M E M O R A N D U M

TO: Planning Board

FROM: Heidi Schum, P.E., Public Works Development Review Manager
Charles Ferro, AICP, CP&S Development Review Manager

DATE: March 8, 2012

SUBJECT: INFORMATIONAL ITEM: Applicant's response to comments made at the January 19, 2012 Planning Board meeting regarding Boulder Creek Commons (5399 Kewanee Drive)

The applicant for the Boulder Creek Commons development project located at 5399 Kewanee Drive has compiled the attached responses to address comments made during the public participation portion of the Concept Plan Planning Board meeting on January 19, 2012.

Staff intends to review and consider the attached responses throughout the upcoming Site Review process. Additional information may be requested of the applicant in conjunction with Site Review.

Please feel free to contact me at 303-441-4276 or by e-mail at schumh@bouldercolorado.gov with any questions.

ATTACHMENT

14 February 2012

Heidi Schum, P.E.
City of Boulder
Planning & Development Services
1739 Broadway
Boulder, CO 80302

Re: **Response to Public Comments**
Boulder Creek Commons
01/19/12 Planning Board Hearing

File: B1006

Dear Ms. Schum,

Thank you for the opportunity to provide detailed responses to the public comments made during the 19 January 2012 Planning Board Hearing for the *Boulder Creek Commons Concept Plan*. The public comments largely focused on the following topics: flood, storm water drainage, wetlands, traffic and ground water. The responses in this letter, along with those in the enclosed letters prepared by LSC Transportation Consultants and Telesto Solutions, Inc., were prepared based on our professional experience, accepted engineering practices and our technical analysis specific to the Boulder Creek Commons property.

Based on my professional experience, the Boulder Creek Commons property is one of the most analyzed pieces of ground in the City of Boulder. As shown in the 2010 engineering and environmental studies, this property can support development. The independent third party reviewers, hired by the City of Boulder, concurred that this property can support development. The engineering required to develop this site is straight forward and is similar to that of other projects designed AND constructed here in the City of Boulder.

My firm, The Sanitas Group, provides professional civil, water resources and transportation engineering design services throughout Colorado. Our design professionals include Professional Engineers, a Certified Floodplain Manager (CFM) and a LEED AP specializing in Neighborhood Development. The Sanitas Group's Principals have been the engineer-of-record or have prepared substantial engineering design for over 35 projects in the City of Boulder including:

- Boulder Community Hospital – Foothills Campus
- The Peloton
- Carillon at Boulder Creek
- Boulder Creek Apartments (formerly Village at Boulder Creek)
- Landmark Lofts
- Bear Creek Apartments at Williams Village
- Laboratory for Advanced Space Physics at the CU Research Park.

Many of the above projects, as do most in the City of Boulder, involve significant floodplain mitigation and flood proofing (both by elevation and mechanical means). Two included senior housing located within a floodplain. Because of our floodplain development experience, the City of

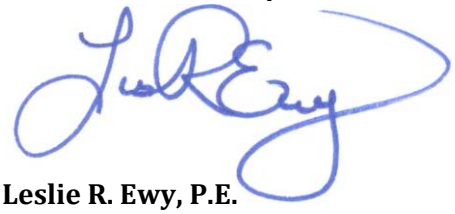
Boulder engaged The Sanitas Group to prepare a *Cost Impact Analysis* for the proposed revisions to the City Flood Ordinance involving at-risk populations and critical facilities.

The Boulder Community Hospital – Foothills Campus and The Peloton projects had significant below grade construction. Both projects had high ground water levels and were located in the Boulder Creek aquifer which has similar characteristics as the aquifer below the Boulder Creek Commons property. Telesto Solutions, Inc. prepared the ground water mitigation design for both projects and has worked on the Boulder Creek Commons project since 2005.

The following information is provided to address the concerns expressed by the neighbors and to correct many of the misperceptions that the neighbors have about this property. If you have any questions or comments, please feel free to contact me at 303.981.9238 or email me at lewy@thesanitasgroup.com.

Sincerely,

The Sanitas Group, LLC



Leslie R. Ewy, P.E.
Principal/Civil Engineer
LEED AP BD+C and ND

CC: Michael Boyers - BCC, LLC

RESPONSES TO PUBLIC COMMENTS MADE AT
01/19/2012 PLANNING BOARD HEARING
CONCEPT PLAN REVIEW

Speaker: Mr. Stephen Meyers

1. Comment: *Development of the Boulder Creek Commons property will degrade surface and ground water resources.* (Source: Comments by Stephen Meyer)

Response: Development of the Boulder Creek Commons will protect both surface and ground water resources. As part of the storm water management plan, the project will implement best management practices (BMPs) for protecting surface water quality. During construction, temporary BMPs will be installed to protect the surface water quality from construction activities. Permanent BMPs will be constructed to protect the surface water quality post-development. These BMPs are site plan dependent and may include grass buffers, constructed wetland channels, water quality swales and an extended detention basin.

The existing upstream developments were constructed prior to the current storm water quality regulations. These developments do not provide water quality treatment prior to discharging into Dry Creek Ditch No. 2 and onto the Boulder Creek Commons property. The proposed flood channel design includes a water quality treatment component to improve off-site storm water quality prior to being released from the Boulder Creek Commons property.

The development of the Boulder Creek Commons will not adversely impact the ground water quality. The surface water contaminants will be filtered by the soil while percolating down into the ground water table.

2. Comment: *Surface water and ground water are interdependent and sensitive to changes in hydrology. Development of the Boulder Creek Commons property will adversely alter the hydrology.* (Source: Comments by Stephen Meyer)

Response: The Boulder Creek Commons development plans both recognizes the interdependency between surface water and ground water and preserves the balance between the two with development of the project. To address and document site specific hydrology interdependencies, a water balance was prepared for the project and presented in the 2010 "*Ground Water Evaluation".*

3. Comment: *Development of the Boulder Creek Commons property will not preserve the natural and beneficial functions of floodplains.* (Source: Comments by Stephen Meyer)

Response: The Boulder Creek Commons project will preserve the natural South Boulder Creek floodplain and its beneficial functions by leaving the East Parcel undeveloped.

The Dry Creek Ditch No. 2 corridor is not a natural floodplain for South Boulder Creek. The existing developments upstream and adjacent to the property have diverted flood flows to Dry Creek Ditch No. 2 which is an irrigation ditch and not a natural flood conveyance. With development of the Boulder Creek Commons property, the diverted South Boulder Creek flood flows will be conveyed

through the site in a flood channel with capacity for the 100-year flood flows. The 60-ft outlot on western edge of the project is provided to allow the City adequate width to construct future flood mitigation improvements along the Dry Creek Ditch No. 2 corridor as identified in the *South Boulder Creek Flood Mitigation Study*.

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4. Comment: *Development in general should be restricted within floodplains.* (Source: Comments by Stephen Meyer)

Response: The City of Boulder regulates 100-year floodplains and restricts development activities that can occur in the floodplain. Floodplain regulations are covered in Sections 9-3-2 through 9-3-8 of the Boulder Revised Code. While the 100-year floodplain minimally impacts the property, the few residential lots that back to the Dry Creek Ditch No. 2 corridor will be developed in compliance with these regulations and will be subject to a Floodplain Development Permit. As discussed in both the recent Concept Plan application and the 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*", the proposed residential structures will be constructed in accordance with the requirements prescribed by the City of Boulder Floodplain Regulations (Chapter 9, B.R.C. 1981):

- Flood proofing all proposed residential structures within the 100-year floodplain by raising the finished floor elevations of the homes a minimum of 2.0-ft above the 100-year base flood elevation.
- Limiting floodwater depths within the subdivision's roadways to allow for emergency access during the event of a flood (currently only Kewanee Drive extension is affected by the 100-year floodplain).
- Restricting basement construction within the 100-year floodplain.

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5. Comment: *Senior housing should not be located in a floodplain*. (Source: Comments by Stephen Meyer)

Response: The proposed senior housing is located outside the 100-year floodplain and partially within the 500-year floodplain. The 500-year floodplain is broad with shallow flood depths of 0.5-ft or less. At this time, the City of Boulder does not regulate development activities within the 500-year floodplain.

We believe that it is prudent to consider 500-year flooding during the design of the entire project, not just the senior housing component. The site grading and street layout take into consideration the flow direction of the flood waters. The street network will be collect flood waters at the upstream property line and will allow the flood waters to pass through the site to the existing downstream discharge location at the northwest corner of the property. The senior housing design includes elevating the first finished floor 1.5-feet above existing grade to provide both positive drainage away from the building and added flood protection in the event of a 500-year flood.

Both Concept Plans presented at the Planning Board hearing incorporated these 500-year flood considerations in the designs.

