dallas water utilities
City of Dallas

April 7, 2005

Mr. Jim Pierce
Assistant Director of Public Works
Town of Addison
P.O. Box 9010
Addison, Texas 75000-9010

Re: DWU Recycled Water Implementation Plan

Dear Mr. Pierce:

This letter is sent to invite you and your staff to a public meeting to be held regarding the Dallas Water Utilities Recycled Water Implementation Plan. Recycled water, also known as water reuse, is the use of highly treated wastewater effluent for purposes that do not require drinking water quality. Use of recycled water is an important part of Dallas' strategy to meet the increasing water supply needs of its customers.

The public meeting will be held on April 12, 2005, at 6:30 pm, in the auditorium at Dallas City Hall, 1500 Marilla St., Room L1FN, Dallas, Texas.

Free parking is available. Enter the parking garage from Young Street (in the median area) in front of the Dallas Convention Center. Park in Visitors' Parking which is near the Auditorium entrance and enter the building through the door in the green section.

We hope that you or your staff can attend this public meeting for this important project for the City of Dallas. If you have questions, please contact me or Dan Nolen at 214-671-0379.

Sincerely,

Donna Long
Program Manager
Wastewater Facilities Project Management
Dallas Water Utilities

cc: Ms. Betty Jordan, Alan Plummer Associates, Inc.
Mr. Dan Nolen, DWU

dallas water utilities
City of Dallas

April 7, 2005

Director of Public Works
Town of Addison
P.O. Box 9010
Addison, Texas 75001-9010

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Dallas Water Utilities

cc: Ms. Betty Jordan, Alan Plummer Associates, Inc.
Mr. Dan Nolen, DWU

dallas water utilities
City of Dallas

Chris
C: Jim Pierce
Steve C.

April 7, 2005

Mr. Ron Whitehead
Town Manager
Town of Addison
P.O. Box 9010
Addison, Texas 75001-9010

Re: DWU Recycled Water Implementation Plan

Dear Mr. Whitehead:

This letter is sent to invite you and your staff to a public meeting to be held regarding the Dallas Water Utilities Recycled Water Implementation Plan. Recycled water, also known as water reuse, is the use of highly treated wastewater effluent for purposes that do not require drinking water quality. Use of recycled water is an important part of Dallas' strategy to meet the increasing water supply needs of its customers.

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Sincerely,

Donna Long
Program Manager
Wastewater Facilities Project Management
Dallas Water Utilities

cc: Ms. Betty Jordan, Alan Plummer Associates, Inc.
Mr. Dan Nolen, DWU

Water Reuse Study

Town of Addison

January 2001

Introduction

Water reclamation and reuse for nonpotable purposes offers the potential of serving residential, commercial and industrial users with an alternative to using existing potable water sources. The following examples apply to the use of reclaimed water:

- Irrigation of lawns, parks, airports, roadway borders & medians.
- Air conditioning and industrial cooling towers.
- Construction activities.
- Scenic waters & fountains.
- Environmental & recreational.

Public water systems are usually designed to provide water of potable quality to serve all of the purposes listed above. The economics of using reclaimed water are site specific, and depend on the cost of sources of high quality water and costs of treatment and disposal of wastewaters. The reclamation and reuse of wastewaters are generally more attractive in serving new residential, commercial, and industrial areas of a municipality than in already developed areas. The construction of reuse water transmission and distribution lines to existing users in an urban area will be expensive and disruptive to the community.

The overriding consideration in developing a reuse system is that the quality of the reclaimed water be appropriate for its intended use. Higher level uses, such as irrigation of public access lands require more extensive wastewater treatment prior to reuse than lower level uses, such as pasture irrigation. In urban settings, with the high potential for human exposure to reclaimed water used for landscape irrigation, the water must receive tertiary treatment and be adequately disinfected such that a chlorine residual can be maintained in the distribution system. The reclaimed water must be clear and odorless to ensure that it is aesthetically acceptable to the general public.

This study assumes that during wet weather and other seasonal conditions, the demand for reuse water may be very low. As a result, it would be necessary for the Town of Addison to maintain the ability to discharge wastewater flow for treatment by our present treatment providers.

