City of Santa Fe

Agenda

CITY CLERK'S OFFICE
DATE 8/1/14 TIME 2:16
SERVED BY Laurie Trevizo
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SANTA FE WATER CONSERVATION COMMITTEE MEETING
SANTA FE COMMUNITY CONVENTION CENTER - 200 LINCOLN AVE.
NAMBE CONFERENCE ROOM- SECOND FLOOR
TUESDAY, AUGUST 12, 2014
4:00 PM TO 6:00 PM

1. CALL TO ORDER
2. ROLL CALL
3. APPROVAL OF AGENDA
4. APPROVAL OF CONSENT AGENDA
5. APPROVAL OF MINUTES JULY 8, 2014 WATER CONSERVATION COMMITTEE MEETING
6. CONSENT AGENDA
   - A. DROUGHT, MONSOON AND WATER RESOURCE UPDATE (Rick Carpenter)
   - B. WATER CONSERVATION AND DROUGHT MANAGEMENT PLAN AND SCHEDULE (Laurie Trevizo)
   - C. STATUS UPDATE ON WATER CONSERVATION EDUCATION AND OUTREACH (Laurie Trevizo)

DISCUSSION ITEMS:

7. SUSTAINABLE SANTA FE PROPOSAL ON WATER CONSERVATION IN CITY FACILITIES (Louise Pape and Esha Chiocchio, 20 minutes)

8. SPECIAL MEETING OF WCC: WATER USER RATING SYSTEM (WURS) PRESENTED BY WORKING GROUP #3 (Doug Pushard, 90 minutes)
   - A. INTRODUCTIONS (Kim)
   - B. BACKGROUND AND OBJECTIVES OF WURS FOR NEW HOMES (Doug)
   - C. OVERVIEW OF CURRENT WATER RATING TOOLS IN THE CITY, STATE AND NATIONALLY (Bill, Amanda, Doug, Laureen)
   - D. BRAINSTORM WHAT SHOULD BE INCLUDED IN SANTA FE WURS TOOL FOR NEW HOMES

INFORMATIONAL ITEMS:

9. *TIME PERMITTING-*
   GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITATIVES:
   - A. GROUP #1 – WATER CONSERVATION & DROUGHT MANAGEMENT PLAN UPDATE
   - B. GROUP #2- WATER CONSERVATION EDUCATION/OUTREACH
   - C. GROUP #3- WATER CONSERVATION CODES, ORDINANCES & REGULATIONS
   - D. GROUP #4- REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS
   - E. GROUP #5- DOMESTIC WELLS WITHIN THE CITY LIMITS

MATTERS FROM STAFF:

MATTERS FROM COMMITTEE:

NEXT MEETING – TUESDAY, SEPTEMBER 9, 2014:

CAPTIONS: AUGUST 25, 2014 @ 3 pm PACKET MATERIAL: AUGUST 27, 2014 @ 3 pm

ADJOURN.

Persons with disabilities in need of accommodations, contact the City Clerk's office at 955-6520, five (5) working days prior to meeting date.

WATER CONSERVATION COMMITTEE
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July 8, 2014

resource management update (rick carpenter, 10 minutes) - Children's poster contest theme selection - Debrief of "innovation in urban water systems" San Francisco		
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Adjournment and signature	There being no further business to come before the Water Conservation Committee, the meeting was adjourned at 6:10 pm.	Page 11

SANTA FE WATER CONSERVATION

MINUTES – JULY 8, 2014

Fran Lucero, Stenographer

DRAFT UNTIL APPROVED

SANTA FE WATER CONSERVATION COMMITTEE MEETING
CITY HALL - 200 LINCOLN AVE.
CITY COUNCILORS' CONFERENCE ROOM
TUESDAY, JULY 8, 2014
4:00 PM TO 6:10 PM

MINUTES

1. CALL TO ORDER

   Melissa McDonald, Acting Chair at 4:00 pm, called the meeting to order. A quorum was declared by roll call.

2. ROLL CALL

   Present:
   Melissa McDonald, Acting Chair
   Doug Pushard
   Tim Michael
   Stephen Wiman
   Lisa Randall
   Grace Perez
   Nancy Avedisian
   Karyn Schmidt

   Not Present
   Councilor Peter Ives, Chair, Excused
   Giselle Piburn, Excused

   Others Present:
   Caryn Grosse, Water Conservation Specialist
   Laurie Trevizo, Water Conservation Manager
   Richard Carpenter, Water Resources and Conservation Manager
   Diana Catanach, Utility Billing Director
   Fran Lucero, Stenographer

3. APPROVAL OF AGENDA

   Amend agenda to hear Stenographer comments before WCC business agenda.

   Ms. Randall moved to approve the agenda as amended, second by Ms. Perez, motion carried by unanimous voice vote.

4. APPROVAL OF CONSENT AGENDA

   Ms. Randall moved to approve the consent agenda as presented, second by Ms. Perez, motion carried by unanimous voice vote.

5. APPROVAL OF MINUTES JUNE 10, 2014 WATER CONSERVATION COMMITTEE MEETING

Corrections:
Page 2: Nathan Manzanares is the Enforcement Officer for the Water Conservation Office (not the committee).

Page 7: Mr. Michael's asked for.... Michael not Michael's

Staff corrections: Exhibit B

Mr. Michael's moved to approve the agenda as amended, second by Ms. Perez, motion carried by unanimous voice vote.

6. CONSENT AGENDA
   A. RESERVOIR IMPROVEMENTS UPDATE (Alan Hook)

DISCUSSION ITEMS:

7. NEW UTILITY BILLING- CUSTOMER BILL FORMAT (Laurie Trevizo, 10 minutes)

Ms. Trevizo introduced Diana Catanach, Utility Billing Director. Ms. Catanach said she is very excited about the new billing system. A sample bill from the test system was included in the packet which provided options for comparison. Ms. Catanach welcomes any input from the committee on points they would like to see in the bill.

Mr. Pushard stated that prior to Ms. Catanach coming on board the committee had provided points that they would like to see in the new bill. The Chair asked staff to review older minutes to research if that information is available. Mr. Pushard said that it would be the 2010 meeting minutes. Ms. Trevizo said that Mr. Schiavo wanted to inform the committee that this is a form template. The format issue was to potentially see the graph a little bit bigger and they would like to see the customer information with district average.

Ms. Perez asked what could be put in the box under monthly usage charge. Ms. Catanach said that it is free text where you can add a message from the city maybe on water conservation.

The Acting Chair said that under her committee report she would provide a sample bill from Boulder, Colorado for Ms. Catanach to review. Ms. McDonald said that the reverse of this sample bill has meter access information.

Ms. Catanach provided her e-mail address for any added comments regarding the bill format. djcatanach@santafenm.gov

Ms. Randall said that one item noted was correct naming on bills is a challenging process. Ms. Randall said as services changes with SFPS she works closely with the Water Department and she looks forward to working with Ms. Catanach on cost of service. She would like as much detail in order to implement and monitor conservation measures. In the 4-years that she has been bill auditing she has found a large amount in billing amounts and she brings it to the attention of the city water department, therefore accuracy on billing is very important to SFPS.

Ms. Schmidt did recall a meeting with Mr. Ortega and said she would like to see a comparison of monthly usage as well as last year's cost comparison. This allows customers to know if they are doing better or worse than last year. Ms. Catanach said that she is working with the vendor regarding this request to receive historical information.

Ms. Trevizo made reference to the bill (sample) where they tried to do an annual comparison.

Ms. Catanach would like to have any feedback from the WCC members by July 25th.

Mr. Pushard stated that in addition to the comparison from year to year that had also spoken about district average. The sample discussed also had a 4th bar for area average. Commercial and residential are separated and they do the same for both to see how you compare to other customers in the area.

Ms. Perez said that at a minimum for single residences or multi-family residences, to have an average would be very helpful.

Stenographer Comments: Included in the meeting packet for consideration. Meeting was conducted in a very organized matter.

INFORMATIONAL ITEMS:

8. DROUGHT, MONSOON AND WATER RESOURCE MANAGEMENT UPDATE (Rick Carpenter, 10 minutes)

(Memo included in packet.) Hand out from Mr. Carpenter on what Regional Reservoirs are looking like. (Exhibit B) Mr. Carpenter reported that not much has changed from last report, our region is in a fourth consecutive year of drought and abnormal heat and wind which will present significant challenges to all water purveyors, utilities and irrigators going forward into the rest of this year. However, many models are now predicting the likelihood of a return of an El Nino weather pattern (75% chance). This could mean increased precipitation for the coming monsoon season, but more likely for the winter month (snow pack). New data show that the water in a section of the ocean called the "El Nino 34" region in the mid-Pacific has reached the +0.5 degree Celsius threshold, typically used to define the start of an El Nino pattern. That figure would have to persist or intensify for the next 5 or 6 months for an El Nino to officially be declared – but there is a very good chance of this happening. Mr. Carpenter said that next Thursday July 17th, a meeting of the Middle Rio Grande Collaborative Program Executive Committee will take place. There is a lot going on with the Endangered Species Act and Mr. Carpenter will report at the next meeting.

2nd paragraph reflects an error in reference to Heron Reservoir is at 41% of capacity and should read 31%.

Mr. Carpenter said that as of today the wild Earth Guardians have not filed suit. Staff will get a hydrology update, a minnow update and progress towards the Endangered Species Act. A newer issue is that the Corp of Engineers and Bureau of Reclamation are responsible for the problems with the Rio Grande.
Stephen Wiman: Any problems with diversion?

Mr. Carpenter, no there was not.

Stephen Wiman: What is the flow rate that is the threshold where it gets to a certain rate and you can't divert in the river?

Mr. Carpenter: There are two thresholds, there is a primitive threshold which is 300 cubic feet per second is where curtailment begins, according to that same permit 180 cubic ft. per second would be where it is required to stop diverting.

Mr. Carpenter: There are many people like Wild Earth Guardians that think that Cochiti Dam is particular and Corp of Engineers who operates Cochiti now is responsible for a lot of problems on the Rio Grande. It is exacerbated by four years drought. The way that the Dam regulates those in the Rio Grande is causing _____ of the channels, preventing overbank flows, changing the temperatures and all those things are not conducive. What the Corp has done in a few years past is they have done what they call deviations; they deviate from the Congressional approved reservoir plan to help the fish. In the wake of the litigation they are saying they may not deviate. What they are saying now in the wake of litigation is we probably should do what the law tells us to do and not deviate anymore because we need to get authority to deviate. Same goes with the Bureau of Reclamation.

Mr. Carpenter per request of Mr. Michael went through Exhibit A with the committee.

9. CHILDREN'S POSTER CONTEST THEME SELECTION (Caryn Grosse, 10 minutes)

Ms. Grosse asked the committee members for theme suggestions for the 12th Annual Poster Contest.

Lisa: Do you have themes from last year?

8th Annual Poster Contest: Theme: Fix a Leak
9th Annual Poster Contest: Theme: Living in a Drought
10th Annual Poster Contest: Theme: Show Us Your Water Appreciation
11th Annual Poster Contest: Theme: Saving Water is Always in Season

Suggestions:

Grace Perez: Where does our water come from? Preceded that water is precious, where does water come from. It may be harder as an art idea.

How can I save water? This would be very specific to the actual school child.

Ms. Trevizo stated that one of the things they tell the Judges is the central point of view, clarity, design, and we have generated a teacher curriculum guide that helps to be easily translatable for 1st to 6th grade. They are Art Teachers; they don't have a science background.

Karyn Schmidt: If you were in the future how would you do this? The children were looking at the garden and this was the question.

Ms. Randall echoed what Ms. Perez said about personal responsibility of "what can I do". In development of the guide that could be a powerful educational tool for teachers, for the community and for kids. We get it out to all SFPS employees because we found if our teachers weren't inspired by the work than the entire school didn't get to participate in the poster project. We now get it out to everyone.

Ms. Trevizo and Ms. Grosse said it would be nice to incentivize the teachers to get everyone to participate.

Ms. Randall said a school competition with participants. Teachers could encourage participation.

Ms. Avedisian: Prize: Give the family one month of free water. Another suggestion: Who and what needs water?

Other suggestions can be sent to Ms. Grosse before the end of July. Early December is a better timeline for the teachers.

Ms. Perez asked if a picture of the students/class could be in the calendar? The Chair said that this would require permission from the parents. Ms. Randall said that the parents do sign a form at the beginning of the school year to allow pictures in the product.

Mr. Wiman: What are our priorities? Household water, bathing water, golf courses, etc., in this climate and in this drought.

10. DEBRIEF OF "INNOVATION IN URBAN WATER SYSTEMS" SAN FRANCISCO

(Laurie Trevizo, 10 minutes)

Ms. Trevizo attended a meting sponsored by the San Francisco Public Utilities in May 2014. They gathered a group of technical stakeholders and they wanted to look at maximizing the use of potable and non-potable water. They looked across the west at different communities that have done some sort of water reuse project or have very in-depth incentives. Ms. Trevizo feels that they tapped in to Santa Fe because of our incentives program. They wanted to get a collaborative group together to talk about how this could be taken to not just the southwest or the west but maybe even to a National level. One of the things that became very apparent was that water resource managers, water conservation managers, public health and safety officials; there were some elected officials as well – there was a definite division of camps. One of the things that we could not get across as water managers was that we are already treating it tertiary standards and we are already reusing it in the landscape and we are already doing most of these things.

EPA/Research Development were present. What Ms. Trevizo found interesting was that the technical advisors, state and local officials were actually trying to say, "Who should head this up". There was this look to EPA and EPA said, "If you want something like this in place with the regulations that you would like to see, then you should do it, if you want us to do it you might not get the regulations you want." One of the things that were agreed upon is if there is one common theme or common regulation, maybe not as restrictive as the public health and safety officials would like, that a lot of these projects could work.

Our rebates and incentive programs. They talked about marketing and public perception and using water and how their rain water rebates are not successful. The question was why is it successful in Santa Fe and not San Francisco, it is important to know that it doesn't translate into other communities. We found some commonalities that we could work together. Major outcome was a blue print document, it is a how to go to the governing body, now to approach the community. It is more of a lessons learned document. American Water Federal will compile and present at a meeting in the fall.

Karyn Schmidt: In my travels, seeing the use of biological water infiltration in downtown Minneapolis they had Demonstration Gardens and people were talking about how they had very good explanations of how it worked.

Mr. Michael's asked when the blue print would be complete? Ms. Trevizo said that it would be in the fall. Concern: Will it remain in this group, how will we let other communities know?

Ms. Perez when they talked about rain barrel program not being successful did they say why?

Ms. Trevizo said that there were not enough takers. Their rain events are very different than ours, the multi house is difficult. People who have them love their rain barrels.

Ms. Trevizo also spoke about the water bank in Santa Fe and they were interested in gathering information and pursuing. The only non West participant was New York – they have multi users and they can't get to their users, rain barrel program would not fit them.

Ms. Schmidt: Was there any talk about water harvesting.

Ms. Trevizo: They have more storm water management concerns. They did this project to manage storm water.

11. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITATIVES: (Councilor Ives 60 minutes)

- GROUP #2- WATER CONSERVATION EDUCATION/OUTREACH (12 minutes)

  Ms. Trevizo commended the members that presented at PUC. Thank you.

  Ms. Perez said that earlier in the month they had 2 presentations at the Southside library and main library, attendance was not heavy. At both of the presentations people were very committed. Grey Water Use is a topic that was brought up at both meetings.

  Mr. Michael stated that at the PUC meeting, Mayor Pro Tem Peter Ives introduced the presenters and spoke about the presentation purpose. There were not a lot of city councilors at this meeting yet only one of them expressed interest in having the presentation in his/her district.