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6. Comment: *The 1969 flood was only a 25 year event.* (Source: Comments by Stephen Meyer)

Response: The 1969 flood was not a 25-year event and the claim is not supported by historical record. The 1969 flood was well over a 500-year event in both precipitation and flooding. The 1969 flood was caused by steady rain over 5 days (May 4th-8th) with occasional heavier storms (3.4" on May 7th alone). Within the South Boulder Creek watershed, total precipitation ranged from 7.6 - 13.05". By making this claim, the neighbors are creating the fear that if the 1969 flood was just a 25-year flood then the 500-year flood must be many times worse.

The flooding on the Boulder Creek Commons property was shown in several photos presented by the neighbors. The flooding extents across the property are similar to the 500-year floodplain areas that were recently mapped. These photos provide additional validation of the floodplain delineations on the Boulder Creek Commons property.

For reference, the following is a direct quote from the *South Boulder Creek Flood Mapping Study*:

1.1.4.2 May 4-8, 1969: Long duration, low intensity general rain and flooding
"Another SBC flooding example was caused by the long duration, low intensity upslope rain event of May 4-8, 1969. Temperatures averaged 5-7 degrees above normal for over a week before the event, swelling local streams with melting winter snow-pack runoff. … Boulder Creek experienced one of the heavier rainfalls with up to 13 inches in 72 hours, but Big Elk Meadows in Rocky Mountain National Park received almost 20 inches in 4 days. One way to put this precipitation event into perspective is to consider that the 500-year, 72-hour precipitation event at Boulder is 6.87," at Hawthorne 7.89" and Gross Reservoir 8.01". **Thus, the 1969 event was well over a 500-year, 72-hour precipitation event in South Boulder Creek**."

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7. Comment: *Large amounts of fill dirt will be needed for flood mitigation*. (Source: Comments by Stephen Meyer)

Response: Conveying the localized drainage within the proposed development will dictate the amount of fill required for the Boulder Creek Commons development. The 100-year floodplain minimally impacts the property. The few residential lots that back to the Dry Creek Ditch corridor will require 1-ft of fill to elevate and construct the homes above the flood protection elevation. The remainder of the subdivision is not impacted by the floodplain.

To provide positive drainage away from the proposed homes, the Boulder Creek Commons lots will be elevated in a similar manner as the existing homes adjacent to the site. When these homes were constructed in the 1960's, the Keewaydin Meadows Subdivision was not in a mapped 100-year floodplain and elevating the homes for flood reasons was not a design consideration at the time. The homes are all elevated well above what would have been the natural grade prior to development. This is a common practice in subdivision design. The streets are set at or near pre-development grades and generally follow the natural topography. Elevating the lots was necessary to achieve the minimum lot slopes for positive drainage away from the homes. The existing Keewaydin Meadows homes adjacent to the western property line are elevated higher than the minimum flood protection elevation required for the Boulder Creek Commons lots within the 100-year floodplain.

8. Comment: *The development of the Boulder Creek Commons property does not protect properties from flooding impacts.* (Source: Comments by Stephen Meyer)

Response: Properties identified on the South Boulder Creek flood maps as at-risk to flooding will remain at-risk with or without development on the Boulder Creek Commons property.

When developed, Boulder Creek Commons will preserve the existing flow patterns and flow rates of surface runoff and South Boulder Creek flood waters. The East Parcel will remain undeveloped and the drainage patterns will not be altered. The West Parcel discharges storm run-off and flood water onto City property at two existing discharge locations: the northwest corner and the southeast corner. These discharge locations will be preserved. The developed storm water flows from the project will be detained to preserve the existing storm water flow rates at these discharge points.

Speaker: Mr. Jeff Ripkin

1. Comment: *Errors in engineering are "too numerous to present". The City's process failed since the errors where neither caught nor noted.* (Source: Comments by Jeff Ripkin)

Response: Mr. Ripkin's presentation is based on the premise that the supporting engineering and 2011 wetland delineation are flawed. Mr. Ripkin's presented no factual information to support his multiple claims of engineering errors or failed City process. Each of the items cited in the presentation are discussed in detail below.

2. Comment: *The 2010 study showed revised 100-year and 500-year floodplain, but the new plan did not.* (Source: Comments by Jeff Ripkin)

Response: The 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*" showed how one possible development pattern could modify the 100-year and 500-year flood flow paths. The Concept Plans presented two specific development patterns and incorporated considerations for both the 100-year and 500-year flood volumes, flooding limits, flood depths and flow directions. For each of the Concept Plans prepared, the 100-year flood will be contained and conveyed with the 60-ft outlot and the 500-year flood will be contained and conveyed within the internal street network. Including an informational graphic with the Concept Plan may have helped illustrate the post-development flood patterns. However, the absence of this graphic does not constitute a "flaw" in the supporting engineering for the Concept Plans.

3. Comment: *Presented exhibit from 2010 "Conceptual Storm Water Management Plan and Flood Mitigation Report" study and presented both Concept Plans. Asked rhetorically where did the wetlands, the bioswales and the detention go?* (Source: Comments by Jeff Ripkin)

Response: The above questions posed by Mr. Ripkin implied that the Concept Plans submitted to the City last fall were flawed by disregarding the wetlands and omitting both bioswales and detention pond. Each of these items were illustrated on the Concept Plans and discussed at length in the written summary that accompanied the Concept Plan.

Each of the Boulder Creek Commons Concept Plans included:

- wetland mitigation and preservation based on the most current 2011 wetland delineation
- a bioswale along the west property line that was sized to accommodate the diverted 100-year South Boulder Creek flood flows
- storm water detention ponds: the first Concept Plan showed the detention in the northwest corner of the site and the revised Concept Plan showed a centrally located detention pond contained within the park footprint

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4. Comment: *Dry Creek Ditch No. 2 only flows two weeks out of the year and the lateral to south is lined. Therefore, the wetlands are not supported by ditch seepage.* (Source: Comments by Jeff Ripkin)

Response: Dry Creek Ditch No. 2 typically flows from May through August. Mr. Ripkin's claim regarding ditch operations was surprising since his home backs to Dry Creek Ditch No. 2. The lateral in question was lined in 2008. The liner no longer functions as intended.

The City of Boulder regulates wetlands within the City's jurisdiction without regard to the source of supporting hydrology. Documenting the wetland hydrology source is important for developing the wetland mitigation plan and determining the water augmentation source.

The supporting hydrology was documented through field measurements and discussed at length in both 2010 "*Groundwater Hydrology and Wetland Delineation Report*" and the 2011"*Concept Plan Written Statement*" (pg. 8). In a letter dated 11/14/11, The Corp. of Engineers concurred that the wetlands in question are "*artificially irrigated areas which would revert to upland if the irrigation ceased*." This letter was provided to City staff for record prior to the Planning Board hearing.

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5. Comment: *The wetlands are not low-functioning. The neighbors disagree and believe all wetlands on the Boulder Creek Commons property to be high-functioning.* (Source: Comments by Jeff Ripkin)

Response: Whether or not the existing wetlands are low-function or high-function is a moot point. When City regulated wetlands are mitigated, the newly created or enhanced wetlands must be high-functioning regardless of the original functional rating.

The remainder of Mr. Ripkin's comments relate to ground water. Please refer to the letter prepared by Telesto Solutions, Inc.

Speaker: Mr. Bill Atkinson

1. Comment: *Raising site will divert flows.* (Source: Comments by Bill Atkinson)

Response: The adjacent Keewaydin Meadows homes, the East Boulder Community Park and the 55th Street extension through the property altered the natural topography and are elevated well above the Boulder Creek Commons property. The two existing discharge points for the West Parcel discharge onto the City of Boulder property to the north and will be preserved. These locations are the only two locations where the East Boulder Community Park is at a lower elevation than the Boulder Creek Commons property. Drainage swales and storm sewer will be constructed along the north property line as needed to carry on-site storm flows to these discharge locations. The flood channel will convey both off-site and on-site flows to the discharge location at the northwest corner of the property as the Dry Creek Ditch No. 2 currently does. The site can be elevated as needed to accommodate both on-site and off-site drainage without altering the existing flow patterns.

Response: Please refer to previous response regarding storm flow patterns. (Stephen Meyer – Comment 8)

Speaker: Mr. Steve Slater

1. Comment: *Concerned about the amount of fill dirt needed to raise the site.* (Source: Comments by Steve Slater)

Response: Similar to the Keewaydin Meadows Subdivision, fill dirt will be needed to raise portions of the site. Please refer to previous response regarding fill dirt (Stephen Meyer – Comment 7).

