Curriculum Vitae
STEVEN E. HOLT, Ph.D., P.E.
Water Resources Engineer
Toothman-Orton Engineering Company

PROFESSIONAL REGISTRATION & AFFILIATION
Professional Engineer, Civil Engineering, License No. 7909, Idaho, 1995
Member, American Water Works Association (AWWA)

EDUCATION
Ph.D. Computational Fluid Dynamics, Minor in Mechanical Engineering, Stanford University, 1990
M.S. Water Resources Engineering, Stanford University, 1985
B.S. Civil Engineering, University of Utah, 1984

BACKGROUND
Mr. Holt started his professional career in 1984 with academic research in water resources engineering followed by consulting engineering since 1991. Mr. Holt has diverse experience in the master planning, design, construction management and project management of water resources engineering projects for municipalities, planned developments, transportation, industry, and private landowners.

Specific areas of experience include domestic water system planning and design, pump station design, water supply, water rights, planning and design of separate pressure irrigation systems, wastewater engineering, surface water hydrology and hydraulics, floodplain and floodway analysis, storm water management, and entitlement and design of land development projects.

PROFESSIONAL EMPLOYMENT HISTORY
February, 1991 - Present

Toothman-Orton Engineering Company, Boise, ID: Water resources engineering and project management.

May, 1985 - September, 1990 – **Stanford University, Stanford, CA**

Environmental Fluid Mechanics Laboratory: Theoretical and numerical investigation of stably stratified and sheared turbulence. Experimental investigation of buoyant fluid mechanics including scale modeling of a reservoir.

Instructor, Department of Civil Engineering: Lead instructor in undergraduate fluid mechanics and laboratory classes.

Recipient: Achievement Reward for College Scientists, ARCS Foundation.

SELECTED PROJECT EXPERIENCE

Community and Municipal Water Systems

Sunrider Ranch, Elmore County, ID - Develop planning, design and construction documents for community water system in 66-lot residential subdivision.

Sterling Sage, Elmore County, ID – Planning and design of community water system including supply and distribution, redundancy requirements and system control for 178-lot residential subdivision.

City of Kuna, Water System Improvements, Kuna, ID - Prepared and calibrated a computer model of the City's municipal water system to evaluate system capacity, pressures and flow performance. Prepared a water system master plan that formed the basis for constructed water system improvements. Assisted with securing water rights for a new supply well. Assisted with the funding, design and construction observation of a new well, booster station and storage tank.

City of McCall, Water System Improvements, McCall, ID - Prepared and calibrated a computer model of the City's municipal water system to evaluate storage capacity, pressures, zoning and flow performance of the existing system and to recommend system improvements for future expansion. Assessed capacity of water rights. Performed field verification of water supply pump station performance. Prepared a comprehensive water system master plan including recommendations for system improvements. Assisted the City with adoption of the water system master plan and funding of improvements. Designed and administered construction of raw water supply pump stations and potable distribution system improvements. Provided design and policy guidance to convert the City system to water meters. Provided hydraulic assessment and technical guidance for additional internal system improvements constructed by the City.

M3 Eagle Planned Community, Eagle, Idaho – Developed comprehensive estimates of water system demands for planned community of approximately 7,000 residential units with approximately 765 acres of common area and recreational public areas. Worked in conjunction with project attorneys, civil site engineer and hydro-geologist in compiling, submitting and processing a municipal groundwater right application for a 20 year build-out horizon. Water system demand estimates included domestic needs, irrigation, generation and reuse of treated sewage effluent, and aesthetic and operational storage ponds.

Water Supply Analyses for Multiple Proposed Developments, City of McCall, ID – Performed analyses of water supply to developments from the City of McCall water system. Analyses included estimating domestic, irrigation and fire flow demands, and potential upgrades to the McCall water system.

Spring Mountain Ranch and Woodlands Subdivisions, McCall, ID – Modeled and designed potable water systems and booster pump stations.

Kings Pines Estates, Adams County, ID - Advisory support for water system master plan and design of water supply, water quality, distribution, pressure zones, storage and pumping stations.

South Loop Waterline Project, City of McCall, ID - Planning and design of transmission line to improve existing system performance and support future expansion at south end of the City's water system.

Idaho Club, Lake and Golf Retreat Subdivision, Lake Pend Orielle, ID - Advisory support for master plan design and construction of community water system.

The Meadows Subdivision, Valley County, ID - Advisory support for master plan and design of regional community water system and multi-phase subdivision.

United Water Idaho, Ada County, ID - Design of pipeline to 6 MGD treatment plant. Hydraulic analysis of existing intake and pump station to increase residual delivery pressure to membrane filtration plant.

Heritage Estates, Canyon County, ID - Master planning of community water system and use of existing irrigation water rights for 100 lot development.

Centerville Public Water System, Centerville, ID - Provide basis of public water system review in contested case.

Pressure Irrigation Systems

Surprise Valley, Boise, ID - Prepared a feasibility study and hydraulic model for a separate pressure irrigation system, designed and managed construction of the irrigation system. Prepared and processed a contested water rights transfer and application for water right in conjunction with project attorneys.

Woodbridge Subdivision, Meridian, ID - Planning, entitlement, modeling and design of a separate pressure irrigation distribution system and pump station. Coordinated with project owner and irrigation district to reconfigure conveyance of existing water rights and combine with supplemental water.

Parks Ranch, Donnelly, ID - Prepared application for use of groundwater to supplement existing surface water rights. Application included analysis of efficacy of existing surface rights, analysis of demand for supplemental water, assessment of aquifer capacity, and preliminary engineering of diversion works. Assisted client and legal counsel with processing of contested water right application.

J.R. Simplot Company, Boise, ID - Planning of separate pressure irrigation system supply for existing and future large-scale development. Designed and assisted client with construction management of main irrigation service including filtering and pressure regulation.

Saddlebrook Development, Star, ID - Master planning and design of pressure irrigation pump system for multi-phase development and future expansion to regional system.

Tuscan Hills Development, Canyon County, ID - Advisory support for master plan of pressure irrigation system with rotation delivery from local irrigation districts.

Multi – Discipline Projects and Land Development

Jug Mountain Ranch, Valley County, ID – Prepared comprehensive master plans for water supply, water distribution, storage allocation, pressure zones, and wastewater collection, pumping and land application system balance.

WestRock Resort, pre-cursor to Tamarack Resort, Valley County, ID – Planning and entitlement for a four-season resort including: stormwater management, detailed hydrologic analysis, storm water quality mitigation, sewage collection and disposal, agency meetings, multi-agency coordination, and regulatory approvals. Prepared a comprehensive master plan for water supply, water distribution, storage allocation, and pressure zones for a domestic water system, public area irrigation and snowmaking. Developed water use and demand estimates, worked in conjunction with legal counsel to formulate municipal water right application, assisted with water right approval process.

J.R. Simplot Company, Micron Technology, Inc., United Water Idaho, Raw Water Supply System, Boise, ID – Managed the design and construction of a pump station and pipeline for delivery of river water to industrial, utility and private entities. Management responsibilities included in-house and sub-consultant design on 10 sub-projects; construction contract administration and inspection involving 5 separate contractors; and coordination of multiple project owners. Assisted the project owners with planning, permitting and hydraulic modeling of overall system. Project consisted of a river intake structure, wet well, pump station and pumping equipment to deliver approximately 20,000 gallons per minute of river water through 16,000 feet of 30-inch and 24-inch steel, ductile and polyethylene piping.

City of McCall, Sewage Lift Station Upgrades, McCall, ID – Assisted with the design and construction management of upgrades to the City's main lift stations.

Hidden Springs Community, Hidden Springs, ID – Assisted with the design and construction management of a central sewage lift station. Provided value engineering review of proposed water supply, booster pump station, and storage allocation.

The Shores Development, Eagle, ID – Project manager for entitlement, design and construction services to develop approximately 100 acres along the South Channel Boise River into 86 luxury residential home sites. Entitlements within the City of Eagle included rezoning, preliminary and final platting, and a comprehensive floodplain development permit that incorporated floodplain storage. Site grading and excavation was configured to accommodate approval of an individual 404 wetlands permit, conservation easements and wetland enhancement. Site utility design included water service with provision for residential fire sprinklers and connection to a deep buried sewer main in a de-watered condition. Water rights were obtained and transferred and used in a separate pressure irrigation system supplemented by amenity water features. A unique split roadway design was developed in conjunction with a non-traditional storm water system that utilized both center and roadside swales for treatment and infiltration of site storm water. Provided survey staking, construction observation and construction coordination services.

Coordination was done with, and approvals obtained from, the City of Eagle, Eagle Sewer District, United Water, Idaho Power Company, Flood Control District #10, Ada County Highway District, the U.S. Army Corps of Engineers, the Idaho Department of Water Resources and Idaho Department of Lands, the Mace-Catlin Ditch Company, and adjacent property owners.

Riverwalk Development, Boise, ID – "No-rise" floodplain encroachment analysis of existing site conditions, proposed development and future bridge effects. Master planned and designed pressure irrigation system with amenity recirculation channels. Advisory support for modification of existing canal drain. Coordinate with legal counsel on water right applications.

Stonebriar Development, Ada County, ID - Master planning and design of low pressure sewage collection system to interface with sequencing batch reactor. Designed combined pressure irrigation pump station and wastewater treatment building.

Stetson Estates, Canyon County, ID - Prepared comprehensive storm water analysis and master plan for hillside development including detention ponds.

Pearson Park, McCall, ID - Grading, drainage and storm water management for storage unit complex.

Rocky Ridge Construction, Multiple Development Sites, ID - Due diligence to assess potential for entitlements, utility service and development cost pro-forma within multiple development sites.

Ridgeline Vistas, Canyon County, ID - Coordination with County, Highway District, power utility provider, District Health Department on 27 estate lot rural foothills development. Develop water rights transfer applications and coordinate with Idaho Department of Water Resources to refine multiple splits and transfers of existing water right.

Homedale and Garnet Road Development, Canyon County, ID - Coordinate with County and referral regulatory agencies to obtain conditional use permit approval for rural subdivision. Coordinate with irrigation and drainage districts to improve and relocate existing facilities.

Market and Homestead Road Development, Owyhee County, ID - Rural subdivision planning and relocation of irrigation canal.

Mace Road Property, Eagle, ID - Due diligence, entitlement analysis and feasibility study for exclusive development under floodplain storage requirements. Assist client in coordinating joint project with adjacent landowner.

Lower Pleasant Ridge Development, Canyon County, ID - Design and layout of rural subdivision. Coordination with irrigation districts, highway district, fire marshal, district health and other referral agencies. Obtain conditional use permit.

Jayker Nursery, Meridian, ID - Grading, drainage and storm water management plan for wholesale landscape and tree nursery.

Majestic View Estates, Canyon County, ID - Master planning of community water system and separate pressure irrigation system for a 110 lot development. Assisted client in obtaining Conditional Use Permit on appeal of prior decision.

Eagle Sewer District, Eagle, ID – On-call continuing services including Qualified Licensed Professional Engineer review of sewer designs by others.

Floodplain and Hydrologic Studies

Monroc, Eagle Gravel, Lakeland Village, WinCo, Eagle River, Boise River Flood Re-Study, Ada County, ID – Managed a flood re-study on an approximately three mile reach of the Boise River for multiple clients. Objective of flood study was to review, analyze then re-model and correct a Federal Emergency Management Agency study. Flood re-

study results include delineation of the floodplain and floodway. Modeling efforts include accounting for topographic changes, cross-section orientation and placement, flow split at the upstream end of Eagle Island, bridge hydraulics, and levees.

Laguna Pointe Subdivision, Ada County, ID - Delineate floodplain and revise FEMA maps.

Hidden Island Subdivision, Ada County, ID - Review FEMA flood study for resolution and optimize floodway.

Blackhawk Development, Valley County, ID - Peer review of flood study on an approximately 1 mile reach of the North Fork Payette River. Obtain FEMA approval in previously contested and rescinded approval.

Riverwoods Development, Cascade, ID - Detailed flood study on approximately 1.5 miles of the North Fork Payette River. Assisted Client with City's proposed changes to floodplain ordinance including no net loss of floodplain storage and no-rise floodplain development limitations.

Payette River Estates, Valley County, ID - Bank stabilization design and hydraulic analysis on the North Fork Payette River to protect existing sewer main serving approximately 200 lot resort subdivision.

Chaparral Road Development, Ada County, ID - Detailed flood study that developed base flood elevations and a floodway using a split flow analysis in conjunction with hydrologic analysis to determine flow rates.

McCauley Property, Eagle, ID - Refinement of FEMA floodway delineation.

Windsor Valley Subdivision, Canyon County, ID - Detailed floodplain, flood elevation and floodway study on an approximately 1-mile reach of Willow Creek including existing under-sized culverts.

Waltman Property, Canyon County, ID - Determination of base flood elevations with split effective flow model.

Mace Family Trusts Property, City of Eagle, ID - Comprehensive flood study to correct and refine FEMA floodplain maps on an approximately 1-mile reach of the North Channel Boise River. Study included cross-section resolution analysis, field survey, determination of base flood elevations and floodway optimization, bridge and irrigation diversion structures.

Osprey Meadows Subdivision, Valley County, ID - Detailed floodplain, base flood elevation and floodway study on approximately 2-miles of the North Fork Payette River.

Silverstone Campus, Meridian, ID - Coordinated with client and City of Meridian to perform joint study effort to assess impacts of existing under-sized culvert crossings of Eight Mile Creek and propose mitigation concepts.

Overland Village, Meridian, ID - Detailed floodplain, flood elevation and split floodway analysis at confluence of Eight Mile Creek and Five Mile Creek. Assess impacts of existing crossing on FEMA flood elevations. Develop grading and drainage plan and floodplain development permit approval.

Sleepy Hollow Subdivision, Garden City, ID - Analysis of multiple potential floodplain results in studies by FEMA and others to facilitate construction of subdivision within context of City of Garden City floodplain ordinance. Obtain LOMR-F for subdivision including revalidation under revised FEMA maps.

McFarland Creek, Ada County, ID - Forensic investigation and peer assistance on hydraulic effects of constructed pond in tributary floodway obtain approvals in contested case.

Riverside Estates, Bellevue, ID - Obtain permits from regulatory agencies including City of Bellevue, U.S. Army Corps of Engineers, and Idaho Department of Water Resources to authorize construction of bank stabilization to protect luxury river front homes on the Big Wood River.

Lonesome Dove Development, Eagle, ID - Analysis and floodplain development permit approval demonstrating interactive hydraulic characteristics of gravel extraction, amenity ponds and floodplain development in the floodway of the North Channel Boise River.

Transportation Hydraulics

7th Avenue North, City of Payette, ID - Coordination with City, ITD and irrigation district to analyze hydraulic performance of existing and proposed bridge over irrigation canal. Analysis included determination of self-limiting extreme flood event and downstream weir.

Pine Bridge, Elmore County, ID - Hydraulic analysis of existing and proposed bridge improvements to mitigate critical levels of pier and abutment scour on bridge over the South Channel Boise River.

Feather River, Elmore County, ID - Hydraulic analysis of existing culverts and proposed replacement bridge. Analysis included hydraulic and roadway skew angles, and channel and riprap design to facilitate fish passage.

Canyon Creek Bridge, Elmore County, ID - Hydraulic analysis of existing bridge and performance of proposed replacement bridge and modified roadway approach. Analysis of scour and design of revetment for channel and embankments.

Industrial Projects

Micron Technology Incorporated, Boise, ID - Planning, entitlement, design, construction and project management for supply of industrial process water.

SSI Food Services, Inc., Wilder, ID – Hydraulic modeling and design of pumping and dual force main facilities for transportation of industrial wastewater to a land application site.