Existing Conditions

The Town of Addison wastewater collection system transports flow to various outfall interceptor lines and all wastewater is eventually treated at facilities operated by The City of Dallas and Trinity River Authority of Texas (TRA), respectively. Average daily flow (ADF) rates over a twelve (12) month period, from October, 1999 through September, 2000, were determined based on data received from the following metered locations:

Location	ADF (gal.)	Treatment Facility
Texas Christian Academy	140,000	City of Dallas
Dallas Parkway	330,000	City of Dallas
Arapaho Road	660,000	City of Dallas
Inwood Road	250,000	TRA
Spring Valley	320,000	TRA
Brookhaven East	1,800,000	TRA

The Kellway Lift Station and Brookhaven East sites are considered below as potential sources or contributors of reclaimed water for reuse purposes. The Kellway Lift Station experiences an average daily flow rate of 200,000 gpd. This flow is tributary to the wastewater flow of 1,800,000 gpd at the Brookhaven East metering station.

Design Considerations

- Numerous commercial properties exist in the Town of Addison. However, there are no individual sites that would be capable of using a large volume of wastewater effluent for any purpose other than landscape irrigation. The initial cost of installing distribution systems to serve multiple sites, including necessary metering, would be very high.
- There are no large industrial or agricultural users in the Town of Addison that would consume reuse water.
- The vast majority of existing medians and parkways along major collector and minor arterial roadways are currently irrigated with potable water from the Town's distribution system. Extension of a non-potable water line to serve these medians is not cost effective.
- The best apparent use of reclaimed water for reuse within the Town is irrigation of landscape and grassy areas at the Addison Airport and the grounds of the Special Events site adjacent to Addison Road.
- A package wastewater treatment plant would be necessary to accept flow from the sanitary sewer collection system and generate a high quality effluent that could be maintained in a ground storage reservoir until it is subsequently pumped into a reuse water distribution system. Reuse water cannot be mixed with the Town's potable water system.

- Approximately 2.5 acres of land are necessary in order to construct a package plant, pump station, and ground storage. A buffer zone around the site is also necessary. The only point of discharge with available land is located near the Kellway Lift Station. However, the average daily flow through this location is only 200,000 gallons per day. The Brookhaven East metering station, with recorded average daily flows of approximately 1,800,000 gallons per day, does not have sufficient available property to construct these facilities.
- Contractual agreements with the City of Dallas & TRA, respectively, do not currently have provisions for the diversion of wastewater flow for water reuse applications.

Proposed Improvements

The Brookhaven East metering station site, with average daily flows of approximately 1,800,000 gallons per day, is the only location with enough potential effluent discharge to be realistically considered. However, this site does not have available land for construction of the proposed facilities. It would be necessary to purchase an adjacent apartment complex and demolish the structures in order to provide minimum acreage requirements. The following initial cost of improvements was developed for this discharge point. The total flow is currently designated for the TRA wastewater treatment plant via the City of Farmers Branch collection system. The estimated cost of construction of on-site treatment, storage, pumping and distribution facilities, which could serve the Addison Airport and Special Events area, is as follows:

Item	Cost
Right-of-Way Acquisition (12.2 acres), Including site for proposed facilities (2.5 acres), buffer zone (9.7 acres), and demolition of structures	$11,700,000(1)
(1) based on equivalent values for existing land and structures, as developed in an appraisal prepared in April, 2000 by Mackenzie S. Bottum & Associates, Inc.	
Wastewater Treatment Package Plant	
Construction	6,000,000(2)
Design, Permitting, etc.	1,500,000(3)
Sub-Total	7,500,000
(2) based on $3.00/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
(3) based on 25% of total construction cost, obtained from CH2M Hill, Inc.-Dallas, Texas	

2 MG Ground Storage Reservoir, including Engineering & Contingencies	4,500,000(4)
(4) based on $2.25/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
Pump Station @ Storage Site, including Engineering	2,800,000(5)
(5) based on $1.40/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
Pump Station @ Airport Site	720,000(6)
(6) based on $0.40/gallon, estimated by Public Works Department staff	
8" Non-Potable Water Transmission Main, from Intersection of Brookhaven Club Dr. & Marsh Lane To Southwestern Portion of Addison Airport	1,200,000(7)
(7) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual	
6" Non-Potable Water Distribution System Through Addison Airport & Special Events Area	800,000(8)
(8) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual	
Total	$29,220,000

Cost Analysis

Assumptions:

- Five (5) month usage period for reclaimed water as a source of irrigation by the Town during a calendar year.
- Elimination of taxes received by the Town from displaced multi-family units considered an annual cost of the improvements.
- Twenty (20) year debt repayment period.
- Town of Addison will be the only user of reclaimed water, with no recovery of initial construction or annual costs.
- Debt payment based on current bond rate of 5.5%, with AAA rating.