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2. Comment: *Where does the water go?* (Source: Comments by Steve Slater)

Response: The Boulder Creek Commons property storm water run-off currently flows off property at three locations: the West Parcel's northwest corner, the West Parcel's northeast corner and the East Parcel's northeast corner. With development of the project, these existing discharge locations will be preserved.

Speaker: Mr. Ramon Jesch

Mr. Jesch's presentation included historical photographs of the 1969 flood and repeated the claim that the 1969 flood was only a 25-year event.

Response: Please refer to previous response regarding 1969 flood. (Stephen Meyer – Comment 6)

Speaker: Mr. Dan Klein

1. Comment: *The South Boulder Creek 100-year and 500-year flooding will be greater than the 1969 flood*. (Source: Comments by Dan Klein)

Response: Please refer to previous response regarding 1969 flood. (Stephen Meyer – Comment 6)

2. Video: *A video was presented showing what 212-cfs flow looks like in Boulder Creek*. (Source: Comments by Dan Klein)

Response: The existing Dry Creek Ditch No. 2 and the proposed flood channel have very different flow characteristics than the section of Boulder Creek shown in the video. Both the existing irrigation ditch and the proposed flood channel have very little vertical drop along the length of the channels. These channels are vegetated. When passing the South Boulder Creek flood flows, the channels will flow more like a larger irrigation ditch flowing full. The Anderson Ditch during peak early summer flows is a better example of the flow than the Boulder Creek example presented.

3. Comment: *Stated that there are High Hazard Zones on Kewanee Drive and on 55th Street that will isolate the property during a floodplain*. (Source: Comments by Dan Klein)

Response: The City's online Flood Hazard Mapping show no high hazard areas associated with Kewanee Drive or 55th Street.

Just beyond the east end of Kewanee Drive, a high hazard zone is delineated within the Dry Creek Ditch No. 2 channel. When Kewanee Drive is extended to the east, the flood waters will be piped under the roadway.

Note that High Hazard Zones are mapped on Manhattan Drive, Tehino Avenue and at the S. Boulder Road/Foothills Parkway intersection. These high hazard flood areas severely limit evacuation and emergency response routes available to the existing neighborhoods west of the Boulder Creek Commons property.

With development, Kewanee Drive will be extended to 55th Street and will provide a route to Baseline Road that is not impacted by a High Hazard Zone.

4. Comment: *It is not wise to put seniors in a floodplain*. (Source: Comments by Dan Klein)

Response: Please refer to previous response regarding senior housing and the 500-year floodplain. (Stephen Meyer – Comment 5)

Speaker: Mr. Jeff McWhirter

Mr. McWhirter's presentation claims that the supporting engineering presented in the 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*" was flawed and that the new South Boulder Creek flood maps are wrong.

Mr. McWhirter's conclusions do not appear to be based on basic hydrological principles and do not distinguish between the different sources of flood flows: local 100-year storm flows (ie. the urban flooding event), the South Boulder Creek 100 year flood flows, the Boulder Creek Commons developed storm flows and the South Boulder Creek flood mitigation.

1. Comment: *Mr. McWhirter rhetorically asked "where does the water go?". He then described the downstream flow path and shows a photo of the Dry Creek Ditch No. 2 culverts downstream of the Boulder Creek Commons property. He stated that the water cannot flow through these culverts.* (Source: Comments by Jeff McWhirter)

Response: The existing drainage exits the Boulder Creek Commons property at the northwest corner of the property. The off-site culverts that were pictured are located on the East Boulder Community Park property. As part of the Dry Creek Ditch No. 2 infrastructure, the culverts are sized for irrigation flows only. When the ditch is flowing, storm water that exceeds the culvert capacity bypasses the culverts in an existing swale just west of the culverts.

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2. Comment: *Mr. McWhirter stated that after-development, the storm flows exiting the site at the northwest corner would be 198-cfs and that this value was the starting point of his evaluation.* (Source: Comments by Jeff McWhirter)

Response: Mr. McWhirter did not present any methodology as to how he determined his starting value. For the 100-year local storm event, the existing peak flow is **103.38-cfs.** After development, the Boulder Creek Commons will release run-off at or below this existing run-off rate.

Mr. McWhirter may have arrived at this value by adding together peak run-off values for two different design points: DP11 just north of Kewanee Drive (Q_{100}=95.55-cfs) and DPH1 at the northwest corner of the site (Q_{100}=103.38-cfs) as presented in Table 3.1 in the 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*". DP 11 represents off-site flows only. DPH1 represents the existing discharge point at the West Parcel's northwest corner. DPH1 is the confluence of the off-site flows and the on-site flows just prior to discharge from the property.

During a 100-year local storm, the peak run-off passes DP11 and moments later passes DP H1. The 103.38-cfs includes the peak-flow reported at DP11 plus contributing run-off from the Boulder Creek Commons property. In this case, the peak run-off values are for distinct design points and are not additive.

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3. Comment: *The South Boulder Creek flood flow used in report was wrong, the process failed and it*

took the neighbors to find this flaw. (Source: Comments by Jeff McWhirter)

Response: The South Boulder Creek flood flow provided by the City and used in the 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*" was incorrect. The error was discovered just after the report was presented to Planning Board in January 2011. In early February 2011, The Sanitas Group discovered the error while researching the South Boulder Creek flood mitigation options that entailed the Dry Creek Ditch No. 2 corridor. The City provided corrected flood flow values to The Sanitas Group in March 2011.

The South Boulder Creek flood flow used in the 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*" was 23.0-cfs. The corrected flood flow at the northwest corner of the site is 177.50-cfs. The marked increase in flood flows did not change the conclusion of the 2010 study in that the Boulder Creek Commons property can support development. As a result of the increase in flood flows, the bioswale was repositioned parallel to the west property line. The bioswale is sized to route flood flow and off-site drainage through the site. The Concept Plans presented to the City incorporate the corrected South Boulder Creek flood flow values.

According to Mr. McWhirter, the neighbors discovered the "flaw" in late 2011 and accordingly the process had failed. If Mr. McWhirter had opted to report the "flaw" to City staff, the City could have advised him that the error had already been discovered and that the Concept Plans were developed using the correct flood flow values.

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4. Comment: *When developed the flood flows will increase to 350-cfs at the northwest corner of the property.* (Source: Comments by Jeff McWhirter)

Response: As before, Mr. McWhirter did not present any methodology as to how he determined this number and the value presented is in error. During a 100-year South Boulder Creek flood, the peak flood flows at the northwest corner of the property are **177.50-cfs** not 350-cfs as presented. The peak-flow for South Boulder Creek 100-year flooding should not be added to the peak run-off for the local 100-year storm. At the northwest corner, the localized 100-year storm peaks within 30-minutes. The main stem of South Boulder Creek responds to a much larger watershed and is much slower to reach peak flood flow. The localized 100-year flooding will have peaked long before diverted flood waters from South Boulder Creek ever reach the property.

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5. Comment: *Takes issue with City's position that a lower basin storm is an "urban flooding event"* (Source: Comments by Jeff McWhirter)

Response: The *South Boulder Creek Flood Mapping Study* found that lower basin storm does not trigger as much South Boulder Creek flooding as does a storm positioned higher in the basin. The lower basin storm, would be similar in this case, to the 100-year storm that is typically used to determine the local 100-year storm runoff response.

The properties around the Boulder Creek Commons site have been developed (ie. urbanized) without controlling peak run-off rates to pre-development rates which causes localized flooding. As

discussed previously, the localized 100-year run-off at the northwest corner of the site is **103.38-cfs** as compared to **177.50-cfs** of South Boulder Creek 100-year flood flows. The localized flooding was documented and discussed in the 2010 "*Conceptual Storm Water Management Plan and Flood Mitigation Report*".

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6. Comment: *South Boulder Creek Flood Mitigation Study uses the lower basin storm. The study reports the 100-year flood flow is 695-cfs at the northwest corner of the property. The final total flow in Dry Creek Ditch No. 2 after the development of the project will become 868-cfs.* (Source: Comments by Jeff McWhirter)

Response: Mr. McWhirter again does not present his methodology for determining the values presented. The *South Boulder Creek Flood Mitigation Study* is based on the same design storm and resulting flood flows developed and documented in the *South Boulder Creek Flood Mapping Study*. It is not based on a lower basin storm as claimed.

The flood flows in the Dry Creek Ditch No. 2 corridor will remain unchanged with the development of the Boulder Creek Commons property.

In the *South Boulder Creek Flood Mitigation Study*, the Dry Creek Ditch No. 2 corridor is identified for use in mitigating the flooding impacts resulting from the diverted South Boulder Creek flood flows. The study has identified the potential need for a 34-ft wide open channel for conveying flood flows within this corridor. Should the City opt to route additional flood waters along the Dry Creek Ditch No. 2 corridor, the City will construct the appropriate infrastructure to convey these flows. The Concept Plans presented provide a 60-ft outlot that may be used in the future by the City to construct additional flood mitigation infrastructure along Dry Creek Ditch No. 2.