Dairymen's Creamery Association, Boise, ID - Designed a flow equalization facility for collecting and pumping industrial process wastewater to storage and controlling and monitoring tank outflow to the public sewer system.

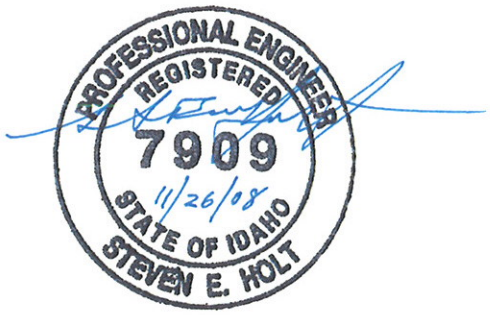
WestFarm Foods, Caldwell, ID - Design and construction assistance for industrial process wastewater including pre-treatment, stabilization, storage equalization and controlled outfall rate to municipal sewer system.

Idaho Power Company, C.J. Strike Projects, Snake River, ID - Coordinate with client to develop proposed improvements for recreational sites and assistance with 404 permitting. Design boat ramps, marina and jetty.

ENGINEERING REPORT
WATER USES

M3 EAGLE PLANNED COMMUNITY

2nd AMENDED WATER RIGHT APPLICATION



Toothman-Orton Engineering Company
Version: November 26, 2008

Engineering Report
Water Uses

M3 Eagle Planned Community
Second Amended Municipal Water Right Application

Steven Holt, P.E.
Toothman-Orton Engineering Co.
November 26, 2008

M3 Eagle Planned Community – Water Right Application (slide 1)
This report, and the attached PowerPoint slides, outline facts and conclusions concerning the M3 Eagle community ground water diversions and uses at project build-out. This report provides an overview of the groundwater diversion and distribution system to serve those uses, summarizes the diversion and storage quantities requested in the application, and reviews the assumptions, calculations and reference data underlying the requested water right diversion quantities. The calculations are contained in the spreadsheet attached as Exhibit 5.7 to Attachment A of M3 Eagle's Second Amended Application (the "spreadsheet").

The calculations provided in the spreadsheet are intended to be neither too conservative nor too aggressive, meaning they are not the least amounts possible for any given use, and they are not at the high end. However, in a project of this size, it is unavoidable that the actual amounts will vary somewhat as the project is developed through its planning horizon. The intent is that the overall volumes diverted, the acres irrigated, and the indoor uses, will not exceed those calculated in the spreadsheet. Accordingly, the use estimates tend to be on the high side rather than on the potentially achievable low side.

Summary of Water Uses (slide 2)
The indoor potable domestic demand consists of 7153 residential units, schools, hotel rooms and 245 acres of commercial development. Irrigation associated with residential and commercial structures totals approximately 487 acres. Public area irrigation totals 765 acres including common areas, two 18-hole golf courses, several parks and ball fields. Approximately 1828 acre-feet (ac-ft or af) of groundwater and reuse water will be stored in aesthetic, operational and effluent ponds with approximately 100 acres of surface area.

Application Exhibit 5.1 - Well Field Diversion Components - Potable Water (slide 3)
Exhibit 5.1 of the Water Rights Application is a flow-chart schematic illustrating how the well field diversion is distributed into storage and use components. The well field diversion provides for potable (drinking and other indoor) water uses on the left of the exhibit, non-potable uses on the right side of the exhibit and the interconnection of non-potable irrigation with effluent at the bottom center of the exhibit.

The potable uses on the left side of the exhibit illustrate that the well field will supply daily demands up to the maximum day demand. Potable storage will provide fire fighting flows and

supplement diversions from the well field to accommodate peak hour demands for residential irrigation and indoor domestic use.

Preliminary water quality testing by Hydro Logic, Inc. indicates the proposed groundwater source is expected to meet Federal and State drinking water standards without treatment and therefore be potable as diverted from the wells. Supplementary treatment, such as establishing a disinfectant residual in the potable distribution system, may be part of the final water system design.

Application Exhibit 5.1 - Well Field Diversion Components – Non-Potable Water (slide 4)
The non-potable uses on the right side of the exhibit illustrates that the well field will supply daily demands up to the maximum day demand. Storage in non-potable operational ponds will supplement diversions from the well field to accommodate peak hour demands for non-potable irrigation on common areas. Although the groundwater is expected to be potable as diverted from the wells, the non-potable irrigation distribution system will be separate from the potable drinking water system, and would not be expected to receive disinfection as described above. The right side of the exhibit also indicates the well field will supply the aesthetic storage ponds.

Application Exhibit 5.1 - Well Field Diversion Components – Reuse Water (slide 5)
The portion of the potable water not consumptively used indoors would be collected in a conventional sewer system, treated to Class A wastewater standards as defined by the Idaho Department of Environmental Quality (DEQ) and used for irrigation of public areas.

During the relatively high demand months of the irrigation season, diversions from the well field will be used in combination with the treated effluent as produced to meet projected public area irrigation demand. To allow for maximum use of treated effluent for irrigation, from time to time some areas normally irrigated with ditch company or other surface water may be irrigated with effluent instead. The irrigation piping will be designed to accommodate this flexibility.

Until M3 Eagle has produced detailed project layouts of homes, commercial areas, and infrastructure, the areas to be irrigated with existing surface water supplies cannot be determined. It is anticipated that use of surface water on the project, which is made possible primarily by the presence of the Farmer's Union ditch on its southeast portion, may require place of use transfers.

Effluent produced in the non-irrigation season will be stored in ponds and used the following irrigation season. In the calculations, storage and reuse of winter effluent is separated from the reuse of effluent during the irrigation season. The exhibit also illustrates effluent storage ponds, which will be lined to control or eliminate leakage.

Requested Diversion and Storage Quantities (slide 6)
The following discussion summarizes the diversion and storage quantities requested in the water right application.

Application Exhibit 5.4 - Annual Groundwater Diversion Volume (slide 7)
Exhibit 5.4 in the application illustrates the components of the requested 6535 ac-ft of annual diversion volume. Approximately 62% of the indoor potable diversion generates 1818 ac-ft of effluent that could be reused for irrigation. The effluent generation represents 28% of the total annual diversion volume. After overcoming 158 ac-ft of evaporative losses from the effluent storage ponds, an estimated 1616 ac-ft of effluent is reused for 54% of the non-potable irrigation. The benefit of the reuse water in reducing diversions is accounted for in the net municipal well divisions for non-potable irrigation and pond evaporation components of the pie chart. If, due to weather conditions that may include abnormally high precipitation or low temperatures, it is necessary to provide more irrigated acreage on which to use treated effluent, dedicated irrigation water supplies (Farmers Union shares, irrigation wells) will not be used so that those acres within the service area can receive treated effluent instead. This operational flexibility is not calculated in the spreadsheet, but is an example of an option that could be implemented as experience on the site dictates.

Exhibit 5-4 indicates well diversions for evaporative losses in aesthetic and operational ponds but not the evaporation from winter effluent storage ponds because those evaporative losses were originally diverted for indoor use. In other words, the spreadsheet assumes that only effluent will be evaporated in the effluent storage ponds and therefore no additional diversions from the wells are needed to overcome evaporation. The effluent that is evaporated is therefore reuse water used up by evaporation.

Application Exhibit 5.4 - Annual Groundwater Consumptive Use (slide 8)
Exhibit 5.5 of the application illustrates the components of the estimated 5381 ac-ft of annual consumptive use. The estimated 1553 ac-ft of consumptively used reuse water represents 29% of the total CU. The consumptive use of reuse water is included in the pie chart as the evaporation from winter effluent storage ponds (158 ac-ft) and 1395 ac-ft within the public area non-potable irrigation. The reuse water represents 55% of the total consumptive use for non-potable irrigation.

Application Exhibit 5.4 - Maximum Daily Well Diversions (slide 9)
Exhibit 5.6 of the application illustrates the components of the requested maximum daily diversion of 23.18 cfs. The maximum daily diversion coincides with the maximum demand during the irrigation season. The net maximum daily well diversion of 6.27 cfs for non-potable irrigation shown on the pie chart accounts for 2.51 cfs from effluent that is generated and reused during the irrigation season. The net maximum daily well diversion also accounts for using effluent generated during the winter for non-potable irrigation on 120 acres that otherwise would have required 1.67 cfs of maximum day well diversions.

Exhibit 5-6 indicates a maximum day well diversion of 1.10 cfs to overcome evaporation in aesthetic and operational ponds but does not illustrate a well diversion to overcome evaporation from winter effluent storage ponds because those losses were originally diverted for indoor potable uses. As described above, the spreadsheet assumes that effluent will be evaporated in the effluent storage ponds and therefore no additional diversions from the wells are needed to overcome evaporation.

Calculations and Reference Data - Application Exhibit 5.7 – The Spreadsheet (slide 10)
Exhibit 5.7 of the application is a spreadsheet that calculates quantities requested in the water right application. The spreadsheet reflects full build-out of the proposed M3 Eagle Development project at the end of the 30-year planning horizon.

Error Concerning Number of Irrigation Shares
Row 5 of the spreadsheet states that M3 holds 17.93 shares of Farmers Union Ditch Co. water that will be used to irrigate 197 acres in the development. Cells C37 and C38 state that 98 acres of ballfields and parks and 99 acres of common area turf, representing the total of 197 acres irrigated by ditch shares, are excluded from the spreadsheet calculations of well diversions. In other words, the water right application does not provide for well diversions to cover this amount of irrigation.

However, the 17.93 number is incorrect. A certificate for 7.30 shares was inadvertently added twice in totaling 17.93 shares. Attachment D of the Water Rights Application documents that M3 Eagle has 9.97 shares and anticipates acquiring 0.66 additional shares for a total of 10.63 shares. The 0.66 shares have since been acquired. The 10.63 shares represent 117 inches of irrigation water under Farmers Union's standard eleven inches per share, and with historic irrigation of 147 acres, there is a duty of water on these lands for these shares of 0.79 inches per acre.

In addition, M3 Eagle holds a groundwater right No. 63-10669 that provides for irrigation of 111 acres ("Kling right"). The Kling right appears to have been used to supplement uses on those acres served under the Farmers Union ditch shares. However, of the 111 acres in the Kling right's place of use, only 104 acres overlap with the Farmers Union place of use. As a result, the Kling right is the primary water right for at least 7 acres. With the additional 7 acres of irrigation from the Kling right, M3 Eagle has historically irrigated, or is otherwise authorized to irrigate, 154 acres of the 197 acres assumed in the spreadsheet. M3 Eagle has several options to accommodate this discrepancy of 43 acres prior to build-out or licensing.

One option is to remove the 43 acres of irrigated ground from the development plan. Another is to transfer one of its several irrigation ground water rights to use on such parcel(s) as they are proposed for development in the future. Another is to acquire additional surface water, either shares in Farmer's Union Ditch Company or otherwise, to transfer to the project.

Implementation of water conservation measures described in Attachment D, pages 4 and 5, are anticipated to allow for a portion of the 43 acres to be irrigated within the diversion quantities requested in the application.

In addition, each golf course is currently sized for 120 acres of irrigated area and likely is approximately 20 acres more than each course actually will have. This conservatively high estimate alone would account for 40 acres of the discrepancy in ditch shares. In any case, when considering a twenty-year or more build-out period, this error is minor and should not affect water planning for the project.

Irrigation Season – Spreadsheet Page 1 (slide 11)
Cell C8 indicates an irrigation season lasting 244 days from March 15 to November 15. This length of season is consistent with the Idaho Department of Water Resources (IDWR) guidelines for irrigation seasons on the project that range from March 15 to November 15 with 246 days to March 1 to November 15 with 260 days based on average day temperatures above 45 degrees.

Irrigation Efficiencies– Spreadsheet Page 1 (remain on slide 11)
Cells B11 and B12 include estimated turf and drip irrigation efficiencies of 80% and 90%, respectively, based on the references contained in accompanying slide 12.

References for Irrigation Efficiency (slide 12)

Estimated Pond Configuration and Storage Quantities - Spreadsheet Page 1 (slide 13)
Row 14 of the spreadsheet lists the surface area, average depth and storage volume of aesthetic, operational and winter effluent storage ponds. The aesthetic ponds will be maintained at relatively constant levels, the operational pond levels will fluctuate to meet peak hour non-potable irrigation demands, and the winter effluent storage ponds will store effluent produced during the winter for use in the subsequent irrigation season. Taken together, the ponds comprise an estimated 100 acres with approximately 1828 acre-feet of storage. The ponds will be lined or sealed to control exfiltration.

Irrigation Evapotranspiration Demand – Spreadsheet page 1 (remain on slide 13)
Referring to Row 27, the monthly evapotranspiration, or ET demand, for irrigation is based on Allen & Brockway data from their 1983 study titled "Estimating Consumptive Irrigation Requirements for Crops in Idaho." The Allen & Brockway ET data used in the spreadsheet is for alfalfa hay to represent turf grass and other landscape vegetation because the Allen & Brockway data does not provide ET demand for turf grass. Also, the spreadsheet estimates ET in November at 1/3 of the Allen Brockway ET for irrigation in October.

The spreadsheet uses the Allen & Brockway data calculated at the Boise Airport. The 2007 study by Allen & Robison titled "Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho" provides ET data for turf grass at the Boise Airport and at a site named "Boise 7N". The Idaho Department of Water Resources ("IDWR") adopted the Allen & Robison data on February 11, 2008 (Administrator's Memorandum, Miscellaneous Memo No. 16) after the Seconded Amended M3 water right application was filed on February 1, 2008. Locations of these sites and the associated ET data are as set forth in slide 14.

Evapotranspiration Reference Locations (slide 14)

References for Irrigation Evapotranspiration (ET) (slide 15)
The Allen & Robison ET sites have a peak ET demand in July that are within 2% of the Allen & Brockway value used in the spreadsheet. The Allen & Robison ET sites have annual ET demands up to 12% higher than the Allen & Brockway value used in the spreadsheet with modification for the length of irrigation season described previously.

Spreadsheet page 1 (slide 16)
Referring to cell K29, the total ET demand for irrigation is approximately 3.3 feet of water depth per year and is consistent with the IDWR consumptive irrigation requirement of 3.5 ac-ft/ac per year for the project location.

IDWR Consumptive Irrigation and Field Headgate Requirement Map (slide 17)

Non-Potable Irrigation Areas and Demands - Spreadsheet page 1 (slide 18)
Cells E36-E39 list a total of 645 acres to be irrigated with non-potable water using a combination of well diversions and effluent produced during the irrigation season.

Cell E40 indicates 120 acres will be irrigated with stored winter effluent. The 120 acres is calculated in the spreadsheet as a result of winter effluent generation, storage, pond evaporation and irrigation. For simplicity the 120 acre calculation is segregated from the 645 acres in Cells E36-E39.

The bold font in cell H41 represents the maximum day irrigation demand of 8.78 cubic feet per second (cfs) for 645 acres of public areas irrigated by summer effluent and well diversions based on the maximum monthly ET demand in July and the assumed irrigation efficiencies. The maximum day irrigation demand of 8.78 cfs allows for irrigation of common areas over a 24-hour period and, when combined with the 6.78 ac-ft of non-potable storage indicated in cell L41, provides for irrigation of the golf courses, parks, and ball fields in time periods ranging from 9 to 12 hours (cells I36 and I37) to accommodate daytime recreational use. Note that the 8.78 cfs demand is equivalent to 0.014 cfs/acre and is 30% less than the statutory duty of water of 0.02 cfs/acre. The estimated application rate of 0.014 cfs/acre is based on relatively high irrigation efficiencies achieved by sprinkler and drip irrigation, the 24 hour irrigation schedule for the common areas, and use of non-potable storage to allow for the 9 hour and 12 hour irrigation times for the golf courses and ball fields.