Ms. Randall said that Councilor Rivera asked that the presentation be made to City Department's and Ms. Catanach volunteered for a presentation to be made in her department.

Mr. Michael stated that in order to get better attendance the presentation needs better advertising. Mr. Michael asked staff "how do we follow on Councilor Rivera's suggestion to present to city departments?"

Ms. Trevizo did do a press release but it was too close to the presentation. She will work to get the presentation scheduled with Councilor Rivera.

Karyn Schmidt: Is there a plan to present it to the full city council? It could then be televised? It would be nice to have a video portion of it to put on the city channel.

Ms. Perez said that the problem she sees in presenting to the city council was for example at the PUC there was only 10 minutes allowed for the complete presentation. It might not work as well for the Mayor and Council if the presentation is limited.

Mr. Michael said as a member of this working group that if there are suggestions to please communicate them to Ms. Perez and Mr. Michael. It is an appropriate presentation for a wide range of audiences.

Ms. Grosse said that today Quail Run had called asking for a presentation.

Mr. Pushard asked Ms. Trevizo if an Ad could be run to provide the community with options to request a presentation.

Ms. Trevizo said that the Ad would need to be developed with content and date; it would take about 1 month to work through this process.

Ms. Perez encouraged the other members of the Water Conservation Committee to be presenters.

Ms. Trevizo asked whoever is going to make the presentation to Quail Run to please be in contact with her.

- GROUP #3- WATER CONSERVATION CODES, ORDINANCES & REGULATIONS (12 minutes)

Mr. Pushard reported – Next meeting in NY – developing the codes – legionnaires is the buzzword to public health. EPA doesn't have any plans to write on the legionnaires. All the public health officials are all over it. Any water that is sprayed would have legionnaires.

Group #3 is still on track to have a draft by this fall and have it out by November-December time frame. It covers potable and non potable use. Public Project worksite is open.

SFCC was the first educational institution to offer water-harvesting class; they can now take the test to be nationally certified. The first class will be this fall and Richard Jennings will give test.

American Rainwater Catchment is re-writing the manual.

WURS – Mr. Pushard would like comments for the in-door portion within the next 30-days. Request is to have it on next month's agenda for a formal vote.

Next phase will be exterior for new homes. There is a packet of information available and I foresee that members will want to comment. Mr. Pushard asked how to publish an open meeting should there be more than 6 at a working meeting.

Ms. Trevizo said that the meeting would need to be public noticed. One of the dangers of meeting outside of the WCC you can only brain storm and bring to the committee for comment. You want to make sure that you don't create a rolling quorum.

Mr. Pushard would like to have his next group meeting published. August 21st is the projected date, 4:00 pm at Barker Realty. Agenda will be sent to Laurie Trevizo once it has been posted. Ms. Trevizo will check with the city attorney. It would be requested as a special meeting to discuss this one item. This meeting will outline what already exists. The first meeting is to provide information on the intent. Mr. Pushard does not want to fall in to a rolling quorum situation.

The Acting Chair said the landscape community would be very busy in August and she recommended in September.

- GROUP #4- REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS (12 minutes)

Ms. McDonald provided the report to the Stenographer. (Exhibit C)
Sustainable tax – Doug has not heard anything back. There is a working group working on water legislation for 2015, and they are trying to update a billing credit. Steve Hale who is the NM Green Built Assoc Director, he has been tasked with trying to create a draft. Mr. Nate Downey and Ms. McDonald are also part of the work group and they will request a meeting with Councilor Peter Ives.

Ms. McDonald circulated the bill from Boulder, Colo. for review. They get an amount of water that they can use and they manage it. Boulder is having a huge success with this. They are benefitting from the amount of water which is very clear. Ms. McDonald will ask for a commercial bill and share with the WCC.

Ms. Trevizo said that the billing system is one contractor and the billing print is a different contractor for Santa Fe.

Ms. McDonald likes the idea of a chart and it also notes what they used the previous month. Maybe a line item description so people would know.

Ms. Schmidt is moving forward with the evaluation on soil moisture. She will check in with the residential person in Las Campanas and with someone at St. John's to acquire more information. She would like to receive short-term experiential information.

- GROUP #5- DOMESTIC WELLS WITHIN THE CITY LIMITS (12 minutes)

  Meeting was held on June 25th. Tim will work on re-organization of the report, Maxine will look at some of the legal issues and Mr. Wiman will take to city legal for review.

  Ms. Trevizo reported that the city attorney would like to have the Chair bring the language to him for review. Mr. Michael said that he is reviewing the report and will bring feedback at the next meting.

  Ms. Trevizo asked if the report would be ready at the next meeting and Mr. Pushard said no, he can give an update but the report would not be ready and it would need legal review before it can be released.

- GROUP #1 – WATER CONSERVATION & DROUGHT MANAGEMENT PLAN UPDATE (12 minutes) (Exhibit C)

  Ms. Perez stated that they had not met (in the packet) – need dates to know when the information can be put in.

  Ms. Trevizo stated that the schedule has not been re-done and if something is completed, it is important to get to her. The items that are required for water conservation planning from OSE, some of the table of contents has been re-tooled. The new template and table of contents format are trying to be mirrored. How cities are broken out is important and included from the last census. 3 and 4 are new chapters and they are items the OSE included in the template. The planning plan is geared towards municipalities who have not always done this. We have broken it down to show our codes, ordinances and programs that we offer. We have separated them as to what is required by code. We will bring in the old pieces that were edited and they can now be integrated. Caryn has been retained as the Editor to review the complete document.

  Ms. Perez said that she wants a more firm deadline as a volunteer. When do you need overall review comments by the working group? When will you seek comments from WCC?

  Ms. Trevizo would like to have everything in prior to November, 2014.

  Ms. Perez wants to know if there will be a time when the full report comes to the WCC for comment. She would like for the working group to go through it in full detail and then have the WCC be able to make comments before it is finalized and approved.

  Ms. Trevizo said that once the plan review was finalized that the working group would take up the strategic pieces and they would come back to the WC office for review.

Mr. Pushard said that it seems that the strategic direction and strategic goals should now be reviewed and merged in to the plan.

The Acting Chair said that the working group will review in the next two weeks, bring back to the next meeting and the WCC would review. Once this is complete all comments would come back to Laurie in September. Ms. Trevizo will provide feedback once the revisions are made and she will send Ms. Perez a formalized schedule. The Acting Chair asked that the Working Group meet with Ms. Trevizo and that this topic be placed on the agenda as a separate item? Guiding Principles or Strategy Piece, what are we talking about. The piece that needs to go in to the appendix.

MATTERS FROM STAFF:

12. REMINDER FROM STENOGRAPHERS – Discussed above.

MATTERS FROM COMMITTEE:

Updating the Quell Training. Will that come out of California or will we figure it here. Ms. Trevizo provided Mr. Pushard the report she will present to the committee.

NEXT MEETING – TUESDAY, AUGUST 12, 2014:

CAPTIONS: JULY 28, 2014 @3 pm PACKET MATERIAL: JULY 30, 2014 @3 pm

ADJOURN.

There being no further business to come before the Water Conservation Committee, the meeting was adjourned at 6:10 pm.

Signature Sheet:

Melissa McDonald, Acting Chair

Fran Lucero, Stenographer

MEMORANDUM

TO: **City of Santa Fe Public Utilities Committee**
City of Santa Fe Water Conservation Committee
Buckman Direct Diversion Board

FROM: **Rick Carpenter, Water Resources and Conservation Manager**

VIA: **Nick Schiavo, Public Utilities Department and Water Division Director**

DATE: **July 24, 2014**

SUBJECT: **35th Monthly Update on Drought and Water Resource Management**

CURRENT UPDATE – GENERAL WATER RESOURCE MANGEMENT

As the Committee/Board is aware, our region is still suffering through a drought. Our region has gone through three consecutive years of record drought and heat. It is now apparent that we are in a fourth consecutive year of drought and abnormal heat and wind which will present significant challenges to all water purveyors, utilities, and irrigators going forward into the rest of this year. Weather prediction models had indicated that, at least through the early part of this summer, if not longer, drought conditions in the southwest (especially Arizona and New Mexico) should be neutral to below average precipitation and above average temperatures. However, there may be some relief in north-central New Mexico. Many models are now predicting the likelihood of a return of an El Nino weather pattern (70% chance , down from 75%, of normal to above normal precipitation). This could mean increased precipitation for the coming monsoon season, but more likely for the winter months (snow pack). New data show that the water in a section of the ocean called the "El Nino 34" region in the mid-Pacific has reached the +0.5 degree Celsius threshold, typically used to define the start of an El Nino pattern. That figure would have to persist or intensify for the next 5 or 6 months for an El Nino to officially be declared – but there is a very good chance of this happening. However, the Pacific trade winds are still too strong for full development of an El Nino in the near term even though we are in late July, i.e., the El Nino is showing early signs of potential weakening. This fire season is also expected to be very challenging which could have significant water quality implications for the BDD water treatment plant and/or Canyon Road water treatment plant.

This current drought is bad, but what sets it apart from previous extreme droughts is that, the region will enter into next summer without very much carry-over water from this year in regional reservoirs – they are at low levels. For example, Heron reservoir (San Juan-Chama Project water) is currently at about 29% of capacity. However, runoff from the San Juan watershed is substantial and accumulation into Heron from this year's snow pack and July rains is on the rise. BoR is predicting that SJCP contractors should receive at least 85% of normal deliveries (if not the full 100%). A good winter snow pack would be very beneficial.

It is worth noting, however, the City of Santa Fe has invested in a robust and diverse portfolio of four distinct water supply sources that allows for flexibility in meeting demand: Buckman well field, City well field, Canyon Road Water Treatment Plant on the Upper Santa Fe River, and the Buckman Direct Diversion on the Rio Grande**.** Supply from these groundwater and surface water sources are expected to be adequate in meeting local demands through the coming high-demand season.

LOCAL CONDITIONS

Source of Supply Utilization Summary

June 2014

City Wells	10.14mg/m	31.12af/m
Buckman Wells	20.60mg/m	63.24af/m
CRWTP	142.84mg/m	438.36af/m
BRWTP	188.90mg/m	579.71 af/m
Other Wells(Osage, MRC, etc)	*0.11mg/m*	*0.32af/m*

Upper Santa Fe River/CRWTP

	Total Combined Reservoir Level	Santa Fe Snow Gage	Reservoir Inflow
July 23, 2014	17.40%	0.00 inches	2.13 MGD
5-Year Average for This Date (2009 – 2013)	55.49 %	0.00 inches	2.47 MGD

As of July 23, total combined storage in Nichols and McClure reservoirs is 17.4% (or about 700 acre-feet of storage). Some flows have been by-passed due to construction on the new intake facilities. Inflows are expected to continue for the near future and so the reservoirs have been releasing water to allow for acequia deliveries, water treatment plant production, active construction, and draining/drying.

Buckman Regional Water Treatment Plant (BDD)

Flows in the Rio Grande are relatively high due to recent rains, and turbidity has been high at times, but the BDD Project in general has been able to divert water.

REGIONAL CONDITIONS

Rio Grande Basin

Surface flows in the Rio Grande and its tributaries through June have been well below normal, (except for temporary releases for the silvery minnow spawn), but July rains have helped increase flows. However, storage levels in regional reservoirs are still low. Native flows in the Rio Grande will likely be low through the summer and fall, and most of the water in the river will be San Juan-Chama releases or "Prior and Paramount" federal trust water.

UPDATE: on Wednesday, July 24, 2014, Wild Earth Guardians filed suit in federal court against the US Army Corps of Engineers and the Bureau of Reclamation citing violations of the Endangered Species Act as related to the Middle Rio Grande. Neither the BDD Project, the City of Santa Fe, nor the County of Santa Fe were named in the law suit, but this action may signal the beginning of collateral issues and/or constraints with regard to Rio Grande native flow management, as well as San Juan-Chama water resource management going forward. Updates will be provided by staff as necessary.

San Juan Basin

Snow melt was complete at the end of June. It should be stressed that, conditions could significantly worsen for San Juan Chama Project deliveries next year, if the drought persists, due to a lack of carry-over storage in Heron Reservoir and other reservoirs in the system. Heron Reservoir is currently at a very low level of 29% of capacity for this time of year. The Bureau of Reclamation has recently indicated that it is very likely that SJCP deliveries this year will be at or near 85% (if not higher) owing to good snow pack in the San Juan watershed last winter, high soil moisture, recent rains, and the minor amount of storage that was already in Heron at the beginning of the snow melt season.

City of Santa Fe, New Mexico

memo

Date: August 12, 2014

To: Water Conservation Committee

From: Laurie Trevizo, Water Conservation Manager

Via: Rick Carpenter, Water Resources and Conservation Manager
Nicholas Schiavo, Public Utilities Department and Water Division Director

RE: Status Update Water Conservation and Drought Management Plan and Schedule

Background:
The Water Conservation and Drought Management Plan is a regulatory requirement of the New Mexico Office of the State Engineer (NMOSE). The NMOSE requires a 5 year update of the plan. The last update submitted by the City of Santa Fe to the NMOSE was in 2010. In 2015 the update is due to maintain compliance with the NMOSE Permit # SP 4842 for the Buckman Direct Diversion, built to divert San Juan-Chama water from the Rio Grande.

Issue:
In late 2013, the NMOSE published *New Mexico's Water Conservation Planning Guide for Public Water Suppliers – Technical Report 53.* Compliance with Technical Report 53 is not mandated, however, given the timely publication of the technical report and the update to Santa Fe's Water Conservation Plan compliance would be in the best interest of the city. It is anticipated that the City of Santa Fe would be the first municipality in the state to comply with the recommendations in the technical guide.

Other issues such as the late publication of the 2013 Annual Water Report have also caused a delay in the schedule. Although this delay has provided staff time to compile the most recent data for submission to the NMOSE.

The schedule for the Water Conservation and Drought Management Plan has been revised to take into the consideration of the NMOSE Technical Guide 53 and inclusion of the data from the 2013 Annual Water Report. The schedule from August 2013 WCC meeting packet materials is provided to indicate that even with the changes included in the revised schedule, the Water Conservation and Drought Management Plan is still on track.