Initial Construction Cost: $29,220,000
Total Debt Incurred: $48,534,011
Annual costs:

• Debt Repayment	$2,426,700
• Maintenance (including permits, Data reports, general, etc.)	65,000
• Personnel (2 employees @ $12.00/hr./each, including indirect costs)	49,900
• Facility Replacement/Repair (i.e., Pump replacement, etc.)	55,000
• Loss of tax revenue	13,000
Total Annual Cost	$2,609,600

Annual Consumption of Reuse Water:
1,800,000 gpd x 30 days/mo. x 5 mo./yr. = 270,000,000 gallons

Annual Cost to Town of Addison for using reclaimed water:

$$\frac{\$2,609,600 \times 1,000}{270,000,000 \text{ gal.}} = \$9.67 \text{ per } 1000 \text{ gallons}$$

Proposed Improvements (Alternative)

The Kellway Lift Station site, has an average daily flow rate of approximately 200,000 gallons per day. The following initial cost of improvements was developed for this discharge point. The flow currently discharges at the Brookhaven East metering station and is designated for the TRA wastewater treatment plant via the City of Farmers Branch collection system. The estimated cost of construction of on-site treatment, storage, pumping and distribution facilities to serve the Addison Airport and Special Events area is as follows:

Item	Cost
Right-of-Way Acquisition (7.8 acres), Including site for proposed facilities (2.0 acres), 3-sided buffer zone (5.8 acres)	$ 5,346,000(1)
(1) based on equivalent values for existing land and structures, as developed in an appraisal prepared in April, 2000 by Mackenzie S. Bottum & Associates, Inc.	
Wastewater Treatment Package Plant	
Construction	600,000(2)
Design, Permitting, etc.	150,000(3)
Sub-Total	750,000
(2) based on $3.00/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
(3) based on 25% of total construction cost, obtained from CH2M Hill, Inc.-Dallas, Texas	
0.2 MG Ground Storage Reservoir, including Engineering & Contingencies	450,000(4)
(4) based on $2.25/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
Pump Station @ Storage Site, including Engineering	280,000(5)
(5) based on $1.40/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
6" Non-Potable Water Distribution System Through Addison Airport & Special Events Area	800,000(8)

(6) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual

Total	$7,626,000

Cost Analysis

Assumptions:

- Five (5) month usage period for reclaimed water as a source of irrigation by the Town during a calendar year.
- Twenty (20) year debt repayment period.
- Town of Addison will be the only user of reclaimed water, with no recovery of initial construction or annual costs.
- Debt payment based on current bond rate of 5.5%, with AAA rating.

Initial Construction Cost: $7,626,000
Total Debt Incurred: $12,666,680
Annual costs:

• Debt Repayment	$633,334
• Maintenance (including permits, Data reports, general, etc.)	65,000
• Personnel (2 employees @ $12.00/hr./each, including indirect costs)	49,900
• Facility Replacement/Repair (i.e., Pump replacement, etc.)	40,000
Total Annual Cost	$788,234

Annual Consumption of Reuse Water:
200,000 gpd x 30 days/mo. x 5 mo./yr. = 30,000,000 gallons

Annual Cost to Town of Addison for using reclaimed water:

$$\frac{\$788{,}234 \times 1{,}000}{30{,}000{,}000 \text{ gal.}} = \$26.27 \text{ per } 1000 \text{ gallons}$$

Alternative Irrigation Water Supply Considerations

Ground Water

Ground water supply can be considered a source of water for irrigation, as an alternate to water reuse. The Special Events site was selected for comparison. This site consists of approximately 16 acres, and if irrigated with 1.5 inches of water per week, it will require 93,094 gallons of water per day (gpd). The proposed system requirements would include a well and pump, a ground storage tank, and a high service pump to boost pressure. An estimate of the cost of the proposed facilities is as follows:

Paluxy Formation Well & Pump	$200,000
100,000 Gallon Storage Tank	225,000
Booster Pump Station	200,000
Total Construction Cost	$625,000

Cost Analysis

Assumptions:

- Five (5) month usage period.
- Irrigation of site during the hours of 9:00 p.m. to 7:00 a.m.
- Twenty (20) year debt repayment period.
- Town of Addison will be the only user of groundwater, with no recovery of initial construction or annual costs.
- Debt payment based on current bond rate of 5.5%, with AAA rating.