Potable Irrigation Areas and Demands - Spreadsheet page 1 (remain on slide 18)
Cells D45 and D46 illustrate the estimated irrigated area for single family detached units consisting of a projected 2000 square feet (s.f.) of turf irrigation area and 1500 s.f. of drip irrigation area where the latter would typically be tree and shrub beds. Taken together, the estimated total of 3500 s.f. of irrigated area per unit represents 45% irrigated area on an average lot size of 7800 s.f.

Cells D52 and D53 indicate estimated 750 s.f. of turf area and 500 s.f. of drip area per dwelling unit for single-family attached and multi-family attached units. Cells B59 and B60 indicate the total 245 gross acres of commercial development with an estimated 5% irrigated area.

The residential and commercial irrigation will be served by the potable water distribution system. Cell H63 indicates a maximum day residential and commercial irrigation demand of 6.45 cfs if applied at a constant rate a 24-hour period. Cells I47-I60 indicate irrigation is estimated to occur over a 12-hour nighttime period and results in the 12.9 cfs total potable irrigation demand shown in cell J63. Because application at 12.9 cfs could require diversions of more than 0.02 cfs/acre,

diversion of 9.74 cfs (cell K63) from the well field at 0.02 cfs/acre is combined with delivery of 1.02 millions gallons of potable water storage (cell M63) to accomplish the irrigation in the estimated 12-hour period.

Indoor Demands –Spreadsheet page 2 (slide 19)
The top half of page 2 of the spreadsheet calculates indoor water demands for the residences, schools, hotels and commercial areas. The residential units represent the majority (82%) of the indoor water demands. Cell D80 indicates an average daily residential demand of 274 gallons per day per unit (gpd/unit) that results from a planning estimate of 100 gallons per capita per day (gpcd) of average daily water use multiplied by 2.74 people/house per the Ada County 2000 census. The 274 gpd/unit estimate is supported by the sources cited below.

References for Residential Use (slide 20)
The references cited illustrate a wide range of data for average daily use per dwelling unit. Factors that contribute to the data range include influence of irrigation, system leakage, unaccounted for water, accuracy of water use and production records, population density and amounts of outdoor use.

Irrigation can have a significant effect on water use in the western United States. The reference data include United Water Idaho data for winter use, which demonstrates approximately 255 gpd/unit, consistent with M3 Eagle's planning estimate of 274 gpd/unit used in the spreadsheet.

Conservation measures and plumbing code restrictions on flow and volume, which are not fully implemented in many existing areas but are expected to be implemented in all phases of the M3 Eagle project, could result in residential demands less than 274 gpd/unit. The actual demand will be metered and adjustments made to the design and construction of the diversion and distribution system where appropriate as the M3 Eagle project develops.

If the average daily indoor potable residential use is lower than 274 gpd/unit, then well diversions for indoor potable water will be lower and effluent production and reuse water likely will decrease. In that case, well diversions for non-potable irrigation will increase to compensate for the reduction in reuse water. The net effect, however, would be a slight reduction in the total requested 23.18 cfs peak daily diversion because of the reduced indoor use.

Maximum Daily Indoor Demands - Spreadsheet page 2 (slide 21)
Diversions from the well field will supply the maximum day indoor demand. For indoor potable use, the maximum day demand is 5.0 cfs as calculated in cell F80. This calculation requires application of a peaking factor to the average daily demand. As indicated in cell B75, the peaking factor was estimated at 1.5.

References for Residential Peaking Factor (slide 22)
Review of data for maximum day peaking factors reveals a range on the order of 1.5 to 3.5. The spreadsheet uses an indoor water use peaking factor of 1.5 because the higher peaking factors appear to be influenced by irrigation. From another perspective, the spreadsheet anticipates up to 50% more indoor water use on the maximum day of demand. Examples including influx of

visitors on holidays, perhaps more showers or ingestion of water during the summer months, and incidental outdoor water uses such as car washing.

Potable Water Storage - Spreadsheet page 2 (slide 23)
Diversions from the wells will supply the maximum daily indoor demand whereas peak hour demands will be supplied by combining the well field diversions with potable water storage. Cell B98 contains an estimate that 2.62 million gallons of potable water storage is needed. The storage components shown in cells B94 to B97 consist of irrigation peaking storage calculated in Cell M63 on page 1 of the spreadsheet, indoor peak hour demand storage calculated in Cell I90, fire flow of 3,000 gallons per minute (gpm) as storage held in reserve, and estimated operational storage for well pump cycling.

Wastewater and Effluent Production - Spreadsheet page 2 (remain on slide 23)
Potable water delivered for average daily indoor water demands is assumed to be either consumptively used or collected as wastewater for treatment and reuse. Cells F106-F108 show that an estimated 60% to 75% of the indoor water demand is generated as wastewater and potentially available for reuse.

References for Residential Wastewater Production Rate (slide 24)
The percent of wastewater generation typically varies from 60% to 130% in reference data. Wastewater production rates greater than 100% indicate the presence of other water sources in the sewer collection system such as infiltration of groundwater into sewer pipes or inflow of stormwater into manholes. The wastewater production rate of roughly 69% in the spreadsheet is at the low end of the data range so as to not over-predict the resulting effluent (and thus under-predict the amount of well pumping needed for non-potable irrigation) and because the design, construction and operation of the M3 sewer system will include measures to control infiltration and inflow.

Effluent Available for Non-Potable Irrigation - Spreadsheet page 2 (slide 25)
Row 124 calculates effluent generated from indoor potable demands. In particular, cell G124 indicates a total of 1818 ac-ft of effluent is produced annually. Cell H124 shows 1215 ac-ft of effluent is generated during the irrigation season and cell I124 shows 603 ac-ft of effluent is produced during the winter.

Cells C128 through C130 calculate the net winter effluent available for reuse. Cell C128 begins with the 603 ac-ft of effluent produced and stored during the winter. Cell C129 deducts an estimated 158 ac-ft of evaporative losses from the effluent storage ponds during the subsequent irrigation season, resulting in a net 445 ac-ft (in cell C130) of winter effluent re-used for irrigation. Cell 131 adds the 1215 ac-ft of effluent produced and re-used during the irrigation season for a total annual 1660 ac-ft (in cell C132) of effluent re-use.

The estimated 158 ac-ft of evaporation from the effluent storage ponds in cell C129 is equivalent to 3.5 ac-ft/acre per year and was derived from the following references. The estimated annual evaporation was also used for the aesthetic and operational ponds.

References for Pond Evaporation (slide 26)

Summary Results - Diversion Rates and Volumes - Spreadsheet Page 3 (slide 27)
Spreadsheet page 3 summarizes calculation results for diversion rates, diversion volumes and consumptive use volumes. A graphic summary of those results is provided in application Exhibits 5.4, 5.5 and 5.6 (pie charts). Spreadsheet pages 3 and 4 also segregate the diversion rates and volumes into the irrigation season and non-irrigation seasons.

Application Attachment A Quantities - Spreadsheet Page 4 (slide 28)
Spreadsheet page 4 provides selected spreadsheet results cited in Attachment A, page 12. Spreadsheet page 4 also calculates the direct well diversion and reuse components of consumptive use for non-potable irrigation and pond evaporation needed for Exhibit 5.5 (pie chart) of the application.

Monthly Potable and Non-Potable Irrigation Demands - Spreadsheet Page 5 (slide 29)
Spreadsheet page 5 calculates monthly diversion volumes and consumptive uses for all irrigation demands. Cell AR58 verifies a total annual irrigation consumptive use of 3.34 ac-ft per acre from the modified Allen Brockway ET input data on spreadsheet page 1. Cell AR59 indicates a total annual irrigation diversion of 4.01 ac-ft/acre resulting from the estimated 80%-90% irrigation efficiencies. The IDWR guidelines for annual irrigation diversions allow for 4.5 ac-ft/acre in the vicinity of the M3 project.

Conclusion
This report summarizes the bases for the groundwater diversion quantities requested in the second amended water right application for the M3 Eagle planned community. Reference data supporting calculation of these quantities are included.

The calculated diversion quantities are reasonable, based on sound engineering judgment, and within the ranges indicated in the literature on water use. They are also within the ranges Toothman-Orton has found or used for other projects.

Calculation of precise usages is impossible at this stage, but the overall proposed annual diversion volume is anticipated to have sufficient flexibility to accommodate changes and actual experience as the project is developed. Overall, the water supply being sought is adequate for this development and provides some cushion to accommodate unforeseen circumstances that may arise during the planning horizon.

M3 Planned Community

Eagle, Idaho

Water Right Application

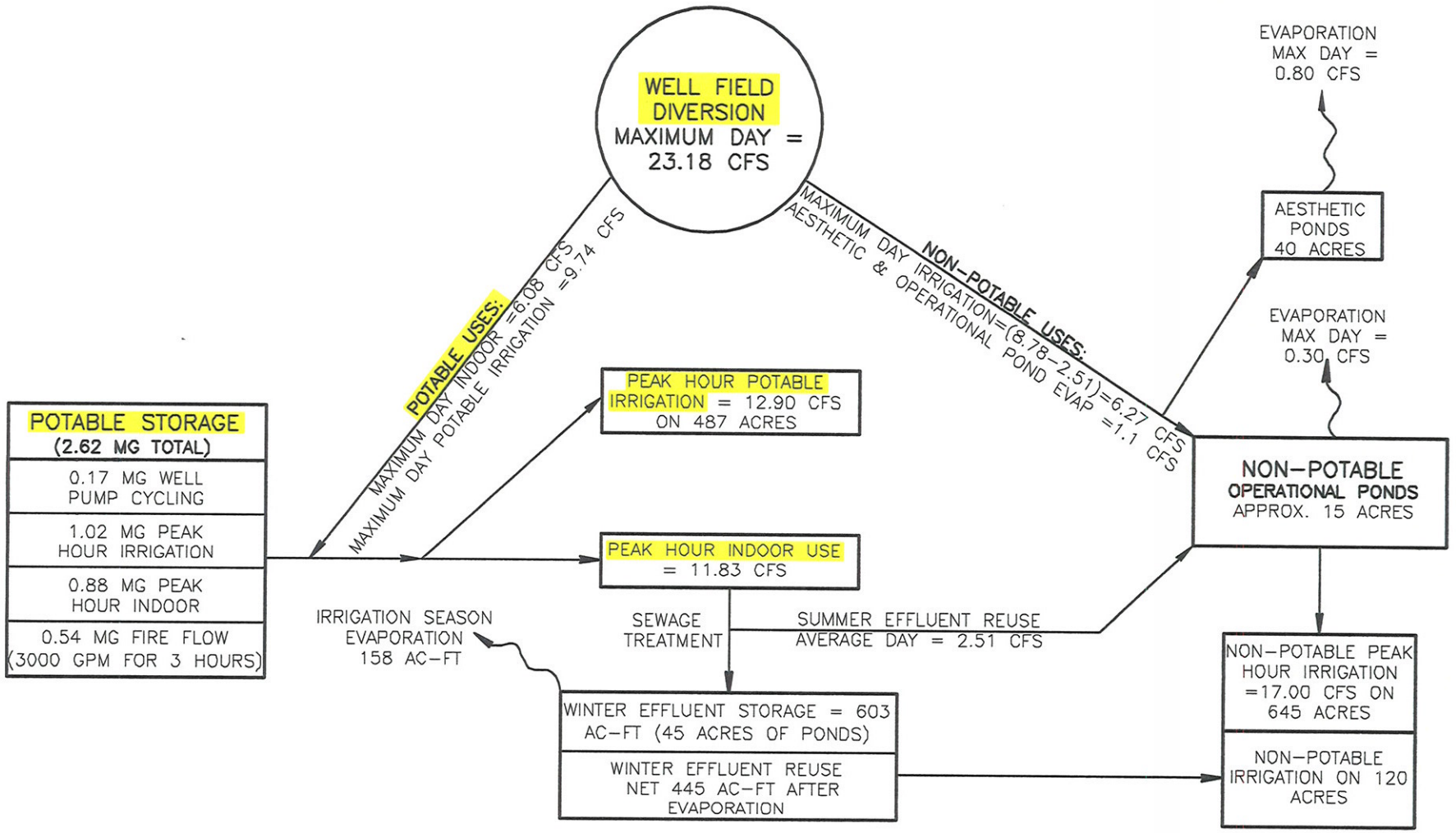
- Water Uses
- Overview of Diversion and Distribution System
- Requested Diversion and Storage Quantities
- Calculations and Reference Data

Summary of Water Uses

- Indoor
  - 7153 residential units (5216 single family and 1937 attached units)
  - Other
    - Schools (5480 students)
    - Hotel rooms (500)
    - Commercial development (245 gross acres)
  - 2.6 million gallons of potable water storage
- Irrigation – 1252 total acres
  - 487 acres residential & commercial
  - 765 acres public area (golf courses, parks, ballfields, common area)
- Aesthetic, Operational and Effluent Ponds
  - 1828 acre-feet (a.f.) of pond volume
  - 100 acres of pond surface area

M3 EAGLE DEVELOPMENT

WELL FIELD DIVERSION COMPONENTS



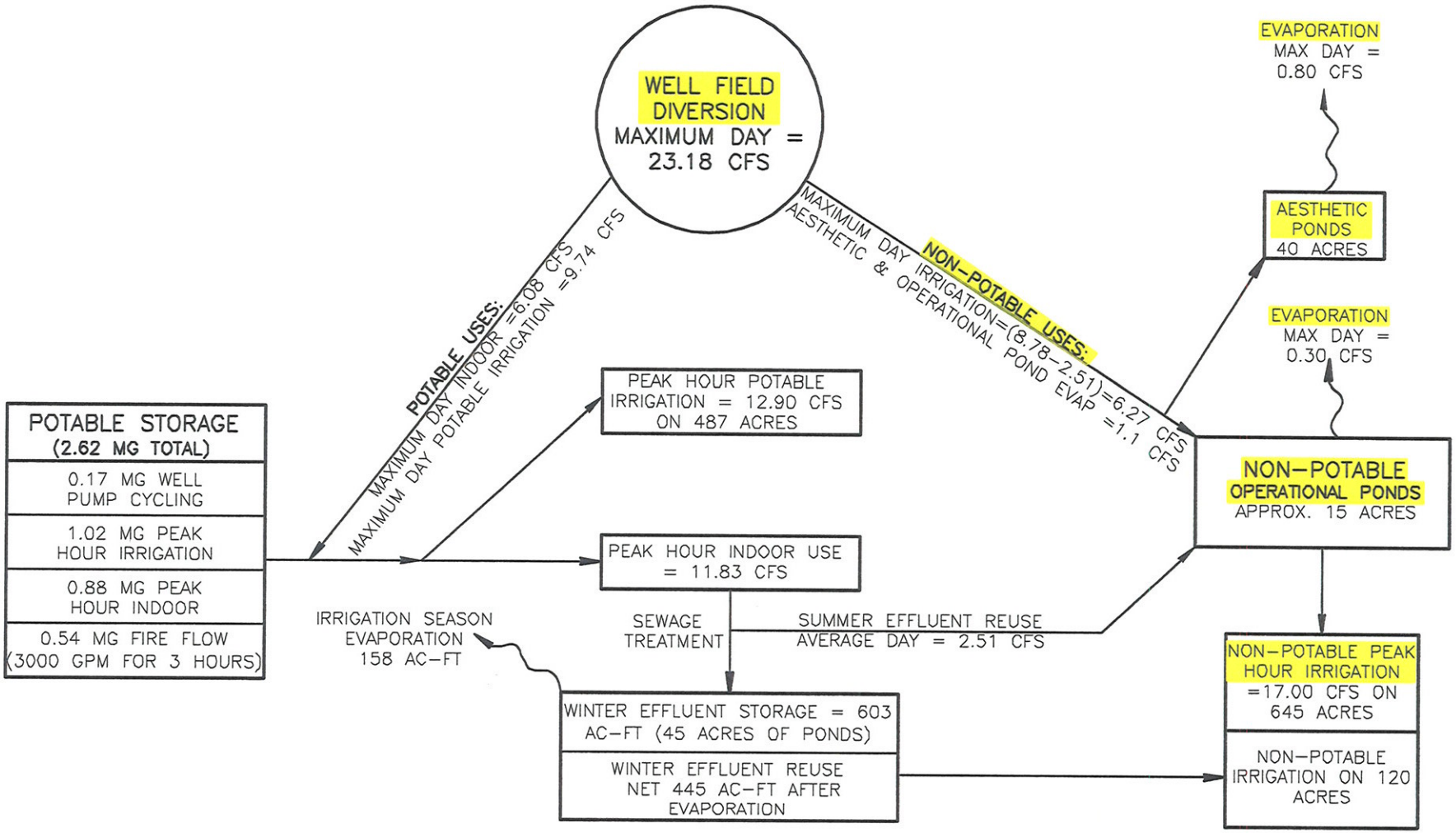
NOTE:

THE CONNECTIONS BETWEEN COMPONENTS DO NOT REPRESENT A SPECIFIC OR PROPOSED CONFIGURATION OF A DIVERSION AND DELIVERY SYSTEM.

