6 MGD	8 MGD	10 MGD	<u>12 MGD</u>
January	5.55	93%	69%	56%	46%
February	4.58	76%	57%	46%	38%
March	5.56	93%	69%	56%	46%
April	6.65	100%	83%	67%	55%
May	6.89	100%	86%	69%	57%
June	7.95	100%	99%	80%	66%
July	11.31	100%	100%	100%	94%
August	9.80	100%	100%	98%	82%
September	7.93	100%	99%	79%	66%
October	7.93	100%	99%	79%	66%
November	7.75	100%	97%	78%	65%
December	8.04	100%	100%	80%	67%
Basic Operat	ing Efficiency	96.8%	88.2%	74.0%	62.3%
Adj. for Peak Factor		-	2.0%	2.0%	2.0%
Maint. Down Time		2.0%	2.0%	2.0%	2.0%
Normal Opera	ation Efficiency	94.8%	84.2%	70.0%	58.3%

Hunter Associates

III. WATER RIGHTS/AVAILABILITY

In May, 1984 the New Braunfels Utilities requested that the Guadalupe Blanco River Authority (GBRA) perform a Water Availability Study. The purpose of this study was to make a determination of the amount of water from storage at Canyon Reservoir, which would be necessary to provide a firm supply for the New Braunfels Utilities, when used in conjunction with ground water and the existing run-of-the-river permits, held collectively by the New Braunfels Utilities and the City of New Braunfels. Subsequently, a Water Availability Study was performed by Espey Huston & Associates, Inc., under contract to GBRA, to do the research and make the preliminary calculations on available flows and existing water rights. This report was subsequently presented to the New Braunfels Utilities in June, 1984.

The results of this study indicated that, under a repeat of the 1956 flow conditions (worst recorded flow conditions in history) and a 12,000 acrefoot per year demand by the New Braunfels Utilities, the existing run-of-theriver permits and a 50% availability of ground water would be adequate to meet the demand of the New Braunfels Utilities, in the months of January through May and November and December, without imposing forced conservation. During the critical period of June through October, with no run-of-the-river water or ground water available, a forced conservation program resulting in a 50% reduction in demand, approximately 3,000 acre feet of water from storage in Canyon Reservoir, would provide an adequate supply to meet the base demands of the citizens of New Braunfels.

At present, there are two (2) run-of-the-river permits which we feel would be available to the New Braunfels Utilities. The first is held by the New Braunfels Utilities as Certified Filing No. 135, which allows the use of 5,658 acre-feet per annum, for industrial purposes at the Comal Steam Plant.

8

Hunter Associate

An additional filing, held by the City of New Braunfels, as Certified Filing No. 411 allows for the use of 1,289 acre-feet per annum for municipal purposes at the headwaters of the Comal River. For the purposes of this report, we have made the assumption, as did Espey Huston & Associates, Inc. in their report, that these two existing certified filings could be transferred from the Comal River to some location of withdrawal on the Guadalupe River, and traded for downstream rights for water from the Guadalupe by other permit holders. Thus, the New Braunfels Utilities would have available permitted withdrawals allowing for 6,947 acre-feet per year from run-of-the-river permits. This coupled with an available 3,000 acre-feet per year from storage at Canyon Reservoir would allow the New Braunfels Utilities to take nearly 10,000 acre-feet per year from surface water supply in the Guadalupe River.

Thus, we feel that there is a sufficient availability of surface water from the Guadalupe River to provide for base demands, for a surface water supply and treatment facility to be located somewhere in the City of New Braunfels.

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IV. LOCATION OF SURFACE WATER TREATMENT FACILITIES

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The preliminary engineering report by Hunter Associates, Inc. dated July, 1985, identified three potential sites for the construction of a surface water treatment plant, identified as Sites "A", "B" and "C".

Since that time a fourth site has been studied, to be identified as Site "D" on the Water Project Key Map.

Site "D" would be located near the Guadalupe River, somewhere between the Comal County Fair Grounds to the junction of the Comal and Guadalupe Rivers. The site could be on the Fair Property, in Cypress Bend Park above the flood elevation, or in an undeveloped area at the end of East River Street, easterly from Union Street and southerly from East Mather Street.

This site would be near the river, making the raw water line only 500' to 800' from the intake structure on the Guadalupe River, to the treatment plant site.

In order to deliver the treated water into the distribution system, large transmission mains would have to be installed in a westerly and easterly direction from the plant; to Loop 337 on the west, and to Gruene Road to the east.

These transmission mains would range from 12" in diameter to 30" in diameter, depending on the quantity of water that needed to be delivered to each area of the City. The size of mains and their capacities are shown as follows:

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Size of Main	Capacity at F	low Rate of 5 fps
	Gallons Per Minute	Million Gallons per Day
12"	1800 GPM	2.59 MGD
14"	2250 GPM	3.25 MGD
16"	2750 CDM	3 06 MCD
10	2750 684	3.30 000
18"	3500 GPM	5.04 MGD
20"	4500 GPM	6.48 MGD
24"	6300 GPM	9.07 MGD
30"	10300 GPM	14.83 MGD

The summary of costs of these transmission mains varies with the capacity of the treatment plant as follows:

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Capacity of Plant	Cost of Transmission
6 MGD	\$450,000
8 MGD	\$650,000
10 MGD	\$750,000
12 MGD	\$800,000

Any one of the four selected sites would be acceptable, with sites "A" and "D" being the most desirable in terms of transmitting the treated water into the system.