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7. Comment: *FEMA maps not good enough.* (Source: Comments by Jeff McWhirter)

Response: As discussed above, Mr. McWhirter has misinterpreted information presented in *The South Boulder Creek Flood Mapping Study* and the *South Boulder Creek Flood Mitigation Study*. He offered no scientific basis for claiming the new South Boulder Creek flood maps are "not good enough".

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8. Comment: *Development's flood study must be redone and claims that plan presented doesn't accurately consider the South Boulder Creek flows or the South Boulder Creek flood mitigation.* (Source: Comments by Jeff McWhirter)

Response: Both Concept Plans presented to the City show a 60-ft wide outlot parallel to the west property line. The outlot will accommodate both the flood channel geometry needed to safely convey the existing South Boulder Creek 100-year flood flows (177.50-cfs) and the potential improvements to Dry Creek Ditch No. 2 as identified in the *South Boulder Creek Flood Mitigation Study*. An updated "*Conceptual Storm Water Management Plan and Flood Mitigation Report*" will be provided with the Site Review application.

Speaker: Ms. Ruth Blackmore

Ms. Blackmore's comments repeat comments made previously by other neighbors. She references the flood flow values presented by Mr. McWhirter which were shown in the previous section to be grossly in error. The following are her comments with references of where to find the detailed responses in this document.

1. Comment: *Citizens had to figure out the flaws in the flood flows.* (Source: Comments by Ruth Blackmore)

Response: Please refer to previous response regarding the chronology of discovering the flood flow error. (Jeff McWhirter – Comment 5)

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2. Comment: *Development shouldn't occur in a floodplain.* (Source: Comments by Ruth Blackmore)

Response: City of Boulder places restrictions on development within the 100-year floodplain and prohibits development in the Conveyance Zone and High Hazard Zones. Please refer to previous response regarding development in the floodplain. (Stephen Meyer – Comment 4)

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3. Comment: *We should be preparing for the 500-year flood and not the 100-year flood.* (Source: Comments by Ruth Blackmore)

Response: We believe that it is prudent to consider the 500-year flood when designing a project. Both Concept Plans presented at the Planning Board hearing incorporated 500-year flood considerations in the designs.

Please refer to previous response regarding development in the 500-year floodplain. (Stephen Meyer – Comment 5)

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4. Comment: *This project shouldn't be allowed to add fill and divert flows onto the neighbors.* (Source: Comments by Ruth Blackmore)

Response: The property currently drains to the north onto the City of Boulder property. The development of the Boulder Creek Commons will preserve existing storm water runoff or flood flow release locations. The project's grading will not divert flows away from these discharge locations onto other neighboring properties.

Speaker: Mr. Eric Walls

Mr. Walls did not offer much in the way of commentary to accompany his presentation. Viewers

were left to infer the meaning of the various slides shown. The following responses are restricted to the material presented on the slides.

Slides 2-8
Slides show previous 1994 grading, a 2002 evaluation of the wetlands on-site, a reference to a 2008 notice to neighbors regarding upcoming perforated piping construction and a 2008 aerial photo showing the perforated pipe staged for construction.

Response: In 2007 and into 2008, the property owners had presented both Construction Documents for the final piping of Dry Creek Ditch No. 2 (Phase 2) and plans for an interim perforated pipe to intercept the ditch seepage (Phase 1). A contract with the Ditch Company was in the final stages of negotiation and the Phase 1 work needed to be completed prior to the call for water later in the spring. The owners' notified the adjacent neighbors in writing prior to construction of the perforated pipe. Work on irrigation ditches and laterals are exempt from Boulder County grading permits. Because the owners felt they were working in cooperation with the Ditch Company, they did not apply for a Boulder County grading permit. The construction activities were openly carried out. The Ditch Company president and vice-president live in the homes adjacent to the south property line. During construction staging and initial excavation work, they gave no indication that the work, which was easily visible from their homes, was not going to be ultimately allowed by the Ditch Company.

When Boulder County issued a stop work order, the property owners immediately halted work and restored the property as requested by both the County and the City of Boulder. The only visible evidence of the 2008 construction today is the vehicle tracking control pad at the gated entrance to the property.

Slides 9-15
It appears that the intent of these slides is to show the 2008 construction to control the ditch seepage destroyed wetlands on the property.

Response: Mr. Walls does not tell the viewers of the slides (despite comments from the audience to explain what they are seeing) that the wetlands shown are in fact the current 2011 wetland delineation mapping. These wetlands were not destroyed in 2008 as insinuated by the pictures.

Slides 16-17
These slides show remnants of gravel surfaces later in the spring of 2008 and quotes from the City of Boulder and Boulder County regarding the expected restoration work.

Response: Mr. Walls does provide commentary for these slides. Based on the bent of his presentation, he is leaving it up to the viewer to interpret the photos as the property owners non-compliance with the restoration requests. In the previous slide 14, another perspective of the same gravel area is shown over the 2011 wetland delineation. Today, the area in question is well vegetated with pockets of wetlands. The property was restored.

Slides 18-22
No commentary from Mr. Walls to explain intent photos or when the photos were taken. Mr. Walls leaves it up to the viewer to infer meaning.

Response: In order of presentation, the location and subject of photos are described below:

Slide 18: The existing wetland in the photo is located on East Boulder Community Park property. North fence line of the Boulder Creek Commons property is visible on the left in the photo.

Slide 19: The existing willows in the photo are located the CD Bodam property. South fence line of the Boulder Creek Commons property is visible in the foreground and the trees on the Bodam property are visible behind the willow stand.

Slides 20-22: Like the previous two photos, these photos do not appear to be of water features found on the Boulder Creek Commons property. The photos lack any discernible landmarks to place where the photos were taken. The Boulder Creek Commons property is surrounded by development such as adjacent homes, soccer fields, fencing, old farm structures, 55th Street, and East Boulder Recreation Center. As with the first two photos physical features of the property and adjacent landmarks are typically easy to pick-out in photos of the Boulder Creek Commons property.

Speaker: Ms. Christy Schaich

Slide 1: May 2008 a liner was installed in the Bodam Lateral. Photo presented shows construction work related to installing liner. Caption states that the work was "ditch maintenance" and no permit was required.

Response: The irony of this slide is that it supports the property owners position that when permission is granted by the ditch owner (in this case CD Bodam and the Boulder Creek Commons property owners) ditch maintenance does not require a Boulder County grading permit. Also note that the photo was taken just two months after the March 2008 construction photos presented by Mr. Walls. The May 2008 photo shows the vegetation from the restoration efforts of the March and April 2008.

Slides 2-6: The letter from Stoeker Ecological Consultants is presented and states that the lining of the irrigation lateral did not affect any endangered species or affect the hydrology of the site. Following the letter are photos of the maintenance work being performed. Ms. Schaich comments that the counter to the letter, the ditch maintenance work caused extensive disturbance and the liner changed the hydrology.

Response: The disturbance shown in the photos was contained within a track-hoe's width of the lateral. For scale the track-hoe can be seen in at least two of the photos. Typically, irrigation ditches and laterals are lined by bentonite or some other type liner. Ditch companies and lateral owner's do

this to prevent the unnecessary loss of their water shares. When an irrigation ditch is unlined, the ditch can alter the ground water hydrology within the vicinity of the ditch. The leaking ditch can adversely impact adjacent and downstream properties. Lining the ditch helps to restore the natural hydrology. In this case, Mr. Stoeker's letter is referring to both surface and ground water hydrology The ditch maintenance in question did not adversely impact downstream properties.

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1. Comment: *Since 2008, the wetlands have doubled on the West Parcel and, curiously, wetlands were lost on the East Parcel.* (Source: Comments by Christy Schaich)

Response: The change in wetland areas is not as "curious" as Ms. Schaich presents. As documented in the original 2008 wetland delineation study and discussed at length in the Concept Plan Written Summary, the wetlands on the Boulder Creek Commons property are not supported by a natural hydrology. The wetlands are supported primarily by irrigation ditch seepage and adjacent flood irrigation. Flood irrigation ceased on the East Parcel and the wetlands have retracted in response to the reduction in supporting hydrology. Flood irrigation was also ceased on the West Parcel. Seep from both the Bodam lateral (temporary liner has failed) and Dry Creek Ditch No. 2 continue to provide the hydrology for the wetlands.

Slides 16: This slide appears to be taken at the northwest corner of the property and is the Howard Superphostical lateral just upstream Dry Creek Ditch No. 2.

Response: With the development of the Boulder Creek Commons property, the wetland pictured in this area will be preserved in place. This wetland (Wetland J) was pictured in slide 12 of Ms. Schaich's presentation.

