APPENDIX P

Water System Analysis

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

WATER AND RECYCLED WATER STUDY FOR THE NORTH RIVER FARMS PROJECT IN THE CITY OF OCEANSIDE

July 16, 2018

2234 FARADAY AVENUE • CARLSBAD, CA • (760) 438-4422

WATER AND RECYCLED WATER STUDY
FOR THE
NORTH RIVER FARMS PROJECT
IN THE CITY OF OCEANSIDE

July 16, 2018

7-16-2018

Prepared by:
Dexter Wilson Engineering, Inc.
2234 Faraday Avenue
Carlsbad, CA 92008
760-438-4422

Job No. 930-008

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July 16, 2018

930-008

Integral Communities
2235 Encinitas Blvd, Suite 216
Encinitas, CA 92024

Attention: Ninia Hammond, Project Manager

Subject: Water and Recycled Water Study for the North River Farms Project in the City of Oceanside

Introduction

This report provides an analysis of water and recycled water service for the North River Farms project in the City of Oceanside and was originally prepared on November 6, 2017. City of Oceanside Water Utility Department comments on the November 2017 report are dated March 23, 2018, and along with comment responses are provided in Appendix A for reference. A revised water study was prepared on May 3, 2018. City of Oceanside Water Utilities review comments from a meeting on Thursday, July 12, 2018, included three items.

1. Show the proposed North River Farms Pressure Reducing Station connecting to the existing 24" 800 Pressure Zone transmission main.
2. Eliminate the three dead-end water mains at the ends of proposed cul-de-sacs.
3. Show easements for the three water main connections that will eliminate the dead ends.

All three comments are addressed in this version of the water study for North River Farms. The connection point for the proposed North River Farms Pressure Reducing Station near the intersection of North River Road and Wilshire Road is shown to be to the existing 800 Pressure Zone 24-inch transmission main in Wilshire Road. Easements for water lines at the three cul-de-sacs are shown in Figure 3; these proposed 20-foot water easements will eliminate all the dead-end water mains within the North River Farms project.

The North River Farms project is comprised of multiple land uses including agriculture, parks, commercial, hotel, and residential areas on approximately 176.6 acres. The project proposes a mix of residential dwelling unit densities totaling 689 dwelling units.

Access to the project will be from North River Road. Public and private streets and drives will provide access throughout the project. Proposed elevations within the project range from approximately 100 feet to 225 feet. Figure 1 presents a vicinity map for the North River Farms project and Figure 2 presents the proposed land use map.

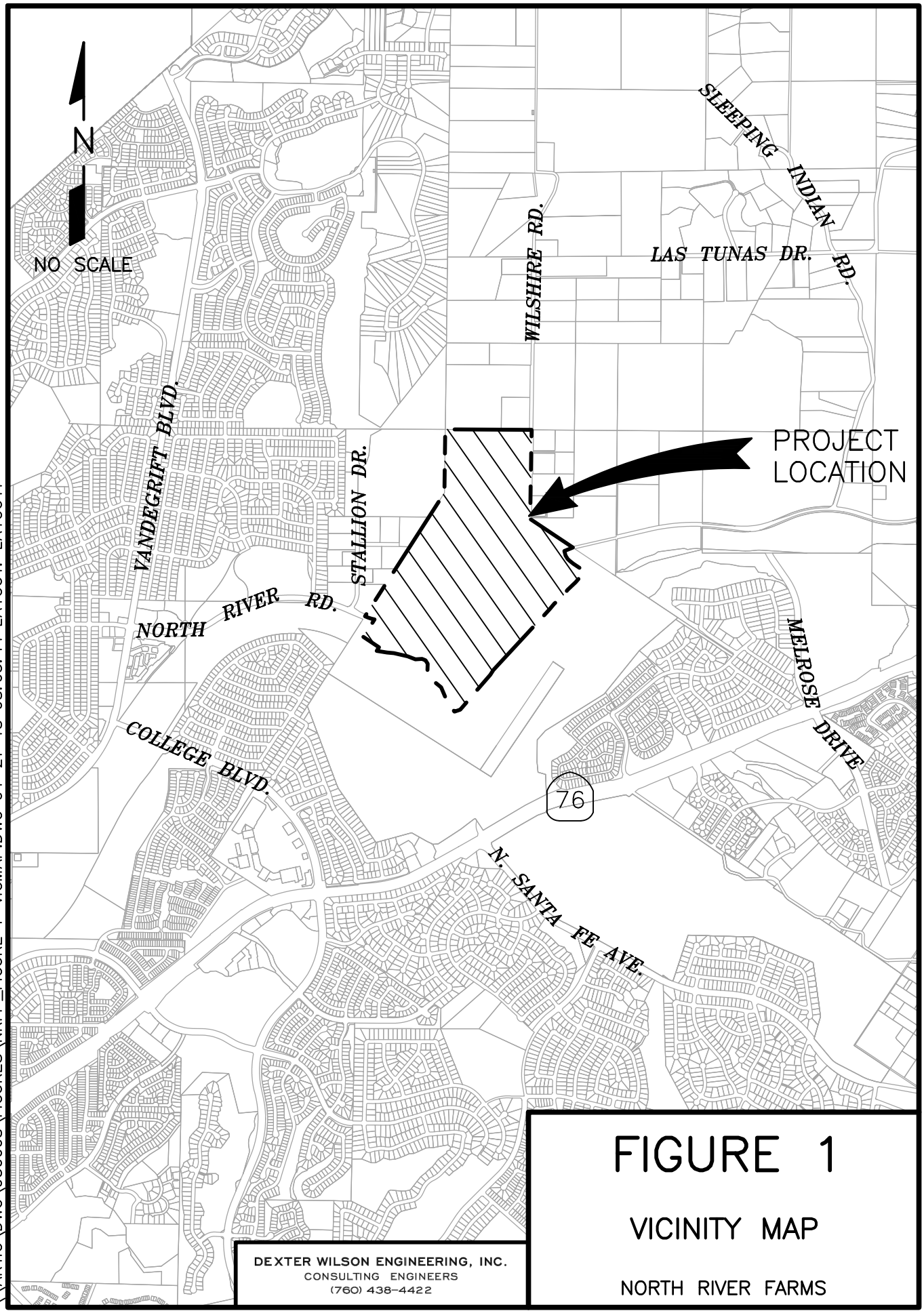

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FIGURE 1

VICINITY MAP

NORTH RIVER FARMS

\\ARTIC\DWG\930008\FIGURES\NRFP_WTR_FIGURE-2_LU.DWG 04-21-18 08:11:33 LAYOUT: LAYOUT

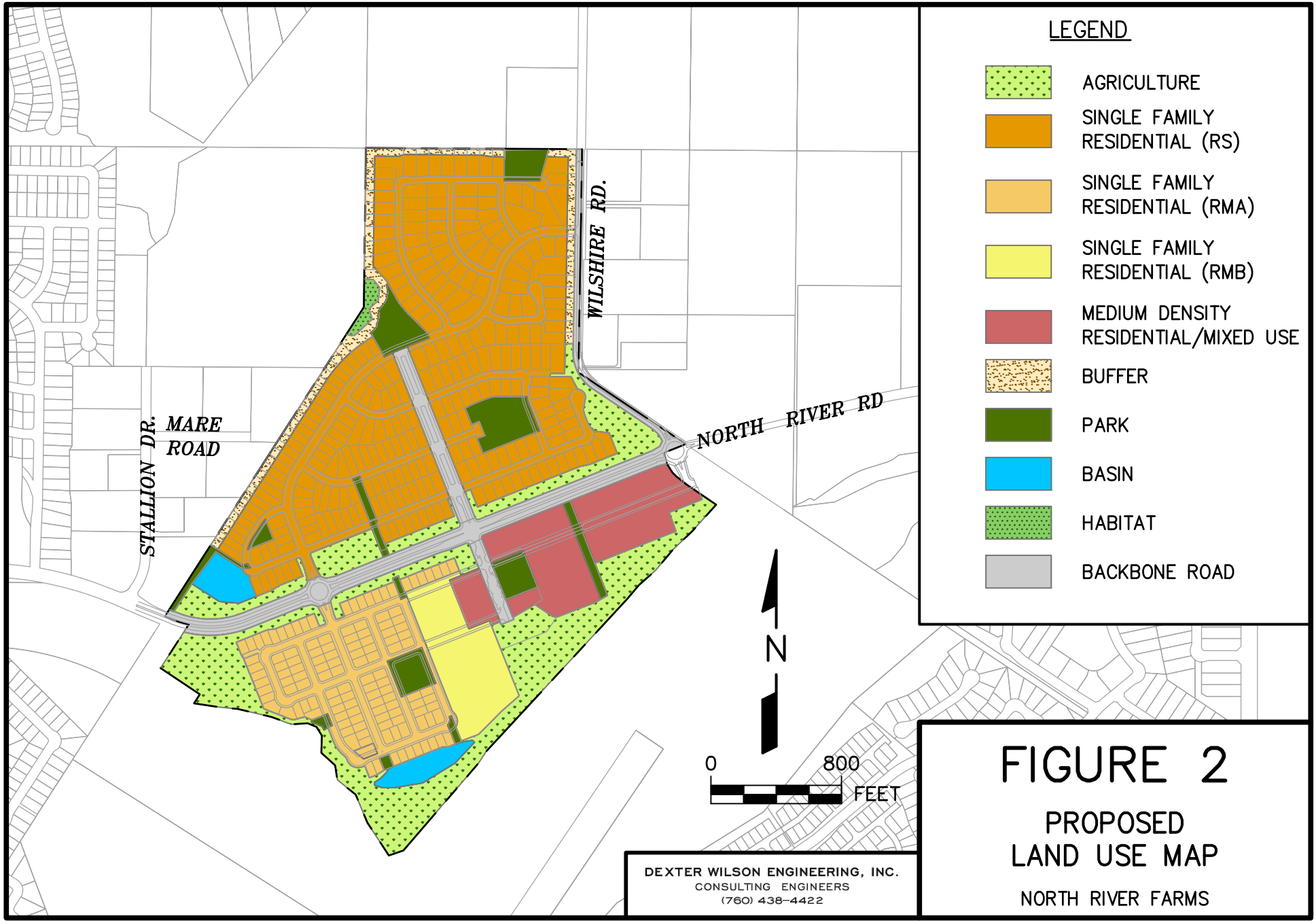

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FIGURE 2

PROPOSED LAND USE MAP

NORTH RIVER FARMS

Existing Water System Description

Water service to the North River Farms project will be provided by the City of Oceanside. The project is situated in the northeastern section of the City of Oceanside. The project area is within the existing 420 Pressure Zone. The water supply to this area originates from the Guajome Reservoir and from a high pressure pipeline (511 Pressure Zone) which is reduced to the 420 Pressure Zone at the College Boulevard and North River Road Pressure Reducing Station. These facilities are located west of the project.

Exhibit B at the back of this report shows the existing water infrastructure in the vicinity of the North River Farms project. Reference to this exhibit will assist in understanding the existing water system as described in the next paragraphs.

Currently the 420 Pressure Zone is fed by two operating pressure reducing stations. One PR Station is located at the intersection of North River Road and College Boulevard and is supplied by the 511 Pressure Zone. The second pressure reducing station is located on Wilshire Road approximately 2,700 feet north of the intersection of Wilshire Road and North River Road. This PR Station is supplied from the existing 24-inch 800 Pressure Zone pipeline in Wilshire Road and connects to the existing 10-inch 420 Zone water line in Wilshire Road extending south to North River Road.

There are also two existing pressure reducing stations in the vicinity which supply the 480 Zone system. One such pressure reducing station is located on Wilshire Road at the intersection with Las Tunas Drive (see Exhibit B).

The second pressure reducing station supplying the 480 Zone is at the intersection of North River Road and Wilshire Road. This PR Station is connected to the existing 24-inch 800 Pressure Zone water line which extends from North Santa Fe Avenue across the San Luis Rey River and into Wilshire Road. This PR Station is at the eastern boundary of the North River Farms project site as shown in Exhibit B. It will remain in service supplying 480 Zone water to the existing 16-inch water line in North River Road east of Wilshire Road.

An existing 14" 420 Pressure Zone water main is located in North River Road within the project area. This water main will remain in place and as the backbone for the 420 Pressure Zone water system through the North River Farms project.

Water System Design Criteria

Water system design criteria are based on Section 2 of the City of Oceanside Design and Construction Manual, revised August 1, 2017, and the June 2015 Integrated Master Plan Volume 1, Water Master Plan.

Water Demand. Potable water demands are based on Section 2 of the City of Oceanside Design and Construction Manual, revised August 1, 2017. The hotel water use demand factor was taken from the June 2015 Integrated Master Plan Volume 1, Water Master Plan, Section 3.5, page 3-13. Based on these sources, domestic average day water demands are determined based on land use; the rates are presented in Table 1.

Pressure Criteria. A minimum residual pressure of 20 psi must be maintained under maximum day demands plus fire flow. Minimum service static pressure is 50 psi. Minimum residual pressure of 35 psi must be maintained under peak hour demands, and 45 psi must be maintained under maximum day demands.

Water Mains. Water mains are required to have a minimum diameter of 8-inches. Pipeline velocity must not exceed 7.5 feet per second (fps) under maximum flow conditions not including fire flow.

For fire flow conditions, maximum velocity is 15 fps for existing mains less than 12-inch diameter. For 12-inch and larger existing piping, maximum velocity is 10 fps under maximum day plus fire flow.

For new mains, velocity under maximum day demand plus fire flow is limited to 10 fps with the fire flow demand flowing through one hydrant.

TABLE 1 AVERAGE DAILY WATER DEMAND FACTORS	
Land Use	**Gallons Per Day Per Acre**
Single Family Res. (1-2 DU/ac)	1,200
Single Family Res. (2-4 DU/ac)	2,100
Single Family Res. (4-8 DU/ac)	2,400
Single Family Res. (8-12 DU/ac)	2,500
Single Family Res. (12-15 DU/ac)	2,800
Single Family Res. (15-20 DU/ac)	3,200
Single Family Res. (20-30 DU/ac)	4,100
Agricultural Acres	1,750
Commercial Acres	1,850
Institutional	1,675
Hotel	115 gpd/room

Fire Flows. Fire hydrant flow requirements vary by the type of land use and are established by the City of Oceanside in Section 2 of the City of Oceanside Design and Construction Manual, revised August 1, 2017. Based on commercial land use the corresponding fire flow requirement is 4,000 gpm; for multi-family residential land use the fire flow requirement is 3,000 gpm, and for single family and duplex residential land use the fire flow is 1,500 gpm.

As mentioned earlier, a minimum residual pressure of 20 psi must be maintained under maximum day demands plus fire flow. Design of the water system is based on maximum day demands plus fire flow requirements.

Potable Water Demands

Based on the water use factors presented in Table 1 and the proposed development plan for the North River Farms project, the estimated water demand for the project is calculated and presented in in Table 2 below.

TABLE 2
WATER DEMAND FOR NORTH RIVER FARMS

Land Use	Water Demand Factor (gpd/acre)	Area (acres)	Average Water Demand, gpd
Residential (1-2 DU/ac)	1,200	0	0
Residential (2-4 DU/ac)	2,100	0	0
Residential (4-8 DU/ac)	2,400	69.8	167,520
Residential (8-12 DU/ac)	2,500	41.5	103,750
Residential (12-15 DU/ac)	2,800	0	0
Residential (15-20 DU/ac)	3,200	0	0
Residential (20-30 DU/ac)	4,100	0	0
Agricultural Acres	1,750	31.6	55,300
Parks and Slope Acres	1,750	19.3	33,775
Commercial Acres	1,850	0.7	1,295
Hotel	115 gpd/room	100 rms	11,500
Backbone Roads	--	13.1	0
Habitat	1,750	0.6	1,050
TOTAL		**176.6**	**374,190**

From Section 2 of the City of Oceanside Design and Construction Manual, revised August 1, 2017, maximum day demands are two (2) times the average day demands and peak hour demands are three (3) times the average day demands.

The proposed water demands for the North River Farms project are calculated below:

Average Day Demand = 374,190 gpd (260 gpm)
Maximum Day Demand = 374,190 gpd x 2 = 748,380 gpd (520 gpm)
Peak Hour Demand = 374,190 gpd x 3 = 1,122,570 gpd (780 gpm)

Average day demands for existing development within the 420 Pressure Zone adjacent to the North River Farms project was estimated and included in the water system computer model.