ABBREVIATIONS:
CFS = CUBIC FEET PER SECOND
MG = MILLION GALLONS
AC-FT = ACRE-FEET

M3 EAGLE DEVELOPMENT

WELL FIELD DIVERSION COMPONENTS



NOTE:

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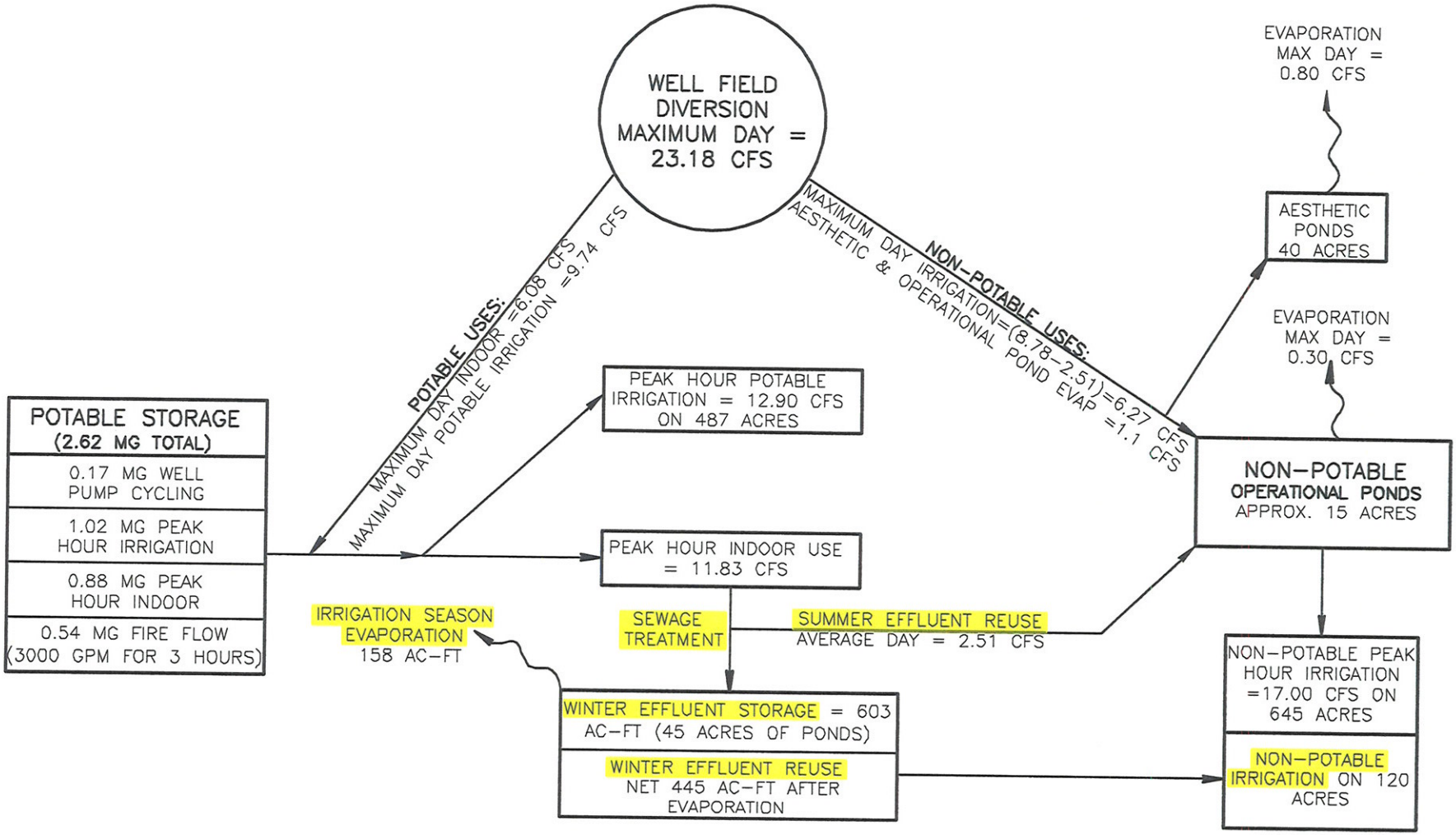
M3 EAGLE DEVELOPMENT

WELL FIELD DIVERSION COMPONENTS



NOTE:

THE CONNECTIONS BETWEEN COMPONENTS DO NOT REPRESENT A SPECIFIC OR PROPOSED CONFIGURATION OF A DIVERSION AND DELIVERY SYSTEM.

ABBREVIATIONS:
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MG = MILLION GALLONS
AC-FT = ACRE-FEET

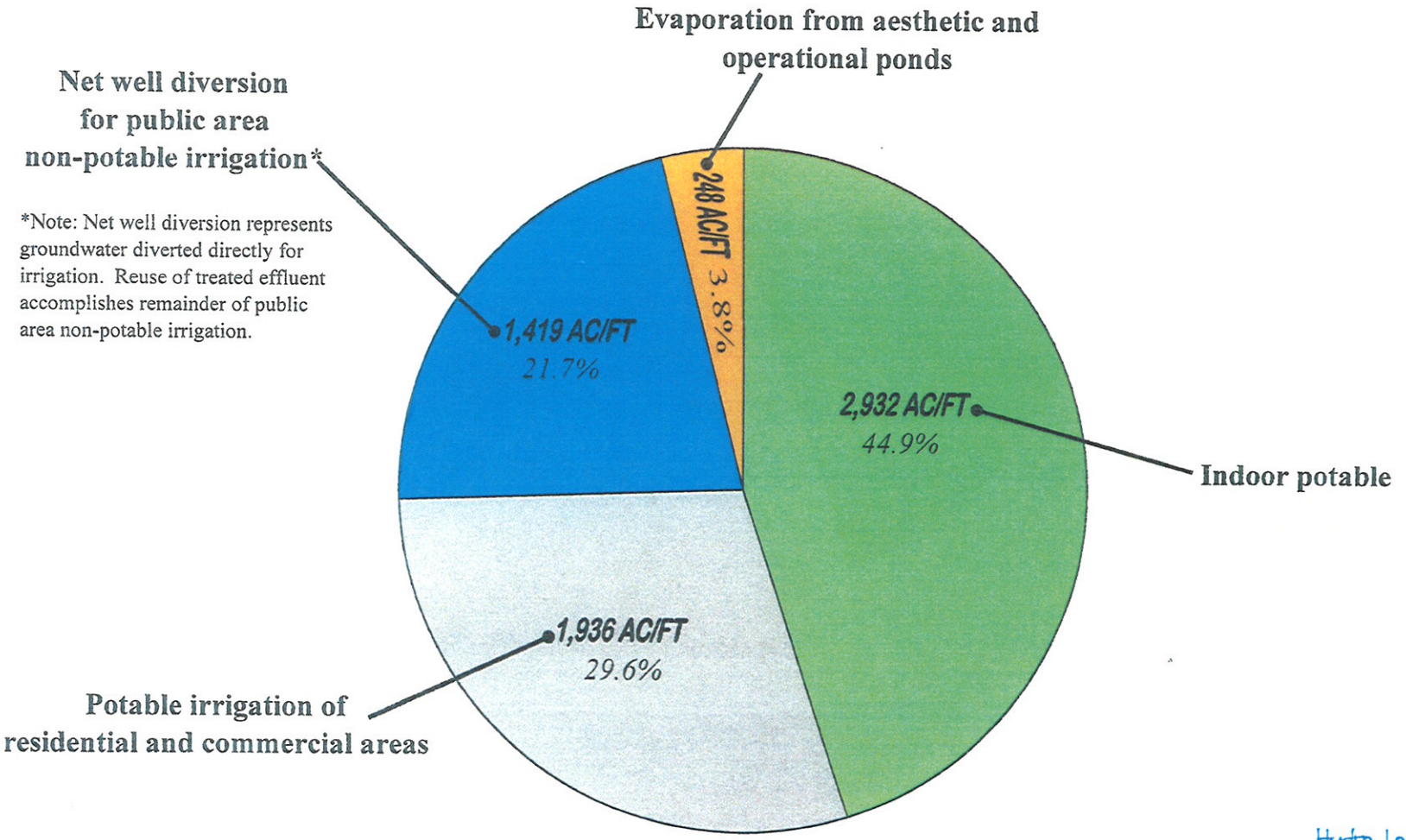
Requested Diversion and Storage Quantities

Exhibit 5.4

M3 Eagle

ANNUAL GROUND WATER DIVERSION VOLUME PERCENTAGES AT FULL BUILD-OUT

(Acre-Feet and Percentage of Total)



Total Annual Ground Water Diversion Volume ≈ 6,535 AC/FT

Note: Components of total well diversion shown herein may not add exactly to total annual diversion volume due to round-off error.

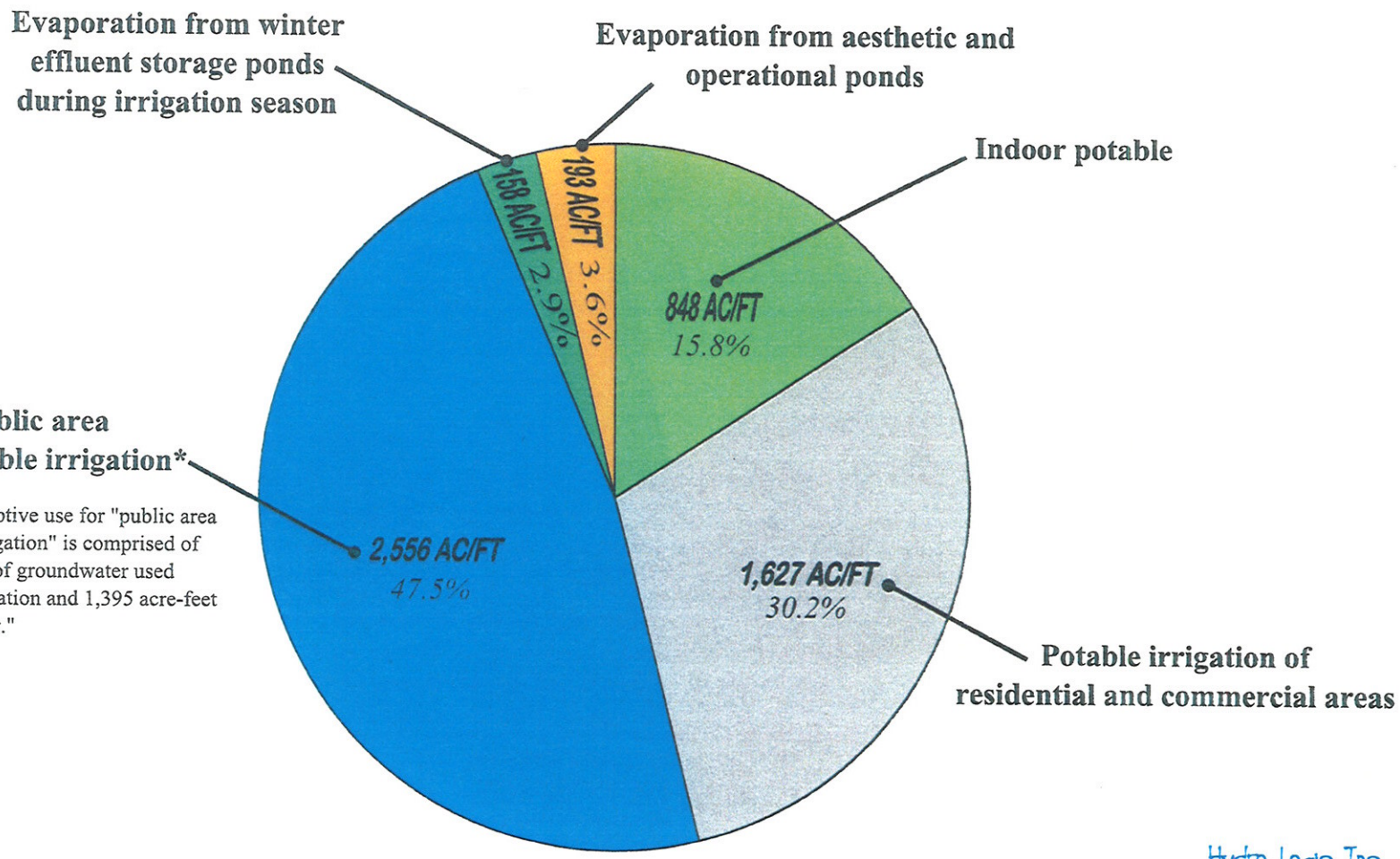
Hydro Logic Inc.
Boise, Idaho

Exhibit 5.5

M3 Eagle

ANNUAL GROUND WATER CONSUMPTIVE USE PERCENTAGES AT FULL BUILD-OUT

(Acre-Feet and Percentage of Total)



*Note: Consumptive use for "public area non-potable irrigation" is comprised of 1,161 acre-feet of groundwater used directly for irrigation and 1,395 acre-feet of "Reuse Water."