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V: WATER TREATMENT PROCESS

As discussed in the Preliminary Engineering Report, the quality of the water in the Guadalupe River is generally very good. Minimal treatment would be required for this water; the only requirements would be treatment facilities to allow for the removal of silt and colloidal organic materials carried by the water, and disinfection.

In general, for each of the alternatives considered for this project, the treatment process would consist of the same basic units and processes. The only variables would be the sizes of the basins involved. The required treatment units would be as follows:

- 1. <u>Raw Water Pump Station</u> for pumping water from the Guadalupe River to the site of the surface water treatment facilities.
- 2. <u>Inlet Rapid Mix Basin</u> for mixing chemicals with the water for removal of the silt and organic materials.
- 3. Flocculation Zone for providing reaction time to build the size of the particles and particulate matter for subsequent settling.
- 4. <u>Settling Basin</u> for settling of the flocculated particulate matter.
- 5. <u>Filter Unit</u> for filtering of any residual fine organic or coloidal-type materials.
- 6. Clearwell Storage and High-Service Pumping Facilities.
- 7. <u>Backwash and Sludge Thickener and Decant Basin</u> for separating the filtered and settled materials for thickening and removal of water from the sludge with facilities to recycle the water portion back to the head end of the treatment plant.
- 8. <u>Sludge De-watering Facilities</u> for de-watering the sludge to consistency of approximately 12% to 15% sludge to be subsequently removed to the landfill.
- 9. <u>Chemical Storage and Feeding Facilities</u> for feeding alum for flocculation of the materials and soda ash for pH adjustment of the water, chlorine for disinfection, and hydrofluosilicic acid for fluoridation.

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10. Plant Administration, Laboratory and Control Building.

VI. PROJECT COST ANALYSIS

As previously discussed, four alternative sizings are being considered as part of this report. These four alternatives would allow for water supply and treatment facilities sized for 6.0, 8.0, 10.0 and 12.0 mgd. In general, the construction and total project costs, for each of these four alternatives are shown in Table No. 5, which follows herein. Total construction costs for the four alternatives considered range from \$4,650,000 to \$7,300,000, and total project costs range from \$5,730,000 to \$8,910,000, depending upon the total capacity of the system selected.

Incremental and total annual production costs for water from a surface water supply are shown in Table No. 6, which follows herein. The costs considered include operation and maintenance costs, general and administrative, and electrical power costs to determine a total annual O&M cost for each of the alternatives which range from \$390,000 to \$670,000, for the four alternatives considered. Included on Table No. 6 are estimated total annual production, capabilities for each of the four alternative sizes seleceted, which indicates unit production costs for treated water, from a surface water supply source, ranging from \$0.19 to \$0.26 per thousand gallons of water produced. Also included on this table, is a line item for water purchase costs, which range from \$0.05 cents to \$0.06 cents per thousand gallons. This cost allows for the purchase of 3,000 acre feet per year from storage at Canyon Reservoir valued at \$38.75 per acre-foot (\$0.12/thousand gallons) with this total amount being amortized over the total annual production, including water taken under, since there would be run-of-the-river permits, essentially no cost involved for this water. The inclusion of the water purchase cost provides for total unit finished water production costs ranging

from \$0.25 cents to \$0.31 cents per 1,000 gallons. This figure neglects the inclusion of debt service for ammortization of bonded indebtness for water treatment facilities, and provides a good basis of comparison with the water production cost presently being used for producing water from the Edwards Aquifer.

In the preliminary report prepared by Hunter Assocites, Inc. the cost of producing ground water from the Edwards Aquifer Wells, ranged from \$0.16 to \$0.19 per thousand gallons from the various wells presently owned by the New Braunfels Utilities. Consequently, the unit production costs for surface water vs. that unit production cost for ground water would be higher by approximately \$0.07 to \$0.10 per thousand gallons, in the absence of consideration of debt service costs. When including the unit cost for debt service, ammortized over the annual water production from the surface water facility, the total finished water production costs range from \$0.51 to \$0.64 cents per thousand gallons, based on the particular alternative being considered.