Available Water System Pressure

Water service to the North River Farms project will be from the 420 Pressure Zone of the City of Oceanside public water system. Pad elevations within the project boundary range from approximately 100 feet to 225 feet. This results in maximum static water pressure ranging from 84 psi to 139 psi within the project boundary.

When static pressures exceed 80 psi, the California Plumbing Code requires pressure regulating valves at each building supply. All building services within the North River Farms project will be required to have individual pressure regulating valves at each building supply connection.

Proposed Water Service System for North River Farms

As discussed earlier in this report, there are two existing and active pressure reducing stations supplying the existing 420 Pressure Zone. Of the two active stations the College at North River Road PRS is intended to remain as the primary supply to the 420 Pressure Zone service area. This is because the College at North River Road PRS is fed from the 511 Pressure Zone which is a primary distribution zone for the City's water system. This pressure reducing station is supplied by a 24-inch pipeline which provides sufficient hydraulic capacity for the College at North River Road PRS to function as the primary feed to the 420 Pressure Zone.

For a second source to the 420 Pressure Zone, which will have increased water demand due to the North River Farms project, a new pressure reducing station will be constructed by the North River Farms project at the Wilshire Road and North River Road intersection. At this intersection is located the existing 800/480 Zone PRS supplying the 16-inch 480 Zone pipeline to the east of Wilshire Road. This existing pressure reducing station will remain in place. The new North River Farms Pressure Reducing Station is proposed to connect to the existing 24-inch 800 Pressure Zone pipeline to supply the new 420 Zone pressure reducing station. A schematic diagram of the North River Farms Pressure Reducing Station upstream and downstream piping is shown on Figure 3.

Connecting the existing College at North River Road PRS and the proposed new North River Farms PRS will be the existing 14-inch 420 Pressure Zone water main in North River Road. The internal water distribution piping for the North River Farms project will extend off of this existing 14-inch water line. Thus the 420 Pressure Zone and the North River Farms project will have a primary supply source from the west, and a new supply source from the new North River Farms PRS on the east side of the 420 Pressure Zone service area.

Computer Model Development

The onsite public water system for the North River Farms project was designed based on providing the necessary domestic and fire protection demands at the required pressures. To establish and evaluate the proposed onsite public water system, a computer model was developed.

The KYPIPE computer software program developed by the University of Kentucky was used to analyze the proposed onsite and existing offsite public water system. KYPIPE utilizes the Hazen-Williams equation for determining head loss in pipes. The program also determines the flow and velocity in the pipes as well as the available pressure at nodes in the water system. An assumed roughness coefficient "C" value of 120 was used for all pipes.

Computer Modeling the 420 Pressure Zone System. The two water sources for the 420 Pressure Zone are identified as fixed grade nodes in the computer model and are set based on the expected hydraulic grade line within the supply zone. Each pressure reducing station consists of two (2) pressure reducing valves: a larger main valve and a smaller bypass valve.

The individual pressure reducing valve downstream setpoints are included in the computer model. The setpoint values are as shown below.

College at North River Road PR Station (existing facility)

Bypass valve setpoint	420 feet HGL
Large valve setpoint	408 feet HGL

North River Farms PR Station (new proposed facility)

Bypass valve setpoint	415 feet HGL
Large valve setpoint	403 feet HGL

These are proposed setpoints for these valves that could be implemented once the North River Farms PR Station is constructed and operational. The computer modeling results demonstrate that these setpoints provide adequate flow and pressure to the 420 Pressure Zone system. In addition, these setpoints result in favoring the College at North River Road PR Station which is consistent with the City of Oceanside Water Utilities Department preference to have it function as the primary supply to the 420 Pressure Zone.

Results of Computer Modeling for the North River Farms Project

Computer modeling of the proposed onsite and existing offsite water system for the North River Farms project was performed to determine the pipe sizes necessary to provide adequate domestic and fire protection service. The water system was analyzed under average day demand, peak hour demand, and maximum day demand plus fire flow. Multiple scenarios under maximum day demand plus fire flow were analyzed to ensure that all areas of the North River Farms project will be properly served.

The model was analyzed with the fire flow demand located at the fire hydrant at the highest elevation on the project and with the furthest distance for water to travel in order to analyze the worst case scenario. Appendix B provides the results of the computer model for the analyzed water system. Exhibit A provides the corresponding Node and Pipe Diagram of the analyzed water system.

Residual Pressures. Results of the peak hour demand scenario with service from the 420 Pressure Zone indicate that the minimum expected pressure within the North River Farms project site is 85 psi at the northeast corner, which exceeds the minimum residual pressure of 35 psi required by the City of Oceanside. The minimum offsite residual pressure under peak hour demand is 80.7 psi in Wilshire Road adjacent to the northern-most portion of the project.

Results of the maximum day demand plus fire flow scenarios with service from the 420 Pressure Zone indicate that with 1,500 gpm single family fire flow the residual pressures at the fire flow locations range from 68 to 125 psi. Under average day demand these same nodes range from 135 psi. In all cases the residual pressures exceed the minimum residual pressure requirement of 20 psi.

For maximum day demand plus 4,000 gpm fire flow for the commercial zone, the residual pressures at the fire flow locations modeled are 123 psi (Node 36) and 118 psi (Node 30). Under average day demand conditions, the pressures at these two Nodes are 136 psi and 129 psi respectively. Again, the proposed water distribution system provides residual pressure in excess of the 20 psi required.

Maximum Velocities. Maximum velocity in the distribution piping under peak hour demand is 1.8 fps in the existing offsite piping. The maximum velocity under peak hour demand for the onsite piping is approximately 1.0 fps. This is less than the maximum velocity requirement of 7.5 fps by the City of Oceanside under peak hour flow. Under maximum day demand plus 4,000 gpm fire flow the maximum onsite pipeline velocity is 6.4 fps.

Figure 3 shows the proposed onsite water system layout for the North River Farms project. The proposed onsite water system consists of 8-inch and 12-inch water mains. A 12-inch water main loop is proposed through the mixed use and high density residential areas of the project which are south of and abutting North River Road. In addition to the onsite piping, the North River Farms project will construct the new North River Farms Pressure Reducing Station to be located at the east end of the site in the vicinity of the intersection of North River Road and Wilshire Road and supplied by the existing 24-inch 800 Pressure Zone Transmission Main.

DETAIL "A"
NO SCALE

DETAIL "B"
NO SCALE

DETAIL "C"
NO SCALE

20' EASEMENT FOR PROPOSED WATER

PVT DR "F"

PVT DR "G"

PVT DR "J"

WILSHIRE ROAD

SEE DETAIL "A" FOR ENLARGED PLAN

SEE DETAIL "B" FOR ENLARGED PLAN

SEE DETAIL "C" FOR ENLARGED PLAN

SEE DETAIL "D" FOR ENLARGED PLAN

EX.24" 800 ZONE

EX.10" 420 ZONE

NEW 8"

EX.24"

EX.10"

PVT. DR. "F"

PVT. DR. "A"

PVT. DR. "G"

PVT DR "B"

PVT DR "J"

PVT DR "K"

PVT DR "O"

PVT DR "A"

8"

12"

EX.8"

STALLION DR.

MARE ROAD

EX.6"

NORTH RIVER RD.

16" 480 ZONE

EX.14"

EX.14" 420 ZONE

MELROSE

PROPOSED WILSHIRE AT NORTH RIVER ROAD PRESSURE REDUCING STATION

COLLEGE BLVD.

LEGEND

PROJECT BOUNDARY

EXISTING WATER

PROPOSED WATER

PRESSURE REDUCING STATION

N

0 600 FEET

WILSHIRE RD

EX.24" 800 ZONE

EX.10" 420 ZONE

PROPOSED 16" CONNECTION PIPELINE TO 800 ZONE

EX.16" 480 ZONE

NORTH RIVER RD

EXISTING 800/480 PRS

16"

EX.14" 420 ZONE

12" 420 ZONE

PROPOSED 800/420 PRS

EX.24" 800 ZONE

PROPOSED CONNECTION TO 420 ZONE

DETAIL "D"
NO SCALE

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FIGURE 3

PROPOSED ONSITE WATER SYSTEM

NORTH RIVER FARMS

North River Farms Pressure Reducing Station

The new pressure reducing station to be constructed by the North River Farms project at the North River Road and Wilshire Road intersection is proposed to have the same pressure reducing valve configuration as the primary 420 Zone pressure reducing station at College and North River Road. This means the new pressure reducing station will have a main valve at 12-inch diameter and a smaller valve at 6-inch diameter.

This pressure reducing station is proposed to be constructed in a vault to be located adjacent to the proposed North River Road/Wilshire Road roundabout. The new pressure reducing station will be supplied from the existing 800 Pressure Zone 24-inch Transmission Main with a 16-inch feed line, and will connect to the existing 14-inch 420 Pressure Zone pipeline in North River Road with a new 16-inch water line. The exact configuration of the piping and the location of the new pressure reducing station vault will be worked out during the final design of the project improvements.

Recycled Water Service

The North River Farms project intends to construct recycled water facilities within its project in order to obtain beneficial use of recycled water when it becomes available. The use of recycled water will be for parks and irrigated open space. Some areas of agriculture may be able to use recycled water depending on the type and purpose of plants that are cultivated. For an estimate of potential recycled water use within the North River Farms project, twenty-five percent of the agricultural acreage was assumed to be irrigated with recycled water.

Table 3 presents the estimated recycled water use for North River Farms. This water use will be refined further as the project design progresses and landscape and irrigation plans are prepared.

TABLE 3 RECYCLED WATER USE FOR NORTH RIVER FARMS			
Land Use	**Demand Factor (gpd/acre)**	**Area (acres)**	**Avg. Recycled Water Use, gpd**
Agricultural Acres (25%)	1,750	7.9	13,825
Parks and Slope Acres	1,750	19.3	33,775
Habitat	1,750	0.6	1,050
TOTAL		**27.8**	**48,650**

Average annual recycled water use is 17,757,250 gallons per year which converts to 54.5 AFY.

Recycled Water Infrastructure

Presently there are no recycled water facilities proximate to the North River Farms project. The City of Oceanside Water Utilities Department is working on a recycled water master plan and developing a capital improvement program to extend recycled water piping to potential high use areas of the City. One such area is the North River agricultural area of the City which encompasses the North River Farms project.

Figure 4 shows a map of existing and proposed recycled water piping in the northeast quadrant of the City of Oceanside. The recycled water source is planned to be the San Luis Rey Water Reclamation Plant. At the present level of recycled water system planning the working hydraulic grade line of the recycled water system has been established as 466 feet.

SOURCE: CITY OF OCEANSIDE WATER UTILITIES DEPARTMENT, 03-21-2018

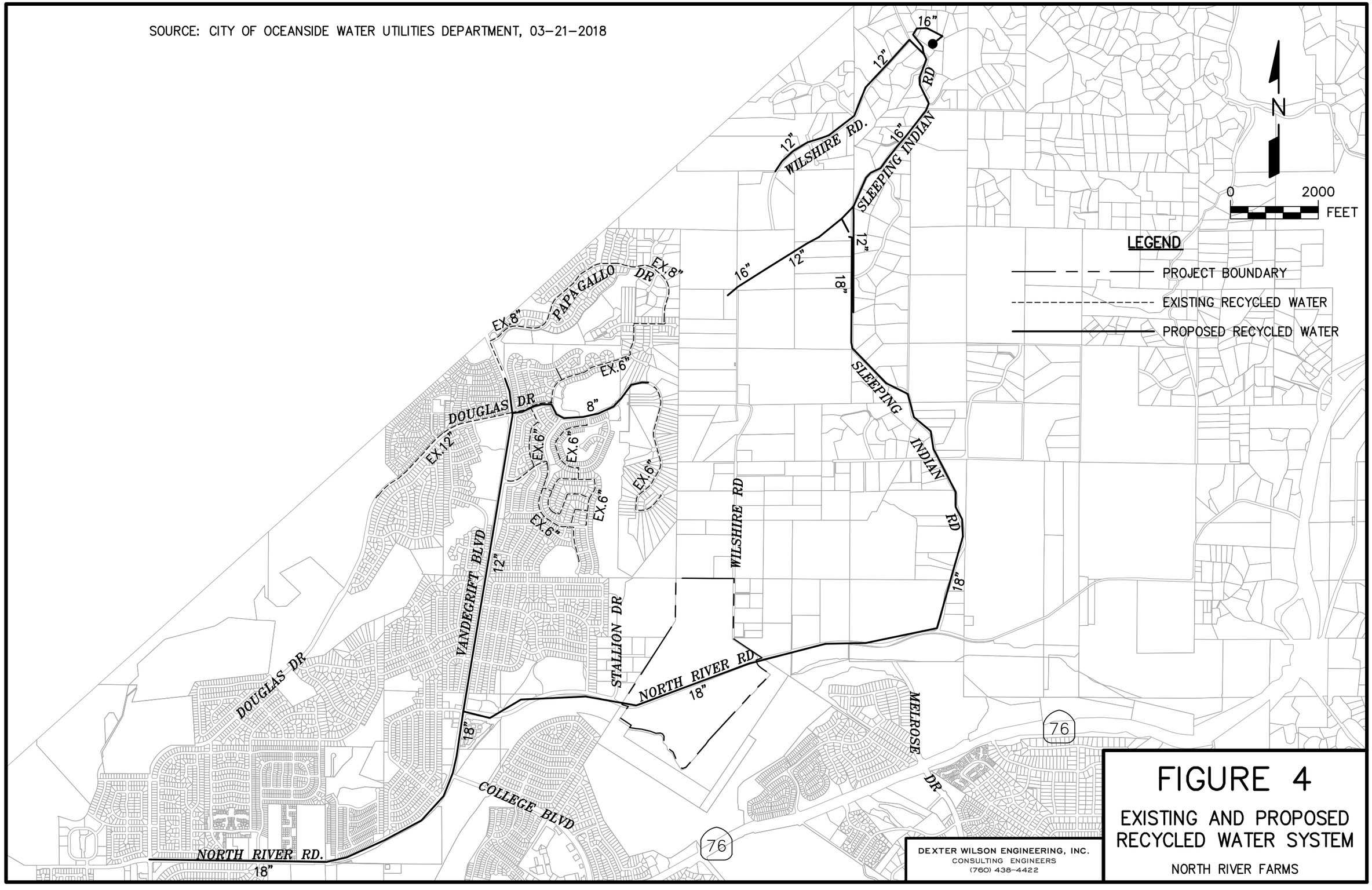

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FIGURE 4

EXISTING AND PROPOSED RECYCLED WATER SYSTEM

NORTH RIVER FARMS

The proposed recycled water distribution system includes an 180-inch pipeline in North River Road. The North River Farms project is proposing to construct the segment of this 18-inch pipeline through the project as part of the North River Road improvements. The City has indicated that the construction of the 18-inch recycled water main is a reimbursable expense as the City has identified the backbone recycled water infrastructure to be part of the capital improvements for the City's recycled water system expansion. Documentation substantiating the City's commitment to full reimbursement of the cost of the proposed 18-inch recycled water pipeline in North River Road is included in Appendix C.

The North River Farms project will extend local recycled water piping into its project in order to provide service to recycle water irrigation meters. The extent of the onsite recycled water piping within North River Farms will depend on the design of the landscape and irrigation for the project which will be prepared at a later stage in the development process.

Conclusions and Recommendations

The following conclusions and recommendations are presented based on the water system analysis prepared for the North River Farms project.

1. Water service to the North River Farms project will be provided by the City of Oceanside from the 420 Pressure Zone.

2. Static pressures within the North River Farms project boundary range from approximately 84 psi to 139 psi. As a result, individual pressure regulators in accordance with plumbing code will be required at all buildings in the project.

3. The fire flow available to the project site meets the City of Oceanside fire flow requirement of 4,000 gpm for commercial land use, 3,000 gpm for multi-family residential, and 1,500 gpm for single family residential land use. Under each maximum day demand plus fire flow scenario the minimum residual pressures are greater than the requirement of 20 psi.

4. A new 800/420 Zone pressure reducing station will be constructed by the North River Farms project in the vicinity of the intersection of Wilshire Road and North River Road. This new PR Station will become the backup supply to the 420 Zone water service area.