Slides 17-21: These slides are identical to Slides 18-22 presented in Mr. Walls presentation.

Response: These photos do not appear to be of water features found on the Boulder Creek Commons property. Please see detailed discussion of these same slides in the responses to Mr. Walls presentation.

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2. Comment: *Ms. Schaich scoffs at the idea of enhancing the ecological value of the existing wetlands and states that the 3rd party review had no comments regarding the delineation.* (Source: Comments by Christy Schaich)

Response: With the exception of Wetland J, the wetland/water body photos presented by the neighbors were not of wetlands or wetland vegetation on the Boulder Creek Commons property. The Boulder Creek Commons wetlands are marked with bright orange flags, are in close proximity to property lines and are visible from adjacent properties. The wetlands on this property are degraded and are not very photo worthy. When mitigated the wetlands will have a reliable and sustainable water source and will be mitigated or enhanced as high-functioning wetlands. Disturbed wetlands that will be relocated to the East Parcel, will be reestablished a 2:1 ratio. The overall wetlands area on the property will increase and the ecological value wetland areas will be

enhanced.

With each delineation review, the applicant's consultants together with City staff, Mr. Alan Carpenter (3rd party reviewer in question) and Terry McKee (US Army Corp. of Engineers) walked each of the delineated areas, discussed in detail the methodology for determining the delineations, provided comments delineation extents, and verified the final delineations.

Speaker: Ms. Karen Chin

1. Comment: *Since no surveys were performed, no evidence that the endangered prebles jumping mouse may exist on the property. Since standing water can be found on the site in the spring, the endangered northern leopard frog may also exist on the property.* (Source: Comments by Karen Chin)

Response: Ms. Chin offers no verifiable scientific data to refute the findings of the *Species of Concern* report submitted to the City in 2010.

Speaker: Mr. Jim Johnson

1. Comment: *In 2007, an inch of rain fell within an hour flooding the streets to the point that the sidewalks disappeared.* (Source: Comments by Jim Johnson)

Response: The 2007 storm is great example of the "urbanized flooding effect" discussed in response to Mr. McWhirter's presentation. The Keewaydin Meadows neighborhood relies on the road network to convey storm drainage. Using streets in this manner is common and an accepted practice. Per the City's *Design and Construction Standards*, Section 7.1 "Street Drainage", residential and local streets may pass the 2-year minor storm without overtopping the curb and gutter. During the 100-year major storm event, the depth of the curb and gutter flowline may not exceed 18-inches.

Speaker: Mr. Alan Katz

1. Comment: *Senior housing should not be located in the middle of a floodplain.* (Source: Comments by Alan Katz)

Response: Please refer to previous response regarding senior housing and the 500-year floodplain. (Stephen Meyer – Comment 5)

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2. Comment: *20-acres of wetlands will be destroyed by development.* (Source: Comments by Alan Katz)

Response: Only 2.16-acres of wetlands were delineated in 2011.

Speaker: Ms. Debra Flora

1. Comment: *Ms. Flora reiterates comments made by Mr. Ripkin, Mr. McWhirter and Dr. McCurry and questions accuracy of engineering.* (Source: Comments by Debra Flora)

Response: Please refer to previous responses provided for Mr. Ripkin and Mr. McWhirter. For detailed responses to Dr. McCurry's presentation, please refer to the letter prepared by Telesto Solutions, Inc.

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2. Comment: *The neighbors' factual historical timeline reveals huge discrepancies in ground water analysis. The construction at the East Boulder Recreation Center caused problems. Ms. Flora reiterates Dr. McCurry's claim that development is not appropriate on the property due to ground water.* (Source: Comments by Debra Flora)

Response: Each of the above statements reiterates claims made by previous Speakers regarding ground water and the ground water analysis. Please refer to the letter prepared by Telesto Solutions, Inc. where these claims are proved unsubstantiated.

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3. Comment: *Site is a water logged wetland without access.* (Source: Comments by Debra Flora)

Response: Ms. Flora's statement is greatly exaggerated. As stated previously, only 2.16-acres of wetlands were delineated in 2011. The site has two existing access locations: 55th Street and Kewanee Drive.

Speaker: Mr. Jacob Arinell

1. Comment: *Traffic issues are not limited to Kewanee Drive. North end of Manhattan Drive has significant traffic issues.* (Source: Comments by Jacob Arinell)

Response: For detailed responses to traffic concerns and comments, please refer to the letter prepared by LSC Transportation Consultants.

Speaker: Mr. Toby Carpenter

1. Comment: *Piping Dry Creek Ditch No. 2 will cause more flooding at Kewanee Drive.* (Source: Comments by Toby Carpenter)

Response: When the irrigation ditch is piped, a new open channel will be constructed immediately east of the pipe. This channel will intercept the flows from Kewanee Drive in place of the Dry Creek Ditch No. 2 channel.

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2. Comment: *Watched many loads of fill dirt brought in for the East Boulder Recreation Center improvements. Concerned about the amount of fill required for development and where the water will go.* (Source: Comments by Toby Carpenter)

Response: Please refer to previous responses regarding amount of fill and flow directions post development. (Bill Atkinson – Comment 1 and Steve Slater – Comments 1 and 2)

Speaker: Hampton Isel

1. Comment: *Soccer field construction changed storm flows at his property. Mr. Isel has contacted the City regarding new flooding.* (Source: Comments by Hampton Isel)

Response: Construction of the Boulder Creek Commons development will not alter off-site drainage patterns. Please refer to previous responses regarding storm flow directions post development. (Bill Atkinson – Comment 1 and Steve Slater – Comment 2)

Speaker: Ms. Maryann McWhirter

1. Comment: *Requested that City complete mitigation study and halt development until study finished.* (Source: Comments by Mary McWhirter)

Response: The previous owners of the property agreed to delay the Concept Plan submittal until the City could quantify the flood flows and complete the *South Boulder Flood Study.* The *South Boulder Creek Flood Mitigation Study* has progressed enough to identify potential mitigation options that include the Dry Creek Ditch No. 2 corridor. The Concept Plans presented provide a 60-ft outlot that the City may use in the future to construct additional flood mitigation infrastructure along Dry Creek Ditch No. 2.

Traffic Comments - 01/19/2012 Planning Board Meeting

LSC Transportation Consultants was retained by the project team to prepare a traffic analysis for Boulder Creek Commons, meeting City of Boulder guidelines for Concept Review. A *Travel Demand Management (TDM) Plan* was also prepared. Our work built on the report, dated May, 2010, for the Hogan-Pancost Property, prepared by Drexel, Barrel & Co. This report was prepared with trip generation and trip distribution assumptions approved by the City of Boulder.

Alex Ariniello, President of LSC, attended the Planning Board public hearing on January 19, 2012 and recorded the comments made by the neighbors regarding traffic. As with most new developments, the nearby neighbors are opposed to <u>any</u> new traffic added to their streets, and this hearing was no different. In reality, the City of Boulder requires a traffic analysis to assess the traffic impacts of a new development in terms of City policies and criteria with recommendations made to mitigate potential impacts, if necessary.

The following are the traffic comments (shown in red) that were recorded and our response shown immediately after.

Comment: Traffic would become a problem on 55th Street.

Response: 55th Street is designed as a residential collector with curb, gutter, and detached walks. There are no back-out driveways. It also has several traffic calming features including medians, bulb-outs, and curves to limit speeds to less than 30 mph. Traffic volumes range from 1,000 to 1,800 vehicles per day. BCC will add 100 to 250 vehicles per day which will keep the volume within the City's range of 1,000 to 2,500 vpd for a residential collector.

Comment: LOS "F" on Manhattan and 55th Street
- School Traffic
- 1974: Manhattan functions as a collector but designed as a local access street.
- Planning Board - appropriate level of traffic for a local access street is 1,000 to 2,500 ADT. Manhattan has more.
- Kewanee Street impacts
- 55th not designated as an outlet

Response: <u>South Boulder Road/Manhattan:</u>
The LOS analysis will be revised with the full traffic study. Previous analysis indicated poor Levels of Service on the northbound and southbound approaches and that a traffic signal would be warranted with existing traffic. With a traffic signal, Levels of Service would be "B" or better even with the addition of BCC traffic.

South Boulder Road/55th:
Previous analysis indicated LOS "F" on the southbound left-turn movement. BCC will add two vehicles or less per hour to this movement. The intersection is not expected to meet traffic signal warrants.