Attachments:
August 6, 2013 Water Conservation Plan Schedule
Updated August 12, 2014 Water Conservation Plan Schedule

Water Conservation Plan Update

Task Name	Start Date	End Date	Duration	% Complete	Assigned To	Comments
Strategic Planning	**10/01/12**	**12/13/13**	**315**	**100%**		
Create SmartSheet	10/01/12	10/05/12	5	100%	Caryn Grosse	
Check State Statute	01/21/13	01/25/13	5	100%	Laurie Trevizo	
Check Clerks office re:quorem	01/21/13	01/25/13	5	100%	Laurie Trevizo	
Climate Change Report				100%	Claudia Borchert	
Reclaimed Wastewater Report				100%	Claudia Borchert	
Long Range Supply Plan					Rick Carpenter	
Annual Water Reports- 2012				100%	Alan Hook	
Demand Elasticity Report					Jim Fryer	
Residential End Use Study					Aquacraft	
Identify Updates to Plan	01/17/13	12/13/13	237	100%	Working Group	
section 1: Overview	01/17/13	02/14/13	21	100%	Working Group	update ordinances, meter size rates
section 2: Water Conservation Program	02/15/13	06/21/13	91	100%	Working Group	
section 3: Drought Management Plan	07/12/13	08/09/13	21	100%	Working Group	
section 4: Regional Water Plan	08/23/13	09/20/13	21	100%	Working Group	
section 5: Continued Improvements Plan	10/04/13	11/01/13	21	100%	Working Group	
section 6: Conclusions	11/15/13	12/13/13	21	100%	Working Group	Review completed 7-25-13
Prepare Documents					WC Staff/Consultant	structure realigned with OSE Water Conservation Planning Guide
section 1: Overview				85%	WC Staff/Consultant	edited
section 2: Local Conditions				50%	WC Staff/Consultant	currently being edited
section 3: Assessing PWS Performance-Per Capita				50%	WC Staff/Consultant	currently being edited
section 4: Assessing PWS Performance-Water Loss				20%	WC Staff/Consultant	in progress
section 5: Goals				20%	WC Staff/Consultant	in progress
section 6: Santa Fe Water Conservation Plan				20%	WC Staff/Consultant	in progress
section 7: Drought Manager Plan				20%	WC Staff/Consultant	in progress
section 8: Quantitative Evaluation of Water Conservation Measures				20%	WC Staff/Consultant	in progress
section 9: Conclusions				20%	WC Staff/Consultant	in progress
Committee Process						
Informational update to PUC/WCC	03/05/14	08/12/14	115	50%	WC Staff	
Include 2013 Annual Report	03/03/14	09/15/14	141	50%	Alan Hook	
Revisions	03/03/14	10/30/14	152			
GPCD Calculator	04/01/14	04/30/14	22	100%	WC Staff	
PUC	05/01/14	10/01/14	110			
Finance	06/02/14	10/20/14	101			
Info Item to Council	08/01/14	10/08/14	49			
Finalize Edits/Comments to Water Conservation Plan	**11/28/14**	**11/28/14**	**1**			
In House Deadline	11/28/14	11/28/14	1			
Approval	**12/01/14**	**12/19/14**	**15**			
Vote to Accept/Present to OSE	12/01/14	12/19/14	15			
Water Conservation Plan due to OSE	10/01/12	01/15/15	599			

Exported on July 30, 201

Water Conservation Plan Update

	Task Name	Start Date	End Date	Duration	Predecessors	% Complete	Assigned To	At Risk	Comments
1	**Strategic Planning**	**10/01/12**	**12/30/14**	**587**		**50%**			
2	Create SmartSheet	10/01/12	10/05/12	5		100%	clgrosse@santafenm.gov		
3	Check State Statute	01/21/13	01/25/13	5		95%	lltrevizo@ci.santa-fe.nm.us		
4	Check Clerks office re:quorem	01/21/13	01/25/13	5		95%	lltrevizo@ci.santa-fe.nm.us		
5	Climate Change Report					95%	claudia borchert		
6	Reclaimed Wastewater Report					95%	claudia borchert		
7	Stella Modeling						rrcarpenter@ci.santa-fe.nm.us		
8	Annual Water Reports- 2012					100%	Alan Hook		
9	Demand Elasticity Report						Jim Fryer		
10	Residential End Use Study						Aquacraft		
11	Identify Updates to Plan	01/17/13	12/13/13	237		100%	Working Group		
12	section 1: Overview	01/17/13	02/14/13	21		100%	Working Group		update ordinances, meter size rates
13	section 2: Water Conservation Program	02/15/13	06/21/13	91	12	100%	Working Group		
14	section 3: Drought Management Plan	07/12/13	08/09/13	21		100%	Working Group		
15	section 4: Regional Water Plan	08/23/13	09/20/13	21		100%	Working Group		
16	section 5: Continued Improvements Plan	10/04/13	11/01/13	21		100%	Working Group		
17	section 6: Conclusions	11/15/13	12/13/13	21		100%	Working Group		Review completed 7-25-13
18	Prepare Documents	01/10/14	12/30/14	253			Water Conservation Staff		
19	**Committee Process**								
20	Informational update to PUC/WCC	03/05/14	04/01/14	20					
21	Include 2013 Annual Report	03/03/14	03/31/14	21					
22	Revisions	03/03/14	03/31/14	21					
23	GPCD Calculator	04/01/14	04/30/14	22					
24	PUC	05/01/14	05/30/14	22					
25	Finance	06/02/14	07/31/14	44					
26	Info Item to Council	08/01/14	09/30/14	43					
27	**Finalize Edits/Comments to Water Conservation Plan**	**11/28/14**	**11/28/14**	**1**					
28	In House Deadline	11/28/14	11/28/14	1					
29	**Approval**	**12/01/14**	**12/19/14**	**15**					
30	Vote to Accept/Present to OSE	12/01/14	12/19/14	15					
31	**Water Conservation Plan due to OSE**	10/01/12	01/15/15	599					

City of Santa Fe, New Mexico

memo

Date: July 15, 2014

To: Public Utilities Committee
Water Conservation Committee

From: Laurie Trevizo, Water Conservation Manager

Via: Rick Carpenter, Water Resources and Conservation Manager
Nick Schiavo, Public Utilities Department and Water Division Director

RE: Status Update on Water Conservation Education and Outreach for 2014

Throughout the year the City of Santa Fe Water Conservation Office provides a number of Education and Outreach opportunities to the community.

Upcoming Water Conservation Events:

12th Annual Children's Poster Contest:
Theme: "How Water Connects Us"
Call for Entries: Monday, September 15, 2014
Entry Deadline: Friday, December 5, 2014
The annual poster calendar featuring the winning artwork is a favorite in the Santa Fe community! Winners of the poster contest will also receive a prize package that includes a trophy, a gift card and a conservation kit for saving water at home during the awards presentation next spring and the grand prize poster will be displayed for a year on the back of a city bus and on the cover of the 2016 calendar.

Spooky Showerhead Swap:
October 31, 2014 in Water Division Lobby
Give your water bill a treat and replace your spooky showerhead. On Friday, October 31st, bring your scary old high-flow showerhead to the Water Division, 801 W. San Mateo, between 9 am and 2 pm and receive an EPA WaterSense 2.0 gallon per minute showerhead. This is a limited, one-day only, promotion (while supplies last.) Installing efficient showerheads is one of the easiest ways to improve water efficiency in your home and reduce your water and energy bills.

QWEL (Qualified Water Efficient Landscaper) Training:
November 2014 at Genoveva Chavez Community Center, date TBD
The City of Santa Fe and the New Mexico Water Conservation Alliance will be co-sponsoring Qualified Water Efficient Landscaper (QWEL) training. QWEL is an approved U.S. EPA WaterSense Irrigation Auditor certification program. Landscape professionals who achieve and maintain QWEL certification and have a current City of Santa Fe business license will become approved contractors for the City of Santa Fe Water Conservation Irrigation Efficiency Rebate Program. Training is limited to 25 participants. Invitations will be mailed and emailed (if available) to landscape design and installation firms

2015 Water Conservation Calendars:
December 2014-March 2015

Approximately 5,000 calendars will be distributed into the community and some will make their way around the state! These calendars will showcase winning artwork from the 11th Annual Children's Poster Contest and provide monthly tips on irrigation.

2014 Water Conservation Accomplishments (Year-to-Date):

Fix-a-Leak Week:
March 17-21, 2014
The Bad Flapper returned! 2014 was the City of Santa Fe's fourth year to participate in the national event sponsored by the U.S. EPA WaterSense Program. Fixing a leaky toilet can save up to 1,000 gallons of water every month, and the number one cause of a leaky toilet is a faulty flapper. This inexpensive rubber part decays or gets covered with mineral deposits, which can cause it to leak, often silently, hence the hunt for the silent-movie roaring 20's villainess.

Qualified Water Efficient Landscaper (QWEL) Training:
April 23-24, 29-30, and May1, 2014
Ten people were certified in the Spring 2014 training. To date, 48 people have achieved certification in New Mexico, of whom 25 are Landscape Professionals, available for hire in Santa Fe. The City of Santa Fe is currently the only certifying agency in New Mexico for this EPA WaterSense approved Irrigation Auditor program.

Rebates:
The Irrigation Efficiency Rebate Program was re-launched in May 2014. QWEL certified Landscape Professionals provide Irrigation Efficiency Evaluations to customers ($50 rebate to residential customers) and based up on the resulting recommendations, customers who upgrade to high-efficiency Irrigation Equipment, such as Smart Irrigation Controllers, are eligible for additional rebates.

11th Annual Children's Poster Contest Awards:
April 30, 2014
The theme was "Saving Water is Always in Season!" The Water Conservation Office received 270 entries. Winners of the poster contest received a trophy and a prize package that includes conservation kits for saving water at home during the April 30th City Council meeting. The grand prize winning poster is displayed for a year on the back of a city bus and on the calendar cover. First through third place winners will be featured in the 2015 calendar.

12th Annual Children's Water Fiesta:
April 16-17, 2014
This year, an online form was utilized to register the classes. All slots were filled within 4 days of the webform going live and registration was cut off well in advance of the deadline. Twenty-eight classes (596 students) registered for this event!

Students in the 4th grade from throughout the Santa Fe area spent a wonderful day learning about water at the Santa Fe Community Convention Center! Fiesta activities covered a wide range of core curriculum areas including language arts, math, science, social studies, visual arts, and health & wellness. Presenters demonstrated water related facts, concepts and values through fun, hands-on learning activities.

Project WET (Water Education for Teachers) Workshop:
June 17, 2014
Education provides one of the best approaches to ensuring responsible behavior toward our most precious resource, water. Project WET is a water education program for teachers, with the goal of facilitating awareness, appreciation, knowledge and stewardship of water. This program provides curriculum and activities for grades K-12 designed by educators for educators to present water information in many different formats, ranging from large and small group learning, whole body activities, laboratory investigations, discussion of water topics both local and global, and involvement in community service projects.

The City of Santa Fe Water Conservation Office partnered with the Environmental Education Association of New Mexico to offer a workshop hosted by Rio Grande School. The workshop was attended by 18 participants, half of whom are teachers, and the other half from various governmental agencies, NGOs and other groups with environmental education outreach programs, many of whom participate as presenters in the Annual Children's Water Fiesta. Each participant in the workshop received a copy of the Project WET 2.0 Curriculum Guide.

Santa Fe Leads Project

The ***Santa Fe Leads Project*** is to upgrade City facilities to meet basic environmental standards and become visible models of basic environmental practices for our citizens and guests. Our City will lead by example.

Steps include to:
a. conduct a survey of public city facilities to identify site-specific opportunities to meet basic environmental standards
b. identify additional Best Practices when appropriate
c. work with managers to make improvements based on the initial survey

The topics will initially include water conservation, recycling and waste reduction, and energy usage. Agencies involved include the Sustainable Santa Fe Commission, the Water Conservation Department, and others.

GROSSE, CARYN L.

From: TREVIZO, LAURIE L.
Sent: Wednesday, July 30, 2014 3:21 PM
To: GROSSE, CARYN L.
Subject: FW: Water Use Rating System - Exterior Rating Brainstorm Session

See below. With links.

-----Original Message-----
From: Doug [mailto:doug@harvesth2o.com]
Sent: Wednesday, July 30, 2014 12:36 PM
To: TREVIZO, LAURIE L.
Cc: WURS Group
Subject: Re: Water Use Rating System - Exterior Rating Brainstorm Session

Laurie

I have given you links to the materials. Let me know if you can't access them. I am assuming you will copy and put in the packets.

August 12th, 4-6PM at City Hall

Objective: Educate and solicit input on Water Use Rating System (WURS) new home tool - exterior water use

Agenda:

- Introductions (Kim)
- Background and objectives of WURS for NEW homes (Doug)
- Overview of current Water Rating tools in the city, state and nationally (Bill, Amanda, Doug, Laureen)
- Brainstorm what should be included in Santa Fe WURS tool for new homes

Materials for this sessions that are recommended pre-reading materials:

Background: Currently there are numerous city, state, and national building standards. There is interest in creating an easy-to-use tool to help builders rate the water use in new homes in the Santa Fe area.
WURS, or Water Use Rating System, is an effort to address this desire put forth the the Santa Fe Homebuilder's Association. We currently have a tool for energy (HERZ) and hopefully WURS would be the equivalent tool for water.

EPA New Home -
https://www.dropbox.com/s/is5gozmmfjt54wt/home_irr-audit-checklist508_new%20homes.pdf

EPA Existing Home Irrigation Audit -
https://www.dropbox.com/s/4erq6rphdeakwex/Shortcut%20to%20Final%20Manual%2005.26.09%20pdf.lnk

New Mexico GB - Outdoor -
https://www.dropbox.com/s/2r19wz7trudc724/GBNM%20Current%20Outdoor%20Sheet.docx

Santa Fe QWEL Irrigation Audit Program - https://www.dropbox.com/s/kg5h8bxnwyja9tj/Water-Audit-Form-English-straight-sided.pdf

Santa Fe Green Build Requirements and NM Green Build Outdoors - https://www.dropbox.com/s/ggvelaiq61yt258/Santa%20Fe%20Green%20Build%20Outdoor%20Sheet.docx

US GBC LEED Water Efficiency Outdoor - https://www.dropbox.com/s/c92qw3sqtqb2wad/Santa_Fe_Green_Building_Code_Water%20Sections.pdf

National Green Build Outdoor Only -

Version 1.1 WaterSense® Labeled New Home Irrigation Audit Checklist

Site Information
Builder Name:
Lot Number/Street Address:
City:
State:
Zip:

Audit Information
Was audit conducted by a WaterSense Irrigation Partner? ☐ Yes ☐ No Name of Irrigation Auditor:
Company Name:
Date:
Time Started:
Time Ended:

By affixing my signature below, the undersigned does hereby declare that the irrigation system criteria for new homes, as specified in the *Version 1.1 WaterSense New Home Specification* and the *Irrigation Audit Guidelines for WaterSense Labeled New Homes*, have been met and, if requested, will provide the necessary supporting documents.

WaterSense Irrigation Partner Name:	Company Name:
Signature:	Date:

A. Distribution Uniformity Lower Quarter

Irrigation system distribution uniformity lower quarter (DU_{LQ}) (calculated from catch-can test) is _____%.

B. Verification of Specification Criteria & Operating Pressure

Item		Criterion	Yes	No	NI*
Outdoor Water-Efficiency Criteria–Irrigation System Design					
Design and installation	4.2.1	Designed or installed by WaterSense irrigation partner Name of partner:			
		Waiver provided for design/installation Name of designer/Installer:			
Leaks	4.2.3	System operates without leaks (checked during the audit)			
Overspray	4.2.4	System prevents runoff and overspray from leaving the property (checked during the audit)			
DU_{LQ}	4.2.5	Is 65% or greater (determined by catch-can test during audit)			
Rain shutoff device	4.2.6	System includes a technology that inhibits or interrupts operation of the irrigation system during periods of rainfall or sufficient moisture (e.g., rain sensors, soil moisture sensors)			
Irrigation controller	4.2.7	WaterSense labeled weather-based controller† or soil moisture sensor-based controller with the following capabilities in both smart and standard mode: ○ The controller shall be capable of preserving the contents of the irrigation program settings when the power source is lost and without relying on an external battery backup. ○ The controller shall either be capable of independent, zone-specific programming or storing a minimum of three different programs to allow for separate schedules for zones with differing water needs. ○ The controller shall be capable of indicating to the user when it is not receiving a signal or local sensor input and is not adjusting irrigation based on current weather or soil moisture conditions. ○ The controller shall be capable of interfacing with a rainfall device. ○ The controller shall be capable of accommodating watering restrictions as follows: ○ Operation on a prescribed day(s)-of-week schedule ○ Either even-day or odd-day scheduling, or any day-interval scheduling between two and seven days ○ The ability to set irrigation runtimes to avoid watering during a prohibited time of day (e.g., between 9:00 a.m. and 9:00 p.m.) ○ Complete shutoff (e.g., on/off switch) to accommodate			

* Not installed (NI)
† As of June 1, 2013, any weather-based irrigation controller used shall be WaterSense labeled.