5. Proposed onsite water system piping will consist of 8-inch and 12-inch diameter water mains. Piping is recommended to be AWWA C900 PVC DR18 Class 235.

6. The City of Oceanside will be implementing a recycled water master plan which includes capital improvements such as an 18-inch recycled water main in North River Road. The North River Farms project design will accommodate this 18-inch recycled water main in North River Road through the proposed development.

7. Construction of the 18-inch recycled water main in North River Road through the project by the North River Farms project will be reimbursable by the City's recycled water capital improvements program.

8. The 18-inch recycled water pipeline material is yet to be determined by the City. Pipe material can be worked out during the final design of the North River Road improvements through the North River Farms project.

Thank you for the opportunity to provide water system planning services for this project. Please feel free to contact us to further discuss any aspect of the information presented in this water service analysis for the North River Farms project.

Dexter Wilson Engineering, Inc.

Andrew Oven, P.E.

AO:ps

Attachments

APPENDIX A

WATER UTILITIES REPORT REVIEW COMMENTS AND COMMENT RESPONSES

City of Oceanside
Water Utilities Department

MEMORANDUM

DATE: March 23, 2018

TO: Greg Keppler, P.E., Principal Engineer

FROM: Mabel Uyeda, P.E., Senior Civil Engineer

RE: Water System Analysis for the North River Farms Project – Water Utilities Department Review

BACKGROUND

The report titled, "Water Service Analysis for the North River Farms Project" dated November 6, 2017 was submitted to the Water Utilities Department for review and comment.

COMMENTS

The Water Utilities Department has the following comments that will need to be addressed and resubmitted in the water analysis.

1. In the first paragraph on page 3, the last two sentences should be revised as follows: "The water supply to this area originates from the Guajome Reservoir and from a high pressure pipeline (511 Pressure Zone) which is reduced to 420 Pressure Zone at College and North River Rd PRV. These facilities are located west of the project."
2. The last four paragraphs of the Water Service Overview should be revised to reflect the markups on Exhibit B attached. The pressure regulating stations and normally closed valves shown in the water study was not complete. Revise as necessary and rerun hydraulic model. If you would like to meet with Water Utilities Operations and Maintenance Staff for further clarification, please let me know to schedule a meeting.
3. Unit Water demands shall be in accordance with the 2015 Water Master Plan. Peaking factors shall be in accordance with the 2017 Water, Sewer, and Recycled Water Design and Construction Manual. Revise the Potable Water Demand Table.
4. In addition to max pipe velocity under maximum flow conditions, the City has a design criteria of max velocity of 15 fps or 10 fps for maximum day demand plus fire flow, depending upon the pipe diameter size. Please provide this information to verify all existing and proposed pipelines impacted by the Project will meet this criteria. Add this to text in study including section on Fire Flows of page 6.
5. On page 7, last paragraph, The City is in agreement with a PRV off of the 24-inch 800 Pressure Zone transmission line. However, the City needs the existing Wilshire and North River Road 800/480 PRS to serve as a backup supply for the 480 Zone and back feed the agricultural customers along Sleeping Indian Road. Therefore, a new pressure regulating

station at this location and off of the 24” transmission main that is dedicated to the 420 PZ is required.

6. Figure 2, any dead end waterlines that are more than 150 feet must be looped. If the water mains are less than 150 feet, then there shall be a fire hydrant at the end and metered services as close the end of the main as possible. See Streets “E” and “D.”
7. Provide an exhibit that shows the proposed land uses within the project area and overlay it on the proposed waterline sizes.
8. Provide additional fire flow conditions in the most critical locations within the Project.
9. Exhibit A, revise the details showing the PRS based on markups to Exhibit B (see attachment) regarding the operation of the water system. The proposed dead end 12” main is not acceptable. It must be looped per our Department’s design manual requirements.

Please revise and resubmit the water study for review prior to approval of entitlement package.

ATTACHMENT

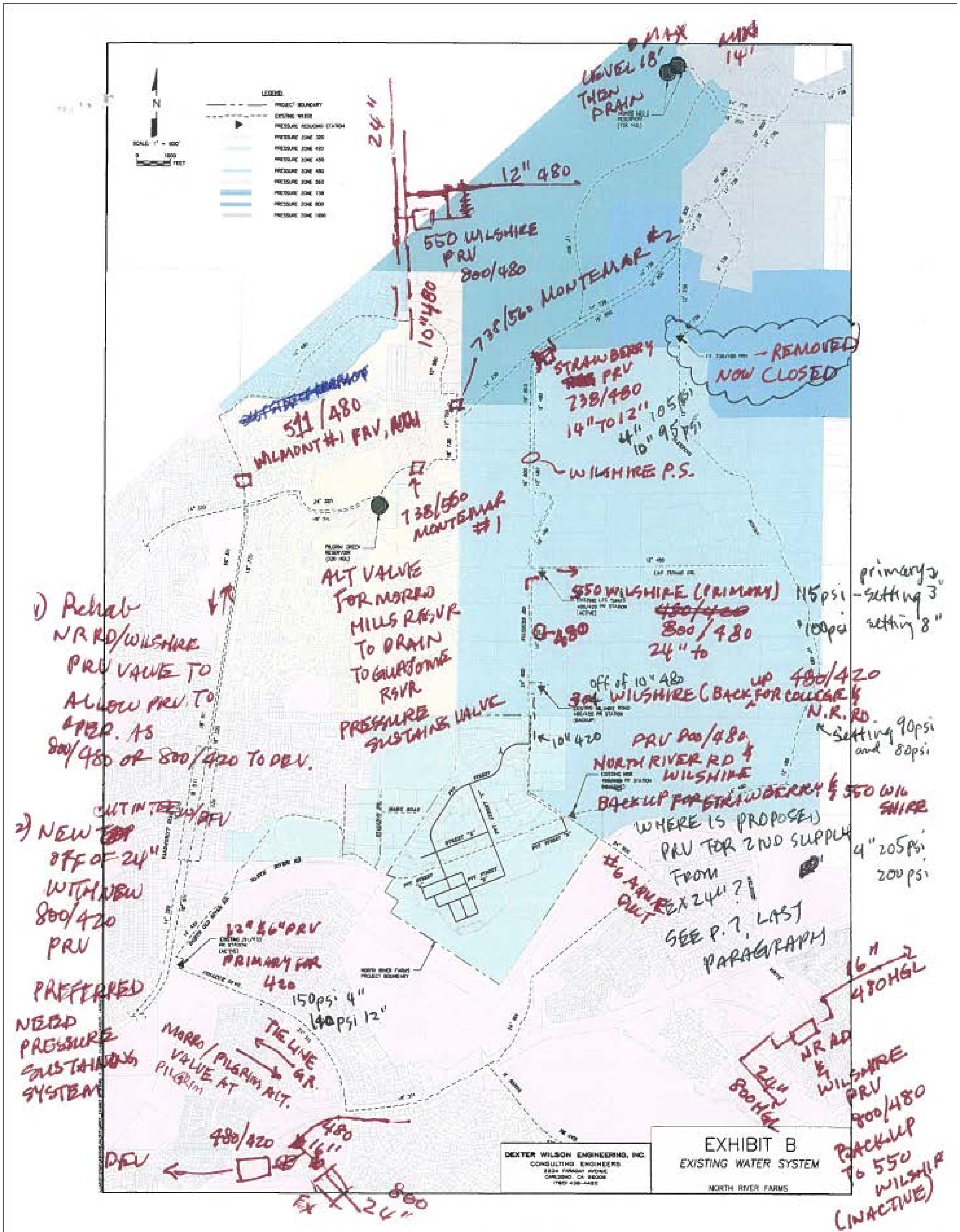
EXHIBIT B
EXISTING WATER SYSTEM
NORTH RIVER FARMS
DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
550 WILSHIRE PRV 800/480
738/560 MONTEMAR #2
STRAWBERRY PRV 738/480
WILSHIRE P.S.
738/560 MONTEMAR #1
550 WILSHIRE (PRIMARY) 800/480
NORTH RIVER RD & WILSHIRE
NOW CLOSED
EX 24"
SEE P. 7, LAST PARAGRAPH
NR RD & WILSHIRE PRV 800/480 BACKUP TO 550 WILSHIRE (INACTIVE)

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MEMORANDUM **930-008**

TO: **Greg Keppler, P.E., Principal Engineer, City of Oceanside Water Utilities Department**

FROM: **Andrew Oven, P.E., Dexter Wilson Engineering, Inc.**

DATE: **April 23, 2018**

SUBJECT: **Response to Comments dated March 23, 2018, on the Water System Analysis for the North River Farms Project**

Attached to the memorandum are the Water Utilities Department comments. We will address each comment.

1. This revision has been made.

2. The Water Service Overview section of the report has been updated based on the input provided by the Water Utilities Department. Computer modeling has been updated accordingly as well as updated to match the North River Farms current development plan.

3. Water demand factors are taken primarily from the Design and Construction Manual with the hotel water use coming from the 2015 Master Plan. The text in the report identifies the sources of the water demand factors used.

4. An additional section in the report was added to include the velocity criteria.

5. The North River Farms project will construct a new PR Station to supply the 420 Zone; the existing 800/480 Zone PR Station will be left in place.

6. Figure 2 has been moved to Figure 3; updated water line sizes are provided based on the new computer modeling and the new land plan for the project.

7. Proposed land use exhibit is now Figure 2.

8. Additional fire flow modeling scenarios are included.

9. The Exhibit A Node and Pipe Diagram has been updated to match the new project design layout; a new PR Station is shown at the east side of the project; no long dead end pipes are shown.

AO:ps

APPENDIX B

COMPUTER MODEL RESULTS

NODE AND PIPE DIAGRAM REFERENCE:

Exhibit A at the back of the report.

CONDITIONS MODELED:

1. Average Day Demand

2. Peak Hour Demand

3. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 146.

4. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 112.

5. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 60.

6. Maximum Day Demand plus 4,000 gpm Fire Flow at Node 36.

7. Maximum Day Demand plus 4,000 gpm Fire Flow at Node 30.

FLOWRATE IS EXPRESSED IN GPM AND PRESSURE IN PSIG

A SUMMARY OF THE ORIGINAL DATA FOLLOWS

THERE IS A PRV AT JUNCTION 203 FOR LINE 206 SET AT A GRADE OF 415.00
THERE IS A PRV AT JUNCTION 207 FOR LINE 212 SET AT A GRADE OF 403.00
THERE IS A PRV AT JUNCTION 502 FOR LINE 506 SET AT A GRADE OF 420.00
THERE IS A PRV AT JUNCTION 506 FOR LINE 512 SET AT A GRADE OF 408.00

PIPE NO.	NODE NOS.		LENGTH (FEET)	DIAMETER (INCHES)	ROUGHNESS	MINOR LOSS K	FIXED GRADE
1	0	1	110.0	16.0	120.0	.00	800.00
7	0	10	30.0	14.0	120.0	.00	490.00
11	4	300	6150.0	14.0	120.0	.00	
13	6	8	530.0	14.0	120.0	.00	
15	2	100	110.0	16.0	120.0	.00	
17	100	26	70.0	14.0	120.0	.00	
19	8	12	580.0	14.0	120.0	.00	
23	12	16	600.0	14.0	120.0	.00	
25	26	28	270.0	14.0	120.0	.00	
27	16	20	540.0	14.0	120.0	.00	
29	26	24	620.0	14.0	120.0	.00	
31	24	20	830.0	14.0	120.0	.00	
33	28	30	790.0	12.0	120.0	.00	
35	12	46	270.0	12.0	120.0	.00	
37	46	44	350.0	12.0	120.0	.00	
39	44	42	560.0	12.0	120.0	.00	
41	42	40	250.0	12.0	120.0	.00	
43	40	38	260.0	12.0	120.0	.00	
45	38	36	560.0	12.0	120.0	.00	
47	36	34	620.0	12.0	120.0	.00	
49	34	32	360.0	12.0	120.0	.00	
51	30	32	660.0	12.0	120.0	.00	
53	20	32	270.0	12.0	120.0	.00	
55	46	48	260.0	12.0	120.0	.00	
57	48	50	250.0	12.0	120.0	.00	
59	50	52	310.0	12.0	120.0	.00	
61	52	32	310.0	12.0	120.0	.00	
63	50	36	350.0	8.0	120.0	.00	
65	48	54	350.0	8.0	120.0	.00	
67	44	54	250.0	8.0	120.0	.00	
69	36	54	250.0	8.0	120.0	.00	
71	54	40	550.0	8.0	120.0	.00	
73	46	56	250.0	8.0	120.0	.00	
75	56	58	250.0	8.0	120.0	.00	
77	58	60	350.0	8.0	120.0	.00	
79	60	62	250.0	8.0	120.0	.00	
81	62	64	410.0	8.0	120.0	.00	
83	64	42	340.0	8.0	120.0	.00	
85	56	62	350.0	8.0	120.0	.00	
87	44	62	250.0	8.0	120.0	.00	
101	12	102	280.0	8.0	120.0	.00	

103	102	104	550.0	8.0	120.0	.00
105	104	106	580.0	8.0	120.0	.00
107	20	106	280.0	8.0	120.0	.00
109	102	120	330.0	8.0	120.0	.00
111	120	108	290.0	8.0	120.0	.00
113	108	110	1030.0	8.0	120.0	.00
115	106	110	330.0	8.0	120.0	.00
117	108	112	560.0	8.0	120.0	.00
119	112	114	580.0	8.0	120.0	.00
121	110	114	350.0	8.0	120.0	.00
123	112	116	520.0	8.0	120.0	.00
125	114	116	350.0	8.0	120.0	.00
127	102	118	450.0	8.0	120.0	.00
129	118	120	560.0	8.0	120.0	.00
131	106	122	630.0	8.0	120.0	.00
133	122	124	600.0	8.0	120.0	.00
135	122	126	220.0	8.0	120.0	.00
137	124	126	270.0	8.0	120.0	.00
139	114	126	710.0	8.0	120.0	.00
141	110	128	240.0	8.0	120.0	.00
143	116	130	310.0	8.0	120.0	.00
145	130	132	330.0	8.0	120.0	.00
147	132	134	260.0	8.0	120.0	.00
149	134	136	260.0	8.0	120.0	.00
151	136	138	380.0	8.0	120.0	.00
153	132	140	360.0	8.0	120.0	.00
154	140	406	200.0	8.0	120.0	.00
155	130	142	1390.0	8.0	120.0	.00
157	142	144	320.0	8.0	120.0	.00
159	144	146	230.0	8.0	120.0	.00
160	146	418	300.0	8.0	120.0	.00
161	134	142	750.0	8.0	120.0	.00
163	136	144	420.0	8.0	120.0	.00
203	1	203	20.0	6.0	120.0	.00
205	204	2	20.0	6.0	120.0	.00
206	203	204	20.0	6.0	120.0	.00
THERE IS A CHECK VALVE IN LINE NUMBER206						
207	1	207	20.0	12.0	120.0	.00
209	212	2	20.0	12.0	120.0	.00
212	207	212	20.0	12.0	120.0	.00
THERE IS A CHECK VALVE IN LINE NUMBER212						
301	300	6	300.0	14.0	120.0	.00
305	300	304	410.0	8.0	120.0	.00
309	304	308	340.0	8.0	120.0	.00
313	308	312	310.0	8.0	120.0	.00
317	312	316	600.0	6.0	120.0	.00
321	312	320	230.0	8.0	120.0	.00
325	320	324	230.0	8.0	120.0	.00
401	100	402	830.0	10.0	120.0	.00
405	402	406	570.0	10.0	120.0	.00
413	406	138	360.0	10.0	120.0	.00
417	138	418	510.0	10.0	120.0	.00
503	10	502	20.0	6.0	120.0	.00
505	504	4	20.0	6.0	120.0	.00