Total Annual Consumptive Use ≈ 5,381 AC/FT

Hydro Logic Inc.
Boise, Idaho

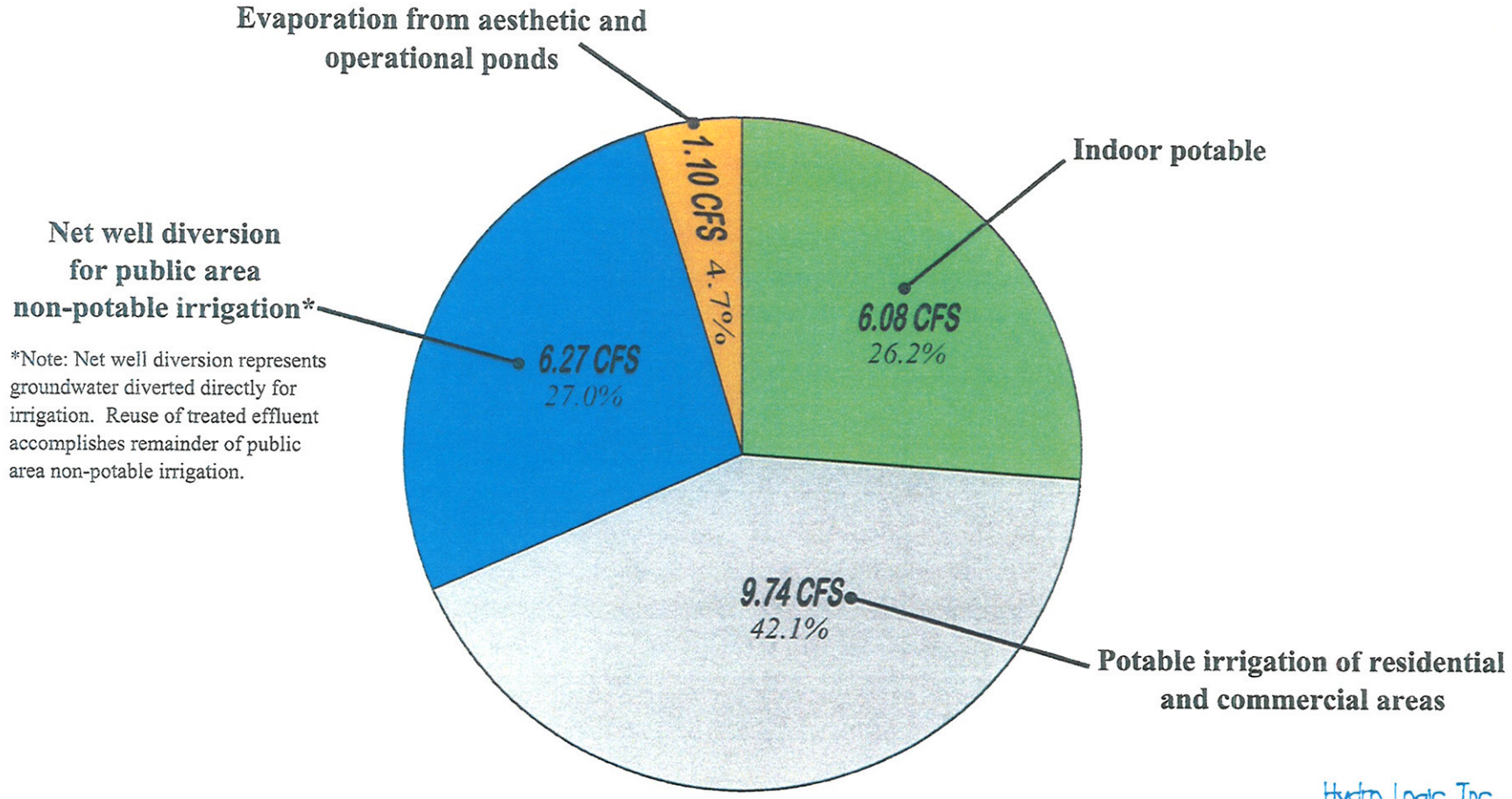
Note: Components of total consumptive use shown herein may not add exactly to total annual consumptive use due to round-off error.

Exhibit 5.6

M3 Eagle

MAXIMUM DAILY WELL DIVERSIONS DURING IRRIGATION SEASON AT FULL BUILD-OUT

(Cubic Feet per Second (CFS) and Percentage of Total)



*Note: Net well diversion represents groundwater diverted directly for irrigation. Reuse of treated effluent accomplishes remainder of public area non-potable irrigation.

Hydro Logic Inc.
Boise, Idaho

Maximum Daily Diversion ≈ 23.18 CFS

Note: Components of daily diversion shown herein may not add exactly to maximum daily diversion due to round-off error.

Calculations and Reference Data

Application Exhibit 5.7
The Spreadsheet

M3 Eagle Water Demand at Build-Out, Based on Projected Uses

Spreadsheet Revision Date: January 31, 2008

IRRIGATION

Irrigation Assumptions: Note: Input data cells in this spreadsheet are shaded.

1) 17.93 shares of Farmers Union Ditch Co. water, at 11 inches per share, and a total of 197 miner's inches (3.94 cfs), will be used to irrigate 197 acres in the development. The shares provide a total of 765 acre-feet at 3.88 ac-ft per acre.
2) Tertiary-treated sewage effluent will be used for non-potable irrigation at sewage production rates during the irrigation season. During non-irrigation season, it will be stored and subsequently used for irrigation.
3) Compressed irrigation times: Golf irrigation assumed to occur only during 9 hours at night; ball fields and residences during 12 hours. Common area can be irrigated anytime. Residences are assumed to migrate to 12 hour overnight irrigation.
4) Number of irrigation days per year: 244 (March 15th - November 15th) Number of non-irrigation days per year: 121 (November 16th - March 14th)
5) It is assumed sufficient standby power is provided to offset the need for standby potable water storage.
6) Turf irrigation efficiency: 80%
7) Drip irrigation efficiency: 90%

8) Acres of aesthetic and operational ponds:	Aesthetic ponds	Operational ponds	Ponds w/winter effluent storage	Totals
Average depth:	40	15	45	100
Acre feet storage:	25	15	13	17.8
Primary water source:	1000	225	603	1,828
	well diversions	well / effluent	effluent	

8a) Operational and effluent ponds will be lined or sealed and will fluctuate with evaporation and irrigation demand. Aesthetic ponds also will be lined or sealed and will fluctuate mainly due to evaporation.
9) Non-potable irrigation storage calculated from maximum day well diversion rate.
10) Potable irrigation storage calculated from .02 cfs/acre well diversion rate.
11) "Max day" refers to highest 24-hour demand. For irrigation, this occurs during July, as shown by the Allen & Brockway numbers. "Peak" refers to peak demand during compressed irrigation periods or on an instantaneous basis.
12) Irrigation diversion rates, as they relate to use of potable water for irrigation, are less than 0.02 cfs/acre except during peak periods, where they may increase to this limit.
13) Monthly evapo-transpiration (ET) is based on Allen & Brockway (1983) for alfalfa, for each month in the irrigation season except November (which Allen & Brockway did not evaluate), which was estimated at one third of October. These values are:

	March 15-31	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*Nov 1-15*	Total Annual		Avg. Daily	
mm/day	*0.760*	*3.670*	*5.410*	*6.610*	*6.730*	*5.110*	*3.680*	*1.450*	*0.483*	*1017.9*	mm/yr	4.17	mm/day
inches/day	*0.030*	*0.144*	*0.213*	*0.260*	*0.265*	*0.201*	*0.145*	*0.057*	*0.019*	*40.1*	in/yr	0.164	in/day
feet/day	*0.002*	*0.012*	*0.018*	*0.022*	*0.022*	*0.017*	*0.012*	*0.005*	*0.002*	*3.34*	ft/yr	0.014	ft/day

		square feet	acres	Average day cfs	Max day acre-feet	Max day cfs	Irr'n Hours	Scheduled peak cfs	cfs when div'ns increased to .02 cfs/a	Acre-feet non-potable storage to meet scheduled peak	Million Gallons potable storage to meet scheduled peak
Public area irrigation (using non-potable water)											
Golf Course (turf):		10,454,400	240	2.07	6.62	**3.34**	9	8.91	4.80	**4.14**	
Parks and Ballfields (turf):	Excluding 98 acres irr'd with ditch shares	8,319,960	191	1.65	5.27	**2.66**	12	5.32	3.82	**2.64**	
Common area (turf):	Excluding 99 acres irr'd with ditch shares	3,659,040	84	0.72	2.32	**1.17**	24	1.17	1.68	**0.00**	
Common area (drip):		5,662,800	130	1.00	3.19	**1.61**	24	1.61	2.60	**0.00**	
Common area drip irrig'd solely with stored effluent:	After effluent evap. from ponds at 3.5 AFA	5,224,612	120								
	Total public area irrigation:	28,096,200	765	5.44	17.40	**8.78**		17.00	12.90	**6.78**	
Residential irrigation (using potable water only)											
Single Family Detached Units: 5,216											
turf area/unit:		2,000	0.05	Note: Single family detached irrigation area based on average lot size of 7,800 sq. ft. with 3900 sq. ft. minimum building footprint plus incidental impervious area.							
drip area/unit:		1,500	0.03								
Total single family turf:		10,432,000	239.49	2.07	6.61	3.33	12.00	6.67	**4.79**		**0.61**
Total single family drip:		7,824,000	179.61	1.38	4.41	2.22	12.00	4.44	**3.59**		**0.28**
	Total single family irrigation (potable):	18,256,000	419.10	3.44	11.02	5.56		11.11	**8.38**		**0.88**
Single Family and Multi-Family Attached units: 1,937											
turf area/unit:		750	0.02	Note: Attached units consist of approximately 80% single family with an assumed irrigation being approximately 1/3 that of single family detached.							
drip area/unit:		500	0.01								
Total multi-family turf:		1,452,750	33.35	0.29	0.92	0.46	12.00	0.93	**0.67**		**0.08**
Total multi-family drip:		968,500	22.23	0.17	0.55	0.28	12.00	0.55	**0.44**		**0.03**
	Total multi-family irrigation (potable):	2,421,250	55.58	0.46	1.47	0.74		1.48	**1.11**		**0.12**
Commercial irrigation (using potable water)											
Acres of Commercial 245	Total commercial turf (25%):	133,403	3.06	0.03	0.08	0.04	12.00	0.09	**0.06**		**0.01**
% of Acres Irrigated 5.0%	Total commercial drip (75%):	400,208	9.19	0.07	0.23	0.11	12.00	0.23	**0.18**		**0.01**
	Total commercial irrigation (potable):	533,610	12.25	0.10	0.31	0.16		0.31	**0.25**		**0.02**
Commercial turf: 25%											
Commercial drip: 75%	**Total irr'n with potable water:**	21,210,860	486.93	4.00	12.79	6.45		12.90	**9.74**		**1.02**
	Total irrigation with both potable and non-potable water:	49,307,060	1251.87	9.44	30.20	15.23		29.90	22.64		

References for Irrigation Efficiency			
No.	Reference	Efficiency (%) based on irrigation type	
		Solid set	Drip
IER1	Rogers, et. al., Efficiencies and Water Losses of Irrigation Systems, Irrigation Management Series, Kansas State University, 1997	70-85	75-95
IER2	Solomon, K. H., Irrigation Systems and Water Application Efficiencies, Center for Irrigation Technology, CSU, Fresno, 1988	70-80	75-90
IER3	AgriMet Irrigation Guide, U.S. Bureau of Reclamation, Pacific Northwest Cooperative Agricultural Weather Network, Internet Website	70-85	75-90
	M3 Spreadsheet Exhibit 5.7 – Cells B11 and B12	80	90

M3 Eagle Water Demand at Build-Out, Based on Projected Uses

Spreadsheet Revision Date: January 31, 2008

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Common area drip irrig'd solely with stored effluent:	After effluent evap. from ponds at 3.5 AFA	5,224,612	120								
	Total public area irrigation:	28,096,200	765	5.44	17.40	**8.78**		17.00	12.90	**6.78**	
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drip area/unit:		1,500	0.03								
Total single family turf:		10,432,000	239.49	2.07	6.61	3.33	12.00	6.67	**4.79**		**0.61**
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drip area/unit:		500	0.01								
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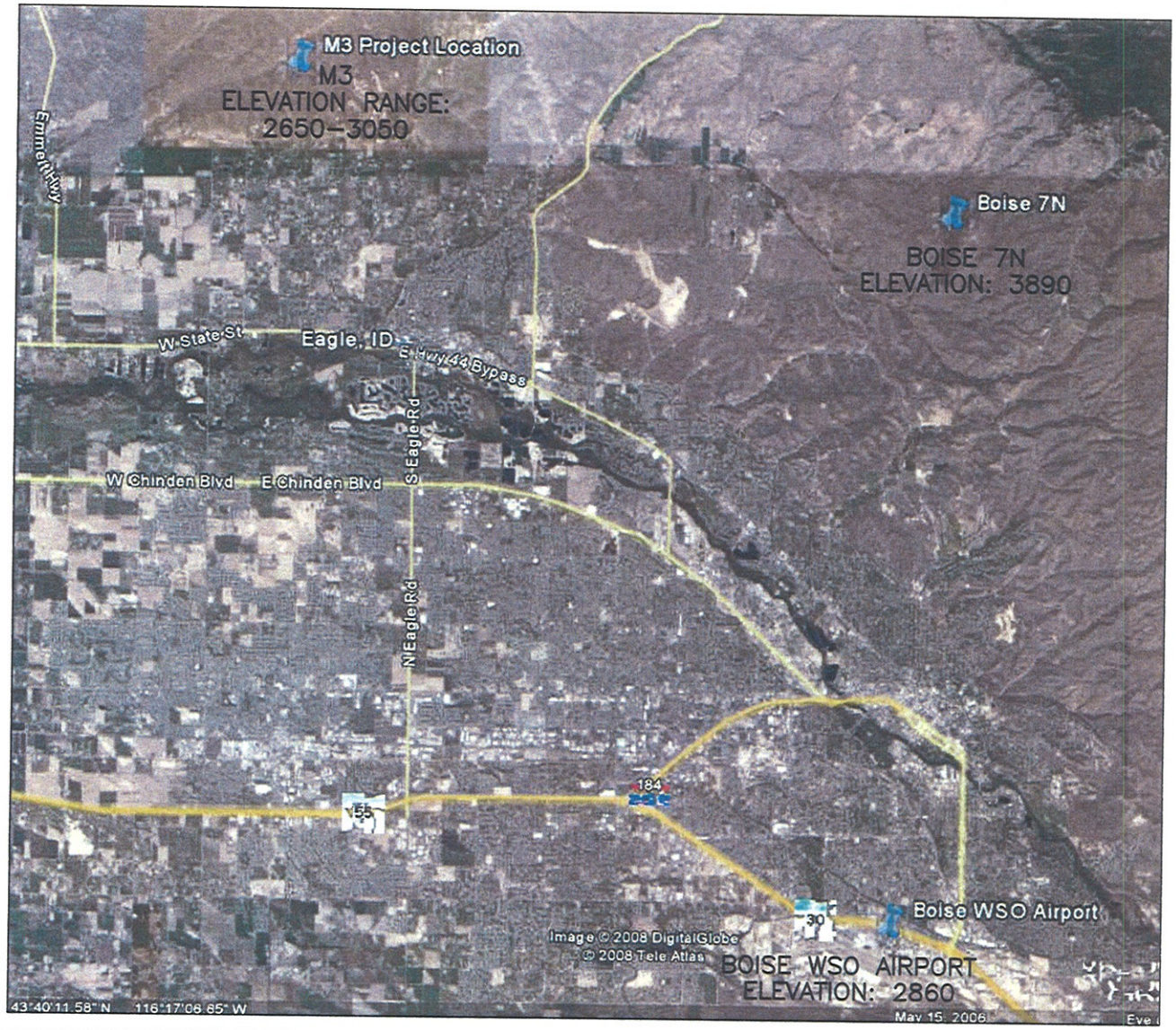
Total multi-family drip:		968,500	22.23	0.17	0.55	0.28	12.00	0.55	**0.44**		**0.03**
	Total multi-family irrigation (potable):	2,421,250	55.58	0.46	1.47	0.74		1.48	**1.11**		**0.12**
Commercial irrigation (using potable water)											
Acres of Commercial	245	Total commercial turf (25%):	133,403	3.06	0.03	0.08	0.04	12.00	0.09	**0.06**		**0.01**
% of Acres Irrigated	5.0%	Total commercial drip (75%):	400,208	9.19	0.07	0.23	0.11	12.00	0.23	**0.18**		**0.01**
		Total commercial irrigation (potable):	533,610	12.25	0.10	0.31	0.16		0.31	**0.25**		**0.02**
Commercial turf:	25%										
Commercial drip:	75%	**Total irr'n with potable water:**	21,210,860	486.93	4.00	12.79	6.45		12.90	**9.74**		**1.02**
		Total irrigation with both potable and non-potable water:	49,307,060	1251.87	9.44	30.20	15.23		29.90	22.64		

M3 EAGLE DEVELOPMENT

EVAPOTRANSPIRATION REFERENCE LOCATIONS



References for Irrigation Evapotranspiration (ET)					
No.	Crop	Reference	Location	Peak Monthly ET (July) mm/day [1]	Irrigation Season ET mm/season [2]
ETR1	Alfalfa	Allen and Brockway, 1983	Boise Airport	6.73	1021
ETR2	Turf grass	Allen and Robison, 2007	Boise Airport	6.85	1139.7
ETR3	Turf grass	Allen and Robison, 2007	Boise 7N	6.59	1054.2
	Alfalfa	M3 Spreadsheet Exhibit 5.7 – Cells B75 and B74	Boise Airport	6.73	1017.9

[1] Daily ET data for July uses average ET values from Allen and Brockway and mean monthly values from Allen and Robison

[2] Irrigation Season ET data for all references has been adjusted for irrigation in March from 15th-31st and irrigation in November from 1st – 15th.