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NEW BRAUNFELS, TEXAS

SURFACE WATER SUPPLY

CAPITAL COSTS

Item Description	Alt. "A" (6.0 MGD)	Alt. "B" (8.0 MGD)	Alt. "C" (10.0 MGD)	Alt. "D" <u>(12.0 MGD)</u>
1) Raw Water Intake/ Pump Station	\$ 275,000	\$ 300,000	\$ 325,000	\$ 350,000
2) Raw Water Piping	\$ 75,000	\$ 100,000	\$ 125,000	\$ 150,000
3) Water Treatment Facilities	\$2,800,000	\$3,500,000	\$4,100,000	\$4,600,000
 Sludge Handling/ Dewatering Fac. 	s 600,000	\$ 700,000	\$ 750,000	\$ 800,000
5) Clearwell Storage & High Service Pump Facilities	\$ 450,000	\$ 500,000	\$ 550,000	\$ 600,000
6) Treated Water Transmission Piping to Dist. System	\$ 450,000	\$ 650,000	\$ 750,000	\$ 800,000
Sub-Total for Const.	\$4,650,000	\$5,750,000	\$6,600,000	\$7,300,000
Contingencies (10%)	\$ 465,000	\$ 575,000	\$ 660,000	\$ 730,000
Engineering, Surveying & Inspection (10%)	\$ 465,000	\$ 575,000	\$ 660,000	\$ 730,000
Land & Easements	\$ 125,000	\$ 125,000	\$ 125,000	\$ 125,000
Administration	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
Total Capital Cost	.\$5,730,000	\$7,050,000	\$8,070,000	\$8,910,000
Annual Debt Service (20 yrs. @ 7.0%)	\$ 540,000	\$ 665,000	\$ 760,000	\$ 840,000
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NEW BRAUNFELS, TEXAS

SURFACE WATER SUPPLY

ANNUAL PRODUCTION COSTS

Item Description	Alt. "A" (6.0 MGD)	Alt. "B" (8.0 MGD)	Alt. "C" <u>(10.0 MGD)</u>	Alt. "D" <u>(12.0 MGD)</u>
Operation & Maintenance	\$140,000	\$160,000	\$180,000	\$200,000
General & Administrative	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000
Electrical Power	\$215,000	\$290,000	\$365,000	\$435,000
Total Annual Cost	\$390,000	\$485,000	\$580,000	\$670,000
Est. Plant Operation Efficiency	94.8%	84.2%	70.0%	58.3%
Est. Total Annual Production (M.G.)	2076	2460	2555	2555
Unit Production Cost (per 1,000 Gal.)	\$0.19	\$0.20	\$0.23	\$0.26
Water Purchase Cost (per 1,000 Gal.)	\$0.06	\$0.05	\$0.05	\$0.05
Unit Finished Water Production Cost (per 1,000 Gal.)	\$0.25	\$0,25	\$0.28	\$0.31
Annual Debt Service for Supply & Treatment Facilities	\$540,000	\$665,000	\$760,000	\$840,000
Unit Debt Service Cost (per 1,000 Gal.)	\$0.26	\$0.27	\$0.30	\$0.33
Total Finished Water Production Cost (per 1,000 Gal.)	\$0.51	\$0.52	\$0.58	\$0.64

VII. SUMMARY AND RECOMMENDATIONS

In summary, we would recommend that either the 6 or 8 MGD alternative be considered by the New Braunfels Utilities, for providing facilites as a part of this project. Based on the total water production figures presented in Section II, it appears that either of these two alternatives could furnish sufficient water, such that in an extreme emergency situation, that being a total loss of water supply from the Edwards Aquifer, sufficient water could be furnished, so that the quality of life of the New Braunfels citizens would not be significantly affected. However, it should also be noted that under such a condition there would not be sufficient water to allow for unrestricted watering of lawns and shrubs, during the peak demand season from June through September.

In addition, providing a plant of a capacity in either of these two size ranges, could provide base load demand to the New Braunfels system, keeping the existing Edwards Aquifer Wells to provide peak demand supplement. Alternatively, some cities which have two sources of supply, such as this, have elected to utilize wells as the base load facilities, thus keeping the surface water treatment facilities as reserve capacity to provide water for summer peaks. Considering the unit production costs developed in the previous section, either of these two alternatives would require some degree of increase in water rates, but we feel that this increase would be minimal in the absence of debt service for construction of the facilities. If debt service is included in the production costs, then the water rate increase would be somewhat higher; in all probability, somewhere in the range of approximately \$0.30 to \$0.35 per thousand gallons above the existing water rates, currently being charged to the customers of the Utilities.

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The inclusion of a surface water supply source to the New Braunfels system, would add a degree of versitility to the supply facilities, which has not previously been available to system operating personnel. We would recommend that either of these two capacities could provide a substantial back-up supply for the system, and provide facilities which could reduce the need for future wells from the Edwards Aquifer, as proposed in the 1982 Water System Report by Hunter Associates, Inc. NEW BRAUNFELS, TEXAS

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PRELIMINARY ENGINEERING REPORT

for

DEVELOPMENT of SURFACE WATER SUPPLY

& WATER TREATMENT FACILITIES

HUNTER ASSOCIATES, INC.