Item		Criterion	Yes	No	NI*
Outdoor Water-Efficiency Criteria–Irrigation System Design					
		outdoor irrigation prohibition restrictions o The controller shall include a percent adjust (water budget) feature. o If the primary source of weather or soil moisture information is lost, the controller shall be capable of reverting to either a proxy of historical weather data or a percent adjust (water budget) feature. o The controller shall be capable of allowing for a manual operation troubleshooting test cycle and shall automatically return to smart mode within some period of time as designated by the manufacturer, even if the switch is still positioned for manual operation.			
Sprinkler heads	4.2.8	Have a 4-inch or greater pop-up height and matched precipitation. Note: This excludes components of a microirrigation system.			
Sprinkler irrigation	4.2.8	Not installed on plantings other than turfgrass other than as part of a microirrigation system			
Sprinkler irrigation	4.2.8	Not used on strips of turfgrass < 4 feet wide or on slopes > 4:1 other than as part of a microirrigation system			
Microirrigation system	4.2.9	Includes a pressure regulator, filters, and flush end assemblies			
Schedule	4.2.10	Two seasonal water schedules (initial grow-in period and established landscape) are posted at the controller.			
Verification of system operating pressure		Station or zone pressure within 10% of manufacturer recommended operating pressure			

Notes on Irrigation System Criteria

WaterSense® Water Budget Approach

The *2009 WaterSense Single-Family New Home Specification* defines the criteria a home must meet in order to earn the WaterSense label. It addresses indoor water use, outdoor water use, and homeowner education. To meet the Landscape Design Criteria (Section 4.1.1), the builder may choose to comply with one of the following options:

> Option 1 – Design of the landscaped area shall be developed using the *WaterSense Water Budget Tool*.
>
> Option 2 – Turfgrass shall not exceed 40 percent of the landscaped area.

The water budget tool guides the builder, landscape professional, or WaterSense irrigation partner through the water budget calculations. This document provides an overview of the tool as well as detailed instructions for using the tool. Any builder who chooses landscape design Option 1 must complete the tool, regardless of whether or not an irrigation system is to be installed. Additionally, the builder shall submit a copy of the completed tool as part of the inspection package. However, if more than 50 percent of the landscaped area is designed to be nonvegetated (e.g., contains only mulch or permeable hardscape), then the tool is not appropriate for use and Option 2 should be chosen.

I. Background

The water budget approach serves as a design tool, allowing the professional to design a sustainable landscape based on a regionally appropriate amount of water. A water budget is a site-specific method of calculating an allowable amount of water to be used by the landscape and then designing the landscape to meet this budget. The budget takes into account plant type, plant water needs, irrigation system design, and applied water that the landscape receives either by irrigation or by precipitation, as described in detail below. Water budgets must be associated with a specified amount of time, such as a week, month, or year.

The tool is provided in a Microsoft Excel spreadsheet format that guides the user through the water budget calculation in three parts. First, the tool calculates the amount of water a standard landscape would require and the amount of water the designed landscape is allowed in order to be considered water-efficient. Next, the tool calculates how much water the designed landscape requires based on climate, plant type, and irrigation system design. Lastly, it determines whether the designed landscape meets EPA's criteria.

The WaterSense program considers two major factors when designing specifications for water efficiency: water use and performance. In order to be eligible for labeling, products must use less water while performing as well as or better than conventional models. Performance of a landscape can be judged by the presence of healthy plants and the ability to meet user expectations for both functionality and aesthetic effects. It is important to ensure that every plant can have access to the water it needs or it will affect both aspects of the performance concerns—the health of the plant and the aesthetic quality of the landscape. For purposes of the specification, it was determined that a performance-based approach to compliance, i.e.,

designating a water allotment and allowing the landscape designer to meet it in any number of ways, would allow the most flexibility and ease of meeting the criteria. The allotment approach means that the builder or landscape professional must put thought into the landscape plan. This is likely to lead to a landscape that has more "curb appeal" and increases the value of the home, benefiting both the environment and the homeowner.

WaterSense chose a well-maintained lawn composed entirely of cool season turfgrass as the baseline, or conventional, model and a 30 percent reduction in associated water use as the reduction that would result in water efficiency. This does not mean that WaterSense believes a lawn should be watered with 70 percent of the water it requires, but that a plant mix should be selected that would use 30 percent less water than a landscape composed entirely of turf. The data used to calculate water use, discussed below, is modeled across the entire United States by zip code, resulting in site-specific allotments. Therefore, while everyone must achieve the same minimum percentage reduction, the actual requirement, in gallons of water, varies greatly based on what is appropriate for each region. Additionally, the data are conservative in nature in order to result in a landscape capable of withstanding the most challenging months of the year.

Data

The tool requires two climate-based inputs in addition to the types of vegetation planted and the types of irrigation equipment installed. These two climate-based inputs are local reference evapotranspiration (ET_o) and rainfall. In order to make an easy-to-use tool, it was imperative to have a standardized set of data that covered the entire country. While there are numerous local sources of rainfall data, local ET_o, data sets are scarce. However, the International Water Management Institute (IWMI) produced a World Water and Climate Atlas (www.iwmi.cgiar.org/WAtlas/Default.aspx) that used 1961–1990 weather station data across the world to model monthly summary data for a number of parameters, including standardized Penman-Monteith reference evapotranspiration rates. The U.S. data were extracted and summarized with an average value for each zip code using ESRI ArcGIS version 9.3.[1] In order to be consistent, both in terms of actual data and the process used to model it, WaterSense also extracted the 1961–1990 precipitation data to create the Water Budget Data Finder. After the user enters a zip code, the Data Finder displays the peak watering month, associated ET_o, and associated rainfall amounts for that zip code. Any builder choosing to use the water budget tool to meet the specification must use the values provided by the Data Finder in the *WaterSense Water Budget Tool*.

WaterSense designated the peak watering month to be the month when ET_o exceeds precipitation by the greatest amount. This month was chosen because it identifies the month during which the landscape will require the most supplemental irrigation. For locations where precipitation always exceeds ET_o, the peak watering month is the month with the highest ET_o.

The tool also requires the use of a landscape coefficient for each category of vegetation planted. Theoretically, these coefficients reduce ET_o by a percentage, based on species type, to portray the water needs of each plant. While extensive research has been conducted on the

[1] More information on this process is available at: www.epa.gov/watersense/nhspecs/wb_data_finder.html.

water needs of various types of turfgrasses, very little data exists on the water needs of other vegetation, including groundcovers, shrubs, and trees. Additionally, the landscape coefficient varies depending on location, meaning that the available data cannot automatically be ascribed to the same species in different regions. However, vegetation can be described in broad categories as high-water-using, medium-water-using, or low-water-using. In order to make a functional tool, WaterSense has assigned relative factors to each category within the broad plant types: trees, shrubs, groundcover, and turfgrass. The coefficients chosen were based on research done in California and are also used by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) for Homes Rating System (2008). As better data become available nationwide, WaterSense intends to revise the tool to incorporate these advances.

Appropriate Uses of the Tool

As discussed, the data chosen for the tool represent conservative estimates for the major variables included in the tool. Additionally, generalizations and assumptions were made in order to simplify the tool and make it applicable nationwide. The tool functions well for its intended purpose of promoting a conservative landscape design. However, it should not be used to determine irrigation scheduling amounts, as it would likely result in the over-application of water. Local sources of real-time data are more appropriate for this purpose.

Explanation of Calculations

Baseline

In order to determine which landscapes are water-efficient, there must be a standard against which to judge water use. The water budget tool set the baseline amount of water at the amount of water required by a site if the landscaped area is watered at 100 percent of local reference evapotranspiration (ET_o). ET_o is representative of the amount of water lost from a well-maintained expanse of average-height green grass and the surrounding soil.[2] It varies by region, depending on the amount of sun, wind, humidity, and temperature at a location. Hot, dry, and windy locations have higher ET_o values than cool, humid locations. As explained above, this tool uses data based on 30-year historical averages for these variables.

Equation 1: Baseline

$$Baseline = ET_o \times A \times C_u$$

Where:
ET_o = Local reference evapotranspiration (inches/month)
A = Landscaped area (square feet)

[2] Irmak, S. and D. Haman. 2003. "ABE 343: Evapotranspiration: Potential or Reference?" Agricultural and Biological Engineering Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.

C_u = Conversion factor (0.6233 for results in gallons/month)

Landscape Water Allowance

The landscape water allowance (LWA) is the amount of supplemental water allotted for the designed landscape. For purposes of the specification, the LWA is 70 percent of the baseline amount of water that would be needed if the entire landscape was covered by a well-maintained expanse of average-height green grass.

The water budget method assumes that all plants will require some amount of supplemental water. EPA has assumed that a landscape will have a variety of vegetation that have different water needs and that none of the vegetation in a residential landscape will need 100 percent of ET_o. Thus, the allotment can be met by incorporating a mixture of high-, medium-, and low-water-using plants in the design of the landscape. The LWA does not mean that each plant is only given 70 percent of the water it needs to survive.

Equation 2: Landscape Water Allowance

$$LWA = 0.70 \times Baseline$$

Where:
LWA = Landscape water allowance (gallons/month)

Landscape Water Requirement

The landscape water requirement (LWR) is the amount of supplemental water required by the design of the established landscape. The LWR is calculated by dividing the landscape into hydrozones, determining the LWR for each hydrozone, and then adding these totals together. Separate hydrozones should be calculated for each category of vegetation planted (trees, shrubs, groundcover, turfgrass). Additional hydrozones should be calculated within vegetation categories if different types of irrigation equipment are used on the same type of planting.

The LWR is based on ET_o, the landscape coefficient, the area of the hydrozone, the lower quarter distribution uniformity (DU_{LQ}) of the associated type of irrigation equipment, and a portion of local rainfall designated as allowable rainfall (R_a). The landscape coefficient (K_L) is a factor used to modify ET_o that factors in the different vegetation species planted (the species factor [K_s]); the conditions at the location where vegetation is planted, such as the amount of sun and wind (the microclimate factor [K_{mc}]); and how closely the plants are grouped together (the density factor [K_d]). $K_L = K_s \times K_{mc} \times K_d$. Both K_d and K_{mc} range from 0.5 to 1.4, therefore, for the purposes of this tool, WaterSense is assuming K_d and K_{mc} are both approximately equal to 1.0 (their average values) to reduce the complexity of the calculations and simplify the equation to $K_L = K_S$.

The first step of calculating the LWR for a hydrozone consists of modifying ET_o according to plant type. Since ET_o is based on the water requirements of a high-water-using grass, relative percentages of ET_o are set as the requirements for different categories of vegetation. Low-water-using plants, such as a native groundcover, require a much lower percentage of ET_o than

a high-water-using tree, such as a fruit tree. As explained above, the percentages used to modify ET_o in the tool are not exact determinations of the water requirements of specific plantings, but are relative percentages based on a limited amount of data compiled on the water use of vegetation in California. Pools, spas, and ornamental water features are assigned the same coefficient as high-water-using turfgrass to account for the high amount of evaporation expected from these features.

After ET_o is modified to account for vegetation type, the LWR is further reduced by the amount of water that can be supplied by precipitation. For the purposes of this tool, WaterSense is allowing 25 percent of the 30-year historical average rainfall to be counted toward a plant's needs. Some portion of each rain event cannot be used by plants, such as rain that falls in short, extreme bursts and washes away before infiltrating the soil. Estimates of the amount that is useful to plants, commonly referred to as "effective rainfall," vary depending on a number of factors, but is often considered to be approximately 50 percent.[3] The rainfall allowance in this tool is a fraction of effective rainfall and leads to a more conservative landscape design. This landscape design will be more resilient in drier-than-average years or periods of unexpected drought.

Irrigation systems rarely water plants with 100 percent efficiency. For example, water sprayed from nozzles can be affected by moderate amounts of wind and the shape of a landscape design may not match the pattern in which water is distributed. This results in some areas of the landscape receiving less water than the rest of the landscape. To avoid patches of wilted vegetation, irrigation systems are scheduled to deliver more water than the amount required based solely on the type of vegetation. This tool modifies the LWR using average lower-quarter distribution uniformity (DU_{LQ}) values for each type of irrigation equipment. Distribution uniformity is the measure of uniformity of irrigation water applied over an area. DU_{LQ} is the ratio of the average of the lowest 25 percent of measurements to the overall average measurement. This is in excess of what would typically be required when scheduling an irrigation system, which should be based on site-specific conditions and minimized as much as possible, but is included in the tool to promote a more conservative landscape design. The data for the irrigation type and DU_{LQ} are based on the Irrigation Association's *Landscape Irrigation Scheduling and Water Management* (IA 2005).

If irrigation systems are not being installed on the site by the builder, an irrigation type still must be designated for each plant type and any pools, spas, or ornamental water features. For low-water-using trees, shrubs, and groundcover, standard drip irrigation is assumed. For all other categories of vegetation, fixed spray irrigation is assumed. This is to account for the type of system that might be installed after the home is sold. For the same reason, if irrigation systems are only installed on a portion of the landscape (e.g., only on turfgrass but not on shrubs), the remaining portions of the designed landscape must use the same assumptions. The specification requires that pools, spas, and ornamental water features be treated as turfgrass. Thus, for the purposes of the tool, these features are assigned fixed spray irrigation in order to account for the expected replacement of water lost to evaporation. Areas containing permeable

[3] Irrigation Association (IA). 2005. *Landscape Irrigation Scheduling and Water Management*. [*Currently out for review*].

hardscape (e.g., porous pavement) or nonvegetated softscape (e.g., mulched areas) are assigned no irrigation and do not count toward the landscape water requirement.

Equation 3: Landscape Water Requirement

$$LWR_H = \frac{1}{DU_{LQ}} \times [(ET_o \times K_L) - R_a] \times A \times C_u$$

Where:
LWR_H = Landscape water requirement for the hydrozone (gallons/month)
DU_{LQ} = lower quarter distribution uniformity (dimensionless)
ET_o = Local reference evapotranspiration (inches/month)
K_L = Landscape coefficient for the highest water-using plant in that hydrozone (dimensionless)
R_a = Allowable rainfall, designated by WaterSense as 25% of the site's peak monthly rainfall
A = Area of the hydrozone (square feet)
C_u = Conversion factor (0.6233 for results in gallons/month)

Results

The final part of the tool displays the water allowance and water requirement calculated for the designed landscape. The LWR must be less than the allotted amount in order for the landscape design to meet the criterion in the specification.

The tool also calculates and displays the total amount of turfgrass used in the landscape. This information is necessary for the inspector to verify the builder actually installed the designated amount of turfgrass at the home site.

Lastly, the tool displays the percent water reduction achieved by the designed landscape. This information may be used for a variety of purposes, such as comparing different landscape designs to choose which would be the most efficient design for a particular location.

II. Instructions

Each worksheet is formatted in an identical fashion:

- The blue section at the top displays the user, builder, and site information. Once the information is entered for Part 1, it is automatically populated into Parts 2 and 3 of the tool.
- The yellow section displays the equation(s) used in each worksheet.
- The gray section is the area of the worksheet where the user enters the required data.
- The green section displays the result.

Note: The tool only allows information to be entered into the white cells.