Initial construction cost: $625,000
Total debt incurred: $1,046,000
Daily Consumption of Ground Water: 93,094 gpd
Annual Costs:

• Debt Repayment	$52,300
• Power	16,000
• Maintenance & Repair	4,000
• Personnel (1/2 person)	15,700
Total Annual Cost	$88,000

Annual Cost to Town of Addison for using ground water:

$$\frac{\$88{,}000 \times 1000}{93{,}094 \text{ gpd} \times 150 \text{ days}} = \$6.30 \text{ per } 1000 \text{ gallons}$$

Purchase Water from City of Dallas

The 16 acre Special Events site may also be irrigated with potable water purchased from the City of Dallas. As previously determined, the site would require purchase of approximately 93,094 gallons per day. This water is delivered to the Town's existing ground storage tanks and subsequently pumped into the distribution system. It is assumed that the irrigation system would operate from the system water pressure.

Cost Analysis

Assumptions:

- Water supply rate of flow from Dallas increased by 100,000 gal./day.
- Volume charge based on rate of $0.3458 per 1000 gallons.
- Five (5) month usage period.
- Irrigation of site during the hours of 9:00 p.m. to 7:00 a.m.
- Town of Addison will be the only user of water purchased from City of Dallas.

Annual Costs:

• Debt Repayment	$ -0-
• Power	3,500
• Maintenance & Repair	-0-
• Personnel	-0-
• Water Demand Charge	12,588
• Water Volume Charge	4,828
Total Annual Cost	$20,916

Annual Cost to Town of Addison for using water purchased from City of Dallas:

$$\frac{\$20{,}916 \times 1000}{93{,}094 \text{ gpd} \times 150 \text{ days}} = \$1.50 \text{ per } 1000 \text{ gallons}$$

Conclusion

- There are only two sites within the Town that could be considered for the location of a water reuse facility.
- The Brookhaven East site, which has sufficient wastewater flow for water reclamation and reuse, is very far from areas that are proposed for irrigation and requires acquisition and demolition of multi-family property.
- The Kellway Lift Station site has an insufficient volume of wastewater flow for significant water reclamation and reuse.
- Both sites were analyzed as potentially viable sources of water reclamation and reuse, and determined to be cost prohibitive.

- The benefit obtained from the construction of treatment, storage, pumping, and distribution facilities for using reclaimed water in the Town of Addison would be minimal, at best. Annual repayment of the initial capital outlay over a twenty (20) year period would be very high for each alternative.
- The annual cost for using ground water for irrigation is less than reclaimed water. However, it is also very high.
- Based on the cost of developing alternate sources of water for irrigation, the purchase of potable water from the City of Dallas is the most viable and cost effective approach to irrigating the Special Events site and any grassy areas within the Addison Airport property.

Prepared by: Town of Addison
Public Works Department

FG: WTR Reuse Study

Reused!

PAY OUT SCHEDULE TO BE INCLUDED!

Steve

Water Reuse Study

Town of Addison
December, 2000

Introduction

Water reclamation and reuse for nonpotable purposes offe
residential, commercial and industrial users with an alterna
potable water sources. The following examples apply to tl

- Irrigation of lawns, parks, airports, roadway bc
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- Construction activities.
- Scenic waters & fountains.
- Environmental & recreational.

Public water systems are usually designed to provide water of potable quality to serve all of the purposes listed above. The economics of utilizing reuse water are site specific, and depend on the marginal costs of sources of high quality water and costs of treatment and disposal of wastewaters. The reclamation and reuse of wastewaters are generally more attractive in serving new residential, commercial, and industrial areas of a municipality than in already developed areas. The construction of reuse water transmission and distribution lines to existing users in an urban area will be expensive and disruptive to the community.