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   506    502  504       20.0     6.0      120.0         .00
 THERE IS A CHECK VALVE IN LINE NUMBER506
   507     10  506       20.0    12.0      120.0         .00
   509    508    4       20.0    12.0      120.0         .00
   512    506  508       20.0    12.0      120.0         .00
 THERE IS A CHECK VALVE IN LINE NUMBER512
```

JUNCTION NUMBER	DEMAND	ELEVATION	CONNECTING PIPES			
1	.00	114.00	1	203	207	
2	.00	114.00	15	205	209	
4	.00	85.00	11	505	509	
6	.00	107.00	13	301		
8	.00	106.00	13	19		
10	.00	85.00	7	503	507	
12	.00	102.00	19	23	35	101
16	.00	112.00	23	27		
20	.00	118.00	27	31	53	107
24	.00	120.00	29	31		
26	.00	114.00	17	25	29	
28	2.30	124.00	25	33		
30	2.30	118.00	33	51		
32	8.20	114.00	49	51	53	61
34	11.90	106.00	47	49		
36	4.80	104.00	45	47	63	69
38	4.80	104.00	43	45		
40	4.80	101.00	41	43	71	
42	14.40	99.00	39	41	83	
44	4.80	103.00	37	39	67	87
46	4.80	105.00	35	37	55	73
48	4.80	107.00	55	57	65	
50	4.80	109.00	57	59	63	
52	4.80	113.00	59	61		
54	4.80	105.00	65	67	69	71
56	4.80	105.00	73	75	85	
58	14.40	108.00	75	77		
60	4.80	106.00	77	79		
62	4.80	104.00	79	81	85	87
64	4.80	100.00	81	83		
100	.00	114.00	15	17	401	
102	5.75	108.00	101	103	109	127
104	5.75	110.00	103	105		
106	5.75	118.00	105	107	115	131
108	5.75	118.00	111	113	117	
110	5.75	124.00	113	115	121	141
112	5.75	130.00	117	119	123	
114	5.75	133.00	119	121	125	139
116	6.63	140.00	123	125	143	
118	5.75	105.00	127	129		
120	5.75	112.00	109	111	129	
122	7.20	122.00	131	133	135	
124	9.60	132.00	133	137		
126	7.20	138.00	135	137	139	
128	5.90	128.00	141			

130	7.20	147.00	143	145	155
132	7.20	155.00	145	147	153
134	7.20	168.00	147	149	161
136	7.20	180.00	149	151	163
138	.00	199.00	151	413	417
140	7.20	168.00	153	154	
142	7.20	180.00	155	157	161
144	7.20	195.00	157	159	163
146	5.90	215.00	159	160	
203	.00	114.00	203	206	
204	.00	114.00	205	206	
207	.00	114.00	207	212	
212	.00	114.00	209	212	
300	.00	104.00	11	301	305
304	16.20	125.00	305	309	
308	16.20	144.00	309	313	
312	16.20	148.00	313	317	321
316	16.20	131.00	317		
320	16.20	149.00	321	325	
324	16.20	150.00	325		
402	5.90	139.00	401	405	
406	5.90	158.00	154	405	413
418	5.90	225.00	160	417	
502	.00	85.00	503	506	
504	.00	85.00	505	506	
506	.00	85.00	507	512	
508	.00	85.00	509	512	

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD
4 VALUES ARE OUTPUT FOR MAXIMUM AND MINIMUM PRESSURES

THIS SYSTEM HAS MULTIPLE SUPPLY ZONES

ZONE NO. 1 IS SUPPLIED THROUGH THESE PIPES:
206
212
506
512

THIS SYSTEM HAS 97 PIPES WITH 72 JUNCTIONS , 21 LOOPS AND 6 FGNS

THE RESULTS ARE OBTAINED AFTER 8 TRIALS WITH AN ACCURACY = .00465

North River Farms in Oceanside **File: 930008C**
420 Pressure Zone Analysis
Average Day Demands

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	.00	.00	.00	.00	.00	.00
7	0	10	375.38	.01	.00	.00	.78	.23
11	4	300	375.38	1.39	.00	.00	.78	.23
13	6	8	278.18	.07	.00	.00	.58	.13
15	2	100	.00	.00	.00	.00	.00	.00
17	100	26	-52.22	.00	.00	.00	-.11	-.01
19	8	12	278.18	.08	.00	.00	.58	.13
23	12	16	96.24	.01	.00	.00	.20	.02
25	26	28	-17.88	.00	.00	.00	-.04	.00
27	16	20	96.24	.01	.00	.00	.20	.02
29	26	24	-34.34	.00	.00	.00	-.07	.00
31	24	20	-34.34	.00	.00	.00	-.07	.00
33	28	30	-20.18	.00	.00	.00	-.06	.00
35	12	46	119.96	.02	.00	.00	.34	.06
37	46	44	45.85	.00	.00	.00	.13	.01
39	44	42	21.69	.00	.00	.00	.06	.00
41	42	40	5.66	.00	.00	.00	.02	.00
43	40	38	5.93	.00	.00	.00	.02	.00
45	38	36	1.13	.00	.00	.00	.00	.00
47	36	34	11.84	.00	.00	.00	.03	.00
49	34	32	-.06	.00	.00	.00	.00	.00
51	30	32	-22.48	.00	.00	.00	-.06	.00
53	20	32	13.82	.00	.00	.00	.04	.00
55	46	48	48.15	.00	.00	.00	.14	.01
57	48	50	33.54	.00	.00	.00	.10	.01
59	50	52	21.72	.00	.00	.00	.06	.00
61	52	32	16.92	.00	.00	.00	.05	.00
63	50	36	7.02	.00	.00	.00	.04	.00
65	48	54	9.81	.00	.00	.00	.06	.00
67	44	54	8.55	.00	.00	.00	.05	.00
69	36	54	-8.50	.00	.00	.00	-.05	.00
71	54	40	5.06	.00	.00	.00	.03	.00
73	46	56	21.16	.00	.00	.00	.14	.02
75	56	58	11.21	.00	.00	.00	.07	.01
77	58	60	-3.19	.00	.00	.00	-.02	.00
79	60	62	-7.99	.00	.00	.00	-.05	.00
81	62	64	3.17	.00	.00	.00	.02	.00
83	64	42	-1.63	.00	.00	.00	-.01	.00
85	56	62	5.15	.00	.00	.00	.03	.00
87	44	62	10.81	.00	.00	.00	.07	.00
101	12	102	61.97	.03	.00	.00	.40	.12
103	102	104	15.81	.01	.00	.00	.10	.01
105	104	106	10.06	.00	.00	.00	.06	.00
107	20	106	48.08	.02	.00	.00	.31	.08
109	102	120	24.24	.01	.00	.00	.15	.02
111	120	108	28.92	.01	.00	.00	.18	.03
113	108	110	5.02	.00	.00	.00	.03	.00
115	106	110	27.79	.01	.00	.00	.18	.03

117	108	112	18.15	.01	.00	.00	.12	.01
119	112	114	-.28	.00	.00	.00	.00	.00
121	110	114	21.15	.01	.00	.00	.14	.02
123	112	116	12.69	.00	.00	.00	.08	.01
125	114	116	15.72	.00	.00	.00	.10	.01
127	102	118	16.17	.00	.00	.00	.10	.01
129	118	120	10.42	.00	.00	.00	.07	.00
131	106	122	24.60	.01	.00	.00	.16	.02
133	122	124	6.63	.00	.00	.00	.04	.00
135	122	126	10.76	.00	.00	.00	.07	.00
137	124	126	-2.97	.00	.00	.00	-.02	.00
139	114	126	-.60	.00	.00	.00	.00	.00
141	110	128	5.90	.00	.00	.00	.04	.00
143	116	130	21.78	.01	.00	.00	.14	.02
145	130	132	8.40	.00	.00	.00	.05	.00
147	132	134	10.18	.00	.00	.00	.06	.00
149	134	136	.39	.00	.00	.00	.00	.00
151	136	138	-10.65	.00	.00	.00	-.07	.00
153	132	140	-8.98	.00	.00	.00	-.06	.00
154	140	406	-16.18	.00	.00	.00	-.10	-.01
155	130	142	6.18	.00	.00	.00	.04	.00
157	142	144	1.57	.00	.00	.00	.01	.00
159	144	146	-1.79	.00	.00	.00	-.01	.00
160	146	418	-7.69	.00	.00	.00	-.05	.00
161	134	142	2.59	.00	.00	.00	.02	.00
163	136	144	3.84	.00	.00	.00	.02	.00
203	1	203	.00	.00	.00	.00	.00	.00
205	204	2	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 206 IS CLOSED								
207	1	207	.00	.00	.00	.00	.00	.00
209	212	2	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 212 IS CLOSED								
301	300	6	278.18	.04	.00	.00	.58	.13
305	300	304	97.20	.12	.00	.00	.62	.28
309	304	308	81.00	.07	.00	.00	.52	.20
313	308	312	64.80	.04	.00	.00	.41	.13
317	312	316	16.20	.02	.00	.00	.18	.04
321	312	320	32.40	.01	.00	.00	.21	.04
325	320	324	16.20	.00	.00	.00	.10	.01
401	100	402	52.22	.03	.00	.00	.21	.03
405	402	406	46.32	.01	.00	.00	.19	.02
413	406	138	24.24	.00	.00	.00	.10	.01
417	138	418	13.59	.00	.00	.00	.06	.00
503	10	502	375.38	.28	.00	.00	4.26	14.01
505	504	4	375.38	.28	.00	.00	4.26	14.01
506	0	504	375.38	.28	.00	.00	4.26	14.01
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED								

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	800.00	114.00	297.27
2	.00	417.84	114.00	131.66

4	.00	419.44	85.00	144.92
6	.00	418.01	107.00	134.77
8	.00	417.94	106.00	135.17
10	.00	489.99	85.00	175.50
12	.00	417.87	102.00	136.88
16	.00	417.85	112.00	132.54
20	.00	417.84	118.00	129.93
24	.00	417.84	120.00	129.07
26	.00	417.84	114.00	131.66
28	2.30	417.84	124.00	127.33
30	2.30	417.84	118.00	129.93
32	8.20	417.84	114.00	131.67
34	11.90	417.84	106.00	135.13
36	4.80	417.85	104.00	136.00
38	4.80	417.85	104.00	136.00
40	4.80	417.85	101.00	137.30
42	14.40	417.85	99.00	138.17
44	4.80	417.85	103.00	136.43
46	4.80	417.85	105.00	135.57
48	4.80	417.85	107.00	134.70
50	4.80	417.85	109.00	133.83
52	4.80	417.85	113.00	132.10
54	4.80	417.85	105.00	135.57
56	4.80	417.85	105.00	135.57
58	14.40	417.84	108.00	134.27
60	4.80	417.84	106.00	135.13
62	4.80	417.85	104.00	136.00
64	4.80	417.85	100.00	137.73
100	.00	417.84	114.00	131.66
102	5.75	417.83	108.00	134.26
104	5.75	417.83	110.00	133.39
106	5.75	417.82	118.00	129.92
108	5.75	417.82	118.00	129.92
110	5.75	417.81	124.00	127.32
112	5.75	417.81	130.00	124.72
114	5.75	417.81	133.00	123.42
116	6.63	417.81	140.00	120.38
118	5.75	417.83	105.00	135.56
120	5.75	417.82	112.00	132.52
122	7.20	417.81	122.00	128.18
124	9.60	417.81	132.00	123.85
126	7.20	417.81	138.00	121.25
128	5.90	417.81	128.00	125.59
130	7.20	417.80	147.00	117.35
132	7.20	417.80	155.00	113.88
134	7.20	417.80	168.00	108.25
136	7.20	417.80	180.00	103.05
138	.00	417.80	199.00	94.81
140	7.20	417.80	168.00	108.25
142	7.20	417.80	180.00	103.05
144	7.20	417.80	195.00	96.55
146	5.90	417.80	215.00	87.88
203	.00	800.00	114.00	297.27
204	.00	417.84	114.00	131.66

207	.00	800.00	114.00	297.27
212	.00	417.84	114.00	131.66
300	.00	418.05	104.00	136.09
304	16.20	417.93	125.00	126.94
308	16.20	417.86	144.00	118.67
312	16.20	417.82	148.00	116.92
316	16.20	417.80	131.00	124.28
320	16.20	417.81	149.00	116.49
324	16.20	417.81	150.00	116.05
402	5.90	417.82	139.00	120.82
406	5.90	417.80	158.00	112.58
418	5.90	417.80	225.00	83.55
502	.00	489.71	85.00	175.38
504	.00	419.72	85.00	145.05
506	.00	489.99	85.00	175.50
508	.00	419.44	85.00	144.92
	MAXIMUM PRESSURES			
1	.00	800.00	114.00	297.27
203	.00	800.00	114.00	297.27
207	.00	800.00	114.00	297.27
10	.00	489.99	85.00	175.50
	MINIMUM PRESSURES			
418	5.90	417.80	225.00	83.55
146	5.90	417.80	215.00	87.88
138	.00	417.80	199.00	94.81
144	7.20	417.80	195.00	96.55

THE NET SYSTEM DEMAND = 375.38

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	.00
7	375.38

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 375.38
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 3.00

THE RESULTS ARE OBTAINED AFTER 5 TRIALS WITH AN ACCURACY = .00021

North River Farms in Oceanside
Peak Hour Demand Scenario

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	462.63	.02	.00	.00	.74	.17
7	0	10	663.51	.02	.00	.00	1.38	.65
11	4	300	663.51	3.99	.00	.00	1.38	.65
13	6	8	371.91	.12	.00	.00	.78	.22
15	2	100	462.63	.02	.00	.00	.74	.17
17	100	26	285.25	.01	.00	.00	.59	.14
19	8	12	371.91	.13	.00	.00	.78	.22
23	12	16	62.44	.00	.00	.00	.13	.01
25	26	28	119.40	.01	.00	.00	.25	.03
27	16	20	62.44	.00	.00	.00	.13	.01
29	26	24	165.84	.03	.00	.00	.35	.05
31	24	20	165.84	.04	.00	.00	.35	.05
33	28	30	112.50	.04	.00	.00	.32	.05
35	12	46	157.33	.03	.00	.00	.45	.10
37	46	44	76.27	.01	.00	.00	.22	.03
39	44	42	37.66	.00	.00	.00	.11	.01
41	42	40	-25.88	.00	.00	.00	-.07	.00
43	40	38	-27.11	.00	.00	.00	-.08	.00
45	38	36	-41.51	.00	.00	.00	-.12	-.01
47	36	34	-47.07	-.01	.00	.00	-.13	-.01
49	34	32	-82.77	-.01	.00	.00	-.23	-.03
51	30	32	105.60	.03	.00	.00	.30	.05
53	20	32	70.96	.01	.00	.00	.20	.02
55	46	48	19.57	.00	.00	.00	.06	.00
57	48	50	-18.71	.00	.00	.00	-.05	.00
59	50	52	-54.80	.00	.00	.00	-.16	-.01
61	52	32	-69.20	-.01	.00	.00	-.20	-.02
63	50	36	21.69	.01	.00	.00	.14	.02
65	48	54	23.88	.01	.00	.00	.15	.02
67	44	54	-9.16	.00	.00	.00	-.06	.00
69	36	54	12.85	.00	.00	.00	.08	.01
71	54	40	13.17	.00	.00	.00	.08	.01
73	46	56	47.09	.02	.00	.00	.30	.07
75	56	58	31.05	.01	.00	.00	.20	.03
77	58	60	-12.15	.00	.00	.00	-.08	-.01
79	60	62	-26.55	-.01	.00	.00	-.17	-.03
81	62	64	-5.94	.00	.00	.00	-.04	.00
83	64	42	-20.34	-.01	.00	.00	-.13	-.02
85	56	62	1.64	.00	.00	.00	.01	.00
87	44	62	33.37	.01	.00	.00	.21	.04
101	12	102	152.14	.18	.00	.00	.97	.65
103	102	104	29.68	.02	.00	.00	.19	.03