Before completing the tool, the user will need to gather the required peak watering month, ET_o, and rainfall data from the Water Budget Data Finder, as well as information regarding the

proposed vegetation and irrigation system equipment. To use the Data Finder, enter the zip code in which the home is being built. It will display the required inputs, which will be verified as part of the process for inspecting the home.

Part 1: Determining the Baseline and Landscape Water Allowance

1. Complete the site information in the blue section at the top of the worksheet. Enter the peak watering month for the site. Also, choose "yes" or "no" to indicate whether an irrigation system is being installed on the site.

2. Complete Step 1A by entering the area of the landscape in square feet. The landscaped area is defined as "The designed area of landscape excluding the footprint of the home and permanent hardscape areas such as driveways, sidewalks, and patios. Septic drainage fields and public right-of-ways should also be excluded from this calculation."

3. Complete Step 1B by entering the ET_o in inches obtained from the Data Finder for the site's peak month.

4. The baseline and LWA are displayed.

5. Click on the worksheet tab labeled "Part 2 – LWR" at the bottom of the screen to calculate the landscape water requirement.

Part 2: Determining the Landscape Water Requirement

1. Complete Step 2A by entering the rainfall in inches obtained from the Data Finder for the site's peak watering month.

2. Complete Step 2B by filling Table 1 with the required information. The information should reflect the proposed design of the established landscape. When completed, the total area of all of the hydrozones/landscape feature areas must equal the landscaped area entered in Part 1 to avoid an error message in Part 3. For each hydrozone/landscape feature area, complete the following information:

    a. Hydrozone/Landscape Feature Area: Enter the area of the hydrozone or landscape feature in square feet.

       Plant Type or Landscape Feature: From the dropdown list, choose the plant type (e.g., trees – high water requirement, turfgrass – medium water requirement, etc.) or landscape feature (i.e., permeable hardscape, nonvegetated softscape, or pool, spa, or water feature) for the associated hydrozone/landscape feature area. If there are multiple plant types or landscape features within one hydrozone, enter the feature with the highest water requirement. The landscape coefficient (K_L) for the respective plant type (or landscape feature) will automatically populate in the adjacent cell.

In general, a high value for K_L is used for plants that need a lot of water, and a low value is used for plants that need little water. As a general rule of thumb, species requiring the indicated amounts of water are designated as follows[4]:

- High K_L: Species that need more water than most plants within that type of vegetation (i.e., trees, shrubs, groundcover, turfgrass) or use 70 to 90 percent of ET_o.
- Moderate K_L: Species that need a typical amount of water as compared to other plants within that type of vegetation or use 40 to 60 percent of ET_o.
- Low K_L: Species that need less water than most plants within that type of vegetation or use less than 30 percent of ET_o.

If you are not familiar with the K_L values for the proposed plant types, contact your local cooperative extension, nursery, or landscape professional for guidance.

For permeable hardscape and nonvegetated softscape, the K_L is assumed to be zero and no water requirement will be assigned in Table 1. For a pool, spa, or water feature, the associated K_L is set at 0.8.

b. Irrigation Type and Lower Quarter Distribution Uniformity (DU_{LQ}): For each hydrozone, choose the type of irrigation (e.g., standard drip, rotor) that will be installed. According to the specification, sprinkler irrigation (fixed spray and rotor) may only be used on areas of turfgrass that are not on slopes greater than 4:1 (i.e., 25 percent or 14°) or strips less than 4 feet wide. The associated DU_{LQ} will automatically populate in the adjacent cell.

   Note: If the hydrozone/landscape feature area is designated as permeable hardscape or nonvegetated softscape then choose “no irrigation” from the dropdown list. If the hydrozone/landscape feature area is designated as “Pool, Spa, or Water Feature,” then set the irrigation type to “fixed spray.”

   If irrigation is not being installed on the site at this time: Although not installing irrigation, an irrigation type must be chosen. Use the following types of irrigation as indicated:

   - Drip-Standard: Low-water-using trees, shrubs and groundcover.
   - Fixed Spray: All turfgrass categories and medium- and high-water using trees, shrubs, and groundcover.
   - No Irrigation: Permeable hardscape and nonvegetated softscape areas.

c. LWR_H: The LWR for each hydrozone, in gallons per month, will be calculated by the tool and displayed in this column.

3. The result is displayed in the green section.

[4] University of California Cooperative Extension and California Department of Water Resources. 2000. *A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California.* The Landscape Coefficient Method and Water Use Classifications of Landscape Species (WUCOLS) III.

4. Click on the worksheet tab labeled "Part 3 – Results" at the bottom of the screen to review the results of the water budget tool.

Part 3: Results

If the total area of the hydrozone/landscape feature areas entered in Part 2 does not equal the landscaped area entered in Part 1, an error message in red text will appear at the top of the gray section requesting that Table 1 be completed.

1. Review the LWA and LWR calculated in Part 1 and Part 2.

2. Review the total area of turfgrass in the designed landscape. The percentage of designed landscape that is composed of turfgrass, pools, spas, and/or water features is also displayed.

3. The result is displayed in the green section.
    a. If the blue cell displays "YES" then the water budget criterion is met (i.e., LWR < LWA).

    b. If the blue cell displays "NO" then the designed landscape requires more water than the site is allotted. Adjustments should be made to the composition of the landscape and/or irrigation system in Step 2B of the water budget tool. Then return to Part 3 – Results to see if the revised design meets the water budget criterion.

When all of the information has been entered into the tool and the water budget has been met, print an entire copy of the completed tool and submit it to the builder to be included in the inspection documentation. This documentation must be provided to the builder prior to a home being inspected for compliance with EPA criteria.

III. Definitions

Allowable rainfall (R_a) –The amount of rainfall WaterSense is allowing to be incorporated into the water budget.

Baseline – The amount of water required by a site if watered at 100 percent of local reference evapotranspiration (ET_o).

Hydrozone – Grouping of plants with similar water and environmental requirements for irrigation with one of more common station/zone valves.[5]

Landscape coefficient (K_L) – Coefficient used to modify reference ET, which includes a species factor (K_s), density factor (K_d), and microclimate factor (K_{mc}). ($K_L = K_s \times K_d \times K_{mc}$)[6]

[5] Weinberg and Roberts 1988 and Water Management Committee 2001 in Irrigation Association (IA). 2005. *Landscape Irrigation Scheduling and Water Management*. [*Currently out for review*]

Landscape water allowance (LWA) – A volume of water allocated to the entire landscape area over a specified period of time.

Landscape water requirement (LWR) – The amount of water required by the landscape over a specified period of time.

Landscaped area (A) – The designed area of landscape excluding the footprint of the home and permanent hardscape areas such as driveways, sidewalks, and patios. Septic drainage fields and public right-of-ways should also be excluded from this calculation.

Lower quarter distribution uniformity (DU_{LQ}) – Distribution uniformity is the measure of uniformity of irrigation water applied over an area. DU_{LQ} is the ratio of the average of the lowest 25 percent of measurements to the overall average measurement.

Nonvegetated softscape – Areas of the landscape that are not hardscape and not planted (e.g., mulched areas).

Permeable hardscape – Material that covers the ground but allows water and oxygen to penetrate the soil. A concrete driveway would be impermeable hardscape whereas brick without mortar on sand would be permeable hardscape. Other common permeable hardscapes include decomposed granite, patio blocks, or flagstone surfaces, as long as no mortar is used.

Reference evapotranspiration (grass reference evapotranspiration) (ET_o) – Rate of evapotranspiration from an extensive surface of cool season grass cover of a uniform height of 12 centimeters, actively growing, completely shading the ground, and not short of water.[7]

Water budget – A water budget is used to calculate the amount of water a landscape needs, taking into account the inputs and outputs of water to and from the root zone. Inputs, such as precipitation, are subtracted from outputs, such as evapotranspiration, to calculate the water needs of the landscape. Many factors are taken into consideration when calculating a water budget, such as plant type and irrigation system efficiencies.

[6] Landscape 2000 in Irrigation Association (IA). 2005. *Landscape Irrigation Scheduling and Water Management*. [*Currently out for review*].
[7] FAO 1998 and ASCE 1990 in Irrigation Association (IA). 2005. *Landscape Irrigation Scheduling and Water Management*. [*Currently out for review*]

IV. Example

A new home in Chicago, Illinois, is being constructed on a 1/3-acre lot. The area remaining after subtracting the square footage of the home, driveway, and sidewalk is 12,280 square feet (ft^2). The builder is providing landscape for the entire yard and an irrigation system will be installed for all portions of the landscape. The builder plans to use vegetation from three main categories: high-water-using turfgrass, medium-water-using shrubs, and low-water-using groundcover. Additionally, there will be a 150-square-foot deck and some areas that are not vegetated, but covered with mulch.

Fixed spray irrigation is going to be installed on the turfgrass and standard drip irrigation is going to be installed for the shrubs and groundcover.

According to the Data Finder, the peak watering month for Chicago (zip code 60653) is June. ET_o during June is 6.43 inches and the average rainfall is 3.56 inches.

The builder completes the *WaterSense Water Budget Tool* and comes up with the following:

- 7,150 ft^2 high-water-using turfgrass
- 2,200 ft^2 medium-water-using shrubs
- 2,030 ft^2 low-water-using groundcover
- 900 ft^2 non-vegetated softscape (includes deck)

This design meets the water budget using turfgrass on 58 percent of the landscaped area. The builder achieves a 30 percent designed water use reduction from the baseline scenario.

Part 1 – Baseline & LWA

WaterSense Single-Family New Home Specification: Water Budget Tool

This water budget tool shall be used to determine if the designed landscape meets Criteria 4.1.1.1 of the specification.
Please refer to the WaterSense Water Budget Approach for additional information.

Your Name:	Landscaper
Builder Name:	WaterSense Builder
Lot Number/Street Address:	123 WaterSense Street
City, State, Zip Code:	Chicago, IL 60653
Peak Watering Month:	June

Obtain from Water Budget Data Finder at www.epa.gov/watersense/nhspecs/wb_data_finder.html

Is an irrigation system being installed on this site? yes

This worksheet determines the baseline and the landscape water allowance (LWA) for a site based on its peak watering month.

The baseline is the amount of water required by the site during the peak watering month if watered at 100 percent of reference evapotranspiration (ET_o). The following formula is used to calculate the baseline:

$$Baseline = ET_o \times A \times C_u$$

Where:
ET_o = Local reference evapotranspiration (inches/month)
A = Landscaped area (square feet)
C_u = Conversion factor (0.6233 for results in gallons/month)

The LWA is the water allotment for the site. The following formula is used to calculate the LWA:

$$LWA = 0.70 \times Baseline$$

Where:
LWA = Landscape water allowance (gallons/month)
Baseline = ET_o x landscaped area x 0.6233

To calculate the Baseline and LWA for a site, enter the designed landscaped area and average monthly reference evapotranspiration for the site's peak watering month. (Enter data in white cells only.)

STEP 1A - ENTER THE LANDSCAPED AREA (A)

12,280 **Area of the designed landscape (square feet)**

STEP 1B - ENTER THE AVERAGE MONTHLY REFERENCE EVAPOTRANSPIRATION (ET_o)

6.43 **Average monthly reference ET (inches/month) for the site's peak watering month**

Obtain from Water Budget Data Finder at www.epa.gov/watersense/nhspecs/wb_data_finder.html

OUTPUT - BASELINE FOR THE SITE

49,219 **Monthly baseline (gallons/month) based on the site's peak watering month**

OUTPUT - WATER ALLOWANCE FOR THE SITE

34,453 **Monthly landscape water allowance (gallons/month) based on the site's peak watering month**

Next Step: Click on the next tab labeled *Part 2 - LWR* to calculate the landscape water requirement.

Part 2 – LWR

WaterSense Single-Family New Home Specification: Water Budget Tool

This water budget tool shall be used to determine if the designed landscape meets Criteria 4.1.1.1 of the specification.
Please refer to the WaterSense Water Budget Approach for additional information.

Your Name:	Landscaper
Builder Name:	WaterSense Builder
Lot Number/Street Address:	123 WaterSense Street
City, State, Zip Code:	Chicago, IL 60653
Peak Watering Month:	June
Is an irrigation system being installed on this site?	yes

This worksheet determines the monthly landscape water requirement (LWR) for a site based on its peak watering month.

The monthly LWR is the water requirement specific to the designed landscape. The sum of the LWRs for each hydrozone equals the site LWR.
The following formula is used to calculate the LWR for each hydrozone:

$$LWR_H = \frac{1}{DU_{LQ}} \times [(ET_o \times K_L) - R_a] \times A \times C_u$$

Where:
LWR_H = Landscape water requirement for the hydrozone (gallons/month)
DU_{LQ} = Lower quarter distribution uniformity
ET_o = Local reference evapotranspiration (inches/month)
K_L = Landscape coefficient for the type of plant in that hydrozone (dimensionless)
R_a =Allowable rainfall, designated by WaterSense as 25% of average peak monthly rainfall (R)
A = Area of the hydrozone (square feet)
C_u = Conversion factor (0.6233 for results in gallons/month)

To calculate the LWR for the site, enter the information requested below for the site's peak watering month. (Enter data in white cells only.)

STEP 2A - ENTER THE AVERAGE MONTHLY RAINFALL (R) AT THE SITE FOR THE PEAK WATERING MONTH IDENTIFIED IN PART 1

3.56 **Average monthly rainfall (inches/month) for the site's peak watering month**

Obtain from Water Budget Data Finder a www.epa.gov/watersense/nhspecs/wb_data_finder.html

STEP 2B - COMPLETE TABLE 1 BELOW (enter data in white cells only)

Enter the area of the hydrozone (square feet). The total area must equal the landscaped area entered in Step 1A.
Choose the plant type from the dropdown list (source data is displayed in Table 2).
Choose the irrigation type from the dropdown list (source data is displayed in Table 3; guidance is displayed in Table 4 and Table 5).

Table 1. Landscape Water Requirement

Zone	e Feature Area (sq. ft.)	Plant Type or Landscape Feature	Landscape Coefficient (K_L)	Irrigation Type	Uniformity (DU_{LQ})	LWR_H (gal/month)
1	7,150	Turfgrass - High water requirement	0.8	Fixed Spray	65%	29,168
2	2,200	Shrubs - Medium water requirement	0.5	Drip - Standard	70%	4,555
3	2,030	Groundcover - Low water requirement	0.2	Drip - Standard	70%	716
4	900	Nonvegetated Softscape		No Irrigation	NA	-
5						-
6						-
7						-
8						-
9						-
10						-
11						-
12						-
13						-
14						-
15						-
Total Area	12,280	Landscape Water Requirement for the Site (gal/month)				34,439

Table 2. Plant Type or Landscape Feature and Associated Landscape Coefficient

Plant Type or Landscape Feature	K_L Water Requirements		
	Low	Medium	High
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turfgrass	0.6	0.7	0.8
Pool, Spa, or Water Feature	0.8		
Permeable Hardscape	0		
Nonvegetated Softscape	0		

Source: Based on LEED for Homes Rating System 2008.

Table 3. Distribution Uniformity

Irrigation Type	$DU_{(LQ)}$ or EU*
Drip - Standard	70%
Drip - Press Comp	90%
Fixed Spray	65%
Micro Spray	70%
Rotor	70%
No Irrigation	NA

*Lower quarter distribution uniformity (DU_{LQ}) applies to sprinkler zones and emission uniformity (EU) applies to drip/microirrigation zones.
Source: (The Irrigation Association, October 2001) in Landscape Irrigation Scheduling and Water Management, IA 2005.