The overriding consideration in developing a reuse system is that the quality of the reclaimed water be appropriate for its intended use. Higher level uses, such as irrigation of public access lands require more extensive wastewater treatment prior to reuse than lower level uses, such as pasture irrigation. In urban settings, the high potential for human exposure to reclaimed water used for landscape irrigation, the water must be adequately disinfected and that a chlorine residual be maintained in the distribution system. The reclaimed water must be clear and odorless to ensure that it is aesthetically acceptable to the general public.

Existing Conditions

The Town of Addison wastewater collection system transports flow to various outfall interceptor lines and all wastewater is eventually treated at facilities operated by The City of Dallas and Trinity River Authority of Texas (TRA), respectively. Average daily flow (adf) rates over a twelve (12) month period, from October, 1999 through September, 2000, were determined based on data received from the following metered locations:

Location	ADF (mgd)	Treatment Facility
Texas Christian Academy	0.14	City of Dallas
Dallas Parkway	0.33	City of Dallas
Arapaho Road	0.66	City of Dallas
Inwood Road	0.25	TRA
Spring Valley	0.32	TRA
Brookhaven East	1.80	TRA

The Kellway Lift Station experiences an average daily flow rate of 0.20 mgd. This value is considered a subsidiary to the wastewater flow metered at the Brookhaven East metering station. Consideration of peak flow conditions is not applicable in this water reuse evaluation. This is based on the assumption that wastewater may be diverted to the appropriate outfall interceptor in lieu of on site treatment by the Town of Addison. During wet weather and other seasonal conditions, the demand for reuse water may be very low. As a result, it would be necessary for the Town of Addison to maintain the ability to transport wastewater flow for treatment by others.

Design Considerations

The following considerations were implemented in the determination of the optimum reuse of reclaimed water:

- Numerous commercial properties exist in the Town of Addison. However, there are no individual sites that would be capable of utilizing a large volume of wastewater effluent for any purpose other than landscape irrigation. The initial cost of installing distribution systems to serve multiple sites, including necessary metering, would be very high.
- There are no large industrial or agricultural users in the Town of Addison that would consume reuse water.
- The vast majority of existing medians and parkways along major collector and minor arterial roadways are currently irrigated with potable water from the Town's distribution system. Extension of a non-potable water line to serve these medians is not cost effective.
- The best apparent use of reclaimed water for reuse within the Town is irrigation of landscape and grassy areas at the Addison Airport and the grounds surrounding the Special Events site adjacent to Addison Road.
- A wastewater package treatment plant would be necessary to accept flow from the collection system and generate effluent that can be maintained in a ground storage reservoir until it is subsequently pumped into the reuse water distribution system. Reuse water cannot be mixed with the Town's potable water system.

- Approximately 2.5 acres of land are necessary in order to construct a package plant, pump station, and ground storage. The only point of discharge with available land is located near the Kellway Lift Station. The average daily flow through this location is approximately 200,000 gallons per day. The Brookhaven East metering station, with recorded average daily flows of approximately 1.80 mgd, does not have sufficient available property to construct these facilities.
- Contractual agreements with the City of Dallas & TRA, respectively, do not currently have provisions for the diversion of wastewater flow for water reuse applications. Each entity would discourage the change in influent ratio of liquids vs. solids entering their wastewater treatment plants.

Proposed Improvements

The Brookhaven East metering station site has experienced average daily flows of approximately 1.80 mgd. This flow is currently designated for the TRA wastewater treatment plant via the City of Farmers Branch collection system. The estimated cost of construction of on-site treatment, storage, pumping and distribution facilities to serve the Addison Airport and Special Events area is as follows:

Item	Cost
Right-of-Way Acquisition (2.5 acres), Including Demolition of Structures	$2,400,000(1)
(1) based on equivalent values for existing land and structures, as developed in an appraisal prepared in April, 2000 by Mackenzie S. bottum & Associates, Inc.	
Wastewater Treatment Package Plant	
Construction	6,000,000(2)
Design, Permitting, etc.	3,000,000(3)
Sub-Total	9,000,000
(2) based on $3.00/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
(3) based on 50% of total construction cost, obtained from CH2M Hill, Inc.-Dallas, Texas	
2 MG Ground Storage Reservoir, including Engineering & Contingencies	4,500,000(4)
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Pump Station, including Engineering	2,800,000(5)
(5) based on $1.40/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
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(6) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual	
6" Non-Potable Water Distribution System Through Addison Airport & Special Events Area	800,000(7)
(7) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual	
Total	$20,700,000

Conclusion

- The benefit obtained from the construction of treatment, storage and distribution facilities for utilizing reclaimed water in the Town of Addison appears to be minimal, at best.
- There are too many wastewater discharge points throughout the Town of Addison that flow into outfall collection systems of other municipalities. Most locations discharge a relatively small portion of the total potential allocation that is available for treatment.
- Cost recovery of the initial capital outlay would be very difficult to fulfill.