Manhattan:
Traffic volumes range from 1,590 north of Kewanee to 660 south of Kewanee to 3,000 just north of South Boulder Road. The higher volume just north of South Boulder Road is due to the hotel and offices located in this area. In the vicinity of Kewanee, BCC will add 125 to 250 vpd, bringing total traffic to 800 to 1,850. This increase will be partially offset by residents in Keewaydin Meadows who will use the new Kewanee connection to travel to East Boulder Rec Center and divert from Manhattan Drive. Manhattan Drive has a local street design (attached walks, back-out driveways, etc.), but will have traffic volumes in the collector range. A series of all-way Stop intersections limits speeds through the corridor.

Kewanee:
BCC will add about 375 vpd to Kewanee but it will still have a total volume of less than 600 vpd, well within the range of a local street.

No outlet on 55th Street:
There are "No Outlet" signs posted on 55th Street as a way of discouraging regional traffic from using it. These will have no impact on BCC use of 55th Street as it does on the residents of Greenbelt Meadows.

Comment:
- 55th Street curve is dangerous
- Peds crossing 55th Street

Response: The curves on 55th Street are designed to discourage speeding. They are not dangerous if vehicles are traveling at or just above the posted speed. Greenbelt Meadows residents most likely cross 55th Street at Ontario Place. This intersection has traffic calming features of medians and bulb-outs. The bulb-outs reduce the crossing distance to less than 24 feet and the relatively low traffic volumes on 55th Street allow for plenty of gaps for pedestrians to cross. It is appropriately signed and marked for the existing and future traffic conditions according to the City of Boulder *Pedestrian Crossing Treatment Installation Guidelines*

Comment: Opposes Kewanee connection - service trucks, Special Transit

Response: Kewanee:
BCC will add about 375 vpd to Kewanee but it will still have a total volume of less than 600 vpd, well within the range of a local street.

With the Senior Housing building located on the east end of the site, 55th Street will most likely be used for transit and service vehicles.

Comment: Traffic is a mess on Manhattan near Baseline
- On-street parking and speeding

Response: Manhattan North:
Some traffic (less than 250 vpd) will be added to this segment of Manhattan.

Comment: Seniors in the area are active and travel just as much as others.

Response: The Institute of Transportation Engineers (ITE) collects trip generation information on various land uses. Various studies of Senior Adult Housing developments have shown an average trip generation rate of 3.48 vehicle-trips (vpd) per day per dwelling unit, as compared to 9.57 vpd for a typical single-family home. Peak-hour vehicle-trips are also significantly lower. Seniors generally don't work and don't have children living with them who need to be driven to school or other activities so trips per household on average are less than families living in single-family homes.

February 14, 2012

Heidi Schum
Engineering Review Manager
Planning & Development Services
1739 Broadway, 3rd fl., Boulder, CO 80302
303-441-1880

Subject: Hogan-Pancost Property: Response to Public Comments from Planning Board Meeting on January 19th, 2012.

Dear Ms. Schum:

The purpose of this letter is threefold: 1) to provide a brief introduction to Telesto Solutions, Inc. (Telesto), 2) summarize or conclusions regarding ground water and the Hogan- Pancost property, and 3) to provide response to ground water related statements made in presentations by Mr. Ron Craig (resident 260 Cimmaron Way), Mr. Jeff Rifkin (resident 210 Cimmaron Way) and Dr. Gordon McCurry (McCurry Hydrology, LLC) during the Planning Board Meeting of January 19th, 2012.

Telesto Solutions, Inc. is an international engineering and science consulting firm based in Fort Collins, Colorado. Telesto has extensive experience with a variety of large and small engineering projects, world-wide. Telesto's hydrogeologic team includes industry-recognized experts in ground water engineering and groundwater contaminant transport modeling.

Telesto has conducted hydrogeologic evaluations for many other projects within the City of Boulder including; design of the Ball Aerospace Fisher Expansion construction and permanent dewatering systems *(2010)*, design of the Boulder Community Hospital dewatering and wetlands mitigation system (*2001-2006)*, ground water flow estimates and capacity design of the Peloton Boulder dewatering system *(2005)*, and ground water inflow estimates for the Kittredge Commons (University of Colorado Boulder) trench and drain system *(2005)*.

Telesto has also developed numerical ground water models for large project sites including the Split Rock Mill Site located in Jeffrey City, Wyoming (2000) and the Cobre Mining Company Continental Mine located near Hanover, New Mexico (2004-2012). These models and other ground water models developed by Telesto have provided the technical basis for successfully securing operating permits by several state environmental regulatory agencies.

Telesto also has a strong presence in geotechnical engineering, including industry-wide recognized experts in soil and rock mechanics. Telesto has extensive experience with large engineering projects where hydrogeology and geotechnical engineering were key components of the successful permitting, completion and operation of such facilities as large open mine pits, large soil impoundments, and large water storage facilities.

Telesto has prepared several documents for the Boulder Creek Commons project that have been submitted to the City of Boulder. These documents have been reviewed by city staff and by CH2M Hill, the third-party consultant chosen by the city for objective review. These documents include the following:

- Ground Water Evaluation for the Proposed Boulder Creek Commons Housing Project Boulder, Colorado (Telesto, September 2007)
- Responses to CH2M Hill Letter dated August 20, 2010 Ground Water Evaluation for the Hogan-Pancost Property (Telesto, November, 8, 2010)
- Ground Water Evaluation for the Hogan-Pancost Property (Telesto, November, 2010)
- Ground Water Hydrology and the Hogan-Pancost Property (Telesto, September 27, 2011)
- Hogan-Pancost Property: Neighborhood Event Timeline and Response to Specific Questions Raised by Adjacent Neighbors (Telesto, September 27, 2011)

As part of this evaluation, Telesto has reached out to the residents surrounding the Hogan-Pancost property in several ways. Telesto has surveyed residents regarding issues related to ground water and met with the residents on several occasions. Telesto has also submitted technical responses to questions, comments and data requests submitted by members of the resident community. We have also met with Dr. Gordon McCurry to discuss his concerns and have provided him with additional background information regarding the project.

Specific ground water related issues raised during the January 19th 2012 Planning Board Meeting are addressed in Attachment 1. These specific questions have been combined into more general questions and concerns by Telesto, to avoid redundancy, and promote clarity of our responses to these questions and concerns. The following general concerns are addressed:

Concern: Construction of the East Boulder Community Park in 1989-1990 caused the water table to rise which required the residents to install sumps or additional sump in their basements.

Response: Ground water levels increased in response to: 1) increased recharge from precipitation, and 2) increased recharge from lawn irrigation due to residential development in south Boulder. In 1990, the ground water levels reached a level that required basement sumps and pumping at these addresses.

The homes along Cimmaron Way were constructed in 1966 with basements and without basement sumps. From 1960 through 1968 the City of Boulder, and the South Boulder Creek watershed, had 6 of 9 years with below average precipitation (Figure 2). This is reflected in the spring flows (March-June) in South Boulder Creek which were 22% lower than average during the same period. At the time the homes were constructed, it is hypothesized that the ground water levels were low due to the multiple years of below average precipitation. In 1969, precipitation was significantly higher and South Boulder Creek flooded. Water from the flood recharged ground water but it was not enough to raise the ground water to a level that required sumps and pumping. Precipitation in 1970 was below average, 1971 and 1972 were near average and 1973 was above average. From 1974 through 1977 precipitation was below average and the ground water levels remained low. From 1978 to 1990 there was a trend of increasing precipitation with 8 of 13 years having higher than average precipitation.

Also, from the time the homes were constructed in 1966 through the 1980's, a significant amount of development occurred in Boulder south of Baseline Rd. By 1990, development in south Boulder covered approximately 3.7 square miles. With the change in land use, lawn irrigation increased and the amount of recharge to ground water also increased.

The combination of increased recharge from precipitation, and increased recharge from lawn watering caused ground water levels to rise. In 1990, the ground water level rise was enough to require basement sumps and pumping.

Concern: Construction of the synthetic turf fields in 2010 caused the water table to rise and a second sump pump need to be installed at 260 Cimmaron Way.

Response: The precipitation for February through July of 2010 was higher than average. As the water level rose in response to the above average precipitation, a second sump pump was needed to maintain the ground water level. Above average monthly precipitation starting in February of 2010 (172% of average) and continuing through March and April (186% and 141% of average precipitation, respectively) caused the seasonal ground water rise to begin earlier than normal. Although precipitation for May of 2010 was slightly below average (86% of average precipitation), the above average precipitation continued through both June and July of 2010 (162% and 129% of average precipitation, respectively). The above average precipitation caused ground water to rise higher than normal and a second sump pump was needed to maintain the ground water level.

Concern: Development will increase ground water levels and the related problems in surrounding homes."