AUSTIN, TEXAS

JULY, 1985

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<u>TABLE OF CONTENTS</u>

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1

SECTION	TITLE	PAGE	<u>NO.</u>
I II	NTRODUCTION	1	
II SO	SCOPE		
I I I OE	OBJECTIVES		
IV F#	ACILITIES FOR NEW BRAUNFELS	4	
A.	Water Demand/Production	4	
B.	Location of Water Treatment Facilities	7	
C.	Discussion of Various Sites	7	
D.	Selection and Evaluation of Alternatives	10	
E.	Present Water Production Costs	14	
F.	Additional Well Facilities	16	
V NE	W BRAUNFELS/GBRA REGIONAL FACILITIES	18	
VI SL	IMMARY	23	

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<u>LIST OF TABLES</u>

| | |

L

TABLE NO.	DESCRIPTION	PAGE NO.
1	New Braunfels - 1984 Water Demand	5
2	Estimated Plant Operating Efficiencies	6
3	Surface Water Supply - Capital Costs	12
4	Surface Water Supply - Annual Production Costs	13
5	Blended Water Production Costs	15
6	Additional Well Facility Costs	17
7	NBU/GBRA Regional Facility -	
	Total Water Demands	20
8	NBU/GBRA Regional Facility -	
	Capital Costs	21
9	NBU/GBRA Regional Facility -	
	Annual Production Costs	22

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I. INTRODUCTION:

Historically, water and its availability, has played a key role in the development and economic structure of the City of New Braunfels. The proximity of the Balcones Fault Zone and the Comal Springs has given New Braunfels a natural attractiveness as a tourism and recreational center. In addition, the natural geology of the area includes the formation of the Edwards Aquifer, which has served as a readily available source of good quality water in a seemingly endless supply.

At present the Edwards Aquifer serves as the sole source of municipal water supply for New Braunfels and a number of other communities along the fault zone. The Utilities currently has seven wells, six of which are in active use which pump water from the Aquifer for storage and distribution to the citizens of New Braunfels. The total pumping capacity of the six active wells is 13,600 gpm (19.6 MGD), with an un-connected stand-by capacity of 4,200 gpm (6.0 MGD) in Well #7 (LCRA Well).

In recent years a number of significant concerns have been voiced with regard to the reliability of the Edwards Aquifer, in terms of both quality and quantity. With so many communities using the aquifer as a primary and/or sole source of water supply, the potential for depletion of the supply increases each year. In addition, the possibility of pollution of the aquifer is an ever-present and increasing danger. As a result, many of the adjacent communities have begun seeking alternate water supply sources, especially from surface waters. The relative abundance of water available from surface run-off to the various impoundments in the region offers an attractive alternate for a water supply source.

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II. SCOPE:

In July, 1984 the engineering firm of Espey, Huston, and Associates prepared a Preliminary Engineering Report for the Guadalupe-Blanco River Authority (GBRA) which outlined the costs associated with furnishing treated water from a surface supply to the following retail water distribution agencies:

- 1. New Braunfels Utilities
- 2. Green Valley Water Supply Corporation
- 3. Spring Hill Water Supply Corporation
- 4. City of Cibolo
- 5. City of Schertz
- 6. City of Marion
- 7. Crystal Clear Water Supply Corporation

The stated prices for delivery of the treated water are variable, depending upon the combination of agencies included for the overall project. In the case of the New Braunfels Utilities, the quoted price ranges from \$0.80 to \$1.03 per thousand gallons, depending upon the combination of municipalities included. This report was subsequently presented by the GBRA to the Board of Trustees of the New Braunfels Utilities for their consideration of prospective membership in such a regional water supply system. In addition, the presentation of this information has raised two primary policy questions for consideration by the New Braunfels Utilities. These questions are:

> Should the New Braunfels Utilities develop a second primary water supply source for use in the event of catastrophic failure or contamination of the Edwards Aguifer?

2. If so, would it be more cost effective to be a member of a regional system or to develop their own supply independent of any other water supply agencies?

In order to more fully assess the second question, the New Braunfels Utilities has authorized the preparation of this report, for the purpose of examining the costs and feasibilities of developing a second source of municipal water supply from surface water in the Guadalupe River.

III. OBJECTIVES:

Several previous reports have been prepared which examine the quantity and quality of water in the Guadalupe River and the availability of water from storage on Canyon Lake upstream from the City of New Braunfels. These reports have been obtained, examined, and used as a basis of information in the preparation of this feasibility analysis.

Consequently, the following assumptions have been made and/or utilized as a basis for this report:

- A) A sufficient quantity of water is available and/or obtainable from GBRA in the form of Base Flow and Storage in Canyon Lake to support each of the alternative schemes considered.
- B) The water from the Gudadalupe River is of a similar enough quality to be compatible with the Edwards Well water in the distribution system; i.e. no adverse effects would result from the combining of water.
- C) Each of the alternatives considered will require the same level of treatment, that being the removal of turbidity, and color and odor control, such that alternative considerations will be based upon volume of flows only.

IV. FACILITIES FOR NEW BRAUNFELS

A. WATER DEMAND/PRODUCTION

The New Braunfels Water System Analysis, prepared by Hunter Associates, Inc., in July 1982, reported an average daily water demand of 5.54 MGD, with a peak demand of 17.3 MGD, during 1980-81, to serve a then existing population of $\pm 24,000$ persons. This report also projected a population of $\pm 56,000$ persons, within the New Braunfels service area by the year 2000. Neglecting any additional large industrial water demands, the projected water demands are:

Average Daily Demand - 11.6 MGD

Peak (Summer) Demand - 37.7 MGD

The total water demand for 1984, by NBU, is shown in Table <u>1</u> herein. Admittedly, 1984 was a very dry year, with little rainfall in the spring and summer months. Apparently, the voluntary water conservation measures imposed, helped to reduce the July and August peaks. Still, the total demand for the year averaged 6.65 MGD.