Prepared by: Steven Z. Chutchian, P.E.
Assistant City Engineer

JP copy

WATER REUSE STUDY

TOWN OF ADDISON

JANUARY 2001

PUBLIC WORKS DEPARTMENT

PREPARED BY: JIM PIERCE, P.E.
ASSISTANT DIRECTOR OF PUBLIC WORKS

STEVE CHUTCHIAN, P.E.
ASSISTANT CITY ENGINEER

Water Reuse Study

Town of Addison

January 2001

Introduction

Water reclamation and reuse for nonpotable purposes offers the potential of serving residential, commercial and industrial users with an alternative to using existing potable water sources. The following examples apply to the use of reclaimed water:

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This study assumes that during wet weather and other seasonal conditions, the demand for reuse water may be very low. As a result, it would be necessary for the Town of Addison to maintain the ability to discharge wastewater flow for treatment by our present treatment providers.

Existing Conditions

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Spring Valley	320,000	TRA
Brookhaven East	1,800,000	TRA

The Kellway Lift Station and Brookhaven East sites are considered below as potential sources or contributors of reclaimed water for reuse purposes. The Kellway Lift Station experiences an average daily flow rate of 200,000 gpd. This flow is tributary to the wastewater flow of 1,800,000 gpd at the Brookhaven East metering station.

Design Considerations

- Numerous commercial properties exist in the Town of Addison. However, there are no individual sites that would be capable of using a large volume of wastewater effluent for any purpose other than landscape irrigation. The initial cost of installing distribution systems to serve multiple sites, including necessary metering, would be very high.
- There are no large industrial or agricultural users in the Town of Addison that would consume reuse water.
- The vast majority of existing medians and parkways along major collector and minor arterial roadways are currently irrigated with potable water from the Town's distribution system. Extension of a non-potable water line to serve these medians is not cost effective.
- The best apparent use of reclaimed water for reuse within the Town is irrigation of landscape and grassy areas at the Addison Airport and the grounds of the Special Events site adjacent to Addison Road.
- A package wastewater treatment plant would be necessary to accept flow from the sanitary sewer collection system and generate a high quality effluent that could be maintained in a ground storage reservoir until it is subsequently pumped into a reuse water distribution system. Reuse water cannot be mixed with the Town's potable water system.

- Approximately 2.5 acres of land are necessary in order to construct a package plant, pump station, and ground storage. A buffer zone around the site is also necessary. The only point of discharge with available land is located near the Kellway Lift Station. However, the average daily flow through this location is only 200,000 gallons per day. The Brookhaven East metering station, with recorded average daily flows of approximately 1,800,000 gallons per day, does not have sufficient available property to construct these facilities.
- Contractual agreements with the City of Dallas & TRA, respectively, do not currently have provisions for the diversion of wastewater flow for water reuse applications.

Proposed Improvements

The Brookhaven East metering station site, with average daily flows of approximately 1,800,000 gallons per day, is the only location with enough potential effluent discharge to be realistically considered. However, this site does not have available land for construction of the proposed facilities. It would be necessary to purchase an adjacent apartment complex and demolish the structures in order to provide minimum acreage requirements. The following initial cost of improvements was developed for this discharge point. The total flow is currently designated for the TRA wastewater treatment plant via the City of Farmers Branch collection system. The estimated cost of construction of on-site treatment, storage, pumping and distribution facilities, which could serve the Addison Airport and Special Events area, is as follows:

Item	Cost
Right-of-Way Acquisition (12.2 acres), Including site for proposed facilities (2.5 acres), buffer zone (9.7 acres), and demolition of structures	$11,700,000(1)
Wastewater Treatment Package Plant Construction	6,000,000(2)
Design, Permitting, etc.	1,500,000(3)
Sub-Total	7,500,000

(1) based on equivalent values for existing land and structures, as developed in an appraisal prepared in April, 2000 by Mackenzie S. Bottum & Associates, Inc.