Response: The water balance (updated in January, 2012) shows that summer recharge rates under historical flood irrigation conditions are 36 gpm. This compares to 18 gpm under

developed conditions. Also, piping of the ditch will stop ground water recharge along the piped ditch corridor. Thus, recharge rates will be lower under developed conditions compared to historical un-piped ditch and flood irrigation conditions. Reduced recharge will translate to lower local ground water levels, and decreased pumping from the resident's sumps.

Concern: The numerical ground water model uses a recharge rate of 36 inches per year rather than 18 inches per year.

Response: To address this concern, the model was adjusted to use a lower flood irrigation recharge rate of 18 inches per year. As a result of the change the simulated flow to the neighbor sumps decreased from 41.1 gpm to 41.0 gpm. The simulated head at the northwest corner of the property did not change and the simulated head at the southwest corner of the property decrease by 0.1 feet. Thus, the modeling results are essentially identical to the initial results and the conclusions based on the model results are valid.

Concern: Compaction of the soil will create a dam that will cause water to back up behind the dam.

Response: In the geotechnical report dated April 8, 2010, out of 13 test pits two logs show water levels extending into the overlying silt layer (~12 inches) and two other test pit logs show the water level to extend only a few inches into the silt layer. Also, the hydraulic conductivity of the silt layer is likely at least two orders of magnitude lower than the underlying sand and gravel layer. The net effect is that the silt layer is essentially impermeable compared to the underlying sand and gravel layer. Thus, compaction of the silt layer cannot affect ground water flow because it carries little ground water flow.

For discussion purposes, assume that under historic undeveloped conditions the thickness of the underlying sand and gravel layer is reduced and there is a reduction in hydraulic conductivity. In the unlikely event that hydraulic conductivity in the project area is reduced by 75%, model simulations indicate that flow to the adjacent resident sumps would increase by only 3.4% (41.1 gpm to 42.4 gpm). Thus, a significant reduction in hydraulic conductivity does not result in large increase in sump pumping.

Concern: Attempts to mitigate ground water will impact wetlands, stream flows and water rights.

Response: Any wetlands impacted by the development will be mitigated at a ratio of 2 to 1. Stream flows will not be negatively impacted in anyway by the development. Finally, the property has its own water rights and thus has the right to use this water to its benefit.

Telesto appreciates this opportunity to provide feedback to city staff and the planning board. If you have any questions regarding the content of this letter or the attachment. If you have any questions, please feel free to give me a call.

Sincerely,

Telesto Solutions, Inc.

Terry Fairbanks
Senior Hydrologist

Enclosure:
cc:
Leslie R. Ewy, PE, The Sanitas Group, LLC

Attachment 1

Individual Responses to Public Comments
from Planning Board Meeting on January 19th, 2012

Comment (Ron Craig): "Last year I pumped 1 million gallons of water out of my basement." "I get it, I handle it but I can't do any more."

Response: Based on the flow rates estimated for Mr. Craig's sump pumps, it is possible 1 million gallons of water was removed from his sump in 2011.

However, there are some important issues to note about Mr. Craig's sump system. First, if his sump was raised by 6 inches he could reduce his pumping rates by approximately 15%. Second, in the case of a power outage, Mr. Craig has an unpermitted backup overflow system that consists of two 4-inch drain pipes (one for each sump) that are connected to the City of Boulder sanitary sewer system. Thus, it is unlikely that Mr. Craig's basement will flood, even in the case of a power outage.

Statements by Mr. Jeff Rifkin

Question (Slides 14 & 15): Why did sump pumping increase at 260 Cimmaron Way in the spring of 2010 so that a second sump needed to be installed?

Comment (Slides 14 & 15): "There were 10 prior years with roughly equal or greater seasonal precipitation than 2010. Water was leaking in a different location in Ron's basement."

Response: This comment is essentially the question: "If annual precipitation is less or the same, why was more pumping required?" The answer is that the data must be evaluated over a much shorter time interval to understand the relationship between precipitation and pumping.

The precipitation for February through July of 2010 was higher than average. As the water level rose in response to the above average precipitation, a second sump pump was needed to maintain the ground water level. Above average monthly precipitation starting in February of 2010 (172% of average) and continuing through March and April (186% and 141% of average precipitation, respectively) caused the seasonal ground water rise to begin earlier than normal. Although precipitation for May of 2010 was slightly below average (86% of average precipitation), the above average precipitation continued through both June and July of 2010 (162% and 129% of average precipitation, respectively). The above average precipitation caused ground water to rise higher than normal and a second sump pump was needed to maintain the ground water level.

Slide 16:

Note: Starting on Slide 16, a timeline of events is provided.

Slide 17:

Comment: Two photos are shown, one from the 1969 South Boulder Creek Flood and another from 1973 that shows similar water levels on the west side of the Hogan Pancost Property. The text on the right side of the slide reads "no sump pumps".

Response: The 1969 flood exceeded a 500-year event in both precipitation and flooding. The 1969 flood was caused by steady rain over 5 days (May 4th-8th) with occasional heavier storms (3.4 inches on May 7th). Within the South Boulder Creek watershed, total precipitation ranged from 7.6 inches to 13.05 inches.

Surface flooding occurred when the precipitation rated exceeded the rate at which water could infiltrate. Based on recent water level data measured on site, the ground water is typically at a low point during the first part of May. Thus, there was likely storage capacity in the aquifer below the resident basements that allowed water levels to rise and but not enter the basements. Given the ground water storage capacity, the limited ground infiltration capacity and the short duration of surface flooding it is understandable why basements did not flood during the 1969 flood. Similar mechanism most likely also occurred during the 1973 high water event.

Slide 18:

Comment: The soccer fields were completed in 1989 and in 1990 the first sumps were installed at 210, 220 and 230 Cimmaron Way.

Response: Ground water levels increased in response to: 1) increased recharge from precipitation, and 2) increased recharge from lawn irrigation due to residential development in south Boulder. In 1990, the ground water levels reached a level that required basement sumps and pumping at these addresses.

The homes along Cimmaron Way were constructed in 1966 with basements and without basement sumps. From 1960 through 1968 the City of Boulder, and the South Boulder Creek watershed, had 6 of 9 years with below average precipitation (Figure 2). This is reflected in the spring flows (March-June) in South Boulder Creek which were 22% lower than average during the same period. At the time the homes were constructed, it is hypothesized that the ground water levels were low due to the multiple years of below average precipitation. In 1969, precipitation was significantly higher and South Boulder Creek flooded. Water from the flood recharged ground water but it was not enough to raise the ground water to a level that required sumps and pumping. Precipitation in 1970 was below average, 1971 and 1972 were near average and 1973 was above average. From 1974 through 1977 precipitation was below average and the ground water levels remained low. From 1978 to 1990 there was a trend of increasing precipitation with 8 of 13 years having higher than average precipitation.

Also, from the time the homes were constructed in 1966 through the 1980's, a significant amount of development occurred in Boulder south of Baseline Rd. By 1990, development in south

Boulder covered approximately 3.7 square miles. With the change in land use, lawn irrigation increased and the amount of recharge to ground water also increased.

The combination of increased recharge from precipitation, and increased recharge from lawn watering caused ground water levels to rise. In 1990, the ground water level rise was enough to require basement sumps and pumping.

Slide 19:

Comment: September 1993, Fiber Optic trench dug through backyards along Cimmaron Way. 1994, 1st sump pump installed 240 Cimmaron Way, 2nd sump pumps installed 210, 220, 230 Cimmaron Way.

Response: In 1995, the residents conducted a dye tracer study that demonstrated a connection between water in the ditch and water in the resident sumps.

It is assumed that this hydraulic connection is still present. The proposal to pipe the ditch across the Hogan-Pancost property was developed to address this hydraulic and remove this connection between the ditch and the sumps. Thus, this is a benefit to the neighborhood.

Slide 20:

Comment: Winter 2001, Dry Creek Ditch Cleaned. January 2002 1st sump pump 250 Cimmaron Way. April 2002 1st sump pump 260 Cimmaron Way.

Response: The claim here is that cleaning of the ditch disturbed the "hard pan" of the ditch and allowed water from the ditch to flow more easily into the aquifer. The ditch company has denied that cleaning of the ditch increased ground water recharge along the ditch.

However, it is typical in channels with low gradient, and hence low flow velocity, for accretionary sediments to be comprised of fine-grained soils (silts and clays), due to low sediment transport energy. Therefore, increased infiltration due to removal of the accreted sediments is not inconsistent with increased infiltration potential along the ditch. The thickness, or even presence of channel accretion sediments is highly variable, and it would be uncommon for such sediments to form a ubiquitous layer in the channel, whereas the piping the ditch will completely cutoff infiltration along the entire piped ditch section. Thus, if ground water recharge was increased due to cleaning of the channel as suggested by the residents, piping of the ditch will stop ground water recharge along the piped ditch corridor. Reduced recharge will translate to lower local ground water levels, and decreased pumping from the resident's sumps.