105	104	106	12.43	.00	.00	.00	.08	.01
107	20	106	157.32	.19	.00	.00	1.00	.69
109	102	120	62.44	.04	.00	.00	.40	.12
111	120	108	70.71	.05	.00	.00	.45	.16
113	108	110	8.26	.00	.00	.00	.05	.00
115	106	110	82.40	.07	.00	.00	.53	.21
117	108	112	45.20	.04	.00	.00	.29	.07
119	112	114	-.85	.00	.00	.00	-.01	.00

121	110	114	55.71	.04	.00	.00	.36	.10
123	112	116	28.81	.02	.00	.00	.18	.03
125	114	116	35.70	.02	.00	.00	.23	.04
127	102	118	42.77	.03	.00	.00	.27	.06
129	118	120	25.52	.01	.00	.00	.16	.02
131	106	122	70.09	.10	.00	.00	.45	.15
133	122	124	18.77	.01	.00	.00	.12	.01
135	122	126	29.72	.01	.00	.00	.19	.03
137	124	126	-10.03	.00	.00	.00	-.06	.00
139	114	126	1.91	.00	.00	.00	.01	.00
141	110	128	17.70	.00	.00	.00	.11	.01
143	116	130	44.62	.02	.00	.00	.28	.07
145	130	132	9.94	.00	.00	.00	.06	.00
147	132	134	25.22	.01	.00	.00	.16	.02
149	134	136	-4.54	.00	.00	.00	-.03	.00
151	136	138	-37.99	-.02	.00	.00	-.24	-.05
153	132	140	-36.88	-.02	.00	.00	-.24	-.05
154	140	406	-58.48	-.02	.00	.00	-.37	-.11
155	130	142	13.08	.01	.00	.00	.08	.01
157	142	144	-.36	.00	.00	.00	.00	.00
159	144	146	-10.11	.00	.00	.00	-.06	.00
160	146	418	-27.81	-.01	.00	.00	-.18	-.03
161	134	142	8.17	.00	.00	.00	.05	.00
163	136	144	11.85	.00	.00	.00	.08	.01
203	1	203	462.63	.41	.00	.00	5.25	20.63
205	204	2	462.63	.41	.00	.00	5.25	20.63
206	0	204	462.63	.41	.00	.00	5.25	20.63
207	1	207	.00	.00	.00	.00	.00	.00
209	212	2	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 212 IS CLOSED								
301	300	6	371.91	.07	.00	.00	.78	.22
305	300	304	291.60	.89	.00	.00	1.86	2.16
309	304	308	243.00	.52	.00	.00	1.55	1.54
313	308	312	194.40	.32	.00	.00	1.24	1.02
317	312	316	48.60	.19	.00	.00	.55	.32
321	312	320	97.20	.07	.00	.00	.62	.28
325	320	324	48.60	.02	.00	.00	.31	.08
401	100	402	177.38	.24	.00	.00	.72	.29
405	402	406	159.68	.14	.00	.00	.65	.24
413	406	138	83.50	.03	.00	.00	.34	.07
417	138	418	45.51	.01	.00	.00	.19	.02
503	10	502	663.51	.80	.00	.00	7.53	40.23
505	504	4	663.51	.80	.00	.00	7.53	40.23
506	0	504	663.51	.80	.00	.00	7.53	40.23
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED								

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	799.98	114.00	297.26
2	.00	414.17	114.00	130.08
4	.00	418.39	85.00	144.47
6	.00	414.33	107.00	133.18

8	.00	414.21	106.00	133.56
10	.00	489.98	85.00	175.49
12	.00	414.08	102.00	135.24
16	.00	414.08	112.00	130.90
20	.00	414.07	118.00	128.30
24	.00	414.12	120.00	127.45
26	.00	414.15	114.00	130.06
28	6.90	414.14	124.00	125.73
30	6.90	414.10	118.00	128.31
32	24.60	414.07	114.00	130.03
34	35.70	414.06	106.00	133.49
36	14.40	414.05	104.00	134.36
38	14.40	414.05	104.00	134.35
40	14.40	414.05	101.00	135.65
42	43.20	414.04	99.00	136.52
44	14.40	414.05	103.00	134.79
46	14.40	414.06	105.00	133.92
48	14.40	414.06	107.00	133.06
50	14.40	414.06	109.00	132.19
52	14.40	414.06	113.00	130.46
54	14.40	414.05	105.00	133.92
56	14.40	414.04	105.00	133.92
58	43.20	414.03	108.00	132.61
60	14.40	414.03	106.00	133.48
62	14.40	414.04	104.00	134.35
64	14.40	414.04	100.00	136.08
100	.00	414.16	114.00	130.07
102	17.25	413.90	108.00	132.56
104	17.25	413.88	110.00	131.68
106	17.25	413.88	118.00	128.22
108	17.25	413.82	118.00	128.19
110	17.25	413.81	124.00	125.59
112	17.25	413.78	130.00	122.97
114	17.25	413.78	133.00	121.67
116	19.89	413.76	140.00	118.63
118	17.25	413.87	105.00	133.85
120	17.25	413.86	112.00	130.81
122	21.60	413.78	122.00	126.44
124	28.80	413.78	132.00	122.10
126	21.60	413.78	138.00	119.50
128	17.70	413.81	128.00	123.85
130	21.60	413.74	147.00	115.59
132	21.60	413.74	155.00	112.12
134	21.60	413.73	168.00	106.48
136	21.60	413.73	180.00	101.28
138	.00	413.75	199.00	93.06
140	21.60	413.76	168.00	106.49
142	21.60	413.73	180.00	101.28
144	21.60	413.73	195.00	94.78
146	17.70	413.73	215.00	86.12
203	.00	799.57	114.00	297.08
204	.00	414.59	114.00	130.25
207	.00	799.98	114.00	297.26
212	.00	414.17	114.00	130.08

300	.00	414.40	104.00	134.51
304	48.60	413.51	125.00	125.02
308	48.60	412.99	144.00	116.56
312	48.60	412.67	148.00	114.69
316	48.60	412.48	131.00	121.97
320	48.60	412.60	149.00	114.23
324	48.60	412.59	150.00	113.79
402	17.70	413.91	139.00	119.13
406	17.70	413.78	158.00	110.84
418	17.70	413.74	225.00	81.79
502	.00	489.18	85.00	175.14
504	.00	419.20	85.00	144.82
506	.00	489.98	85.00	175.49
508	.00	418.39	85.00	144.47

MAXIMUM PRESSURES

1	.00	799.98	114.00	297.26
207	.00	799.98	114.00	297.26
203	.00	799.57	114.00	297.08
10	.00	489.98	85.00	175.49

MINIMUM PRESSURES

418	17.70	413.74	225.00	81.79
146	17.70	413.73	215.00	86.12
138	.00	413.75	199.00	93.06
144	21.60	413.73	195.00	94.78

THE NET SYSTEM DEMAND = 1126.14

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	462.63
7	663.51

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1126.14
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 2.00

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
146	1500.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00053

North River Farms in Oceanside
Maximum Day Demands plus 1500 gpm Fire Flow
Fire Flow at Single Family Residential Node 146

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	1330.05	.14	.00	.00	2.12	1.23
7	0	10	908.91	.03	.00	.00	1.89	1.16
11	4	300	908.91	7.15	.00	.00	1.89	1.16
13	6	8	714.51	.39	.00	.00	1.49	.74
15	2	100	1330.05	.14	.00	.00	2.12	1.23
17	100	26	388.76	.02	.00	.00	.81	.24
19	8	12	714.51	.43	.00	.00	1.49	.74
23	12	16	136.04	.02	.00	.00	.28	.03
25	26	28	152.20	.01	.00	.00	.32	.04
27	16	20	136.04	.02	.00	.00	.28	.03
29	26	24	236.57	.06	.00	.00	.49	.10
31	24	20	236.57	.08	.00	.00	.49	.10
33	28	30	147.60	.07	.00	.00	.42	.09
35	12	46	162.31	.03	.00	.00	.46	.10
37	46	44	65.29	.01	.00	.00	.19	.02
39	44	42	28.80	.00	.00	.00	.08	.00
41	42	40	-11.38	.00	.00	.00	-.03	.00
43	40	38	-12.32	.00	.00	.00	-.03	.00
45	38	36	-21.92	.00	.00	.00	-.06	.00
47	36	34	-13.24	.00	.00	.00	-.04	.00
49	34	32	-37.04	.00	.00	.00	-.11	-.01
51	30	32	143.00	.05	.00	.00	.41	.08
53	20	32	-82.71	-.01	.00	.00	-.23	-.03
55	46	48	52.73	.00	.00	.00	.15	.01
57	48	50	26.79	.00	.00	.00	.08	.00
59	50	52	2.74	.00	.00	.00	.01	.00
61	52	32	-6.86	.00	.00	.00	-.02	.00
63	50	36	14.44	.00	.00	.00	.09	.01
65	48	54	16.35	.00	.00	.00	.10	.01
67	44	54	5.75	.00	.00	.00	.04	.00
69	36	54	-3.84	.00	.00	.00	-.02	.00
71	54	40	8.66	.00	.00	.00	.06	.00
73	46	56	34.68	.01	.00	.00	.22	.04
75	56	58	20.99	.00	.00	.00	.13	.02
77	58	60	-7.81	.00	.00	.00	-.05	.00
79	60	62	-17.41	.00	.00	.00	-.11	-.01
81	62	64	-1.78	.00	.00	.00	-.01	.00
83	64	42	-11.38	.00	.00	.00	-.07	-.01
85	56	62	4.09	.00	.00	.00	.03	.00
87	44	62	21.14	.00	.00	.00	.13	.02
101	12	102	416.16	1.17	.00	.00	2.66	4.18
103	102	104	91.13	.14	.00	.00	.58	.25
105	104	106	79.63	.11	.00	.00	.51	.20
107	20	106	455.31	1.38	.00	.00	2.91	4.93
109	102	120	198.68	.35	.00	.00	1.27	1.06
111	120	108	290.53	.62	.00	.00	1.85	2.15
113	108	110	26.78	.03	.00	.00	.17	.03
115	106	110	299.29	.75	.00	.00	1.91	2.27

117	108	112	252.25	.93	.00	.00	1.61	1.65
119	112	114	-69.30	-.09	.00	.00	-.44	-.15
121	110	114	302.78	.81	.00	.00	1.93	2.32
123	112	116	310.04	1.26	.00	.00	1.98	2.42
125	114	116	398.13	1.35	.00	.00	2.54	3.85
127	102	118	114.85	.17	.00	.00	.73	.38
129	118	120	103.35	.18	.00	.00	.66	.32
131	106	122	224.15	.84	.00	.00	1.43	1.33
133	122	124	71.33	.10	.00	.00	.46	.16
135	122	126	138.42	.12	.00	.00	.88	.54
137	124	126	52.13	.02	.00	.00	.33	.09
139	114	126	-176.15	-.60	.00	.00	-1.12	-.85
141	110	128	11.80	.00	.00	.00	.08	.01
143	116	130	694.91	3.35	.00	.00	4.44	10.80
145	130	132	386.82	1.20	.00	.00	2.47	3.65
147	132	134	456.43	1.29	.00	.00	2.91	4.96
149	134	136	279.01	.52	.00	.00	1.78	1.99
151	136	138	-122.02	-.16	.00	.00	-.78	-.43
153	132	140	-84.01	-.08	.00	.00	-.54	-.22
154	140	406	-98.41	-.06	.00	.00	-.63	-.29
155	130	142	293.69	3.05	.00	.00	1.87	2.19
157	142	144	442.31	1.50	.00	.00	2.82	4.68
159	144	146	814.54	3.33	.00	.00	5.20	14.49
160	146	418	-685.46	-3.16	.00	.00	-4.37	-10.53
161	134	142	163.02	.55	.00	.00	1.04	.74
163	136	144	386.62	1.53	.00	.00	2.47	3.65
203	1	203	1330.05	2.92	.00	.00	15.09	145.86
205	204	2	1330.05	2.92	.00	.00	15.09	145.86
206	0	204	1330.05	2.92	.00	.00	15.09	145.86
207	1	207	.00	.00	.00	.00	.00	.00
209	212	2	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 212 IS CLOSED								
301	300	6	714.51	.22	.00	.00	1.49	.74
305	300	304	194.40	.42	.00	.00	1.24	1.02
309	304	308	162.00	.25	.00	.00	1.03	.73
313	308	312	129.60	.15	.00	.00	.83	.48
317	312	316	32.40	.09	.00	.00	.37	.15
321	312	320	64.80	.03	.00	.00	.41	.13
325	320	324	32.40	.01	.00	.00	.21	.04
401	100	402	941.29	5.30	.00	.00	3.84	6.39
405	402	406	929.49	3.56	.00	.00	3.80	6.24
413	406	138	819.28	1.78	.00	.00	3.35	4.94
417	138	418	697.26	1.87	.00	.00	2.85	3.67
503	10	502	908.91	1.44	.00	.00	10.31	72.06
505	504	4	908.91	1.44	.00	.00	10.31	72.06
506	0	504	908.91	1.44	.00	.00	10.31	72.06
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED								

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	799.86	114.00	297.21
2	.00	409.17	114.00	127.91

4	.00	417.12	85.00	143.92
6	.00	409.74	107.00	131.19
8	.00	409.35	106.00	131.45
10	.00	489.97	85.00	175.48
12	.00	408.91	102.00	133.00
16	.00	408.89	112.00	128.65
20	.00	408.87	118.00	126.05
24	.00	408.95	120.00	125.21
26	.00	409.01	114.00	127.84
28	4.60	409.00	124.00	123.50
30	4.60	408.93	118.00	126.07
32	16.40	408.88	114.00	127.78
34	23.80	408.88	106.00	131.25
36	9.60	408.88	104.00	132.11
38	9.60	408.88	104.00	132.11
40	9.60	408.88	101.00	133.41
42	28.80	408.88	99.00	134.28
44	9.60	408.88	103.00	132.55
46	9.60	408.89	105.00	131.68
48	9.60	408.88	107.00	130.82
50	9.60	408.88	109.00	129.95
52	9.60	408.88	113.00	128.22
54	9.60	408.88	105.00	131.68
56	9.60	408.88	105.00	131.68
58	28.80	408.87	108.00	130.38
60	9.60	408.87	106.00	131.24
62	9.60	408.88	104.00	132.11
64	9.60	408.88	100.00	133.85
100	.00	409.03	114.00	127.85
102	11.50	407.74	108.00	129.89
104	11.50	407.61	110.00	128.96
106	11.50	407.49	118.00	125.45
108	11.50	406.77	118.00	125.13
110	11.50	406.74	124.00	122.52
112	11.50	405.84	130.00	119.53
114	11.50	405.93	133.00	118.27
116	13.26	404.59	140.00	114.65
118	11.50	407.57	105.00	131.11
120	11.50	407.39	112.00	128.00
122	14.40	406.66	122.00	123.35
124	19.20	406.56	132.00	118.98
126	14.40	406.54	138.00	116.37
128	11.80	406.74	128.00	120.79
130	14.40	401.24	147.00	110.17
132	14.40	400.03	155.00	106.18
134	14.40	398.75	168.00	99.99
136	14.40	398.23	180.00	94.57
138	.00	398.39	199.00	86.40
140	14.40	400.11	168.00	100.58
142	14.40	398.19	180.00	94.55
144	14.40	396.70	195.00	87.40
146	1500.00	393.36	215.00	77.29
203	.00	796.95	114.00	295.94
204	.00	412.08	114.00	129.17

207	.00	799.86	114.00	297.21
212	.00	409.17	114.00	127.91
300	.00	409.96	104.00	132.58
304	32.40	409.55	125.00	123.30