(2) based on $3.00/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas

(3) based on 25% of total construction cost, obtained from CH2M Hill, Inc.-Dallas, Texas

2 MG Ground Storage Reservoir, including Engineering & Contingencies (4) based on $2.25/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	4,500,000(4)
Pump Station @ Storage Site, including Engineering (5) based on $1.40/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	2,800,000(5)
Pump Station @ Airport Site (6) based on $0.40/gallon, estimated by Public Works Department staff	720,000(6)
8" Non-Potable Water Transmission Main, from Intersection of Brookhaven Club Dr. & Marsh Lane To Southwestern Portion of Addison Airport (7) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual	1,200,000(7)
6" Non-Potable Water Distribution System Through Addison Airport & Special Events Area (8) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual	800,000(8)
Total	$29,220,000

Cost Analysis

Assumptions:

- Five (5) month usage period for reclaimed water as a source of irrigation by the Town during a calendar year.
- Elimination of taxes received by the Town from displaced multi-family units considered an annual cost of the improvements.
- Twenty (20) year debt repayment period.
- Town of Addison will be the only user of reclaimed water, with no recovery of initial construction or annual costs.
- Debt payment based on current bond rate of 5.5%, with AAA rating.

Initial Construction Cost: $29,220,000
Total Debt Incurred: $48,534,011
Annual costs:

• Debt Repayment	$2,426,700
• Maintenance (including permits, Data reports, general, etc.)	65,000
• Personnel (2 employees @ $12.00/hr./each, including indirect costs)	49,900
• Facility Replacement/Repair (i.e., Pump replacement, etc.)	55,000
• Loss of tax revenue	13,000
Total Annual Cost	$2,609,600

Annual Consumption of Reuse Water:
1,800,000 gpd x 30 days/mo. x 5 mo./yr. = 270,000,000 gallons

Annual Cost to Town of Addison for using reclaimed water:

$$\frac{\$2,609,600 \times 1,000}{270,000,000 \text{ gal.}} = \$9.67 \text{ per } 1000 \text{ gallons}$$

Proposed Improvements (Alternative)

The Kellway Lift Station site, has an average daily flow rate of approximately 200,000 gallons per day. The following initial cost of improvements was developed for this discharge point. The flow currently discharges at the Brookhaven East metering station and is designated for the TRA wastewater treatment plant via the City of Farmers Branch collection system. The estimated cost of construction of on-site treatment, storage, pumping and distribution facilities to serve the Addison Airport and Special Events area is as follows:

Item	Cost
Right-of-Way Acquisition (7.8 acres), Including site for proposed facilities (2.0 acres), 3-sided buffer zone (5.8 acres)	$ 5,346,000(1)
(1) based on equivalent values for existing land and structures, as developed in an appraisal prepared in April, 2000 by Mackenzie S. Bottum & Associates, Inc.	
Wastewater Treatment Package Plant	
Construction	600,000(2)
Design, Permitting, etc.	150,000(3)
Sub-Total	750,000
(2) based on $3.00/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
(3) based on 25% of total construction cost, obtained from CH2M Hill, Inc.-Dallas, Texas	
0.2 MG Ground Storage Reservoir, including Engineering & Contingencies	450,000(4)
(4) based on $2.25/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
Pump Station @ Storage Site, including Engineering	280,000(5)
(5) based on $1.40/gallon, obtained from CH2M Hill, Inc.-Dallas, Texas	
6" Non-Potable Water Distribution System Through Addison Airport & Special Events Area	800,000(8)

(6) based on unit prices for pipeline installation and infrastructure repair, as listed in Dallas Water Utilities Line Item Bid Take Off and Estimating Manual

Total	$7,626,000

Cost Analysis

Assumptions:

- Five (5) month usage period for reclaimed water as a source of irrigation by the Town during a calendar year.
- Twenty (20) year debt repayment period.
- Town of Addison will be the only user of reclaimed water, with no recovery of initial construction or annual costs.
- Debt payment based on current bond rate of 5.5%, with AAA rating.