Table 4. Appropriate Irrigation Types - Landscaped Areas with Irrigation Systems

IF THE PLANT TYPE IS:	THEN THE IRRIGATION TYPE CAN BE:			
	Drip - Standard	Drip - Press Comp	Fixed Spray	Micro Spray*
Trees	x	x		x
Shrubs	x	x		x
Groundcover	x	x		x
Turfgrass	x	x	x	x

* Micro spray may only be used on vegetation other than turfgrass if it meets the definition of microirrigation system, according to the 2009 WaterSense Single-Family New Home Specification: "Microirrigation System- The frequent application of small quantities of water on or below the soil surface as drops, tiny streams or miniature spray through emitters or applicators placed along a water delivery line. Microirrigation encompasses a number of methods or concepts; such as bubbler, drip, trickle, mist or spray and subsurface irrigation. For purposes of this specification, microirrigation includes emission devices that have flow rates less than 30 gallons per hour."

Table 5. Appropriate Irrigation Types - Landscaped Areas without Irrigation Systems

IF THE PLANT TYPE OR LANDSCAPE FEATURE IS:	THEN THE IRRIGATION TYPE SHALL BE:		
	Drip - Standard	Fixed Spray	No Irrigation
Trees, Shrubs, or Groundcover with Low Water Requirements (K_L = 0.2)	x		
Trees, Shrubs, or Groundcover with Medium or High Water Requirements (K_L > 0.2)		x	
Turfgrass with Low, Medium, or High Water Requirements (K_L > 0.2)		x	
Pool, Spa, or Water Feature		x	
Permeable Hardscape			x
Nonvegetated Softscape			x

*Please see additional information in the WaterSense Water Budget Approach for landscapes installed without irrigation systems.

OUTPUT - WATER REQUIREMENT FOR THE SITE

34,439 **Monthly landscape water requirement (gallons/month) based on the site's peak watering month**

Next Step: Click on the next tab labeled *Part 3 - Results* to view the results.

Part 3 – Results

WaterSense Single-Family New Home Specification: Water Budget Tool

This water budget tool shall be used to determine if the designed landscape meets Criteria 4.1.1.1 of the specification.
Please refer to the WaterSense Water Budget Approach for additional information.

Your Name:	Landscaper
Builder Name:	WaterSense Builder
Lot Number/Street Address:	123 WaterSense Street
City, State, Zip Code:	Chicago, IL 60653
Peak Watering Month:	June
Is an irrigation system being installed on this site?	yes

This worksheet determines if the designed landscape meets the water budget.

If the landscape water requirement is LESS than the landscape water allowance, then the water budget criterion is met.
If the landscape water requirement is GREATER than the landscape water allowance, then the landscape and/or irrigation system needs to be redesigned to use less water.

STEP 3A - REVIEW THE LWA AND LWR FROM PART 1 AND PART 2

LWA 34,453 (gallons/month) LWR 34,439 (gallons/month)

STEP 3B - REVIEW THE TOTAL AREA OF TURFGRASS* IN THE DESIGNED LANDSCAPE FROM STEP 2B

The designed landscape contains 7,150 square feet of turfgrass.* This is 58% of the landscaped area.

*This includes the area of any pools, spas, and/or water features, designated by WaterSense to be counted as turfgrass.

OUTPUT - DOES THE DESIGNED LANDSCAPE MEET THE WATER BUDGET?

YES If YES, then the water budget criterion is met.
If NO, then the landscape and/or irrigation system needs to be redesigned to use less water.

The designed landscape water requirement is a 30% reduction in water use from the baseline calculated in Part 1.

54	801.6			**Irrigation systems**		
55	801.6.1			Multi-stream, multi-trajectory rotating nozzles are installed in lieu of spray nozzles for turf or landscaping.	6	
56	801.6.2			Drip irrigation is installed.		
57		(1)		Drip irrigation is installed for landscape beds.	4	
58		(2)		Subsurface drip is installed for turf grass areas.	4	
59	801.6.3			Landscape Plan & Implementation are executed by a certified WaterSense Professional or equivalent as approved by adopting entity.	5	
60	801.6.4			Drip Irrigation Zones Implemented show plant type by name and water use or need for each emitter.	10	
61				NOTE: Points must be taken in 801.6.2(1) in order to claim points for 801.6.4. If points are claimed in 801.6.4, points cannot be claimed for 801.6.5(2).		
62	801.6.5			The irrigation system(s) is controlled by a smart controller. **Claim points for only one from (1)-(2) below:**		
63		(1)		Evapotranspiration (ET) based irrigation controller with a rain sensor or soil moisture sensor based irrigation controller.	8	
64		(2)		No irrigation is installed and a landscape plan is developed in accordance with Section 503.5, as applicable.	15	
65				NOTE: Points must be taken in 503.5(1), 503.5(2), 503.5(3), or 503.5(4) in order to receive points for 801.6.5(2). If points claimed for 801.6.5(2), points cannot be claimed for 801.6.1, 801.6.2, 801.6.4.		
66	801.7			**Rainwater collection and distribution**. Rainwater collection and distribution is provided.		
67	801.7.1			Rainwater is used for irrigation in accordance with the following.		

			(1)	Rainwater is diverted for landscape irrigation without impermeable water storage.	5 points	
			(2)	Rainwater is diverted for landscape irrigation with impermeable water storage.		
			(a)	50-499 gallon storage capacity	5 points	
			(b)	500-2499 gallon storage capacity	10 points	
			(c)	2500+ gallon or larger storage capacity (system is designed by a professional certified by The American Rainwater Catchment Systems Association or equivalent)	15 points	
			(d)	All irrigation demands are met by rainwater capture (documentation demonstrating the water needs of the landscape is provided and the system is designed by a professional certified by The American Rainwater Catchment Systems Association or equivalent).	25 points	0
801.7.2			Rainwater is used for interior demand in the following way (system is designed by a professional certified by The American Rainwater Catchment Systems Association or equivalent).			
			(1)	Rainwater provides for partial domestic demand (any locally approved uses).	5 points per appliance or fixture, 15 points maximum	
			(2)	Rainwater provides for total domestic demand.	25 points	0
			NOTE: Points must be taken in 801.7.1(2)(a)-(d) to be awarded points in 801.7.2.			
801.8			**Sediment filters.** Water filter is installed to reduce sediment and protect plumbing fixtures for the whole building or whole dwelling unit.		1	

802 - Innovative Practices

802.1 **Reclaimed, gray, or recycled water.** Reclaimed, gray, or recycled water is used as permitted by applicable code.

(1)	water closet flushed by reclaimed, gray, or recycled water	5 points each, 20 points maximum
(2)	irrigation from reclaimed, gray, or recycled water on-site	10 points

NOTE: Points awarded for either Section 802.1 or 802.5, not both.

802.2 **Automatic shutoff water devices**. One of following automatic shutoff water supply devices is installed. Where a fire sprinkler system is present, installer is to ensure the device will not interfere with the operation of the fire sprinkler system.

(1)	Excess water flow shutoff.	2 points
(2)	Leak detection system.	2 points

802.3 **Engineered Biological System or Intensive Bioremediation System.** An Engineered Biological System or Intensive Bioremediation System is installed and the treated water is used on site. Design and implementation is approved by appropriate regional authority. — **20**

802.4 **Recirculating humidifier.** Where a humidifier is required, a recirculating humidifier is used in lieu of a traditional "flow through" type. — **1**

802.5 **Advanced wastewater treatment system.** Advanced wastewater (aerobic) treatment system is installed and treated water is used on site. — **20**

NOTE: Points awarded for either Section 802.5 or 802.1, not both.

QWEL Field Audit Exercise
Instructions

This assignment requires the student to determine the distribution uniformity, precipitation rate, weekly watering budget, weekly run time, daily run time, cycles per day and minutes per cycle for a single turf station.

Instructions for completing the QWEL Field Audit exercise.

1 Record site data information onto the assignment sheet.

2 Draw a small diagram of the test area. The diagram does not need to be to scale but should include distances along each edge and indicate general shape as well as sprinkler head and catch can locations.

3 Collect catch can data. **Use straight sided containers.** If you are using your own catch cans refer to the manufacturers instructions for determining precipitation rate (PR) and distribution uniformity (DU_{lq}) and record onto the data sheets.

How to Perform a Simplified Catch-Can Test

1. Place containers in the area being irrigated.

2. Run your sprinkler system for a sufficient amount of time to collect a quarter inch or so of water. Record the run time on the data sheet.

3. Measure the depth of water (in inches) in each container with a ruler and record on the data sheet.

4. Add up the depth of water in the 25% of the cans that had the least amount of water then divide by the number of cans measured. For example, if 20 cans were used, the 5 cans with the least amount would be the lowest 25%. This is the Average Low Quarter CC used to calculate DU_{lq}.

5. Add up the depth of water in all cans then divide the total by the number of containers to get the average amount of water. This is the Average Total CC used to calculate DU_{lq} and PR.

6. Calculate DU_{lq} using the formula on the assignment sheet.

4 Calculate precipitation rate using formula on the assignment sheet.

5 Determine the Plant Water Requirement by obtaining 1 week of ET data from a nearby CIMIS station. You may need to create an account to get the data. The City of Santa Rosa (www.srcity.org/turftime) and MMWD (www.marinwater.org) provide local CIMIS data.

6 Determine the Run Time Multiplier using the formula on the assignment sheet.

7 Determine the Irrigation Water Requirement using the formula on the assignment sheet.

8 Determine the Irrigation Run Time for the week using the formula on the assignment sheet.

9 Determine the Daily Run Time using the formula on the assignment sheet and the Days per Week to Irrigate chart provided.

10 Determine the Cycles per Day using the formula on the assignment sheet. Round up to the nearest whole minute. The Time to Runoff is determined by observing or estimating the minutes it takes for water to begin to pond and run off the test area.

11 Determine the Station Run Time using the formula on the assignment sheet.

QWEL Field Audit Exercise

NAME _____

DATE _____

Site Data

Irrigation Type _____ Pace _____ feet / pace

Soil Type _____ Station Irrigated Area _____ ft^2

Plant Material _____

Root zone Depth _____ Inches

Catch Can Data -- Use a ruler to measure water depth in each straight-sided, flat bottomed catch device.

Can #	Depth (in.)	Can #	Depth (in.)	Can #	Depth (in.)	Can #	Depth (in.)

Uniformity Calculation

Average Low Quarter CC = $\frac{\text{Sum of water depth in lowest 25\%}}{\text{Number of cans}}$ = _____ Inches

Average Total CC = $\frac{\text{Sum of water depth in all cans}}{\text{Number of all cans}}$ = _____ Inches

DU_{lq} = $\frac{\text{Avg. } CC_{lq}}{\text{Avg. Total CC}}$ = _____

Precipitation Rate Calculation

Test Time _____ Minutes

Precipitation Rate (PR) = $\frac{\text{(Avg. Total CC) (60)}}{\text{Test Time}}$ = _____ Inches / Hr.

QWEL Field Audit Exercise

NAME

DATE

Site Map -- Use this page to map audit area(s). Include sprinkler layout and catch can placement.

Ways to Improve Uniformity	Notes and Site Observations
1	
2	
3	
4	
5	

QWEL Field Audit Exercise

NAME _____

DATE _____

Plant Water Requirement (PWR) -- Assume time frame of 1 week. Use weekly ETo CIMIS data.

ETo	x	KL	=	PWR
_____	x	_____	=	_____ inches/wk

Run Time Multiplier (RTM) -- Adjusts the number of minutes to compensate for a lack of perfect uniformity.

1.0	+	(.4 + (.6 x Du_{lq}))	=	RTM
1.0	+	(.4 + (.6 x _____))	=	_____ inches/wk

Irrigation Water Requirement (IWR) -- Total inches required to apply PWR.

PWR	x	RTM	=	IWR
_____	x	_____	=	_____ inches/wk

Irrigation Run Time -- Number of minutes to run per week.

IWR	+	PR	x	60	=	IRT
_____	+	_____	x	60	=	_____ mins/wk

Daily Run Time

IRT	+	Number of Days to Irrigate (see chart)	=	Daily Run Time
_____	+	_____	=	_____ minutes

Days per Week to Irrigate

ETo	Cool 0 - 0.5"	Warm 0.6 - 1"	Hot 1.1 - 1.5+"
Turf	1 - 2 days	2 - 3 days	3 to 7 days
Annuals	2 - 3 days	3 to 5 days	4 to 7 days
Shrub	Every 2 weeks	1 per week	1 - 2 days
Trees	None	Once in Apr/May and Once in Sept/Oct	Once each in June, July and August

Cycles per Day -- Use multiple start times to reduce runoff.

Daily Run Time (minutes)	+	Time to Runoff (minutes)	=	Cycles per Day
_____	+	_____	=	_____ cycles (round **up** to next whole minute)

Station Run Time

Daily Run Time (minutes)	+	Cycles per Day (whole minute)	=	Run Time per Cycle
_____	+	_____	=	_____ minutes (round **up** to next whole minute)

Chapter 5

Lot Design, Preparation, and Development

Item #	Green Building Practices	Points
501	**Lot Selection**	
501.1	Lot: The lot is selected to minimize environmental impact by one or more of the following:	
(1)	An infill site is selected.	4
(2)	A greyfield or an EPA-recognized brownfield lot is selected.	5
501.2	**Mass Transportation**: A range of mass transportation choices are promoted by one or more of the following:	
(1)	A lot is selected within one-half mile (805 m) of pedestrian access to a mass transit system or within five miles (8046 m) of a mass transit station with provisions for parking.	3
(2)	Walkways, street crossings, and entrances designed to promote pedestrian activity are provided. New buildings are connected to existing sidewalks and areas of development.	3
(3)	A lot is selected within one-half mile (805 m) of six or more community resources [e.g., recreational facilities (such as pools, tennis courts, basketball courts), parks, grocery store, post office, place of worship, community center, daycare center, bank, school, restaurant, medical/dental office, laundromat/dry cleaner).	3
503	**Lot Design**	
503.0	**Intent**: The lot is designed to avoid detrimental environmental impacts first, minimize any unavoidable impacts next, and finally mitigate for those impacts that do occur. The project is designed to minimize environmental impacts and to protect, restore, and enhance the natural features and environmental quality of the lot. (to be awarded points allocated for design, the intent of the design is implemented)	
503.1	**Natural Resources**: Natural resources are conserved by one or more of the following:	
(4)	Basic training in tree or other natural resource protection is provided for the on-site supervisor.	4
503.5	**Landscape Plan**: A landscape plan is developed to limit water and energy use while preserving or enhancing the natural environment.	
(2)	Vegetation and trees are selected that are native or regionally appropriate for local growing conditions.	4
(3)	A percentage of cool season turf areas are limited.	
(a)	0 percent	4
(4)	Plants with similar watering needs are grouped (hydrozoning).	5
(5)	Species and locations for tree planting are identified that will provide summer shading of streets, parking areas, and buildings to moderate temperatures when trees reach maturity.	5
504	**Lot Construction**	
504.0	**Intent**: Environmental impact during construction is avoided to the extent possible; impacts that do occur are minimized, and any significant impacts are mitigated.	