308	32.40	409.30	144.00	114.96
312	32.40	409.15	148.00	113.16
316	32.40	409.06	131.00	120.49
320	32.40	409.12	149.00	112.72
324	32.40	409.11	150.00	112.28
402	11.80	403.73	139.00	114.72
406	11.80	400.17	158.00	104.94
418	11.80	396.52	225.00	74.33
502	.00	488.52	85.00	174.86
504	.00	418.56	85.00	144.54
506	.00	489.97	85.00	175.48
508	.00	417.12	85.00	143.92

MAXIMUM PRESSURES

1	.00	799.86	114.00	297.21
207	.00	799.86	114.00	297.21
203	.00	796.95	114.00	295.94
10	.00	489.97	85.00	175.48

MINIMUM PRESSURES

418	11.80	396.52	225.00	74.33
146	1500.00	393.36	215.00	77.29
138	.00	398.39	199.00	86.40
144	14.40	396.70	195.00	87.40

THE NET SYSTEM DEMAND = 2238.96

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	1330.05
7	908.91

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2238.96
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 2.00

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
112	1500.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00414

North River Farms in Oceanside
Maximum Day Demands plus 1500 gpm Fire Flow
Fire Flow at Single Family Residential Node 112

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	1316.90	.13	.00	.00	2.10	1.21
7	0	10	922.36	.04	.00	.00	1.92	1.20
11	4	300	922.36	7.35	.00	.00	1.92	1.20
13	6	8	727.96	.41	.00	.00	1.52	.77
15	2	100	1316.90	.13	.00	.00	2.10	1.21
17	100	26	762.72	.06	.00	.00	1.59	.84
19	8	12	727.96	.45	.00	.00	1.52	.77
23	12	16	58.89	.00	.00	.00	.12	.01
25	26	28	296.95	.04	.00	.00	.62	.15
27	16	20	58.89	.00	.00	.00	.12	.01
29	26	24	465.77	.21	.00	.00	.97	.34
31	24	20	465.77	.28	.00	.00	.97	.34
33	28	30	292.35	.24	.00	.00	.83	.30
35	12	46	64.07	.00	.00	.00	.18	.02
37	46	44	42.76	.00	.00	.00	.12	.01
39	44	42	20.64	.00	.00	.00	.06	.00
41	42	40	-23.10	.00	.00	.00	-.07	.00
43	40	38	-24.36	.00	.00	.00	-.07	.00
45	38	36	-33.96	.00	.00	.00	-.10	-.01
47	36	34	-46.91	-.01	.00	.00	-.13	-.01
49	34	32	-70.71	-.01	.00	.00	-.20	-.02
51	30	32	287.75	.19	.00	.00	.82	.29
53	20	32	-129.22	-.02	.00	.00	-.37	-.07
55	46	48	-17.84	.00	.00	.00	-.05	.00
57	48	50	-40.36	.00	.00	.00	-.11	-.01
59	50	52	-61.82	-.01	.00	.00	-.18	-.02
61	52	32	-71.42	-.01	.00	.00	-.20	-.02
63	50	36	11.86	.00	.00	.00	.08	.01
65	48	54	12.93	.00	.00	.00	.08	.01
67	44	54	-10.19	.00	.00	.00	-.07	.00
69	36	54	15.20	.00	.00	.00	.10	.01
71	54	40	8.34	.00	.00	.00	.05	.00
73	46	56	29.56	.01	.00	.00	.19	.03
75	56	58	20.66	.00	.00	.00	.13	.02
77	58	60	-8.14	.00	.00	.00	-.05	.00
79	60	62	-17.74	.00	.00	.00	-.11	-.01
81	62	64	-5.34	.00	.00	.00	-.03	.00
83	64	42	-14.94	.00	.00	.00	-.10	-.01
85	56	62	-.71	.00	.00	.00	.00	.00
87	44	62	22.70	.00	.00	.00	.14	.02
101	12	102	605.00	2.34	.00	.00	3.86	8.35
103	102	104	111.06	.20	.00	.00	.71	.36
105	104	106	99.56	.17	.00	.00	.64	.30
107	20	106	653.88	2.70	.00	.00	4.17	9.65
109	102	120	307.86	.79	.00	.00	1.96	2.39
111	120	108	459.44	1.46	.00	.00	2.93	5.02
113	108	110	-91.31	-.26	.00	.00	-.58	-.25
115	106	110	453.20	1.61	.00	.00	2.89	4.89

117	108	112	539.24	3.78	.00	.00	3.44	6.75
119	112	114	-470.51	-3.04	.00	.00	-3.00	-5.24
121	110	114	338.60	1.00	.00	.00	2.16	2.85
123	112	116	-490.24	-2.94	.00	.00	-3.13	-5.66
125	114	116	97.31	.10	.00	.00	.62	.28
127	102	118	174.58	.38	.00	.00	1.11	.84
129	118	120	163.08	.41	.00	.00	1.04	.74
131	106	122	288.73	1.34	.00	.00	1.84	2.12
133	122	124	92.24	.15	.00	.00	.59	.26
135	122	126	182.09	.20	.00	.00	1.16	.90
137	124	126	73.04	.04	.00	.00	.47	.17
139	114	126	-240.73	-1.08	.00	.00	-1.54	-1.52
141	110	128	11.80	.00	.00	.00	.08	.01
143	116	130	-406.19	-1.24	.00	.00	-2.59	-3.99
145	130	132	-285.78	-.69	.00	.00	-1.82	-2.08
147	132	134	-82.71	-.05	.00	.00	-.53	-.21
149	134	136	-126.35	-.12	.00	.00	-.81	-.46
151	136	138	-165.21	-.29	.00	.00	-1.05	-.75
153	132	140	-217.47	-.45	.00	.00	-1.39	-1.26
154	140	406	-231.87	-.28	.00	.00	-1.48	-1.41
155	130	142	-134.81	-.72	.00	.00	-.86	-.52
157	142	144	-119.97	-.13	.00	.00	-.77	-.42
159	144	146	-109.91	-.08	.00	.00	-.70	-.35
160	146	418	-121.71	-.13	.00	.00	-.78	-.43
161	134	142	29.24	.02	.00	.00	.19	.03
163	136	144	24.46	.01	.00	.00	.16	.02
203	1	203	1316.90	2.86	.00	.00	14.94	143.20
205	204	2	1316.90	2.86	.00	.00	14.94	143.20
206	0	204	1316.90	2.86	.00	.00	14.94	143.20
207	1	207	.00	.00	.00	.00	.00	.00
209	212	2	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 212 IS CLOSED								
301	300	6	727.96	.23	.00	.00	1.52	.77
305	300	304	194.40	.42	.00	.00	1.24	1.02
309	304	308	162.00	.25	.00	.00	1.03	.73
313	308	312	129.60	.15	.00	.00	.83	.48
317	312	316	32.40	.09	.00	.00	.37	.15
321	312	320	64.80	.03	.00	.00	.41	.13
325	320	324	32.40	.01	.00	.00	.21	.04
401	100	402	554.19	1.99	.00	.00	2.26	2.40
405	402	406	542.39	1.31	.00	.00	2.22	2.30
413	406	138	298.72	.27	.00	.00	1.22	.76
417	138	418	133.51	.09	.00	.00	.55	.17
503	10	502	922.36	1.48	.00	.00	10.47	74.05
505	504	4	922.36	1.48	.00	.00	10.47	74.05
506	0	504	922.36	1.48	.00	.00	10.47	74.05
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED								

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	799.87	114.00	297.21
2	.00	409.27	114.00	127.95

4	.00	417.04	85.00	143.88
6	.00	409.46	107.00	131.06
8	.00	409.05	106.00	131.32
10	.00	489.96	85.00	175.48
12	.00	408.60	102.00	132.86
16	.00	408.60	112.00	128.52
20	.00	408.59	118.00	125.92
24	.00	408.87	120.00	125.18
26	.00	409.08	114.00	127.87
28	4.60	409.04	124.00	123.52
30	4.60	408.80	118.00	126.01
32	16.40	408.61	114.00	127.66
34	23.80	408.60	106.00	131.13
36	9.60	408.60	104.00	131.99
38	9.60	408.59	104.00	131.99
40	9.60	408.59	101.00	133.29
42	28.80	408.59	99.00	134.16
44	9.60	408.59	103.00	132.42
46	9.60	408.60	105.00	131.56
48	9.60	408.60	107.00	130.69
50	9.60	408.60	109.00	129.83
52	9.60	408.60	113.00	128.09
54	9.60	408.59	105.00	131.56
56	9.60	408.59	105.00	131.55
58	28.80	408.58	108.00	130.25
60	9.60	408.58	106.00	131.12
62	9.60	408.59	104.00	131.99
64	9.60	408.59	100.00	133.72
100	.00	409.14	114.00	127.89
102	11.50	406.26	108.00	129.25
104	11.50	406.06	110.00	128.29
106	11.50	405.89	118.00	124.75
108	11.50	404.02	118.00	123.94
110	11.50	404.28	124.00	121.45
112	1500.00	400.24	130.00	117.10
114	11.50	403.28	133.00	117.12
116	13.26	403.18	140.00	114.04
118	11.50	405.88	105.00	130.38
120	11.50	405.47	112.00	127.17
122	14.40	404.55	122.00	122.44
124	19.20	404.40	132.00	118.04
126	14.40	404.35	138.00	115.42
128	11.80	404.27	128.00	119.72
130	14.40	404.42	147.00	111.55
132	14.40	405.10	155.00	108.38
134	14.40	405.16	168.00	102.77
136	14.40	405.28	180.00	97.62
138	.00	405.56	199.00	89.51
140	14.40	405.56	168.00	102.94
142	14.40	405.14	180.00	97.56
144	14.40	405.27	195.00	91.12
146	11.80	405.35	215.00	82.48
203	.00	797.00	114.00	295.97
204	.00	412.14	114.00	129.19

207	.00	799.87	114.00	297.21
212	.00	409.27	114.00	127.95
300	.00	409.69	104.00	132.46
304	32.40	409.27	125.00	123.18
308	32.40	409.02	144.00	114.84
312	32.40	408.87	148.00	113.04
316	32.40	408.78	131.00	120.37
320	32.40	408.84	149.00	112.60
324	32.40	408.83	150.00	112.16
402	11.80	407.15	139.00	116.20
406	11.80	405.84	158.00	107.40
418	11.80	405.48	225.00	78.21
502	.00	488.48	85.00	174.84
504	.00	418.52	85.00	144.52
506	.00	489.96	85.00	175.48
508	.00	417.04	85.00	143.88

MAXIMUM PRESSURES

1	.00	799.87	114.00	297.21
207	.00	799.87	114.00	297.21
203	.00	797.00	114.00	295.97
10	.00	489.96	85.00	175.48

MINIMUM PRESSURES

418	11.80	405.48	225.00	78.21
146	11.80	405.35	215.00	82.48
138	.00	405.56	199.00	89.51
144	14.40	405.27	195.00	91.12

THE NET SYSTEM DEMAND = 2239.26

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	1316.90
7	922.36

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2239.26
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 2.00

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
60	1500.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00126

North River Farms in Oceanside
Maximum Day Demand plus 1500 gpm Fire Flow
Fire Flow at Single Family Residential Node 60

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	1304.07	.13	.00	.00	2.08	1.18
7	0	10	937.09	.04	.00	.00	1.95	1.23
11	4	300	937.09	7.57	.00	.00	1.95	1.23
13	6	8	742.69	.42	.00	.00	1.55	.80
15	2	100	1304.07	.13	.00	.00	2.08	1.18
17	100	26	1061.53	.11	.00	.00	2.21	1.55
19	8	12	742.69	.46	.00	.00	1.55	.80
23	12	16	-151.12	-.03	.00	.00	-.31	-.04
25	26	28	439.02	.08	.00	.00	.91	.30
27	16	20	-151.12	-.02	.00	.00	-.31	-.04
29	26	24	622.51	.36	.00	.00	1.30	.58
31	24	20	622.51	.48	.00	.00	1.30	.58
33	28	30	434.42	.50	.00	.00	1.23	.63
35	12	46	880.57	.63	.00	.00	2.50	2.32
37	46	44	464.04	.25	.00	.00	1.32	.71
39	44	42	24.48	.00	.00	.00	.07	.00
41	42	40	-337.39	-.10	.00	.00	-.96	-.39
43	40	38	-275.15	-.07	.00	.00	-.78	-.27
45	38	36	-284.75	-.16	.00	.00	-.81	-.29
47	36	34	-357.45	-.27	.00	.00	-1.01	-.44
49	34	32	-381.25	-.18	.00	.00	-1.08	-.49
51	30	32	429.82	.41	.00	.00	1.22	.62
53	20	32	402.61	.15	.00	.00	1.14	.55
55	46	48	-224.01	-.05	.00	.00	-.64	-.18
57	48	50	-336.95	-.10	.00	.00	-.96	-.39
59	50	52	-425.18	-.19	.00	.00	-1.21	-.60
61	52	32	-434.78	-.19	.00	.00	-1.23	-.63
63	50	36	78.63	.07	.00	.00	.50	.19
65	48	54	103.35	.11	.00	.00	.66	.32
67	44	54	-163.64	-.19	.00	.00	-1.04	-.74
69	36	54	141.74	.14	.00	.00	.90	.57
71	54	40	71.84	.09	.00	.00	.46	.16
73	46	56	630.93	2.26	.00	.00	4.03	9.03
75	56	58	597.58	2.04	.00	.00	3.81	8.17
77	58	60	568.78	2.61	.00	.00	3.63	7.45
79	60	62	-931.22	-4.64	.00	.00	-5.94	-18.57
81	62	64	-323.47	-1.07	.00	.00	-2.06	-2.62
83	64	42	-333.07	-.94	.00	.00	-2.13	-2.77
85	56	62	23.75	.01	.00	.00	.15	.02
87	44	62	593.60	2.02	.00	.00	3.79	8.06
101	12	102	13.24	.00	.00	.00	.08	.01
103	102	104	-6.31	.00	.00	.00	-.04	.00
105	104	106	-17.81	-.01	.00	.00	-.11	-.01
107	20	106	68.78	.04	.00	.00	.44	.15
109	102	120	1.90	.00	.00	.00	.01	.00
111	120	108	-14.95	.00	.00	.00	-.10	-.01
113	108	110	-8.17	.00	.00	.00	-.05	.00
115	106	110	15.07	.00	.00	.00	.10	.01

117	108	112	-18.28	-.01	.00	.00	-.12	-.01
119	112	114	6.16	.00	.00	.00	.04	.00
121	110	114	-16.39	.00	.00	.00	-.10	-.01
123	112	116	-35.94	-.02	.00	.00	-.23	-.04
125	114	116	-45.34	-.02	.00	.00	-.29	-.07
127	102	118	6.15	.00	.00	.00	.04	.00
129	118	120	-5.35	.00	.00	.00	-.03	.00
131	106	122	24.40	.01	.00	.00	.16	.02
133	122	124	7.65	.00	.00	.00	.05	.00
135	122	126	2.34	.00	.00	.00	.01	.00
137	124	126	-11.55	.00	.00	.00	-.07	-.01
139	114	126	23.60	.01	.00	.00	.15	.02
141	110	128	11.80	.00	.00	.00	.08	.01
143	116	130	-94.54	-.08	.00	.00	-.60	-.27
145	130	132	-75.33	-.06	.00	.00	-.48	-.18
147	132	134	-11.06	.00	.00	.00	-.07	-.01
149	134	136	-37.66	-.01	.00	.00	-.24	-.05
151	136	138	-65.39	-.05	.00	.00	-.42	-.14
153	132	140	-78.67	-.07	.00	.00	-.50	-.19
154	140	406	-93.07	-.05	.00	.00	-.59	-.26
155	130	142	-33.61	-.05	.00	.00	-.21	-.04
157	142	144	-35.81	-.01	.00	.00	-.23	-.04
159	144	146	-36.87	-.01	.00	.00	-.24	-.05