The 1982 Water System Analysis also recommended an increase of water supply capacity, from 13,600 gpm at present, to a total of 28,000 gpm by the year 2000, in order to maintain the TDH standard of 0.6 gpm/connection and meet fire flow demands.

Each of the alternatives considered herein would be supplemental to the existing well capacities. However, it should be noted that the best operating efficiencies can be obtained from a surface water treatment facility by maximizing the time in operation. This is to say that maximum efficiencies will be realized by operating the surface supply continuously, and allowing the well supply to supplement flows as needed. The estimated operating efficiencies for various plant capacities, based on 1984 demands, are shown in Table $\underline{2}$ herein.

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NEW BRAUNFELS, TEXAS

1984 WATER DEMAND

Month	Total Demand (MG)	% of Annual Total	Daily Average (MGD)	Monthly Total (Ac-Ft)
January	159.7	6.6	5.09	485
February	146.5	6.1	5.05	450
March	144.0	6.0	4.65	442
April	217.0	9.1	7.23	666
May	234.6	9.8	7.57	720
June	221.7	9.2	7.39	680
July	279.3	11.7	9.01	857
August	253.1	10.6	8.16	777
September	260.0	10.9	8.67	798
October	206.3	8.6	6.65	633
November	141.1	5.9	4.70	433
December	132.9	5.5	4.29	408
Annual Total	2394.4	100.0		7349
Monthly Average	199.5		6.65	612

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NEW BRAUNFELS, TEXAS

ESTIMATED PLANT OPERATING EFFICIENCIES

Month	Total Demand <u>(1984)</u>	Estimated Plant Operating Efficiencies for Plant Capacities of:			
		4 MGD	6 MGD	8 MGD	<u>10 MGD</u>
January	5.09	100%	85%	64%	51%
February	5.05	100%	84%	63%	51%
March	4.65	100%	78%	58%	47%
April	7.23	100%	100%	90%	72%
May	7.57	100%	100%	95%	76%
June	7.39	100%	100%	92%	74%
July	9.01	100%	100%	100%	90%
August	8.16	100%	100%	100%	82%
September	8.67	100%	100%	100%	87%
October	6.65	100%	100%	83%	67%
November	4.70	100%	79%	59%	47%
December	4.29	100%	72%	54%	43%
Basic Operat	ing Efficiency	100%	91.5%	79.8%	65.6%
Adj. for Peak Factor		-	4.0%	4.0%	4.0%
Maint. Down Time		2.0%	2.0%	2.0%	2.0%
Normal Operation Efficiency		98.0%	85.5%	73.8%	59.6%

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B. LOCATION OF WATER TREATMENT FACILITIES

Several factors enter into the selection of a site for the treatment plant of which the following are a few major considerations:

- 1. Size of plant and quantity of water to be treated
- 2. Availability and cost of land
- 3. Quality and quantity of water to be treated
- 4. Access to River for intake structure and raw water pumpage
- 5. Access to existing water distribution system
- 6. Cost to put treated water into system

Three potential sites along the Guadalupe River have been selected to investigate as follows:

- Site "A" is located on the southerly side of Torrey Street just westerly from its intersection with Gruene Road.
- Site "B" is located on the southerly side of Gruene Road adjacent to the Guadalupe River.
- Site "C" is located north of the Mission Valley Mill plant along Broadway Street.
- C. DISCUSSION OF VARIOUS SITES
 - 1) <u>Site "A"</u>:

Being located adjacent to Torrey Street would make this site desirable because of access. It is property not now being used and is not desirable for use as a subdivision. A plant of any size from one to eight million gallons could be constructed here. Its availability is unknon as well as the cost per acre. The river intake would be in a good location; however the raw water line to feed the plant would be about 2,500 feet away. This location would be easy to pump into the existing distribution

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system on Torrey and Houston Streets where there are 18" mains feeding the system.

2) <u>Site "B"</u>:

The location of this site is generally in the same area as Site "A", except it is closer to the River and the availability and land cost may be too extreme to consider. It would be the closest for a raw water line and the intake structure would be on the property. Any size plant could be built at this location. However, the distance to the existing distribution system will be greater.

3) <u>Site "C"</u>:

This site is the most remote from the existing system and the only one on the Easterly side of the Guadalupe River. The location has one major factor to consider since it is located downstream from the Comal River discharge into the Guadalupe. During flows of the Comal, the utilities permitted water could be treated. Any size plant could be built here depending on the availability and cost of the land. The intake structure could be near to the plant, only 600' or more away. In order to get smaller quantities of water into the distribution system, pipe lines could be restricted to the East side of the River. Larger quantities of water being pumped into the system would require a crossing of the Guadalupe River with either a 16" or 18" diameter pipe.