(1)	a bathroom **(Points awarded for each bathroom)**	**1 3 Points**
(2)	all lavatory faucets	**2 Additional Points**
801.5.2	pedal-activated faucet is installed to enable intermittent on/off operation. **(Points awarded per fixture.)**	**1 3 Points**

801.6	**Water Closets and Urinals.** Water closets and urinals are in accordance with the following and if the gallons per flush rate is not printed on the fixture then documentation of the flush rate must be provided at the plumbing final inspection: **(For water closets, points awarded for either Section 801.6 or 802.2, not both.)**	
(2)	A water closet is installed with an effective flush volume of 1.28 gallons (4.85 L) or less when tested in accordance with ASME A112.19.2 (all water closets) and ASME A112.19.14 (all dual flush water closets), and is in accordance with EPA WaterSense *Tank-Type High-Efficiency Toilet*. **(Points awarded per fixture.)**	**6 18 Points Max**
(3)	A urinal is installed with a flush volume of 0.5 gallons (1.9 L) or less when tested in accordance with ASME A112.19.2. **(Points are awarded per fixture.)**	**4 4 Points Max**
(4)	All water closets and all urinals are in accordance with Section 801.6(2) or Section 801.6(3), as applicable.	**6 Additional Points**

801.7	**Irrigation Systems**	
801.7.1	A low-volume irrigation system is installed:	
(2)	drip irrigation OR	**4**
(3)	bubblers OR	**4**
(4)	drip emitters OR	**4**
(5)	soaker hose	**4**
(6)	subsurface irrigation	**6**
801.7.2	Irrigation system is in accordance with both of the following:	**3**
(1)	designed by a professional in accordance with EPA WaterSense requirements or equivalent	
(2)	Installed in accordance with EPA WaterSense program, or equivalent.	
801.7.3	Irrigation system is zoned separately for areas with different watering needs (hydrozoning).	**2**
801.7.4	The irrigation system(s) is controlled by a smart controller	
(1)	Evapotranspiration (ET) based irrigation controller with a rain sensor	**4**
(2)	Soil moisture sensor based irrigation controller	**4**
(3)	No irrigation is installed and a landscape plan is developed in accordance with Section 503.5, as applicable.	**15**

801.8	**Rainwater Collection and Distribution.** Rainwater collection and distribution is provided in an active system.	
(1)	Rainwater is collected and used	
(a)	1 gallon per square foot for 100% of roofed area is collected and at least 60% of the roof area is collected.	**10**
(b)	1 gallon per square foot for 75% of roofed area is collected and at least 50% of the roof area is collected.	**8**
(c)	1 gallon per square foot for 50% of roofed area is collected and at least 40% of the roof area is collected.	**6**
(2)	Rainwater is distributed using a renewable energy source or gravity.	**2**

(3)	Rainwater that is collected in (1) above is used in an irrigation system as described in 801.7.1	10

802	Innovative Practices	
802.1	**Gray Water.** Gray water, as specified in ICC IRC, Appendix O, is separated and reused, as permitted by local building code. **[Points awarded for either Section 802.1(1) or 802.1(2), not both.]**	
(2)	irrigation from reclaimed or recycled water on-site	10
802.2	**Composting or Waterless Toilets and/or Urinals.** Composting or waterless toilets and/or urinals are in accordance with the following: **(For water closets, points awarded for either Section, 802.2 or 801.6, not both)**	24 Points Max
(2)	Composting or waterless toilet and/or urinal is installed **(Points awarded per fixture)**	8
(3)	All toilets and urinals are in accordance with Section 802.2(2).	8 Additional Points

802.3	**Automatic Shutoff Water Devices.** One of the following automatic shutoff water supply devices is installed. Where a fire sprinkler system is present, installer is to ensure that device will not interfere with the operation of the fire sprinkler system.	2
(1)	excess water flow shutoff	
(2)	leak detection system	

802.4	A real-time water use meter device is installed where the home occupant can easily see and monitor the home's water use like a KopyKap	4

802.5	Recirculating water pump is triggered by either a motion sensor or is switch activated	4

TOTAL REQUIRED:	**0 - 3000 HSF**	**18**
	300 1- 5000 HSF	**28**
	5001 - 8000 HSF	**50**
	8000+ HSF	**61**

LEED® for Homes Rating System

January 2008

SS 2: Landscaping
Maximum points: 7

Intent

Design landscape features to avoid invasive species and minimize demand for water and synthetic chemicals.

Requirements

Prerequisites

2.1 No Invasive Plants. Introduce no invasive plant species into the landscape.

Note: Invasive plant species vary by region. Consult the local Cooperative Extension Service or state agencies. A list of regional resources is available from the U.S. Department of Agriculture, at www.invasivespeciesinfo.gov/unitedstates/state.shtml. Not all nonnative species are considered invasive.

Credits

Note: Points shown below are for homes that are fully landscaped. A project that has not completed the designed landscaping may earn up to 50% of the points for each credit as long as 50% or more of the designed landscaping is completed upon certification. In this case, 100% completion of the landscaping must be required by homeowner association or other rules within a specific time period not to exceed one year after occupancy. Erosion controls and soil stabilization measures must be robust enough to be effective for one year. The builder or project team must also develop a landscaping plan that meets the requirements in SS 2 and provide it to the homeowner.

2.2 Basic Landscape Design (2 points). Meet all of the following requirements for all designed landscape softscapes:

a) Any turf must be drought-tolerant.

b) Do not use turf in densely shaded areas.

c) Do not use turf in areas with a slope of 25% (i.e., 4:1 slope).

d) Add mulch or soil amendments as appropriate.

Mulch is defined as a covering placed around plants to reduce erosion and water loss and to help regulate soil temperature. In addition, upon decomposition, organic mulches serve as soil amendments. The type of mulch selected can affect soil pH.

e) All compacted soil (e.g., from construction vehicles) must be tilled to at least 6 inches.

AND/OR

2.3 Limit Conventional Turf (maximum 3 points, as specified in Table 3). Limit the use of conventional turf in the designed landscape softscapes.

Table 3: Limited Conventional Turf

Percentage of designed landscape softscape area that is conventional turf	Points
41–60%	1
21–40%	2
20% or less	3

AND/OR

2.4 Drought-Tolerant Plants (maximum 2 points, as specified in Table 4). Install drought-tolerant plants.

OR

2.5 Reduce Overall Irrigation Demand by at Least 20% (maximum 6 points, as specified in Table 5). Design the landscape and irrigation system to reduce overall irrigation water usage. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below.

Table 4: Drought-Tolerant Plants

Percentage of installed plants that are drought-tolerant	Points
45–89%	1
90% or more	2

Table 5. Reduction in Water Demand

Reduction in estimated irrigation water usage	SS 2.5 points	WE 2.3 points	Total points
20–24%	2	0	2
25–29%	3	0	3
30–34%	4	0	4
35–39%	5	0	5
40–44%	6	0	6
45–49%	6	1	7
50–54%	6	2	8
55–59%	6	3	9
60% or more	6	4	10

Method for Calculating Reduction in Irrigation Demand

Step 1. Calculate the baseline irrigation water usage:

Baseline Usage= Landscaped Area * ET_0 * 0.62

where ET_0=Baseline Evapotranspiration Rate (available from local and state Departments of Agriculture)

Step 2. Calculate the design case irrigation water usage:

Design Case Usage = (Landscaped Area * ETL + IE) * CF * 0.62

where ETL = ET_0 * KL and KL = K_S * K_{MC}. Refer to **Tables 6 and 7** for values for K_S and K_{MC}, and to **Table 8** for values for IE. For CF, use estimated value based on manufacturer's specifications for percentage water savings.

Step 3. Calculate the percentage reduction in irrigation water usage:

Percentage Reduction = (1 – Design Case Usage ÷ Baseline Usage) * 100

Step 4. Refer to **Table 5**, above, to determine points earned.

Table 6: Species Factor

Vegetation type	Species factor (KS)		
	Low	Average	High
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turf	0.6	0.7	0.8

Table 7. Microclimate Factor

Example microclimate impacts	Microclimate factor (K_{MC})		
	Low	Average	High
Shading	0.5	0.8	1.0
High sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1.0	1.2	1.5

Table 8. Irrigation Efficiency

Irrigation type	Irrigation efficiency (IE)	
	Low	High
Fixed spray	0.4	0.6
Impact and microspray	0.5	0.7
Rotors	0.6	0.8
Multistream rotators	0.6	0.8
Low volume and point source (e.g., drip)	0.7	0.9

Synergies and Trade-Offs

A project receiving points in SS 2.5 should also refer to WE 2.3.

Any measures chosen in SS 2 should be integrated with irrigation system design, which is addressed in WE 2. Rainwater and graywater reuse systems (WE 1) should also be included in landscaping design.

SS 3: Local Heat Island Effects
Maximum points: 1

Intent

Design landscape features to reduce local heat island effects.

Requirements

Prerequisites

None.

Credits

3 **Reduce Local Heat Island Effects (1 point).** Do one of the following:

a) Locate trees or other plantings to provide shading for at least 50% of sidewalks, patios, and driveways within 50 feet of the home. Shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years' growth.

b) Install light-colored, high-albedo materials or vegetation for at least 50% of sidewalks, patios, and driveways within 50 feet of the home. Acceptable strategies include the following:

i. white concrete;

ii. gray concrete;

iii. open pavers (counting only the vegetation, not the pavers); and

iv. any material with a solar reflectance index (SRI) of at least 29.

Synergies and Trade-Offs

Shading hardscapes around the home can reduce irrigation needs as well as temper the home's outdoor environment and reduce cooling loads.

Providing shade is addressed in two other credits: EA 1.2 (Exceptional Energy Performance); and SS 4.3(b) and (c) (Vegetated Roof).

Locating fences, trees, shrubs or other plantings appropriately can capture or deflect seasonal breezes.

SS 4: Surface Water Management
Maximum points: 7

Intent

Design site features to minimize erosion and runoff from the home site.

Requirements

Prerequisites

None.

Credits

Note: Certain surface water management strategies may be regulated, restricted, or even prohibited by local water authorities or code requirements.

4.1 Permeable Lot (maximum 4 points, as specified in Table 9). Design the lot such that at least 70% of the built environment, not including area under roof, is permeable or designed to capture water runoff for infiltration on-site. Area that can be counted toward the minimum includes the following:

a) Vegetative landscape (e.g., grass, trees, shrubs).

b) Permeable paving, installed by an experienced professional. Permeable paving must include porous above-ground materials (e.g., open pavers, engineered products) and a 6-inch porous subbase, and the base layer must be designed to ensure proper drainage away from the home.

c) Impermeable surfaces that are designed to direct all runoff toward an appropriate permanent infiltration feature (e.g., vegetated swale, on-site rain garden, or rainwater cistern).

4.2 Permanent Erosion Controls (1 point). Design and install one of the following permanent erosion control measures:

a) If portions of the lot are located on a steep slope, reduce long-term runoff effects through use of terracing and retaining walls.

OR

b) Plant one tree, four 5-gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed lot area (including area under roof).

4.3 Management of Runoff from Roof (maximum 2 points). Design and install one or more of the following runoff control measures:

a) Install permanent stormwater controls (e.g., vegetated swales, on-site rain garden, dry well, or rainwater cistern) designed to manage runoff from the home (1 point).

b) Install vegetated roof to cover 50% of the roof area (0.5 point).

OR

c) Install vegetated roof to cover 100% of the roof area (1 point).

d) Have the site designed by a licensed or certified landscape design or engineering professional such that all water runoff from the home is managed through an on-site design element (2 points).

Table 9: Permeable Area

Percentage of buildable lot (excluding area under roof) that is permeable	Points
70–79%	1
80–89%	2
90–99%	3
100%	4

Synergies and Trade-Offs

SS 1.1 addresses erosion control during construction.

Trees, shrubs or groundcover installed for erosion control can be designed as drought-tolerant or otherwise preferable; see SS 2 for more information on landscaping. Conventional turf is less permeable than other plantings and consequently less effective at managing runoff.

WE 1: Water Reuse
Maximum points: 5

Intent

Use municipal recycled water, or offset central water supply through the capture and controlled reuse of rainwater and/or graywater.

Requirements

Prerequisites

None.

Credits

Note: Rainwater and graywater capture systems are subject to local codes and may require special permits. Note that the water quality should meet local standards and consult manufacturers' recommendations to determine the compatibility of plumbing fixtures with graywater. Many states and regulatory agencies require that water going into a toilet or sink meet potable water standards; builders should comply with local codes.

1.1 Rainwater Harvesting System (maximum 4 points, as specified in Table 10). Design and install a rainwater harvesting and storage system (including surface runoff and/or roof runoff) for landscape irrigation use or indoor water use. The storage system must be sized to hold all the water from a 1-inch rainfall event (equivalent to 0.62 gallons per square foot of roof area used for capture), taking into consideration the size of the harvest system (i.e., 50% or 75% of total roof area, depending on the measure chosen from Table 10).

AND/OR

1.2 Graywater Reuse System (1 point). Design and install a graywater reuse system for landscape irrigation use (i.e., not a septic system) or indoor water use. The system must include a tank or dosing basin that can be used as part of the irrigation system. Graywater must be collected from at least one of the following:

- ❑ clothes washer;
- ❑ showers;
- ❑ some combination of faucets and other sources estimated to exceed 5,000 gallons per year.

OR

1.3 Use of Municipal Recycled Water System (3 points). Design the plumbing such that irrigation system water demand is supplied by municipal recycled water. This is applicable only in communities with a municipal recycled water program.

Note: A home using a municipal recycled water system cannot receive points under WE 1.2 (Graywater Reuse System) or WE 1.1 (Rainwater Harvesting System) for outdoor applications.

Synergies and Trade-Offs

A project receiving points for WE 1.3 must skip WE 1.1 and WE 1.2.

Rainwater harvesting and graywater reuse irrigation systems should be integrated with resource-efficient landscape (SS 2) and irrigation system design (WE 2).

Table 10: Rainwater Harvesting

System Size	Application	Points
≥ 50% of roof area	Indoor only	2
≥ 50% of roof area	Outdoor only	3
≥ 75% of roof area	Both indoor & outdoor	4

WE 2: Irrigation System
Maximum points: 4

Intent

Minimize outdoor demand for water through water-efficient irrigation.

Requirements

Prerequisites

None.

Credits

Note: Points shown below are for irrigation systems installed throughout the designed landscape. If only 50% of the designed landscape includes these measures, then only 50% of the points are available. Even if part of the yard is not landscaped, the irrigation system must be stubbed to that part of the yard, as appropriate.

2.1 High-Efficiency Irrigation System (1 point each, maximum 3 points). Design and install a high-efficiency irrigation system (based on overall landscaping plans, including measures adopted in SS 2) such that any of the following are met:

a) Install an irrigation system designed by an EPA Water Sense certified professional.

b) Design and install an irrigation system with head-to-head coverage.

c) Install a central shut-off valve.

d) Install a submeter for the irrigation system.

e) Use drip irrigation for at least 50% of landscape planting beds to minimize evaporation.

f) Create separate zones for each type of bedding area based on watering needs.

g) Install a timer or controller that activates the valves for each watering zone at the best time of day to minimize evaporative losses while maintaining healthy plants and obeying local regulations and water use guidance.

h) Install pressure-regulating devices to maintain optimal pressure and prevent misting.

i) Utilize high-efficiency nozzles with an average distribution uniformity (DU) of at least 0.70. This may include conventional rotors, multistream rotors, or high-efficiency spray heads, but the DU must be verified by manufacturer documentation or third-party tests. A point source (drip) irrigation system should be counted as having a DU of 0.80.

j) Check valves in heads.

k) Install a moisture sensor controller or rain delay controller. For example, "smart" evapotranspiration controllers receive radio, pager, or Internet signals to direct the irrigation system to replace only the moisture that the landscape has lost because of heat, wind, etc.

AND/OR

2.2 Third-Party Inspection (1 point). Perform a third-party inspection of the irrigation system in operation, including observation of all of the following:

a) All spray heads are operating and delivering water only to intended zones.

b) Any switches or shut-off valves are working properly.

c) Any timers or controllers are set properly.

d) Any irrigation systems are located at least 2 feet from the home.

e) Irrigation spray does not hit the home.