160	146	418	-48.67	-.02	.00	.00	-.31	-.08
161	134	142	12.20	.00	.00	.00	.08	.01
163	136	144	13.34	.00	.00	.00	.09	.01
203	1	203	1304.07	2.81	.00	.00	14.80	140.62
205	204	2	1304.07	2.81	.00	.00	14.80	140.62
206	0	204	1304.07	2.81	.00	.00	14.80	140.62
207	1	207	.00	.00	.00	.00	.00	.00
209	212	2	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 212 IS CLOSED								
301	300	6	742.69	.24	.00	.00	1.55	.80
305	300	304	194.40	.42	.00	.00	1.24	1.02
309	304	308	162.00	.25	.00	.00	1.03	.73
313	308	312	129.60	.15	.00	.00	.83	.48
317	312	316	32.40	.09	.00	.00	.37	.15
321	312	320	64.80	.03	.00	.00	.41	.13
325	320	324	32.40	.01	.00	.00	.21	.04
401	100	402	242.54	.43	.00	.00	.99	.52
405	402	406	230.74	.27	.00	.00	.94	.47
413	406	138	125.87	.06	.00	.00	.51	.15
417	138	418	60.47	.02	.00	.00	.25	.04
503	10	502	937.09	1.53	.00	.00	10.63	76.25
505	504	4	937.09	1.53	.00	.00	10.63	76.25
506	0	504	937.09	1.53	.00	.00	10.63	76.25
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00
THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED								

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	799.87	114.00	297.21
2	.00	409.38	114.00	128.00

4	.00	416.95	85.00	143.84
6	.00	409.14	107.00	130.93
8	.00	408.72	106.00	131.18
10	.00	489.96	85.00	175.48
12	.00	408.25	102.00	132.71
16	.00	408.28	112.00	128.39
20	.00	408.30	118.00	125.80
24	.00	408.78	120.00	125.14
26	.00	409.14	114.00	127.89
28	4.60	409.05	124.00	123.52
30	4.60	408.56	118.00	125.91
32	16.40	408.15	114.00	127.47
34	23.80	407.97	106.00	130.86
36	9.60	407.70	104.00	131.60
38	9.60	407.54	104.00	131.54
40	9.60	407.47	101.00	132.80
42	28.80	407.37	99.00	133.63
44	9.60	407.38	103.00	131.90
46	9.60	407.62	105.00	131.14
48	9.60	407.67	107.00	130.29
50	9.60	407.77	109.00	129.47
52	9.60	407.96	113.00	127.81
54	9.60	407.56	105.00	131.11
56	9.60	405.37	105.00	130.16
58	28.80	403.33	108.00	127.97
60	1500.00	400.72	106.00	127.71
62	9.60	405.36	104.00	130.59
64	9.60	406.43	100.00	132.79
100	.00	409.24	114.00	127.94
102	11.50	408.25	108.00	130.11
104	11.50	408.25	110.00	129.24
106	11.50	408.26	118.00	125.78
108	11.50	408.25	118.00	125.78
110	11.50	408.25	124.00	123.18
112	11.50	408.26	130.00	120.58
114	11.50	408.26	133.00	119.28
116	13.26	408.28	140.00	116.26
118	11.50	408.25	105.00	131.41
120	11.50	408.25	112.00	128.37
122	14.40	408.24	122.00	124.04
124	19.20	408.24	132.00	119.71
126	14.40	408.24	138.00	117.11
128	11.80	408.25	128.00	121.44
130	14.40	408.37	147.00	113.26
132	14.40	408.42	155.00	109.82
134	14.40	408.43	168.00	104.18
136	14.40	408.44	180.00	98.99
138	.00	408.49	199.00	90.78
140	14.40	408.49	168.00	104.21
142	14.40	408.42	180.00	98.98
144	14.40	408.43	195.00	92.49
146	11.80	408.45	215.00	83.83
203	.00	797.06	114.00	295.99
204	.00	412.19	114.00	129.21

207	.00	799.87	114.00	297.21
212	.00	409.38	114.00	128.00
300	.00	409.38	104.00	132.33
304	32.40	408.96	125.00	123.05
308	32.40	408.71	144.00	114.71
312	32.40	408.56	148.00	112.91
316	32.40	408.47	131.00	120.24
320	32.40	408.53	149.00	112.46
324	32.40	408.53	150.00	112.03
402	11.80	408.81	139.00	116.92
406	11.80	408.54	158.00	108.57
418	11.80	408.47	225.00	79.50
502	.00	488.44	85.00	174.82
504	.00	418.47	85.00	144.51
506	.00	489.96	85.00	175.48
508	.00	416.95	85.00	143.84

MAXIMUM PRESSURES

1	.00	799.87	114.00	297.21
207	.00	799.87	114.00	297.21
203	.00	797.06	114.00	295.99
10	.00	489.96	85.00	175.48

MINIMUM PRESSURES

418	11.80	408.47	225.00	79.50
146	11.80	408.45	215.00	83.83
138	.00	408.49	199.00	90.78
144	14.40	408.43	195.00	92.49

THE NET SYSTEM DEMAND = 2241.16

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	1304.07
7	937.09

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2241.16
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 2.00

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
36	4000.00

THE RESULTS ARE OBTAINED AFTER 5 TRIALS WITH AN ACCURACY = .00053

North River Farms in Oceanside
Maximum Day Demands plus 1500 gpm Fire Flow
Fire Flow at Commercial Area Node 36

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	3370.52	.76	.00	.00	5.38	6.88
7	0	10	1370.64	.07	.00	.00	2.86	2.49
11	4	300	1370.64	15.31	.00	.00	2.86	2.49
13	6	8	1176.24	.99	.00	.00	2.45	1.88
15	2	100	3370.52	.76	.00	.00	5.38	6.88
17	100	26	2851.61	.68	.00	.00	5.94	9.67
19	8	12	1176.24	1.09	.00	.00	2.45	1.88
23	12	16	-430.73	-.18	.00	.00	-.90	-.29
25	26	28	1192.83	.52	.00	.00	2.49	1.92
27	16	20	-430.73	-.16	.00	.00	-.90	-.29
29	26	24	1658.78	2.20	.00	.00	3.46	3.54
31	24	20	1658.78	2.94	.00	.00	3.46	3.54
33	28	30	1188.23	3.20	.00	.00	3.37	4.05
35	12	46	1762.51	2.27	.00	.00	5.00	8.40
37	46	44	1024.85	1.08	.00	.00	2.91	3.08
39	44	42	683.92	.81	.00	.00	1.94	1.46
41	42	40	855.84	.55	.00	.00	2.43	2.20
43	40	38	1007.30	.78	.00	.00	2.86	2.98
45	38	36	997.70	1.64	.00	.00	2.83	2.93
47	36	34	-1507.23	-3.90	.00	.00	-4.28	-6.29
49	34	32	-1531.03	-2.33	.00	.00	-4.34	-6.47
51	30	32	1183.63	2.65	.00	.00	3.36	4.02
53	20	32	1266.86	1.23	.00	.00	3.59	4.56
55	46	48	391.60	.13	.00	.00	1.11	.52
57	48	50	-99.08	-.01	.00	.00	-.28	-.04
59	50	52	-893.46	-.74	.00	.00	-2.53	-2.39
61	52	32	-903.06	-.75	.00	.00	-2.56	-2.43
63	50	36	784.78	4.73	.00	.00	5.01	13.53
65	48	54	481.08	1.91	.00	.00	3.07	5.46
67	44	54	399.87	.97	.00	.00	2.55	3.88
69	36	54	-710.29	-2.81	.00	.00	-4.53	-11.24
71	54	40	161.06	.40	.00	.00	1.03	.72
73	46	56	336.45	.70	.00	.00	2.15	2.82
75	56	58	138.80	.14	.00	.00	.89	.55
77	58	60	110.00	.12	.00	.00	.70	.36
79	60	62	100.40	.08	.00	.00	.64	.30
81	62	64	210.32	.48	.00	.00	1.34	1.18
83	64	42	200.72	.37	.00	.00	1.28	1.08
85	56	62	188.05	.34	.00	.00	1.20	.96
87	44	62	-68.54	-.04	.00	.00	-.44	-.15
101	12	102	-155.54	-.19	.00	.00	-.99	-.68
103	102	104	-60.36	-.06	.00	.00	-.39	-.12
105	104	106	-71.86	-.09	.00	.00	-.46	-.16
107	20	106	-38.81	-.01	.00	.00	-.25	-.05
109	102	120	-73.33	-.06	.00	.00	-.47	-.17
111	120	108	-129.68	-.14	.00	.00	-.83	-.48
113	108	110	-26.73	-.03	.00	.00	-.17	-.03
115	106	110	-79.16	-.06	.00	.00	-.51	-.19

117	108	112	-114.45	-.21	.00	.00	-.73	-.38
119	112	114	31.23	.02	.00	.00	.20	.03
121	110	114	-129.19	-.17	.00	.00	-.82	-.48
123	112	116	-157.19	-.36	.00	.00	-1.00	-.69
125	114	116	-200.46	-.38	.00	.00	-1.28	-1.08
127	102	118	-33.36	-.02	.00	.00	-.21	-.04
129	118	120	-44.86	-.04	.00	.00	-.29	-.07
131	106	122	-43.01	-.04	.00	.00	-.27	-.06
133	122	124	-13.35	.00	.00	.00	-.09	-.01
135	122	126	-44.05	-.01	.00	.00	-.28	-.07
137	124	126	-32.55	-.01	.00	.00	-.21	-.04
139	114	126	91.01	.18	.00	.00	.58	.25
141	110	128	11.80	.00	.00	.00	.08	.01
143	116	130	-370.91	-1.05	.00	.00	-2.37	-3.38
145	130	132	-262.03	-.59	.00	.00	-1.67	-1.77
147	132	134	-74.66	-.05	.00	.00	-.48	-.17
149	134	136	-116.39	-.10	.00	.00	-.74	-.39
151	136	138	-154.08	-.25	.00	.00	-.98	-.66
153	132	140	-201.77	-.39	.00	.00	-1.29	-1.09
154	140	406	-216.17	-.25	.00	.00	-1.38	-1.24
155	130	142	-123.28	-.61	.00	.00	-.79	-.44
157	142	144	-110.35	-.11	.00	.00	-.70	-.36
159	144	146	-101.46	-.07	.00	.00	-.65	-.31
160	146	418	-113.26	-.11	.00	.00	-.72	-.38
161	134	142	27.33	.02	.00	.00	.17	.03
163	136	144	23.28	.01	.00	.00	.15	.02
203	1	203	1982.27	6.11	.00	.00	22.49	305.40
205	204	2	1982.27	6.11	.00	.00	22.49	305.40
206	0	204	1982.27	6.11	.00	.00	22.49	305.40
207	1	207	1388.25	.11	.00	.00	3.94	5.40
209	212	2	1388.25	.11	.00	.00	3.94	5.40
212	0	212	1388.25	.11	.00	.00	3.94	5.40
301	300	6	1176.24	.56	.00	.00	2.45	1.88
305	300	304	194.40	.42	.00	.00	1.24	1.02
309	304	308	162.00	.25	.00	.00	1.03	.73
313	308	312	129.60	.15	.00	.00	.83	.48
317	312	316	32.40	.09	.00	.00	.37	.15
321	312	320	64.80	.03	.00	.00	.41	.13
325	320	324	32.40	.01	.00	.00	.21	.04
401	100	402	518.91	1.76	.00	.00	2.12	2.12
405	402	406	507.11	1.16	.00	.00	2.07	2.03
413	406	138	279.14	.24	.00	.00	1.14	.67
417	138	418	125.06	.08	.00	.00	.51	.15
503	10	502	1370.64	3.08	.00	.00	15.55	154.21
505	504	4	1370.64	3.08	.00	.00	15.55	154.21
506	0	504	1370.64	3.08	.00	.00	15.55	154.21
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00

THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	799.24	114.00	296.94
2	.00	402.78	114.00	125.14

4	.00	413.83	85.00	142.49
6	.00	397.96	107.00	126.08
8	.00	396.97	106.00	126.09
10	.00	489.93	85.00	175.47
12	.00	395.88	102.00	127.35
16	.00	396.05	112.00	123.09
20	.00	396.21	118.00	120.56
24	.00	399.15	120.00	120.97
26	.00	401.35	114.00	124.52
28	4.60	400.83	124.00	119.96
30	4.60	397.63	118.00	121.17
32	16.40	394.98	114.00	121.76
34	23.80	392.65	106.00	124.22
36	4000.00	388.75	104.00	123.39
38	9.60	390.39	104.00	124.10
40	9.60	391.17	101.00	125.74
42	28.80	391.72	99.00	126.84
44	9.60	392.53	103.00	125.46
46	9.60	393.61	105.00	125.06
48	9.60	393.48	107.00	124.14
50	9.60	393.49	109.00	123.28
52	9.60	394.23	113.00	121.86
54	9.60	391.56	105.00	124.18
56	9.60	392.91	105.00	124.76
58	28.80	392.77	108.00	123.40
60	9.60	392.65	106.00	124.21
62	9.60	392.57	104.00	125.05
64	9.60	392.09	100.00	126.57
100	.00	402.03	114.00	124.81
102	11.50	396.07	108.00	124.83
104	11.50	396.13	110.00	123.99
106	11.50	396.23	118.00	120.56
108	11.50	396.26	118.00	120.58
110	11.50	396.29	124.00	117.99
112	11.50	396.48	130.00	115.47
114	11.50	396.46	133.00	114.16
116	13.26	396.84	140.00	111.30
118	11.50	396.09	105.00	126.14
120	11.50	396.12	112.00	123.12
122	14.40	396.27	122.00	118.85
124	19.20	396.27	132.00	114.52
126	14.40	396.28	138.00	111.92
128	11.80	396.29	128.00	116.26
130	14.40	397.88	147.00	108.72
132	14.40	398.47	155.00	105.50
134	14.40	398.51	168.00	99.89
136	14.40	398.61	180.00	94.73
138	.00	398.87	199.00	86.61
140	14.40	398.86	168.00	100.04
142	14.40	398.49	180.00	94.68
144	14.40	398.61	195.00	88.23
146	11.80	398.68	215.00	79.59
203	.00	793.14	114.00	294.29
204	.00	408.89	114.00	127.79

207	.00	799.14	114.00	296.89
212	.00	402.89	114.00	125.19
300	.00	398.52	104.00	127.63
304	32.40	398.10	125.00	118.35
308	32.40	397.86	144.00	110.00
312	32.40	397.71	148.00	108.21
316	32.40	397.62	131.00	115.53
320	32.40	397.68	149.00	107.76
324	32.40	397.67	150.00	107.32
402	11.80	400.27	139.00	113.22
406	11.80	399.11	158.00	104.48
418	11.80	398.79	225.00	75.31
502	.00	486.84	85.00	174.13
504	.00	416.92	85.00	143.83
506	.00	489.93	85.00	175.47
508	.00	413.83	85.00	142.49

MAXIMUM PRESSURES

1	.00	799.24	114.00	296.94
207	.00	799.14	114.00	296.89
203	.00	793.14	114.00	294.29
10	.00	489.93	85.00	175.47

MINIMUM PRESSURES

418	11.80	398.79	225.00	75.31
146	11.80	398.68	215.00	79.59
138	.00	398.87	199.00	86.61
144	14.40	398.61	195.00	88.23

THE NET SYSTEM DEMAND = 4741.16

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	3370.52
7	1370.64

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 4741.16
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE DEMANDS ARE CHANGED FROM ORIGINAL VALUES BY A FACTOR = 2.00