D. SELECTION AND EVALUATION OF ALTERNATIVES:

The alternative Water Supply and Treatment Facilities to be evaluated for comparison are listed as follows:

1) Alternative "A" - 1.0 MGD

For purposes of comparison with the EH&A report prepared for GBRA, a plant capacity of 1.0 MGD (700 gpm) will be considered. It should, however, be noted that 1.0 MGD represents approximately 15% of the average daily water demand for New Braunfels, and would not provide an adequate supply in the event of catastrophic failure of the Edwards Aquifer Supply.

2) Alternative "B" - 4.0 MGD

A capacity of 4.0 MGD (2800 gpm) represents approximately 60% of New Braunfels average daily demand. In an extreme worst case situation, this scheme would be able to provide minimal water service to the customers of New Braunfels Utilities. Under normal conditions this plant would be able to operate as near 100% of the time as possible, in furnishing base demand with the existing wells to furnish water for additional demands.

3) Alternative "C" - 6.0 MGD

A capacity of 6.0 MGD (4200 gpm) would furnish approximately 90% of the present average daily water demand for the City of New Braunfels. Under normal operating conditions the Edwards Wells would supplement the water plant intermittantly through the peak summer demands. As sole water supply the surface water supply could produce enough water to meet present domestic water usage demands in an emergency situation.

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4) Alternative "D" - 8.0 MGD

A capacity of 8.0 MGD (5600 gpm) could supply the total present water demand of New Braunfels for approximately 7-9 months of the year with the Edwards Aquifer Wells to supplement for the summer peak demands only. In the event of no water from the Edwards, only a minimal change of water usage would have to be enacted.

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Table 3, which follows herein, shows the total estimated capital costs required to construct the Surface Water Supply and Treatment Facilities, for the various design capacities, as outlined. Table 4 shows the total annualized costs, operating efficiencies, unit production costs, and total production costs for furnishing treated water from a surface supply to the existing distribution system.

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NEW BRAUNFELS, TEXAS

SURFACE WATER SUPPLY

CAPITAL COSTS

Item Description		A ()	lt. "A" 1.0 MGD)	A1 (4	t. "B" .0 MGD)	A1 (6	t. "C" 5.0 MGD)	A1 <u>(8</u>	t. "D" .0 MGD)
1)	Raw Water Intake/ Pump Station	\$	200,000	\$	250,000	\$	275,000	\$	300,000
2)	Raw Water Piping	\$	25,000	\$	50,000	\$	75,000	\$	100,000
3)	Water Treatment Facilities	\$	700,000	\$2	,000,000	\$2	,800,000	\$3	,500,000
4)	Sludge Handling/ Dewatering Fac.	\$	175,000	\$	450,000	\$	600,000	\$	700,000
5)	Clearwell Storage & High Service Pump Facilities	\$	225,000	\$	350,000	\$	450,000	\$	500,000
6)	Treated Water Transmission Piping to Dist. System	\$	75,000	\$	100,000	\$	200,000	\$	300,000
Sub-Total for Const.		\$1	,400,000	\$3	,200,000	\$4	,400,000	\$5	,400,000
Con	tingencies (10%)	\$	140,000	\$	320,000	\$	440,000	\$	540,000
Ena & I	ineering, Surveying nspection (10%)	\$	140,000	\$	320,000	\$	440,000	\$	540,000
Land & Easements		\$	50,000	\$	75,000	\$	100,000	\$	125,000
Adm	inistration	\$	25,000	\$	25,000	\$	25,000	\$ 	25,000
Total Capital Cost		\$1	,755,000	\$3	,940,000	\$5	,4 05,000	\$6	,630,000
Annual Debt Service (20 yrs. @ 10.0%)		\$	206,200	\$	462,950	\$	635,100	\$	779,000

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NEW BRAUNFELS, TEXAS

SURFACE WATER SUPPLY

ANNUAL PRODUCTION COSTS

Item Description	Alt. "A" (1.0 MGD)	Alt. "B" <u>(4.0 MGD)</u>	Alt. "C" (6.0 MGD)	Alt. "D" (8.0 MGD)
Annual Debt Service for Supply & Treatment	\$206 200	\$462.050	¢ 625 100	¢ 770.000
racificies	\$200,200	9402,950	\$ 035,100	\$ 779,000
Operation & Maintenance	\$100,000	\$125,000	\$ 140,000	\$ 160,000
General & Administrative	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000
Electrical Power	\$ 37,500	\$145,000	\$ 215,000	\$ 290,000
Total Annual Cost	\$378,700	\$767,950	\$1,025,100	\$1,264,000
Est. Plant Operation Efficiency	98%	98%	85 .5%	73.8%
Est. Total Annual Production (M.G.)	357.7	1,430.8	1,872.5	2,155.0
Unit Production Cost (per 1,000 Gal.)	\$1.06	\$0.54	\$0.55	\$0.59
Water Purchase Cost (per 1,000 Gal.)	\$0.12	\$0.12	\$0.12	\$0.12
Total Finished Water Production Cost	\$1.18	\$0.66	\$0.67	\$0.71
0&M/M.G.	\$377.60	\$111.80	\$83.40	\$78.40

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E. PRESENT WATER PRODUCTION COSTS

Based on information obtained from New Braunfels Utilities personnel, the current cost attributable to production of potable water from the Edwards Aquifer wells averages 19.1 cents per thousand gallons. Obviously, this cost is significantly less than the cost of producing treated surface water, due to the treatment facilities required. For purposes of overall analysis, thisfigure has been used to compare the total cost of production for a blended mixture of treated surface water and Edwards Aquifer water.