M3 Eagle Water Demand at Build-Out, Based on Projected Uses

Spreadsheet Revision Date: January 31, 2008

IRRIGATION

Irrigation Assumptions: Note: Input data cells in this spreadsheet are shaded.

1) 17.93 shares of Farmers Union Ditch Co. water, at 11 inches per share, and a total of 197 miner's inches (3.94 cfs), will be used to irrigate 197 acres in the development. The shares provide a total of 765 acre-feet at 3.88 ac-ft per acre.

2) Tertiary-treated sewage effluent will be used for non-potable irrigation at sewage production rates during the irrigation season. During non-irrigation season, it will be stored and subsequently used for irrigation.

3) Compressed irrigation times: Golf irrigation assumed to occur only during 9 hours at night; ball fields and residences during 12 hours. Common area can be irrigated anytime. Residences are assumed to migrate to 12 hour overnight irrigation.

4) Number of irrigation days per year: 244 (March 15th - November 15th) Number of non-irrigation days per year: 121 (November 16th - March 14th)

5) It is assumed sufficient standby power is provided to offset the need for standby potable water storage.

6) Turf irrigation efficiency: 80%

7) Drip irrigation efficiency: 90%

8) Acres of aesthetic and operational ponds:	Aesthetic ponds	Operational ponds	Ponds w/winter effluent storage	Totals
Average depth:	25	15	13	17.8
Acre feet storage:	1000	225	603	1,828
Primary water source:	well diversions	well / effluent	effluent	

8a) Operational and effluent ponds will be lined or sealed and will fluctuate with evaporation and irrigation demand. Aesthetic ponds also will be lined or sealed and will fluctuate mainly due to evaporation.

9) Non-potable irrigation storage calculated from maximum day well diversion rate.

10) Potable irrigation storage calculated from .02 cfs/acre well diversion rate.

11) "Max day" refers to highest 24-hour demand. For irrigation, this occurs during July, as shown by the Allen & Brockway numbers. "Peak" refers to peak demand during compressed irrigation periods or on an instantaneous basis.

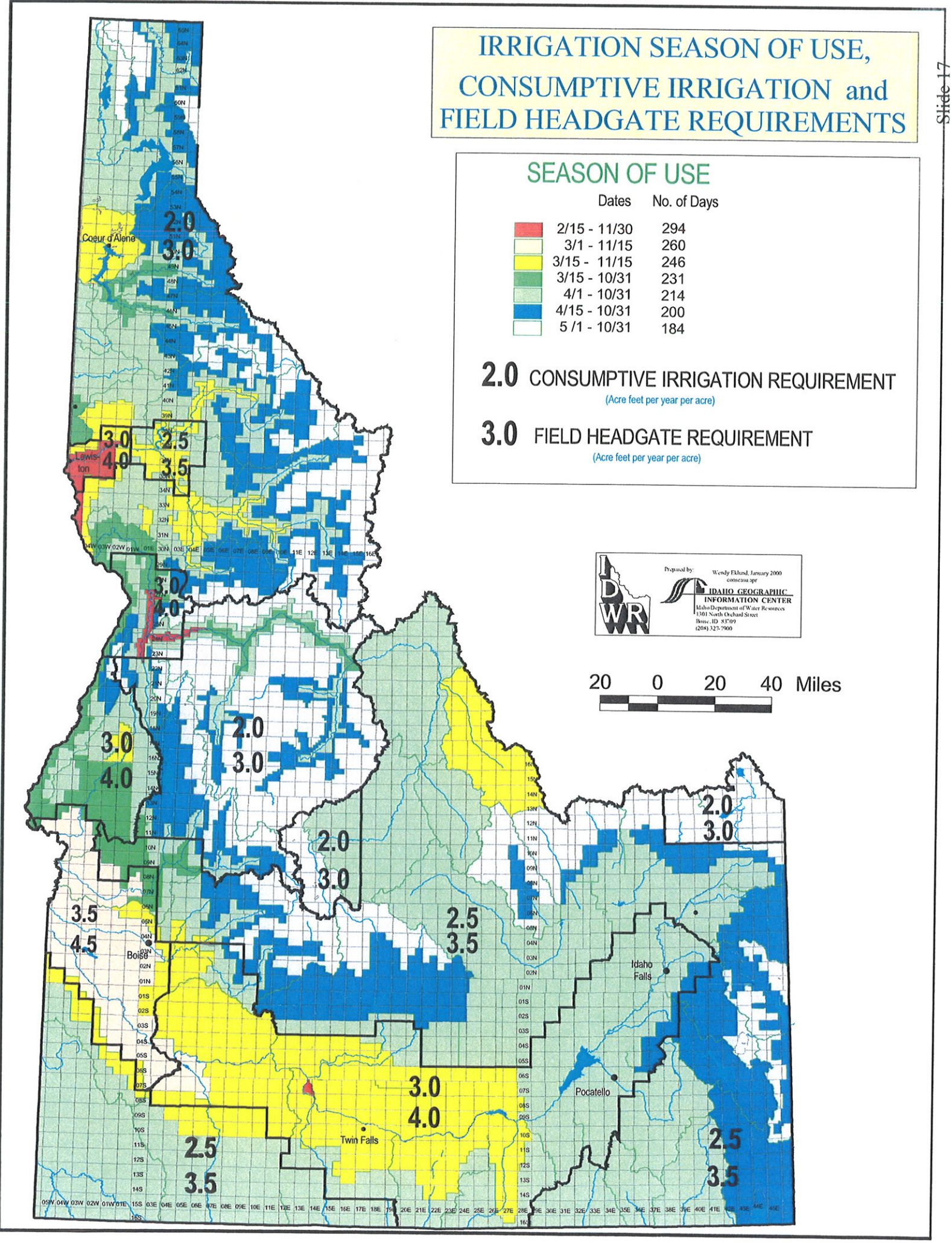
12) Irrigation diversion rates, as they relate to use of potable water for irrigation, are less than 0.02 cfs/acre except during peak periods, where they may increase to this limit.

13) Monthly evapo-transpiration (ET) is based on Allen & Brockway (1983) for alfalfa, for each month in the irrigation season except November (which Allen & Brockway did not evaluate), which was estimated at one third of October. These values are:

	March 15-31	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*Nov 1-15*	Total Annual		Avg. Daily	
mm/day	*0.760*	*3.670*	*5.410*	*6.610*	*6.730*	*5.110*	*3.680*	*1.450*	*0.483*	*1017.9*	mm/yr	4.17	mm/day
inches/day	*0.030*	*0.144*	*0.213*	*0.260*	*0.265*	*0.201*	*0.145*	*0.057*	*0.019*	*40.1*	in/yr	0.164	in/day
feet/day	*0.002*	*0.012*	*0.018*	*0.022*	*0.022*	*0.017*	*0.012*	*0.005*	*0.002*	*3.34*	ft/yr	0.014	ft/day

		square feet	acres	Average day cfs	Max day acre-feet	Max day cfs	Irr'n Hours	Scheduled peak cfs	cfs when div'ns increased to .02 cfs/a	Acre-feet non-potable storage to meet scheduled peak	Million Gallons potable storage to meet scheduled peak
Public area irrigation (using non-potable water)											
Golf Course (turf):		10,454,400	240	2.07	6.62	**3.34**	9	8.91	4.80	**4.14**	
Parks and Ballfields (turf):	Excluding 98 acres irr'd with ditch shares	8,319,960	191	1.65	5.27	**2.66**	12	5.32	3.82	**2.64**	
Common area (turf):	Excluding 99 acres irr'd with ditch shares	3,659,040	84	0.72	2.32	**1.17**	24	1.17	1.68	**0.00**	
Common area (drip):		5,662,800	130	1.00	3.19	**1.61**	24	1.61	2.60	**0.00**	
Common area drip irrig'd solely with stored effluent:	After effluent evap. from ponds at 3.5 AFA	5,224,612	120								
	Total public area irrigation:	28,096,200	765	5.44	17.40	**8.78**		17.00	12.90	**6.78**	
Residential irrigation (using potable water only)											
Single Family Detached Units:	5,216										
turf area/unit:		2,000	0.05	Note: Single family detached irrigation area based on average lot size of 7,800 sq. ft. with 3900 sq. ft. minimum building footprint plus incidental impervious area.							
drip area/unit:		1,500	0.03								
Total single family turf:		10,432,000	239.49	2.07	6.61	3.33	12.00	6.67	**4.79**		**0.61**
Total single family drip:		7,824,000	179.61	1.38	4.41	2.22	12.00	4.44	**3.59**		**0.28**
	Total single family irrigation (potable):	18,256,000	419.10	3.44	11.02	5.56		11.11	**8.38**		**0.88**
Single Family and Multi-Family Attached units:	1,937										
turf area/unit:		750	0.02	Note: Attached units consist of approximately 80% single family with an assumed irrigation being approximately 1/3 that of single family detached.							
drip area/unit:		500	0.01								
Total multi-family turf:		1,452,750	33.35	0.29	0.92	0.46	12.00	0.93	**0.67**		**0.08**
Total multi-family drip:		968,500	22.23	0.17	0.55	0.28	12.00	0.55	**0.44**		**0.03**
	Total multi-family irrigation (potable):	2,421,250	55.58	0.46	1.47	0.74		1.48	**1.11**		**0.12**
Commercial irrigation (using potable water)											
Acres of Commercial	245	Total commercial turf (25%):	133,403	3.06	0.03	0.08	0.04	12.00	0.09	**0.06**		**0.01**
% of Acres Irrigated	5.0%	Total commercial drip (75%):	400,208	9.19	0.07	0.23	0.11	12.00	0.23	**0.18**		**0.01**
		Total commercial irrigation (potable):	533,610	12.25	0.10	0.31	0.16		0.31	**0.25**		**0.02**
Commercial turf:	25%										
Commercial drip:	75%	**Total irr'n with potable water:**	21,210,860	486.93	4.00	12.79	6.45		12.90	**9.74**		**1.02**
		Total irrigation with both potable and non-potable water:	49,307,060	1251.87	9.44	30.20	15.23		29.90	22.64		

IRRIGATION SEASON OF USE, CONSUMPTIVE IRRIGATION and FIELD HEADGATE REQUIREMENTS



M3 Eagle Water Demand at Build-Out, Based on Projected Uses

Spreadsheet Revision Date: January 31, 2008

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Irrigation Assumptions: Note: Input data cells in this spreadsheet are shaded.

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3) Compressed irrigation times: Golf irrigation assumed to occur only during 9 hours at night; ball fields and residences during 12 hours. Common area can be irrigated anytime. Residences are assumed to migrate to 12 hour overnight irrigation.

4) Number of irrigation days per year: 244 (March 15th - November 15th) Number of non-irrigation days per year: 121 (November 16th - March 14th)

5) It is assumed sufficient standby power is provided to offset the need for standby potable water storage.

6) Turf irrigation efficiency: 80%

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	Aesthetic ponds	Operational ponds	Ponds w/winter effluent storage	Totals
8) Acres of aesthetic and operational ponds:	40	15	45	100
Average depth:	25	15	13	17.8
Acre feet storage:	1000	225	603	1,828
Primary water source:	well diversions	well / effluent	effluent	

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	Total public area irrigation:	28,096,200	765	5.44	17.40	**8.78**		17.00	12.90	**6.78**	
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Acres of Commercial 245	Total commercial turf (25%):	133,403	3.06	0.03	0.08	0.04	12.00	0.09	**0.06**		**0.01**
% of Acres Irrigated 5.0%	Total commercial drip (75%):	400,208	9.19	0.07	0.23	0.11	12.00	0.23	**0.18**		**0.01**
	Total commercial irrigation (potable):	533,610	12.25	0.10	0.31	0.16		0.31	**0.25**		**0.02**
Commercial turf: 25%											
Commercial drip: 75%	**Total irr'n with potable water:**	21,210,860	486.93	4.00	12.79	6.45		12.90	**9.74**		**1.02**
	Total irrigation with both potable and non-potable water:	49,307,060	1251.87	9.44	30.20	15.23		29.90	22.64		

INDOOR WATER DEMANDS

Indoor water demand assumptions:

Commercial water use is based on data published by Larry W. Mays in "Water Distribution Systems Handbook" © 2000, which demonstrates a per commercial acre use of: **1,200** gallons per day per gross acre of commercial development land. (data range is 1100-5100 gpd/acre)

800	gpd/unit is estimated residential peak hour demand in accordance with DEQ minimum system capacity	
2.92	Indoor potable water peaking factor (a calculated ratio of peak hour to average day potable water demand)	
1.5	Indoor potable water peaking factor (applied to average day to predict maximum day).	
10.0%	Distribution system leakage allowance factor	

								Est'd gallons of potable storage for peak hr demand [1]			Non-Irrigation Season Diversions acre feet	Irrigation Season Diversions acre feet	Total Diversions acre feet
			avg gpd/unit	max day gpm	max day cfs	peak hr gpm	peak hr cfs		avg. day cfs	avg. day gpm			
Total Residential Units	7,153	274	2,245.74	5.00	4,371	9.74	727,621	3.34	1,497.06	800.4	1614.0	2414.4
		avg gpd/student [2]										
Schools (Number of Students)	5,480	12	75.35	0.17	147	0.33	24,413	0.11	50.23	26.9	54.2	81.0
		avg gpd/hotel rm [3]										
Commercial (hotel rooms)	500	120	68.75	0.15	134	0.30	22,275	0.10	45.83	24.5	49.4	73.9
	Commercial area acres	gpd/sq. ft.										
Commercial (general office, etc.)	245	0.028	336.88	0.75	656	1.46	109,148	0.50	224.57	120.1	242.1	362.2
Totals			2,726.72	6.08	5,307	11.83	883,457	4.05	1,817.69	971.8	1,959.7	2,931.5

Estimated Potable Water Storage

mg	
1.02	Irrigation peaking
0.88	Indoor potable, max day to peak hour storage
0.54	Fire flow estimated (3,000 gpm for 3 hours)
0.17	Estimated potable well pump cycling
2.62	**Million gallons of potable water storage required**

Notes:
1) Peak hour potable storage calculated as 5.4*max day gals/24 using DEQ design guidelines with well diversions for in-house use at max day rate.
2) Average daily school water demand per student incorporates allowance for approximately 180 school days per year and extra-curricular activities.
3) Average daily hotel room water demand incorporates approximately 60% average seasonal occupancy rate.