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
30	4000.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00195

North River Farms in Oceanside
Maximum Day Demands plus 4000 gpm Fire Flow
Fire Flow at Commercial Area Node 30

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	3474.09	.80	.00	.00	5.54	7.27
7	0	10	1272.07	.07	.00	.00	2.65	2.17
11	4	300	1272.07	13.33	.00	.00	2.65	2.17
13	6	8	1077.67	.85	.00	.00	2.25	1.59
15	2	100	3474.09	.80	.00	.00	5.54	7.27
17	100	26	3093.01	.79	.00	.00	6.45	11.24
19	8	12	1077.67	.92	.00	.00	2.25	1.59
23	12	16	168.25	.03	.00	.00	.35	.05
25	26	28	2049.44	1.42	.00	.00	4.27	5.24
27	16	20	168.25	.03	.00	.00	.35	.05
29	26	24	1043.57	.93	.00	.00	2.17	1.50
31	24	20	1043.57	1.25	.00	.00	2.17	1.50
33	28	30	2044.84	8.74	.00	.00	5.80	11.06
35	12	46	896.11	.65	.00	.00	2.54	2.40
37	46	44	306.69	.12	.00	.00	.87	.33
39	44	42	177.34	.07	.00	.00	.50	.12
41	42	40	195.18	.04	.00	.00	.55	.14
43	40	38	202.60	.04	.00	.00	.57	.15
45	38	36	193.00	.08	.00	.00	.55	.14
47	36	34	319.84	.22	.00	.00	.91	.36
49	34	32	296.04	.11	.00	.00	.84	.31
51	30	32	-1955.16	-6.72	.00	.00	-5.55	-10.18
53	20	32	1281.65	1.26	.00	.00	3.64	4.66
55	46	48	470.77	.19	.00	.00	1.34	.73
57	48	50	417.74	.15	.00	.00	1.18	.58
59	50	52	403.48	.17	.00	.00	1.14	.55
61	52	32	393.88	.16	.00	.00	1.12	.52
63	50	36	4.67	.00	.00	.00	.03	.00
65	48	54	43.43	.02	.00	.00	.28	.06
67	44	54	114.97	.10	.00	.00	.73	.39
69	36	54	-131.77	-.12	.00	.00	-.84	-.50
71	54	40	17.02	.01	.00	.00	.11	.01
73	46	56	109.05	.09	.00	.00	.70	.35
75	56	58	50.15	.02	.00	.00	.32	.08
77	58	60	21.35	.01	.00	.00	.14	.02
79	60	62	11.75	.00	.00	.00	.07	.01
81	62	64	56.24	.04	.00	.00	.36	.10
83	64	42	46.64	.02	.00	.00	.30	.07
85	56	62	49.30	.03	.00	.00	.31	.08
87	44	62	4.79	.00	.00	.00	.03	.00
101	12	102	13.31	.00	.00	.00	.08	.01
103	102	104	22.71	.01	.00	.00	.14	.02
105	104	106	11.21	.00	.00	.00	.07	.01
107	20	106	-69.82	-.04	.00	.00	-.45	-.15
109	102	120	-18.61	.00	.00	.00	-.12	-.01
111	120	108	-43.91	-.02	.00	.00	-.28	-.06
113	108	110	6.48	.00	.00	.00	.04	.00
115	106	110	-57.03	-.03	.00	.00	-.36	-.11

117	108	112	-61.89	-.07	.00	.00	-.39	-.12
119	112	114	22.65	.01	.00	.00	.14	.02
121	110	114	-73.85	-.06	.00	.00	-.47	-.17
123	112	116	-96.04	-.14	.00	.00	-.61	-.28
125	114	116	-123.78	-.15	.00	.00	-.79	-.44
127	102	118	-2.29	.00	.00	.00	-.01	.00
129	118	120	-13.79	.00	.00	.00	-.09	-.01
131	106	122	-13.08	.00	.00	.00	-.08	-.01
133	122	124	-2.59	.00	.00	.00	-.02	.00
135	122	126	-24.89	.00	.00	.00	-.16	-.02
137	124	126	-21.79	.00	.00	.00	-.14	-.02
139	114	126	61.08	.08	.00	.00	.39	.12
141	110	128	11.80	.00	.00	.00	.08	.01
143	116	130	-233.08	-.44	.00	.00	-1.49	-1.43
145	130	132	-168.91	-.26	.00	.00	-1.08	-.79
147	132	134	-43.20	-.02	.00	.00	-.28	-.06
149	134	136	-77.27	-.05	.00	.00	-.49	-.18
151	136	138	-109.98	-.14	.00	.00	-.70	-.36
153	132	140	-140.10	-.20	.00	.00	-.89	-.56
154	140	406	-154.50	-.13	.00	.00	-.99	-.67
155	130	142	-78.57	-.26	.00	.00	-.50	-.19
157	142	144	-73.31	-.05	.00	.00	-.47	-.17
159	144	146	-69.40	-.03	.00	.00	-.44	-.15
160	146	418	-81.20	-.06	.00	.00	-.52	-.20
161	134	142	19.66	.01	.00	.00	.13	.01
163	136	144	18.31	.01	.00	.00	.12	.01
203	1	203	1984.89	6.12	.00	.00	22.52	306.15
205	204	2	1984.89	6.12	.00	.00	22.52	306.15
206	0	204	1984.89	6.12	.00	.00	22.52	306.15
207	1	207	1489.20	.12	.00	.00	4.22	6.15
209	212	2	1489.20	.12	.00	.00	4.22	6.15
212	0	212	1489.20	.12	.00	.00	4.22	6.15
301	300	6	1077.67	.48	.00	.00	2.25	1.59
305	300	304	194.40	.42	.00	.00	1.24	1.02
309	304	308	162.00	.25	.00	.00	1.03	.73
313	308	312	129.60	.15	.00	.00	.83	.48
317	312	316	32.40	.09	.00	.00	.37	.15
321	312	320	64.80	.03	.00	.00	.41	.13
325	320	324	32.40	.01	.00	.00	.21	.04
401	100	402	381.08	.99	.00	.00	1.56	1.20
405	402	406	369.28	.64	.00	.00	1.51	1.13
413	406	138	202.97	.13	.00	.00	.83	.37
417	138	418	93.00	.04	.00	.00	.38	.09
503	10	502	1272.07	2.69	.00	.00	14.43	134.30
505	504	4	1272.07	2.69	.00	.00	14.43	134.30
506	0	504	1272.07	2.69	.00	.00	14.43	134.30
507	10	506	.00	.00	.00	.00	.00	.00
509	508	4	.00	.00	.00	.00	.00	.00

THE CHECK VALVE IN LINE NUMBER 512 IS CLOSED

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	.00	799.20	114.00	296.92
2	.00	402.75	114.00	125.13

4	.00	414.63	85.00	142.84
6	.00	400.82	107.00	127.32
8	.00	399.97	106.00	127.39
10	.00	489.93	85.00	175.47
12	.00	399.05	102.00	128.72
16	.00	399.02	112.00	124.37
20	.00	398.99	118.00	121.76
24	.00	400.24	120.00	121.44
26	.00	401.17	114.00	124.44
28	4.60	399.75	124.00	119.49
30	4000.00	391.01	118.00	118.31
32	16.40	397.73	114.00	122.95
34	23.80	397.84	106.00	126.47
36	9.60	398.06	104.00	127.43
38	9.60	398.14	104.00	127.46
40	9.60	398.18	101.00	128.78
42	28.80	398.22	99.00	129.66
44	9.60	398.28	103.00	127.96
46	9.60	398.40	105.00	127.14
48	9.60	398.21	107.00	126.19
50	9.60	398.06	109.00	125.26
52	9.60	397.89	113.00	123.45
54	9.60	398.19	105.00	127.05
56	9.60	398.31	105.00	127.10
58	28.80	398.29	108.00	125.79
60	9.60	398.29	106.00	126.66
62	9.60	398.28	104.00	127.52
64	9.60	398.24	100.00	129.24
100	.00	401.95	114.00	124.78
102	11.50	399.05	108.00	126.12
104	11.50	399.03	110.00	125.25
106	11.50	399.03	118.00	121.78
108	11.50	399.07	118.00	121.80
110	11.50	399.07	124.00	119.20
112	11.50	399.14	130.00	116.63
114	11.50	399.13	133.00	115.32
116	13.26	399.28	140.00	112.36
118	11.50	399.05	105.00	127.42
120	11.50	399.05	112.00	124.39
122	14.40	399.04	122.00	120.05
124	19.20	399.04	132.00	115.72
126	14.40	399.04	138.00	113.12
128	11.80	399.07	128.00	117.46
130	14.40	399.72	147.00	109.51
132	14.40	399.98	155.00	106.16
134	14.40	400.00	168.00	100.53
136	14.40	400.05	180.00	95.35
138	.00	400.18	199.00	87.18
140	14.40	400.18	168.00	100.61
142	14.40	399.99	180.00	95.33
144	14.40	400.04	195.00	88.85
146	11.80	400.08	215.00	80.20
203	.00	793.08	114.00	294.27
204	.00	408.88	114.00	127.78

207	.00	799.08	114.00	296.87
212	.00	402.88	114.00	125.18
300	.00	401.30	104.00	128.83
304	32.40	400.88	125.00	119.55
308	32.40	400.63	144.00	111.21
312	32.40	400.48	148.00	109.41
316	32.40	400.39	131.00	116.74
320	32.40	400.45	149.00	108.96
324	32.40	400.44	150.00	108.52
402	11.80	400.96	139.00	113.52
406	11.80	400.32	158.00	105.00
418	11.80	400.14	225.00	75.89
502	.00	487.25	85.00	174.31
504	.00	417.31	85.00	144.00
506	.00	489.93	85.00	175.47
508	.00	414.63	85.00	142.84
	MAXIMUM PRESSURES			
1	.00	799.20	114.00	296.92
207	.00	799.08	114.00	296.87
203	.00	793.08	114.00	294.27
10	.00	489.93	85.00	175.47
	MINIMUM PRESSURES			
418	11.80	400.14	225.00	75.89
146	11.80	400.08	215.00	80.20
138	.00	400.18	199.00	87.18
144	14.40	400.04	195.00	88.85

THE NET SYSTEM DEMAND = 4746.16

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	3474.09
7	1272.07

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 4746.16
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

APPENDIX C

RECYCLED WATER REIMBURSEMENT REFERENCE

Andrew Oven

From: Mabel Uyeda <MUyeda@ci.oceanside.ca.us>
Sent: Friday, April 06, 2018 10:02 AM
To: nhammond@integralcommunities.com; Andrew Oven; Cari Dale; Greg Keppler
Subject: North River Farms - 20" RW Line

Everyone,

Per our meeting earlier this week, I had mentioned the latest conditions on the project. Below are two items that I would like to clarify:

1. Recycled water reimbursement for construction of 20" in North River Farms will be full reimbursement (not fair-share percentage) since the 20" was already a planned CIP.

   W29. *Item The City's future recycled water expansion to the Upper System includes a proposed 20-inch recycled water main in North River Road. The Water Utilities Department reserves the right to enter into a reimbursement agreement with the developer if it would be advantageous, due to timing and coordination of work, to have the developer construct the 20-inch recycled water main along the full frontage length of North River Road as part of the Project. A reimbursement agreement would need to be executed prior to final improvement plan approval. The City would fully reimburse the developer for the construction cost.*

2. On-site sewer shall all be private per latest condition. However, the Water Utilities Department will review plan showing turning radius template of 46' outside wheel radius and 48' if near buildings or structures. The same plan shall show an 8' wide parking aisle where applicable on the proposed private streets. Depending upon the outcome, the department may revise this condition.

   W39. On-site sewer shall be private up to and including connection to public sewer main. The connection point to public sewer main shall be stationed and called out on plans. There shall be one sewer lateral per parcel. However, Homeowner's Association and CC&Rs should address the maintenance and repair of any "shared" sewer laterals or facilities among individually owned townhome or condo units.

Sincerely,

Mabel

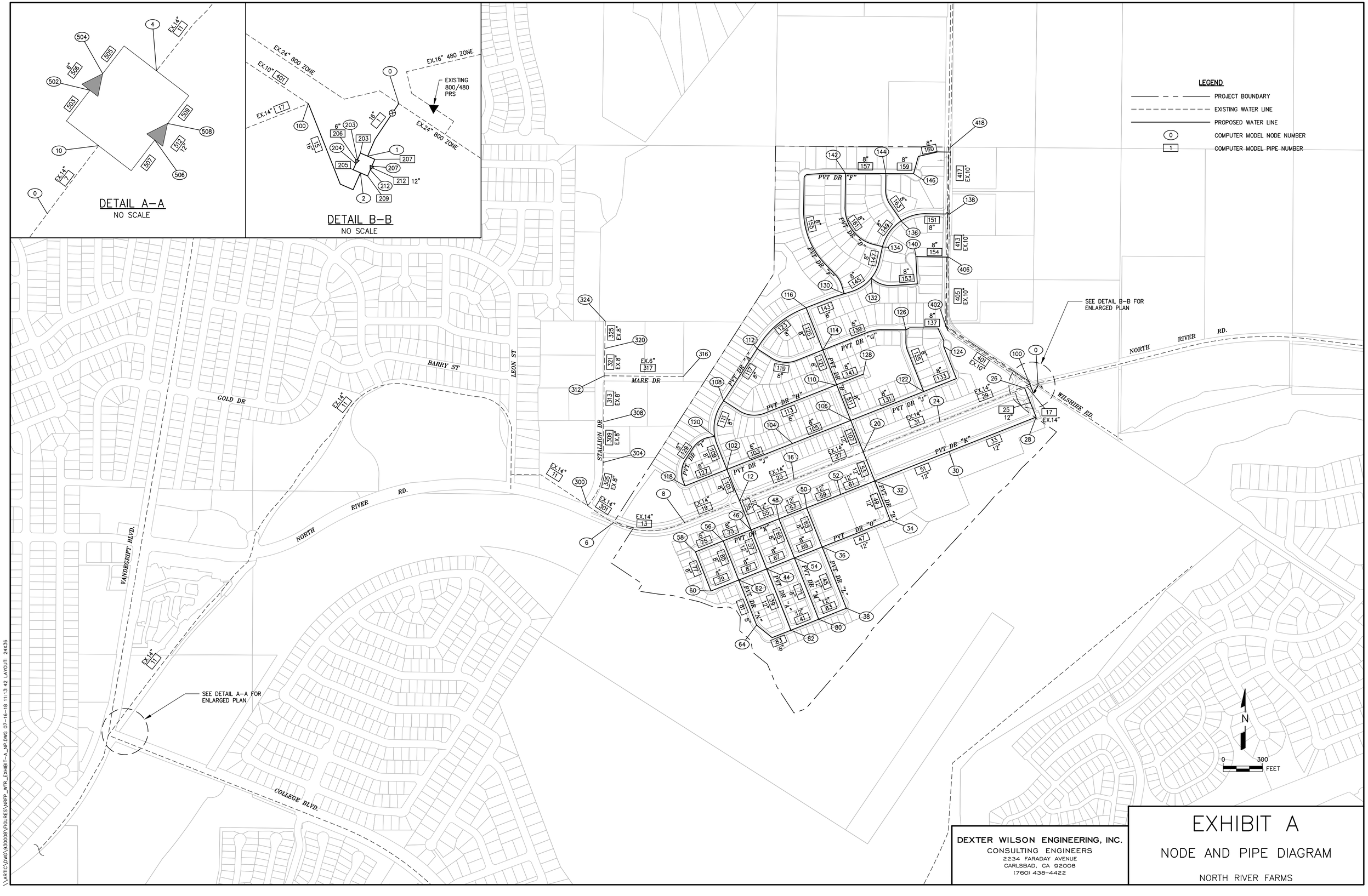
Mabel Uyeda, P.E.
Senior Civil Engineer
300 North Coast Highway
Oceanside, CA 92054
(760) 435-5819
muyeda@ci.oceanside.ca.us

EXHIBIT A

NODE AND PIPE DIAGRAM

DETAIL A–A
NO SCALE

DETAIL B–B
NO SCALE



DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
2234 FARADAY AVENUE
CARLSBAD, CA 92008
(760) 438-4422

EXHIBIT A

NODE AND PIPE DIAGRAM

NORTH RIVER FARMS

EXHIBIT B

EXISTING WATER INFRASTRUCTURE
AROUND NORTH RIVER FARMS

N

0 600 FEET

LEGEND

- PROJECT BOUNDARY
- EXISTING WATER
- PRESSURE REDUCING STATION
- PRESSURE ZONE 320
- PRESSURE ZONE 420
- PRESSURE ZONE 450
- PRESSURE ZONE 480
- PRESSURE ZONE 560
- PRESSURE ZONE 738
- PRESSURE ZONE 800
- PRESSURE ZONE 1000

MORRO HILLS RESERVOIR (738 HGL) MAX. LVL:18' MIN. LVL: 14'

EXISTING MONTEMAR #2 738/560 PR STATION (ACTIVE)

EXISTING MONTEMAR #1 738/560 PR STATION (ACTIVE)

EXISTING WILMONT #1 511/480 PR STATION (ACTIVE)

PILGRIM CREEK RESERVOIR (320 HGL), ALTITUDE VALVE FOR MORRO HILLS RESERVOIR TO DRAIN TO GUAJOME RESERVOIR PRESSURE SUSTAINING VALVE

EXISTING STRAWBERRY 738/480 PR STATION (ACTIVE)

EX. 738/480 PRS REMOVED

EXISTING WILSHIRE PUMP STATION

EXISTING WILSHIRE ROAD (PRIMARY) 800/480 PR STATION (ACTIVE)

EXISTING WILSHIRE ROAD (SECONDARY) 800/480 PR STATION (BACKUP FOR COLLEGE AND NORTH RIVER ROAD)

EXISTING NORTH RIVER RD & WILSHIRE 800/480 PR STATION, BACKUP FOR STRAWBERRY & 550 WILSHIRE (INACTIVE)

EXISTING 511/420 PR STATION 12" & 6" PRV (ACTIVE) PRIMARY FOR 420

NORTH RIVER FARMS PROJECT

SLEEPING INDIAN

LAS TUNAS DR.

WILSHIRE RD.

RD.

MARE ROAD

STALLION DR.

VANDEGRIFT BLVD.

NORTH RIVER RD.

NORTH OLD RIVER RD.

COLLEGE BLVD.

#6 AQUEDUCT

MELROSE DRIVE

N. SANTA FE AVE.

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EXHIBIT B

EXISTING WATER SYSTEM

NORTH RIVER FARMS