Table 5 which follows herein shows the averaged costs of production of ground water and surfacewater to supply the total New Braunfels demand (1984), based on the various size increments for surface water treatment plants previously considered.

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NEW BRAUNFELS, TEXAS

BLENDED WATER PRODUCTION COSTS

	Alt. "A" (1.0 MGD)	Alt. "B" (4.0 MGD)	Alt. "C" (6.0 MGD)	Alt. "D" <u>(8.0 MGD)</u>
Total 1984 Demand (MG)	2,395	2,395	2,395	2,395
Est. S.W. Production (MG)	358	1,431	1,873	2,155
Total S.W. Production Cost (\$1,000/Yr.)	\$ 421.5	\$ 937.2	\$1,246.1	\$1,521.7
Est. G.W. Req'd. (MG)	2,037	964	522	240
Total G.W. Production Cost	\$ 389.1	\$ 184.1	\$ 99.7	\$ 45.8
Total Annual Prod. Cost	\$ 810.6	\$1,121.3	\$1,345.8	\$1,567.5
Total Average Prod. Cost/1,000 Gal.	\$ 0.34	\$ 0.47	\$ 0.56	\$ 0.65

F. ADDITIONAL WELL FACILITIES

As previously discussed, the 1982 Hunter Associates report projected significant increases in both population and water demand for the remainder of this century. In order to meet this demand, the New Braunfels Utilities must provide additional facilities for supplying water from either a surface supply or a ground water supply. Obviously the least expensive alternative would be to construct additional wells into the Edwards Aquifer, provided that the availability and quality of the water continues to be good. In addition the LCRA well, presently owned by New Braunfels Utilities, could be restored and tied into the distribution system, to provide additional capacity at minimal cost. Table <u>6</u> outlines the costs of restoring the LCRA well, and constructing new well supply facilities, along with the additional production costs resulting from these improvements.

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NEW BRAUNFELS, TEXAS

ADDITIONAL WELL FACILITIES

CAPITAL COSTS

	Restore LCRA Well	Drill New Well
Well Drilling	-	\$300,000
Pumping Equipment	\$ 50,000	\$ 50,000
Ground Storage Tank & High Service Pump Fac.	\$450,000 	\$450,000
Sub-Total for Construction	\$500,000	\$800,000
Contingencies	\$ 50,000	\$ 80,000
Engineering & Surveying	\$ 40,000	\$ 65,000
Land & Easements	-	\$ 25,000
Administration	\$ 10,000	\$ 10,000
Total Capital Cost	\$600,000	\$980,000
Annual Debt Service (20 Yrs. @ 10%)	\$ 70,475	\$115,100
Add'l. Prod. Cost/1,000 Gal.	\$ 0.03	\$ 0.05

V. NEW BRAUNFELS/GBRA REGIONAL FACILITIES

Information furnished by GBRA indicates that the cities of Cibolo, Schertz, and Marion will probably choose not to participate in the GBRA Regional Project, primarily due to their distance from the facility site and the cost of treated water transmission piping. There is, however, considerable interest remaining on the parts of Green Valley, Springs Hill, and Crystal Clear Water Supply Corporations, in participating in the GBRA project, primarily due to their proximity to the facility site, and their remoteness from acceptable well locations.

As a result, this section of this report will consider the construction of a Regional Water Supply Facility to furnish treated surface water to the New Braunfels Utilities, Green Valley WSC, Springs Hill WSC, and Crystal Clear WSC via Springs Hill. This report will assume that the costs of construction, operation, and maintenance will remain constant, regardless of whether the facilities are owned and operated by New Braunfels Utilities, or GBRA, or both entities together as a Joint Venture. The anticipated location of the water treatment facilities for the Regional Project would be the Dunlap Dam site proposed by GBRA in the 1984 E, H, & A report, as this site is most centrally located for all of the retail distribution agencies involved.

Green Valley WSC presently receives water from two sources of supply. The primary source is two (2) Edwawrds Aquifer wells located southwest of New Braunfels. A secondary supply, constructed in 1984, comes from the New Braunfels Utilities distribution system, through a connection located near F.M. 1044 and County Line Road in the southeast portion of New. Braunfels.

Springs Hill WSC currently has a 1.0 MGD surface water treatment plant located near the Guadalupe River between New Braunfels and Seguin. In addition, they also receive water from the New Braunfels Utilities distribution system through a connection located adjacent to Highway 46 near Clear Springs.

Crystal Clear WSC currently uses Edwards Aquifer Wells as its sole source of water supply, but could connect to the Springs Hill System for a secondary source. Demand allowances for Crystal Clear WSC will be included with Springs Hill for purposes of this project.