WASTEWATER GENERATION AND REUSE

Indoor wastewater production assumptions:

1) Residential wastewater production is assumed to be the following percentage of potable indoor water demand:	69%	This percentage excludes leakage allowance in potable water distribution system.
2) School and hotel wastewater production is assumed to be the following percentage of potable indoor water demand:	75%	"
3) Commercial unit wastewater production assumed at the percentage of potable indoor water demand:	60%	"
4) Infiltration, inflow, treatment losses & leakage in sewer system are collectively assumed to have no net significant effect.		

1.0	Factor indicating that wastewater calculations are based on avg day indoor water demand
67%	Percent of treated effluent produced (and used) during irrigation season (number of irrigation days/365)
33%	Percent of treated effluent stored during (and used) later during the next irrigation season (number of non-irrigation days/365)

Treated Effluent Generation

		gpd/unit (gpd/student for schools or gpd/sq ft for comm'l)			effluent acre-feet/yr	effluent af/irr'n season	effluent af/non-irr'n season	Indoor CU acre-feet/yr	Indoor CU af/irr'n season	Indoor CU af/non-irr'n season
	# of units		gpm	cfs						
Residences	7,153	189.06	939.13	2.09	1,514.46	1,012.41	502.06	680.6	455.0	225.6
Schools (number of students)	5,480	9.00	34.25	0.08	55.23	36.92	18.31	18.4	12.3	6.1
Commercial (hotel rooms)	500	90.00	31.25	0.07	50.39	33.69	16.71	16.8	11.2	5.6
Commercial (unit area in acres)	245	0.02	122.50	0.27	197.55	132.06	65.49	131.7	88.1	43.7
Total Effluent and Indoor Consumptive Use			1,127.13	2.51	1,817.64	1,215.08	602.56	847.6	566.6	281.0

Effluent Storage and Reuse	Acre-feet/year	
Stored winter effluent	603	
Evaporation from winter effluent storage ponds	158	Evaporation at 3.5 AFA, not 4.5 AFA, as evaporation water originally diverted for indoor use
Net winter effluent for non-potable irrigation	445	
Effluent available for use during irrigation season	1215	
Total annual effluent available for non-potable irrigatio	1660	

References for Residential Use			
No.	Reference	Average Water Use Per Home gallons per day (gpd)	Average Water Use Per Person gallons per capita per day gpcpd)
IRU1	Mays - Editor, Water Distribution Systems Handbook, AWWA, Chapter 3 System Design and Overview (Ysusi), 2000, Table 3.1, Pages 3.3 & 3.4	590.64* (Idaho) 288 (U.S. average) 236 (U.S. median)	186 (Idaho) 105 (US average) 86*(median)
IRU2	Dewberry & Davis, Land Development Handbook, Chapter 13 Table 13.1, Page 461	274*	100
IRU3	Survey of Residential Water Usage by Stanley Consultants - United Water Idaho for SW Boise; canal water for irrigation	330	120*
IRU4	Lindeburg, Civil Engineering Reference Manual, 2001, Table 26.4, Page 26-18	206-356*	75-130
IRU5	Fair, et al., Elements of Water Supply and Wastewater Disposal, 1971, Table 2.8, Page 33	400 (national average) 460 (west)	145* (national average) 168 (west)
IRU6	McGhee, Water Supply and Sewerage, 1991, Page 11	96 - 1452*	35 - 530
IRU7	Marchus, M., DEQ Design File Note – Design Flows - Public Water Systems, July1999	274	100*
IRU8	United Water Idaho Website – Winter Demand 20 MGD for 215,000 people	255*	93
IRU9	Cook, et.al., Domestic, Commercial, Municipal and Industrial Water Demand Assessment and Forecast in Ada and Canyon Counties, Idaho, 2001, Page 2	532*	194
IRU10	Urban, S., Water Budget for the Treasure Valley Aquifer System For the Years 1996 and 2000, for Caldwell, Nampa & Kuna reported to be exclusive of domestic irrigation for 2000, Table 3, Page 3-2	318-614*	116-224
	M3 Spreadsheet Exhibit 5.7 – Cell D80	274	100*

*Calculated based on 2000 Ada County Census Data average of approximately 2.74 persons/house

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Indoor water demand assumptions:

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2.92	Indoor potable water peaking factor (a calculated ratio of peak hour to average day potable water demand)	
1.5	Indoor potable water peaking factor (applied to average day to predict maximum day).	
10.0%	Distribution system leakage allowance factor	

								Est'd gallons of potable storage for peak hr demand (1)			Non-Irrigation Season Diversions acre feet	Irrigation Season Diversions acre feet	Total Diversions acre feet
		avg gpd/unit	max day gpm	max day cfs	peak hr gpm	peak hr cfs		avg. day cfs	avg. day gpm			
Total Residential Units	7,153	274	2,245.74	5.00	4,371	9.74	727,621	3.34	1,497.06	800.4	1614.0	2414.4
		avg gpd/student (2)										
Schools (Number of Students)	5,480	12	75.35	0.17	147	0.33	24,413	0.11	50.23	26.9	54.2	81.0
		avg gpd/hotel rm (3)										
Commercial (hotel rooms)	500	120	68.75	0.15	134	0.30	22,275	0.10	45.83	24.5	49.4	73.9
	Commercial area acres	gpd/sq. ft.										
Commercial (general office, etc.)	245	0.028	336.88	0.75	656	1.46	109,148	0.50	224.57	120.1	242.1	362.2
Totals			2,726.72	6.08	5,307	11.83	883,457	4.05	1,817.69	971.8	1,959.7	2,931.5

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Notes:
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Treated Effluent Generation

		gpd/unit (gpd/student for schools or gpd/sq ft for comm'l)			effluent	effluent	effluent	Indoor CU	Indoor CU	Indoor CU
	# of units		gpm	cfs	acre-feet/yr	af/irr'n season	af/non-irr'n season	acre-feet/yr	af/irr'n season	af/non-irr'n season
Residences	7,153	189.06	939.13	2.09	1,514.46	1,012.41	502.06	680.6	455.0	225.6
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Commercial (hotel rooms)	500	90.00	31.25	0.07	50.39	33.69	16.71	16.8	11.2	5.6
Commercial (unit area in acres)	245	0.02	122.50	0.27	197.55	132.06	65.49	131.7	88.1	43.7
Total Effluent and Indoor Consumptive Use			1,127.13	2.51	1,817.64	1,215.08	602.56	847.6	566.6	281.0

Effluent Storage and Reuse	Acre-feet/year	
Stored winter effluent	603	
Evaporation from winter effluent storage ponds	158	Evaporation at 3.5 AFA, not 4.5 AFA, as evaporation water originally diverted for indoor use
Net winter effluent for non-potable irrigation	445	
Effluent available for use during irrigation season	1215	
Total annual effluent available for non-potable irrigatio	1660	

References for Residential Peaking Factor			
No.	Reference	Maximum Day: Average Day	Peak Hour: Average Day
IRP1	Larry Mays, Water Distribution Systems Handbook, AWWA, Chapter 3 System Design and Overview (Ysusi), 2000, Table 3.6, Page 3.9	1.5 – 3.5 : 1	2.0 – 7.0 : 1
IRP2	Harberg, Planning and Managing Reliable Urban Water Systems, 1995, Table 5-1, Page 95	1.4 – 1.7 : 1 (estimated)	2.0 – 4.0 : 1
IRP3	Fair, et al., Elements of Water Supply and Wastewater Disposal, 1971, Table 2-8, Page 33	1.5 – 3.5 : 1	1.5 – 3.5 : 1
IRP4	Dewberry & Davis, Land Development Handbook, 1996, Page 462	1.5 – 3 : 1	2 –5 : 1
	M3 Spreadsheet Exhibit 5.7 – Cells B75 and B74	1.5	2.92 (calculated)

INDOOR WATER DEMANDS

Indoor water demand assumptions:

Commercial water use is based on data published by Larry W. Mays in "Water Distribution Systems Handbook" © 2000, which demonstrates a per commercial acre use of: 1,200 gallons per day per gross acre of commercial development land. (data range is 1100-5100 gpd/acre)

800	gpd/unit is estimated residential peak hour demand in accordance with DEQ minimum system capacity	
2.92	Indoor potable water peaking factor (a calculated ratio of peak hour to average day potable water demand)	
1.5	Indoor potable water peaking factor (applied to average day to predict maximum day).	
10.0%	Distribution system leakage allowance factor	

								Est'd gallons of potable storage			Non-Irrigation Season Diversions	Irrigation Season Diversions	Total Diversions
		avg gpd/unit	max day gpm	max day cfs	peak hr gpm	peak hr cfs	for peak hr demand (1)	avg. day cfs	avg. day gpm	acre feet	acre feet	acre feet
Total Residential Units	7,153	274	2,245.74	5.00	4,371	9.74	727,621	3.34	1,497.06	800.4	1614.0	2414.4
		avg gpd/student (2)										
Schools (Number of Students)	5,480	12	75.35	0.17	147	0.33	24,413	0.11	50.23	26.9	54.2	81.0
		avg gpd/hotel rm (3)										
Commercial (hotel rooms)	500	120	68.75	0.15	134	0.30	22,275	0.10	45.83	24.5	49.4	73.9
	Commercial area acres	gpd/sq. ft.										
Commercial (general office, etc.)	245	0.028	336.88	0.75	656	1.46	109,148	0.50	224.57	120.1	242.1	362.2
Totals			2,726.72	6.08	5,307	11.83	883,457	4.05	1,817.69	971.8	1,959.7	2,931.5

Estimated Potable Water Storage

mg	
1.02	Irrigation peaking
0.88	Indoor potable, max day to peak hour storage
0.54	Fire flow estimated (3,000 gpm for 3 hours)
0.17	Estimated potable well pump cycling
2.62	**Million gallons of potable water storage required**

Notes:
1) Peak hour potable storage calculated as 5.4*max day gals/24 using DEQ design guidelines with well diversions for in-house use at max day rate.
2) Average daily school water demand per student incorporates allowance for approximately 180 school days per year and extra-curricular activities.
3) Average daily hotel room water demand incorporates approximately 60% average seasonal occupancy rate.

WASTEWATER GENERATION AND REUSE

Indoor wastewater production assumptions:

1) Residential wastewater production is assumed to be the following percentage of potable indoor water demand:	69%
2) School and hotel wastewater production is assumed to be the following percentage of potable indoor water demand:	75%
3) Commercial unit wastewater production assumed at the percentage of potable indoor water demand:	60%

This percentage excludes leakage allowance in potable water distribution system.
"
"

4) Infiltration, inflow, treatment losses & leakage in sewer system are collectively assumed to have no net significant effect.

1.0	Factor indicating that wastewater calculations are based on avg day indoor water demand
67%	Percent of treated effluent produced (and used) during irrigation season (number of irrigation days/365)
33%	Percent of treated effluent stored during (and used) later during the next irrigation season (number of non-irrigation days/365)

Treated Effluent Generation

		gpd/unit (gpd/student for schools or gpd/sq ft for comm'l)			effluent	effluent	effluent	Indoor CU	Indoor CU	Indoor CU
	# of units		gpm	cfs	acre-feet/yr	af/irr'n season	af/non-irr'n season	acre-feet/yr	af/irr'n season	af/non-irr'n season
Residences	7,153	189.06	939.13	2.09	1,514.46	1,012.41	502.06	680.6	455.0	225.6
Schools (number of students)	5,480	9.00	34.25	0.08	55.23	36.92	18.31	18.4	12.3	6.1
Commercial (hotel rooms)	500	90.00	31.25	0.07	50.39	33.69	16.71	16.8	11.2	5.6
Commercial (unit area in acres)	245	0.02	122.50	0.27	197.55	132.06	65.49	131.7	88.1	43.7
Total Effluent and Indoor Consumptive Use			1,127.13	2.51	1,817.64	1,215.08	602.56	847.6	566.6	281.0

Effluent Storage and Reuse	Acre-feet/year	
Stored winter effluent	603	
Evaporation from winter effluent storage ponds	158	Evaporation at 3.5 AFA, not 4.5 AFA, as evaporation water originally diverted for indoor use
Net winter effluent for non-potable irrigation	445	
Effluent available for use during irrigation season	1215	
Total annual effluent available for non-potable irrigatio	1660	

References for Residential Wastewater Production			
No.	Reference	Wastewater production as % of water demand	Gallons of wasterwater per day per residential unit
WWP1	Fair, et al., Elements of Water Supply and Wastewater Disposal, 1971, Page 37	60-70%	n/a
WWP2	Survey of Residential Water Usage and Wastewater Generation completed by Stanley Consultants	69 – 127%	n/a
WWP3	Merritt, Standard Handbook for Civil Engineers, 1983, Page 22-5	70-130%	n/a
WWP4	McGhee, Water Supply and Sewerage, 1991, Page 18	70-130%	n/a
WWP5	Bench Sewer District	n/a	184-214
WWP6	Northwest Boise Sewer District	n/a	300
WWP7	Eagle Sewer District	n/a	266
	M3 Spreadsheet Exhibit 5.7 – Cell F106	69%	189

INDOOR WATER DEMANDS

Indoor water demand assumptions:

Commercial water use is based on data published by Larry W. Mays in "Water Distribution Systems Handbook" © 2000, which demonstrates a per commercial acre use of: **1,200** gallons per day per gross acre of commercial development land. (data range is 1100-5100 gpd/acre)

800	gpd/unit is estimated residential peak hour demand in accordance with DEQ minimum system capacity
2.92	Indoor potable water peaking factor (a calculated ratio of peak hour to average day potable water demand)
1.5	Indoor potable water peaking factor (applied to average day to predict maximum day).
10.0%	Distribution system leakage allowance factor

		avg gpd/unit	max day gpm	max day cfs	peak hr gpm	peak hr cfs	Est'd gallons of potable storage for peak hr demand [1]	avg. day cfs	avg. day gpm	Non-Irrigation Season Diversions acre feet	Irrigation Season Diversions acre feet	Total Diversions acre feet
Total Residential Units	7,153	274	2,245.74	5.00	4,371	9.74	727,621	3.34	1,497.06	800.4	1614.0	2414.4
		avg gpd/student [2]										
Schools (Number of Students)	5,480	12	75.35	0.17	147	0.33	24,413	0.11	50.23	26.9	54.2	81.0
		avg gpd/hotel rm [3]										
Commercial (hotel rooms)	500	120	68.75	0.15	134	0.30	22,275	0.10	45.83	24.5	49.4	73.9
	Commercial area acres	gpd/sq. ft.										
Commercial (general office, etc.)	245	0.028	336.88	0.75	656	1.46	109,148	0.50	224.57	120.1	242.1	362.2
Totals			2,726.72	6.08	5,307	11.83	883,457	4.05	1,817.69	971.8	1,959.7	2,931.5

Estimated Potable Water Storage

mg	
1.02	Irrigation peaking
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0.54	Fire flow estimated (3,000 gpm for 3 hours)
0.17	Estimated potable well pump cycling
2.62	**Million gallons of potable water storage required**

Notes:
1) Peak hour potable storage calculated as 5.4*max day gals/24 using DEQ design guidelines with well diversions for in-house use at max day rate.
2) Average daily school water demand per student incorporates allowance for approximately 180 school days per year and extra-curricular activities.
3) Average daily hotel room water demand incorporates approximately 60% average seasonal occupancy rate.