Initial Construction Cost: $7,626,000
Total Debt Incurred: $12,666,680
Annual costs:

• Debt Repayment	$633,334
• Maintenance (including permits, Data reports, general, etc.)	65,000
• Personnel (2 employees @ $12.00/hr./each, including indirect costs)	49,900
• Facility Replacement/Repair (i.e., Pump replacement, etc.)	40,000
Total Annual Cost	$788,234

Annual Consumption of Reuse Water:
200,000 gpd x 30 days/mo. x 5 mo./yr. = 30,000,000 gallons

Annual Cost to Town of Addison for using reclaimed water:

$$\frac{\$788{,}234 \times 1{,}000}{30{,}000{,}000 \text{ gal.}} = \$26.27 \text{ per } 1000 \text{ gallons}$$

Alternative Irrigation Water Supply Considerations

Ground Water

Ground water supply can be considered a source of water for irrigation, as an alternate to water reuse. The Special Events site was selected for comparison. This site consists of approximately 16 acres, and if irrigated with 1.5 inches of water per week, it will require 93,094 gallons of water per day (gpd). The proposed system requirements would include a well and pump, a ground storage tank, and a high service pump to boost pressure. An estimate of the cost of the proposed facilities is as follows:

Paluxy Formation Well & Pump	$200,000
100,000 Gallon Storage Tank	225,000
Booster Pump Station	200,000
Total Construction Cost	$625,000

Cost Analysis

Assumptions:

- Five (5) month usage period.
- Irrigation of site during the hours of 9:00 p.m. to 7:00 a.m.
- Twenty (20) year debt repayment period.
- Town of Addison will be the only user of groundwater, with no recovery of initial construction or annual costs.
- Debt payment based on current bond rate of 5.5%, with AAA rating.

Initial construction cost: $625,000
Total debt incurred: $1,046,000
Daily Consumption of Ground Water: 93,094 gpd
Annual Costs:

• Debt Repayment	$52,300
• Power	16,000
• Maintenance & Repair	4,000
• Personnel (1/2 person)	15,700
Total Annual Cost	$88,000

Annual Cost to Town of Addison for using ground water:

$$\frac{\$88{,}000 \times 1000}{93{,}094 \text{ gpd} \times 150 \text{ days}} = \$6.30 \text{ per } 1000 \text{ gallons}$$

Purchase Water from City of Dallas

The 16 acre Special Events site may also be irrigated with potable water purchased from the City of Dallas. As previously determined, the site would require purchase of approximately 93,094 gallons per day. This water is delivered to the Town's existing ground storage tanks and subsequently pumped into the distribution system. It is assumed that the irrigation system would operate from the system water pressure.

Cost Analysis

Assumptions:

- Water supply rate of flow from Dallas increased by 100,000 gal./day.
- Volume charge based on rate of $0.3458 per 1000 gallons.
- Five (5) month usage period.
- Irrigation of site during the hours of 9:00 p.m. to 7:00 a.m.
- Town of Addison will be the only user of water purchased from City of Dallas.

Annual Costs:

• Debt Repayment	$ -0-
• Power	3,500
• Maintenance & Repair	-0-
• Personnel	-0-
• Water Demand Charge	12,588
• Water Volume Charge	4,828
Total Annual Cost	$20,916

Annual Cost to Town of Addison for using water purchased from City of Dallas:

$$\frac{\$20{,}916 \times 1000}{93{,}094 \text{ gpd} \times 150 \text{ days}} = \$1.50 \text{ per } 1000 \text{ gallons}$$

Conclusion

- There are only two sites within the Town that could be considered for the location of a water reuse facility.
- The Brookhaven East site, which has sufficient wastewater flow for water reclamation and reuse, is very far from areas that are proposed for irrigation and requires acquisition and demolition of multi-family property.
- The Kellway Lift Station site has an insufficient volume of wastewater flow for significant water reclamation and reuse.
- Both sites were analyzed as potentially viable sources of water reclamation and reuse, and determined to be cost prohibitive.

- The benefit obtained from the construction of treatment, storage, pumping, and distribution facilities for using reclaimed water in the Town of Addison would be minimal, at best. Annual repayment of the initial capital outlay over a twenty (20) year period would be very high for each alternative.
- The annual cost for using ground water for irrigation is less than reclaimed water. However, it is also very high.
- Based on the cost of developing alternate sources of water for irrigation, the purchase of potable water from the City of Dallas is the most viable and cost effective approach to irrigating the Special Events site and any grassy areas within the Addison Airport property.

Prepared by: Town of Addison
Public Works Department