The 1984 Espey, Huston report included first-stage capacities of 2.0 MGD and average demands of 1.0 MGD for each Green Valley WSC and Springs Hill/Crystal Clear WSC. As previously discussed, maximum plant operating efficiencies will be realized by utilizing the surface water facilities to furnish base demands, and supplementing with well water to accommodate peak demands. For this reason the average demands for Green Valley WSC and Springs Hill WSC have been increased to 1.5 MGD each.

Table $\underline{7}$, which follows herein, shows estimated plant operational efficiencies for the three regional facility alternatives considered. Tables $\underline{8} \& \underline{9}$ show the capital costs for construction, and total annual production costs for furnishing treated surface water to the various retail distribution agencies.

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NEW BRAUNFELS/GBRA REGIONAL FACILITY

SURFACE WATER SUPPLY

TOTAL DEMANDS

	Alt. "E" (8.0 MGD)	Alt. "F" (10.0 MGD)	Alt. "G" (12.0 MGD)
Annual Plant Production Capacity (MG)	2,920	3,650	4,380
NBU Capacity (MGD)	4.0	6.0	8.0
Annual NBU Demand (MG)	1,459	2,004	2,329
GVWSC Capacity (MGD)	2.0	2.0	2.0
Annual GVWSC Demand (MG)	548	548	548
SHWSC Capacity (MGD)	2.0	2.0	2.0
Annual SHWSC Capacity (MG)	548	548	548
Total Annual Demand (MG)	2,555	3,100	3,425
Plant Operating Eff.	87.5%	84.9%	78.2%

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NEW BRAUNFELS/GBRA REGIONAL FACILITY

SURFACE WATER SUPPLY

CAPITAL COSTS

Item Description		Alt. "E" (8.0 MGD)	Alt. "F" (10.0 MGD)	Alt. "G" (12.0 MGD)
1)	Raw Water Intake/ Pump Station	\$ 300,000	\$ 325,000	\$ 350,000
2)	Raw Water Piping	100,000	125,000	150,000
3)	Water Treatment Facilities	3,500,000	4,100,000	4,600,000
4)	Sludge Handling/ Dewatering Fac.	700,000	750,000	800,000
5)	Clearwell Storage & High Service Pump Facilities	500,000	550,000	600,000
6)	Treated Water Transmission Piping to Dist. System	700,000	950,000	1,200,000
Sub-Total for Const.		\$5,800,000	\$6,800,000	\$7,700,000
Contingencies (10%)		580,000	680,000	770,000
Eng	ineering, Surveying & Inspection (10%)	580,000	680,000	770,000
Land & Easements		75,000	100,000	125,000
Adm	inistration	25,000	25,000	25,000
Total Capital Cost		\$7,060,000	\$8,285,000	\$9,390,000
Annual Debt Service (20 Yrs. @ 10.0%)		\$ 829,550	\$ 973,500	\$1,103,300

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VI. SUMMARY

When considering the advantages and disadvantages of developing surface water supply and treatment facilities, several factors, which will potentially affect the feasibility of the project become very apparent. Some of these factors are:

- There is no less expensive source of water than the Edwards Aquifer, provided that the quality of the water in the aquifer remains good and the availability remains plentiful.
- 2) The development of a surface water supply can not compete with Edwards Well water on a cost-effectiveness basis.
- 3) If there is sufficient desire for the New Braunfels Utilities to develop a surface water supply, as a second water supply source, it can be accomplished based on water rate increases of 15 cents to 45 cents per thousand gallons, depending upon the alternative plant capacity selected.
- 4) The required rate increase for customers of the New Braunfels Utilities would not be affected significantly by New Braunfel's development of the system, as opposed to New Braunfels Utilities participation in a regional project. However, the other participants in the regional project could be affected significantly by New Braunfel's participation, due to the "economy of scale" of the project.
- 5) Development of the project by GBRA, with participation by New Braunfels Utilities could be advantageous to both entities for the following reasons:
 - a) New Braunfel's Bonding Capacity would not be used to develop the project.
 - b) GBRA could possibly utilize "Run-of-the River" permits and thus reduce the raw water cost by not taking total flows from storage at Canyon Dam.

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NEW BRAUNFELS/GBRA REGIONAL FACILITY

SURFACE WATER SUPPLY

ANNUAL PRODUCTION COSTS

Item Description	Alt. "E" <u>(8.0 MGD)</u>	Alt. "F" (10.0 MGD)	Alt. "G" (12.0 MGD)
Annual Debt for Supply & Treatment Facilities	\$ 829,550	\$ 973,500	\$1,103,200
Operation & Maintenance	160,000	180,000	200,000
General & Administrative	35,000	35,000	35,000
Electrical Power	335,000	420,000	500,000
Total Annual Cost	\$1,359,550	\$1,608,500	\$1,838,300
Est. Plant Operation Efficiency	87.5%	84.9%	78.2%
Est. Total Annual Production (M.G.)	2,555	3,100	3,425
Unit Production Cost (per 1,000 Gal.)	\$0.53	\$0.52	\$0.54
Water Purchadse Cost (per 1,000 Gal.)	\$0.12	\$0.12	\$0.12
Total Finished Water Production Cost	\$0.65	\$0.64	\$0.66