WASTEWATER GENERATION AND REUSE

Indoor wastewater production assumptions:

1) Residential wastewater production is assumed to be the following percentage of potable indoor water demand:	69%	This percentage excludes leakage allowance in potable water distribution system.
2) School and hotel wastewater production is assumed to be the following percentage of potable indoor water demand:	75%	"
3) Commercial unit wastewater production assumed at the percentage of potable indoor water demand:	60%	"
4) Infiltration, inflow, treatment losses & leakage in sewer system are collectively assumed to have no net significant effect.		

1.0	Factor indicating that wastewater calculations are based on avg day indoor water demand
67%	Percent of treated effluent produced (and used) during irrigation season (number of irrigation days/365)
33%	Percent of treated effluent stored during (and used) later during the next irrigation season (number of non-irrigation days/365)

Treated Effluent Generation

	# of units	gpd/unit (gpd/student for schools or gpd/sq ft for comm'l)	gpm	cfs	effluent acre-feet/yr	effluent af/irr'n season	effluent af/non-irr'n season	Indoor CU acre-feet/yr	Indoor CU af/irr'n season	Indoor CU af/non-irr'n season
Residences	7,153	189.06	939.13	2.09	1,514.46	1,012.41	502.06	680.6	455.0	225.6
Schools (number of students)	5,480	9.00	34.25	0.08	55.23	36.92	18.31	18.4	12.3	6.1
Commercial (hotel rooms)	500	90.00	31.25	0.07	50.39	33.69	16.71	16.8	11.2	5.6
Commercial (unit area in acres)	245	0.02	122.50	0.27	197.55	132.06	65.49	131.7	88.1	43.7
Total Effluent and Indoor Consumptive Use			1,127.13	2.51	1,817.64	1,215.08	602.56	847.6	566.6	281.0

Effluent Storage and Reuse	Acre-feet/year
Stored winter effluent	603
Evaporation from winter effluent storage ponds	158
Net winter effluent for non-potable irrigation	445
Effluent available for use during irrigation season	1215
Total annual effluent available for non-potable irrigatio	1660

Evaporation at 3.5 AFA, not 4.5 AFA, as evaporation water originally diverted for indoor use

	References for Pond Evaporation	
No.	Reference	Evaporation in acre-feet/acre (AFA)
PER1	Idaho Department of Water Resources (IDWR) Pond Evaporation Map	3.5 (42 inches)
PER2	Allen and Brockway, 1983 Alfalfa – Boise WSO Airport (Equivalent Crop)	3.34
PER3	Allen and Robison, 2007, Open Water – Shallow at Boise 7N	2.92 (878 mm)
PER4	Allen and Robison, 2007, Open Water – Shallow at Boise Airport	3.08 (952 mm)
PER5	Climatalogical Handbook for Columbia Basin States Precipitation Volume 2 Page A-87 - Average Lake Evaporation, 1969	2.83 (34 inches)
PER6	Idaho Department of Water Resources (IDWR) Consumptive Use Map (Equivalent Crop)	3.0 - 3.5
PER7	M3 Spreadsheet Exhibit 5.7	3.5

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
134														
137	**SUMMARY**													
138														
139														
140	**Average daily well diversions**			cfs	gpm	af/day	mgd							
141			Indoor potable average day (constant annual rate)	4.05	1,818	8.0	2.6							
142			Residential and commercial potable irrigation average day (during irrigation season only)	4.00	1,795	7.9	2.6							
143														
144			Public area non-potable irrigation average day demand (during irrigation season only)	5.44	2,442	10.8	3.5							
145			Less water reuse / treated effluent produced (during irrigation season)	-2.51	-1,127	-5.0	-1.6							
146			**Net average day well diversion for public area non-potable irrigation**	**2.93**	**1,315**	**5.8**	1.9							
147														
148			Evaporation from aesthetic & operational ponds	0.68	306	1.4	0.4							
149			**Average daily diversion from wells during irrigation season:**	**11.66**	**5,233**	**23.1**	**7.5**							
150														
151			**Average daily diversion from wells during non-irrigation season:**	**4.05**	**1,818**	**8.0**	**2.6**							
152														
153														
154														
155	**Maximum daily well diversions**			cfs	gpm	af/day	mgd							
156			Indoor potable max day	6.08	2,727	12.0	3.9	(Well field produces max day potable in house demand; potable storage with well field produces peak hour demand.)						
157			Residential and commercial potable irrigation max day (during irrigation season only)	9.74	4,371	19.3	6.3	Well field produces max day outdoor potable irrigation demand at 0.02 cfs/acre; potable storage with well field produces scheduled peak demand						
158														
159			Public area non-potable irrigation max day demand during irrigation season	8.78	3,939	17.4	5.7	Well field produces max day non-potable irrigation demand; non-potable pond storage with well field produces scheduled peak demand						
160			Less: water reuse / treated effluent produced during irrigation season	-2.51	-1,127	-5.0	-1.6	Effluent is used for non-potable irrigation at sewage production rate						
161			**Net max day well diversion for public area non-potable irrigation**	**6.27**	**2,812**	**12.4**	4.0							
162														
163			Evaporation from aesthetic & operational ponds	1.10	494	2.2	0.7	Evaporation from ponds at 0.02 cfs/acre						
164			**Maximum daily diversion from wells during irrigation season:**	**23.18**	**10,403**	**46.0**	**15.0**							
165														
166			**Maximum daily diversion from wells during non-irrigation season:**	**6.08**	**2,727**	**12.0**	**3.9**	(Evaporation from ponds is assumed to be neglible during non-irrigation season)						
167														
168														
169														
170		**Annual ground water diversion volume**												
171				acre feet	million gallons									
172			Indoor potable	2,932	956	(Annual ground water diversions for potable indoor uses based on average annual demand, including leakage allowance.)								
173			Potable irrigation of residential and commerical areas	1,936	631	(Annual potable irrigation diversions from ground water based on total annual Allen Brockway ET, and factoring in irrigation efficiency.)								
174														
175			Public area non-potable irrigation demand	3,079	1003									
176			Less: water reuse / treated effluent originally diverted from well for indoor demand	-1,660	-541	(Reuse water is the total annual effluent production including stored winter effluent less evaporation from effluent ponds.)								
177			**Net annual well diversion for public area non-potable irrigation**	**1,419**	**462**	(Annual non-potable irrigation diversions from ground water based on total annual Allen Brockway ET, and factoring in irrigation efficiency.)								
178														
179			Evaporation from aesthetic & operational ponds	248	81	(Annual well diversions at 4.5 AFA to overcome evaporation. The non-potable peaking storage is considered part of operational storage for this calculation.)								
180			Irrigation season evaporation from winter effluent storage ponds	158	51									
181			Less: water reuse / treated effluent originally diverted from well for indoor demand	-158	-51									
182			**Net annual well diversion for pond evaporation**	**248**	**81**									
183														
184			**Well Diversion Volume During Non-Irrigation Season**	**972**	**317**									
185			**Well Diversion Volume During Irrigation Season**	**5,563**	**1,813**									
186														
187			**Total annual well diversion volume:**	**6,535**	**2,130**									
188														
189														
190														
191		**Annual consumptive use of ground water**												
192				acre feet	million gallons									
193			Indoor potable	848	276	(Indoor consumptive use is the difference between average annual water demand and sewage production rate and excludes distribution system leakage allowance that returns to groundwater.)								
194														
195			Potable irrigation of residential and commerical areas	1,627	530	(Potable and non-potable irrigation CU is the total annual Allen Brockway ET.)								
196			Public area non-potable irrigation	2,556	833	"								
197														
198			Evaporation from winter effluent storage ponds during irrigation season	158	51	(Annual pond consumptive use--i.e., evaporation--is based on an estimated 3.5 acre feet per acre.)								
199			Evaporation from aesthetic & operational ponds	193	63	(Annual pond consumptive use--i.e., evaporation--is based on an estimated 3.5 acre feet per acre. The non-potable peaking storage is considered part of operational storage for this calculation.)								
200			**Subtotal pond evaporation**	**350**	**114**									
201														
202			**Consumptive Use During Non-Irrigation Season**	**281**	**92**	(Consumptive use due to pond evaporation is accounted for in the irrigation season)								
203			**Consumptive Use During Irrigation Season**	**5,100**	**1,662**									
204														
205			**Annual consumptive use of ground water:**	**5,381**	**1,753**									
206			Annual CU as % of diversions:	82%		(Overall efficiency of use of well diversions)								
207														

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
208														
209	**Source numbers for Attachment A, Page 11 of Water Rights Application Narrative**													
210														
211							**Consumptive use expressed as direct well and reuse components**							
212														
213	**Type of Use**	**Peak Diversion**		**Annual Diversion**	**Annual C.U.**		**Direct Well**	**Reuse Water**						
214		**Rate**	**Average Diversion Rate**	**Volume**	**Volume**		**Annual C.U.**	**Annual C.U.**						
215		**(cfs)**	**(cfs)**	**(acre feet)**	**(acre feet)**		**Volume**	**Volume**						
216							**(acre feet)**	**(acre feet)**						
217	Indoor Potable	6.08	4.05	2,932	848		848	0						
218														
219	Residential and Commercial Potable Irrigation	9.74	4.00	1,936	1,627		1627	0						
220														
221	Public Area Non-Potable Irrigation	6.27	2.93	1,419	2,556		1161	1395						
222														
223	Pond Evaporation	1.10	0.68	248	350		193	158						
224														
225	Irrigation Season Total	23.18	11.66	5,563	5,100		3,548	1552						
226														
227	Non-Irrigation Season Total	6.08	4.05	972	281		281	0						
228														
229	Total Annual	23.18	9.03	6,535	5,381		3829	1552						
230		(peak day)	(annual average)											

Irrigation Demands by Month (Note: Maximum Monthly Demand and Maximum Daily Demand Occurs in July)

Non-Potable Irrigation Demand (excluding 197 acres irrigated by Farmer's Union ditch shares):

		January	Feb	March 15-31			April			May			June			July			August			September			October			November 1-15			December	Totals
				avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	af/day	af/mo	cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs		af/yr
	Golf	0.00	0.00	0.75	12.72	**0.38**	3.61	108.37	**1.82**	5.32	165.07	**2.69**	6.51	195.18	**3.29**	6.62	205.34	**3.35**	5.03	155.92	**2.54**	3.62	108.66	**1.83**	1.43	44.24	**0.72**	0.48	7.14	**0.24**	0	1,003
	Ballfields	0.00	0.00	0.60	10.12	**0.30**	2.87	86.24	**1.45**	4.24	131.37	**2.14**	5.18	155.33	**2.61**	5.27	163.42	**2.66**	4.00	124.08	**2.02**	2.88	86.48	**1.46**	1.14	35.21	**0.57**	0.38	5.68	**0.19**	0	798
	Common turf	0.00	0.00	0.26	4.45	**0.13**	1.26	37.93	**0.64**	1.86	57.77	**0.94**	2.28	68.31	**1.15**	2.32	71.87	**1.17**	1.76	54.57	**0.89**	1.27	38.03	**0.64**	0.50	15.48	**0.25**	0.17	2.50	**0.08**	0	351
	Common drip	0.00	0.00	0.36	6.12	**0.18**	1.74	52.18	**0.88**	2.56	79.48	**1.29**	3.13	93.97	**1.58**	3.19	98.87	**1.61**	2.42	75.07	**1.22**	1.74	52.32	**0.88**	0.69	21.30	**0.35**	0.23	3.44	**0.12**	0	483
Common drip with stored effluent:		0.00	0.00	0.33	5.65	**0.17**	1.60	48.14	**0.81**	2.37	73.33	**1.19**	2.89	86.70	**1.46**	2.94	91.22	**1.49**	2.23	69.26	**1.13**	1.61	48.27	**0.81**	0.63	19.65	**0.32**	0.21	3.17	**0.11**	0	445
	Totals:	0.00	0.00	2.30	39.06	**1.16**	11.10	332.85	**5.60**	16.36	507.02	**8.26**	19.98	599.49	**10.09**	20.35	630.72	**10.28**	15.45	478.90	**7.80**	11.13	333.76	**5.62**	4.38	135.89	**2.21**	1.46	21.92	**0.74**	0.00	**3,080**

Non-potable irrigation demand by application type:

	Non-potable Irr'n demand (acre feet)	Non-potable CU (acre feet)
Turf irr'd w/well and effluent as produced	2,151	1,721
Drip irr'd w/well and effluent as produced	483	434
Drip irr'd w/winter stored effluent (after evap. from effluent ponds)	445	401
Totals:	3,079	2,556

Potable Irrigation Demand

		January	Feb	March 15-31			April			May			June			July			August			September			October			November 1-15			December	Totals
				avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	af/day	af/mo	cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs	avg af/day	af/mo	avg cfs		af/yr
	Detached, Turf	0	0	0.75	12.69	**0.38**	3.60	108.13	**1.82**	5.31	164.72	**2.68**	6.49	194.76	**3.28**	6.61	204.90	**3.34**	5.02	155.58	**2.53**	3.61	108.43	**1.83**	1.42	44.15	**0.72**	0.47	7.12	**0.24**	0	1,000
	Detached, Drip	0	0	0.50	8.46	**0.25**	2.40	72.09	**1.21**	3.54	109.81	**1.79**	4.33	129.84	**2.19**	4.41	136.60	**2.23**	3.35	103.72	**1.69**	2.41	72.29	**1.22**	0.95	29.43	**0.48**	0.32	4.75	**0.16**	0	667
	Attached, Turf	0	0	0.10	1.77	**0.05**	0.50	15.06	**0.25**	0.74	22.94	**0.37**	0.90	27.12	**0.46**	0.92	28.53	**0.46**	0.70	21.67	**0.35**	0.50	15.10	**0.25**	0.20	6.15	**0.10**	0.07	0.99	**0.03**	0	139
	Attached, Drip	0	0	0.06	1.05	**0.03**	0.30	8.92	**0.15**	0.44	13.59	**0.22**	0.54	16.07	**0.27**	0.55	16.91	**0.28**	0.41	12.84	**0.21**	0.30	8.95	**0.15**	0.12	3.64	**0.06**	0.04	0.59	**0.02**	0	83
	Commercial, Turf	0	0	0.01	0.16	**0.00**	0.05	1.38	**0.02**	0.07	2.11	**0.03**	0.08	2.49	**0.04**	0.08	2.62	**0.04**	0.06	1.99	**0.03**	0.05	1.39	**0.02**	0.02	0.56	**0.01**	0.01	0.09	**0.00**	0	13
	Commercial, Drip	0	0	0.03	0.43	**0.01**	0.12	3.69	**0.06**	0.18	5.62	**0.09**	0.22	6.64	**0.11**	0.23	6.99	**0.11**	0.17	5.31	**0.09**	0.12	3.70	**0.06**	0.05	1.51	**0.02**	0.02	0.24	**0.01**	0	34
	Total			1.44	24.56	**0.73**	6.98	209.28	**3.52**	10.28	318.78	**5.19**	12.56	376.92	**6.35**	12.79	396.56	**6.46**	9.71	301.10	**4.91**	6.99	209.85	**3.53**	2.76	85.44	**1.39**	0.92	13.78	**0.46**	0	**1,936**

Potable irrigation demand by application type:

	Acre-feet Potable Demand	Acre-feet Potable CU
Turf	1,153	922
Drip	784	705
Annual Potable Irrigation Water demand (acre feet)	1,936	1,627

Summary of Irrigation Demands:

Total Irrigated Acreage	1,252	acres
Total CU	4,184	ac-ft/yr
Total Demand	5,016	ac-ft/yr
Total CU/ Total Irrigated Acres	3.34	ac-ft/ac
Total Demand / Total Irrigated Acres	4.01	ac-ft/ac

Note: This summary is for acres irrigated by well diversions or reuse water and excludes the 197 acres irrigated with Farmer's Union ditch shares.