OR

2.3 Reduce Overall Irrigation Demand by at Least 45% (maximum 4 points, as specified in Table 11). Design the landscape and irrigation system to reduce the overall irrigation water demand water budget. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below.

Note: A project must earn full points in SS 2.5 before receiving points for this credit.

Table 11: Reduction in Water Demand

Reduction in estimated irrigation water usage	WE 2.3 points	SS 2.5 points	Total points
45–49%	1	6	7
50–54%	2	6	8
55–59%	3	6	9
60% or more	4	6	10

Method for Calculating Reduction in Irrigation Demand

Step 1. Calculate the baseline irrigation water usage:

Baseline Usage= Landscaped Area * ET_0 * 0.62

where ET_0=Baseline Evapotranspiration Rate (available from local and state Departments of Agriculture)

Step 2. Calculate the design case irrigation water usage:

Design Case Usage = (Landscaped Area * ET_L ÷ IE) * CF * 0.62

where $ET_L = ET_0 * K_L$ and $K_L = K_S * K_{MC}$. Refer to **Tables 12 and 13** for values for K_S and K_{MC}, and to **Table 14** for values for IE. For CF, use estimated value based on manufacturer's specifications for percentage water savings.

Step 3. Calculate the percentage reduction in irrigation water usage:

Percentage Reduction = (1 – Design Case Usage ÷ Baseline Usage) * 100

Step 4. Refer to **Table 11**, above, to determine points earned.

Table 12: Species Factor

Vegetation type	Species factor (K_S)		
	Low	Average	High
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turf	0.6	0.7	0.8

Table 13: Microclimate Factor

Example microclimate impacts	Microclimate factor (K_{MC})		
	Low	Average	High
Shading	0.5	0.8	1.0
High sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1.0	1.2	1.5

Table 14: Irrigation Efficiency

Irrigation type	Irrigation efficiency (IE)	
	Low	High
Fixed spray	0.4	0.6
Impact and microspray	0.5	0.7
Rotors	0.6	0.8
Multistream rotators	0.6	0.8
Low volume and point source (e.g., drip)	0.7	0.9

Synergies and Trade-Offs

A project receiving points for WE 2.3 must skip WE 2.1 and 2.2.

A project receiving points for WE 2.3 must achieve full points in SS 2.5.

This irrigation system design must address all aspects of the landscape design, including any features from SS 2, as well as any rainwater harvesting or graywater reuse system (WE 1).

Home Innovation RESEARCH LABS

#REF!	2012	Current Status		Performance Level Minimums			
		Score	Mandatory	Bronze	Silver	Gold	Emerald
	This Chapter	0	N/A	25	39	67	92
#REF!	This Project	#REF!	#REF!	231	349	509	641

NGBS Scoring for New Construction for BGNM
ICC 700-2012 National Green Building Standard™

Practice #	Chapter 8: Water Efficiency	Points Available	Points Claimed	Notes	Approved Products
801 - Indoor and Outdoor Water Use					
801.0	**Intent.** Measures that reduce indoor and outdoor water usage are implemented.				
801.1	**Indoor hot water usage.** Indoor hot water supply system is in accordance with one of the practices listed in items (1) through (5). The maximum water volume from the source of hot water to the termination of the fixture supply is determined in accordance with Tables 801.1(1) or 801.1(2), or 50 feet, whichever is less. - Where more than one water heater is used or where more than one type of hot water supply system, including multiple circulation loops, is used, points are awarded based on the system that qualifies for minimum number of points. - Systems with circulation loops are eligible for points only if pumps are demand controlled. Circulation systems with timers or aquastats and constant-on circulation systems are not eligible to receive points. -The points are awarded only if the pipes are insulated in accordance with Section 704.5.3. See Tables 801.1(1) and 801.1(2)				
	(1) The maximum volume from the water heater to the termination of the fixture supply at furthest fixture is 128 ounces (1 gallon or 3.78 liters). — 11 points	#REF!			--
	(2) The maximum volume from the water heater to the termination of the fixture supply at furthest fixture is 64 ounces (0.5 gallon or 1.89 liters). — 17 points				
	(3) The maximum volume from the water heater to the termination of the fixture supply at furthest fixture is 32 ounces (0.25 gallon or 0.945 liters). — 29 points				
	(4) A demand controlled hot water priming pump is installed on the main supply pipe of the circulation loop and the maximum volume from this supply pipe to the furthest fixture is 24 ounces (0.19 gallons or 0.71 liters). — 35 points				
	(4a) 801.1(4) is met AND the volume in the circulation loop (supply) from the water heater or boiler to the branch for the furthest fixture is no more than 128 ounces (1 gallon or 3.78 liters). — 39 points		0		
	NOTE: See 704.5.3.				
(5)	A central hot water recirculation system is implemented in **multi-unit buildings** in which the hot water line distance from the recirculating loop to the engineered parallel piping system (i.e., manifold system) is less than 30 feet (9144 mm) and the parallel piping to the fixture fittings contains a maximum of 64 ounces (1.89 liters) (115.50 cubic inches) (0.50 gallons). **Multi-unit not chosen. Points not available for this practice. See Start Here! worksheet.**	9			--
(6)	Tankless water heater(s) with at least 0.5 gallon (1.89 liters) of storage are installed or a tankless water heater that ramps up to at least 110F within 5 seconds is installed. The storage may be internal or external to the tankless water heater. NOTE: Points must be claimed for 801.1.1(1-5) in order to claim points for 801.1.1(6).	4			--
801.2	**Water-conserving appliances.** ENERGY STAR or equivalent water-conserving appliances are installed. **Claim points for all that apply from (1)-(2) below:**				
(1)	dishwashers (multiples must all comply)	2			--
(2)	washing machine with a water factor of >6.0 **OR** with a water factor of ≤6.0 NOTE: If multiple dishwashers and washing machines are installed, ALL instances must meet the above conditions to be awarded points. Multi-Unit Building Note: Washing machines are installed in individual units or provided in common areas of multi-unit buildings.	>6.0 = 13 pts ≤6.0 = 24 pts	0		--
801.3	**Showerheads.** Showerheads are in accordance with the following:				
(1)	The total maximum combined flow rate of all showerheads controlled by a single valve at any point in time in a shower compartment is 1.6 to less than 2.5 gpm. Maximum of two valves are installed per shower compartment. The flow rate is tested at 80 psi (552 kPa) in accordance with ASME A112.18.1. Showerheads are served by an automatic compensating valve that complies with ASSE 1016 or ASME A112.18.1 and specifically designed to provide thermal shock and scald protection at the flow rate of the showerhead. *For SI: 1 gallon per minute = 3.785 L/m* **Points awarded per shower compartment. In multi-unit buildings, the average of the points assigned to individual dwelling units may be used as the number of points available for this practice (rounded to the nearest whole number).**	1 fixture = 4 pts 2 fixtures = 5 pts 3 fixtures = 6 pts 4+ fixtures = 7 pts	0		--
(2)	All shower compartments in the dwelling units and common areas meet the requirements of 801.3(1). NOTE: Points must be claimed for 801.3(1) in order to claim points for 801.3(2).	2.0 to <2.5 gpm = 11 pts 1.6 to <2.0 gpm = 14 pts	0		--
(3)	Any control that can shut off water flow without affecting temperature is installed. **Points awarded per shutoff.**	1 shutoff = 1 pt 2 shutoffs = 2 pts 3 shutoffs = 3 pts	0		--
801.4	**Lavatory Faucets**				
801.4.1	Water-efficient lavatory faucets with 1.5 gpm (5.68 L/m) or less maximum flow rate when tested at 60 psi (414 kPa) in accordance with ASME A112.18.1 are installed:				
(1)	ALL lavatory faucets per bathroom comply. **Points awarded for each bathroom. In multi-unit buildings, the average of the points assigned to individual dwelling units may be used as the number of points available for this practice (rounded to the nearest whole number).**	1 bath = 1 pt 2 baths = 2pts 3+ baths = 3 pts	0		--
(2)	ALL lavatory faucets per dwelling unit(s) and common areas comply. NOTE: Points must be claimed for 801.4.1(1) in order to claim points for 801.4.1(2).	6			--
801.4.2	Self-closing valve, motion sensor, metering, or pedal-activated faucet is installed to enable intermittent on/off operation.	1 fix. = 1 pt 2 fix. = 2 pts 3+ fix. = 3 pts	0		--
801.5	**Water closets and urinals.** Water closets and urinals are in accordance with the following:				

	(1)	Water closets and urinals installed meet the following conditions: (a) All water closets are 1.28 gallons per flush or less and all urinals are 0.5 gallons per flush or less, **OR** (b) All water closets and urinals are waterless or composting.	**Mandatory for Gold or Emerald**	**Not Eligible for Gold or Emerald**		--
	(2)	A water closet is installed with an effective flush volume of 1.28 gallons (4.85 L) or less when tested in accordance with ASME A112.19.2/CSA B45.1 (all water closets) or when tested in accordance with ASME A112.19.14 (all dual flush water closets), and is in accordance with EPA WaterSense Tank-Type High-Efficiency Toilet. **Points awarded per fixture. In multi-unit buildings, the average of the points assigned to individual dwelling units may be used as the number of points available for this practice (rounded to the nearest whole number).**	**1 fixture = 2 pts 2 fixtures = 4 pts 3+ fixtures = 6 pts**	**0**		--
	(3)	All water closets are in accordance with Section 801.5(2).	**11**			--
	(4)	All water closets are in accordance with Section 801.5(2) and one or more of the following are installed:				
	(a)	Dual flush (or other) water closets are used that have a flush volume of 1.2 gallons or less and comply with 801.5(2); and all other water closets comply with 801.5(2). **Points awarded per toilet. In multi-unit buildings, the average of the points assigned to individual dwelling units may be used as the number of points available for this practice (rounded to the nearest whole number).** **NOTE:** Points must be claimed for 801.5(3) in order to claim points for 801.5(3)(a).	**1 fixture = 1 pt 2 fixtures = 2 pts 3+ fixtures = 3 pts**	**0**		--
	(b)	One or more urinals are installed with a flush volume of 0.5 gallons (1.9L) or less when tested in accordance with ASME A112.19.2 and all other water closets comply with 801.5(2). **NOTE:** Points must be claimed for 801.5(3) in order to claim points for 801.5(3)(b).	**1**			--
	(c)	One or more composting or waterless toilets and/or urinals are installed and all other water closets comply with 801.5(2). **NOTE:** Points must be claimed for 801.5(3) in order to claim points for 801.5(3)(c).	**6**			--
801.6		**Irrigation systems**				
801.6.1		Multi-stream, multi-trajectory rotating nozzles are installed in lieu of spray nozzles for turf or landscaping.	**6**			--
801.6.2		Drip irrigation is installed.				
	(1)	Drip irrigation is installed for landscape beds.	**4**			--
	(2)	Subsurface drip is installed for turf grass areas.	**4**			
801.6.3		Landscape Plan & Implementation are executed by a certified WaterSense Professional or equivalent as approved by adopting entity.	**5**			--
801.6.4		Drip Irrigation Zones Implemented show plant type by name and water use or need for each emitter. **NOTE:** Points must be taken in 801.6.2(1) in order to claim points for 801.6.4. If points are claimed in 801.6.4, points cannot be claimed for 801.6.5(2).	**10**			--
801.6.5		The irrigation system(s) is controlled by a smart controller. **Claim points for only one from (1)-(2) below:**				
	(1)	Evapotranspiration (ET) based irrigation controller with a rain sensor or soil moisture sensor based irrigation controller.	**8**			
	(2)	No irrigation is installed and a landscape plan is developed in accordance with Section 503.5, as applicable. **NOTE:** Points must be taken in 503.5(1), 503.5(2), 503.5(3), or 503.5(4) in order to receive points for 801.6.5(2). If points claimed for 801.6.5(2), points cannot be claimed for 801.6.1, 801.6.2, 801.6.4	**15**			--
801.7		**Rainwater collection and distribution**. Rainwater collection and distribution is provided.				
801.7.1		Rainwater is used for irrigation in accordance with the following.				

(1)	Rainwater is diverted for landscape irrigation without impermeable water storage.	5 points
(2)	Rainwater is diverted for landscape irrigation with impermeable water storage.	
(a)	50-499 gallon storage capacity	5 points
(b)	500-2499 gallon storage capacity	10 points
(c)	2500+ gallon or larger storage capacity (system is designed by a professional certified by The American Rainwater Catchment Systems Association or equivalent)	15 points
(d)	All irrigation demands are met by rainwater capture (documentation demonstrating the water needs of the landscape is provided and the system is designed by a professional certified by The American Rainwater Catchment Systems Association or equivalent).	25 points

				0		--
801.7.2		Rainwater is used for interior demand in the following way (system is designed by a professional certified by The American Rainwater Catchment Systems Association or equivalent).				

(1)	Rainwater provides for partial domestic demand (any locally approved uses).	5 points per appliance or fixture, 15 points maximum
(2)	Rainwater provides for total domestic demand.	25 points

		NOTE: Points must be taken in 801.7.1(2)(a)-(d) to be awarded points in 801.7.2.		**0**		--
801.8		**Sediment filters.** Water filter is installed to reduce sediment and protect plumbing fixtures for the whole building or whole dwelling unit.	**1**			--
802 - Innovative Practices						
802.1		**Reclaimed, gray, or recycled water.** Reclaimed, gray, or recycled water is used as permitted by applicable code.				

(1)	water closet flushed by reclaimed, gray, or recycled water	5 points each, 20 points maximum
(2)	irrigation from reclaimed, gray, or recycled water on-site	10 points

		NOTE: Points awarded for either Section 802.1 or 802.5, not both.		**0**		--
802.2		**Automatic shutoff water devices**. One of following automatic shutoff water supply devices is installed. Where a fire sprinkler system is present, installer is to ensure the device will not interfere with the operation of the fire sprinkler system.				

(1)	Excess water flow shutoff.	2 points
(2)	Leak detection system.	2 points

				0		--

802.3	**Engineered Biological System or Intensive Bioremediation System.** An Engineered Biological System or Intensive Bioremediation System is installed and the treated water is used on site. Design and implementation is approved by appropriate regional authority.	**20**			--
802.4	**Recirculating humidifier.** Where a humidifier is required, a recirculating humidifier is used in lieu of a traditional "flow through" type.	**1**			--
802.5	**Advanced wastewater treatment system.** Advanced wastewater (aerobic) treatment system is installed and treated water is used on site. **NOTE:** Points awarded for either Section 802.5 or 802.1, not both.	**20**			--

End of Chapter 8 **Proceed to Chapter 9 >>**

Home Innovation RESEARCH LABS

This project has not met all the requirements for Bronze, Silver, Gold, or Emerald.

Revised May 07, 2013

2012	Current Status		Performance Level Minimums			
	Score	Mandatory	Bronze	Silver	Gold	Emerald
This Chapter	0	N/A	25	39	67	92
This Project	0	Not Met	231	349	509	641

NGBS Scoring for New Construction for BGNM
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(2)	Subsurface drip is installed for turf grass areas.	4			
801.6.3	Landscape Plan & Implementation are executed by a certified WaterSense Professional or equivalent as approved by adopting entity.	5			--
801.6.4	Drip Irrigation Zones Implemented show plant type by name and water use or need for each emitter. NOTE: Points must be taken in 801.6.2(1) in order to claim points for 801.6.4. If points are claimed in 801.6.4, points cannot be claimed for 801.6.5(2).	10			--
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(b)	500-2499 gallon storage capacity — 10 points				
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End of Chapter 8

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