There is a potential hydrologic explanation for the increase water levels. January of 2002 was unseasonably warm and wet. Ground water levels rose in response to increased recharge and dropped when the recharge decreased in February and March of 2002.

The ground water level rose in January of 2002 in response to an increase in recharge to ground water from precipitation and snow melt. Records show that South Boulder Creek flows were 34% higher than average and precipitation was 57% higher than the 1950-2011 average. Anecdotal reports from the neighbors indicate that Dry Creek Ditch No. 2 was also running in January 2002 but dry in March 2002.

The 2002 drought began in February of 2002. Recharge to ground water from precipitation decreased as the precipitation decreased. For February, March and April of 2002 the South Boulder Creek flows were only 50%-60% of average. Precipitation was also below average during same time period and was 55% (February), 84% (March), and 8% (April).

Slide 21:

Comment:

1. *2008 Flood Irrigation Stops Lateral Ditch Lined, no change in use of sump pumps. 2010,*
2. *Completion of new raised soccer fields. June 2010, 2nd sump pump installed 260 Cimmaron Way.*

Response:

1. When comparing the 2006 and 2011 measured water levels it is understandable why the residents have not seen a marked decrease in their sump pumping. Water levels at B-2 (center of the property) during the months of June, July and August 2011 are 2 to 4 feet lower than in 2006. Thus, cessation of flood irrigation did lower water levels in this center of the property. However, if water levels at B-1 (northwest) and B-2 (southwest) along the west side of the property are compared, the water levels are similar for the two time periods. This is due to the proximity of B-1 and B-3 to Dry Creek Ditch No. 2. When flowing with water, the ditch provides a constant source of water along the west property boundary. Thus it is understandable why the residents have not seen a marked decrease in their sump pumping. If the ditch is piped, it will remove the ditch as a constant water source which will translate into lower ground water levels and decreased pumping from the resident sumps.

2. The precipitation for February through July of 2010 was higher than average. As the water level rose in response to the above average precipitation, a second sump pump was needed to maintain the ground water level. Above average monthly precipitation starting in February of 2010 (172% of average) and continuing through March and April (186% and 141% of average precipitation, respectively) caused the seasonal ground water rise to begin earlier than normal. Although precipitation for May of 2010 was slightly below

average (86% of average precipitation), the above average precipitation continued through both June and July of 2010 (162% and 129% of average precipitation, respectively). The above average precipitation caused ground water to rise higher than normal and a second sump pump was needed to maintain the ground water level.

Slide 22:

Comment: There is a correlation between local construction events and water problems in our neighborhood.

Response: The residents have demonstrated a connection between Dry Creek Ditch No. 2, the TCI cable trench and resident sumps. Also, as stated in the response to Slide 20, increased infiltration due to removal of the accreted sediments is not inconsistent with increased infiltration potential along the ditch.

Although construction activities at the East Boulder Community Park and ground water issues experienced by the residents are related chronologically, there is no relationship between this construction and changes in ground water levels. Please see the response to Slides 18 and 21 for additional information.

Statements by Dr. Gordon McCurry

Slide 2:

Comment:

1. *Ground water levels are very high on the property and surrounding neighborhoods*
2. *Development will increase ground water levels and problems in surrounding homes*
3. *Developer's ground water evaluation contains key flaws so its conclusions are incorrect*

Response:

1. Telesto has documented that water levels are high on the property.
2. The water balance (updated in January, 2012) shows that summer recharge rates under historical flood irrigation conditions are 36 gpm. This compares to 18 gpm under developed conditions. Also, piping of the ditch will stop ground water recharge along the piped ditch corridor. Thus, recharge rates will be lower under developed conditions compared to historical un-piped ditch and flood irrigation conditions. Reduced recharge will translate to lower local ground water levels, and decreased pumping from the resident's sumps.

3. This issue is addressed in the responses to Slides 10, 11 and 12.

Slide 3:

Comment: "Site is at a constriction in the watershed"

Response: The Hogan-Pancost property, East Boulder Community Park, Keewaydin Meadows and Green Belt Meadows all lie in a constriction in the watershed. This fact combined with the shallow bedrock cause water levels to be high throughout the area during the spring and summer months. The 22-acre Hogan-Pancost property covers only 0.04 square miles which is 0.03% of the 132 square mile (84,480 acres) South Boulder Creek watershed. Thus, it is not possible for the development on Hogan-Pancost property to significantly influence the local ground water level because the lateral extent of the underlying ground water is so extensive and the property represents only a small fraction (0.03%) of the total watershed area.

Slide 4:

Comment: South Boulder Creek, a number of ditches, and a number of lakes. "These are all surface water bodies which help convey surface water into the ground water system. So there is a lot of infiltration and recharge." As a result we have very shallow ground water levels in this particular area.

Response: Surface water features both contribute and remove water from the ground water system. These features and processes have been included in the analyses presented to date.

Slide 5:

Comment: Push pin map showing results of an informal survey showing active and inactive sumps in the area.

Response: Telesto would like to point out two issues. First, the active sumps in the Keewaydin Meadows subdivision are concentrated along Dry Creek No. 2. Second, there is a high concentration of active sumps in Greenbelt Meadows. In addition to being located in a constriction in the watershed, and shallow depth to bedrock, the Greenbelt Meadows subdivision is completely surrounded by surface water features (ditches and South Boulder Creek). Thus, it is understandable why there are so many active sumps in this area.

Slide 6:

Comment: "The Area Has Shallow Ground Water!"

Response: Given the location of Keewaydin Meadows and Greenbelt Meadows in the watershed and the proximity to nearby surface water features, shallow ground water levels during the spring and summer months are to be expected. The groundwater levels do not reflect solely natural conditions, but are also increased by lawn irrigation.

Slide 7:

Comment:

1. *Compaction of soil reduces aquifer thickness*
2. *Installation of foundation footers reduces aquifer flow area*
3. *Residential watering increases local recharge*
4. *Bioswale concentrates recharge at western side and central park area. "We heard that they will be lined with clay but they will be also vegetated and so over time the roots are going to penetrate through the clay and provide pathways for that ponded water to infiltrate."*
5. *Development is likely to increase ground water levels and problems in surrounding homes*

Response:

1. As described in the response to Slide 9, settlement of the silt layer cannot affect ground water flow because it carries very little ground water flow compared to the underlying sand and gravel layer.
2. Basements are not proposed in the current concept plan and foundations would be constructed above the measured seasonal high ground water level. Therefore, these elements cannot influence ground water flow because they will not be in ground water.
3. The net recharge from the developed area will be less than the recharge under historic flood irrigation conditions.
4. The claim that a Bioswale would concentrate recharge is false. If a bioswale is constructed, it will be lined to prevent concentrated recharge. The claim that roots would penetrate the liner is also false. First, the liner will be covered with 12 to 18 inches of soil which will provide ample depth for roots. Second, water will be readily available which will cause root depths to be shallow. Finally, the liner will be constructed using a geosynthetic clay liner (i.e. Bentomat). Per the manufacturer product specifications, the entire sealed surface of the Bentomat liner is impervious to root penetration. Also, Bentomat is 'self-sealing'. For example, if the liner is punctured by a sharp object, the bentonite swells to plug the gaps, reinstating the impermeable liner.
5. Telesto has demonstrated that piping Dry Creek Ditch No. 2 will reduce recharge to ground water. The water balance shows that recharge rates are lower under developed conditions compared to historical flood irrigation conditions. Reduced recharge will

translate to lower local ground water levels, and decreased pumping from the resident's sumps.

Slide 8:

Comment: Effect of soil compaction on ground water flow. When compacted, both the number and size of voids contained in the soil mass are reduced. This reduction in voids reduces the soil permeability, thus reducing the seepage of water.

Response: As described in the response to Slide 9, settlement of the silt layer cannot affect ground water flow because it carries very little ground water flow compared to the underlying sand and gravel layer.

Slide 9:

Comment:

1. *Shallow groundwater extends into compressible silt over much of the site*
2. *Compaction is recommended for all slabs, roads, utility lines -- reduces aquifer thickness*

Response:

1. In the geotechnical report dated April 8, 2010, out of 13 test pits only two logs show water levels extending into the silt layer (~12 inches). Two other test pit logs show the water level to extend only a few inches into the silt layer. Second, the hydraulic conductivity of the silt layer is likely at least two orders of magnitude lower than the underlying sand and gravel layer. Thus, settlement of the silt layer cannot affect ground water flow because it is essentially impermeable (i.e., carries little ground water flow) compared to the underlying sand and gravel layer.
2. For the sake of discussion, assume that thickness of the underlying sand and gravel layer is reduced and there is a corresponding reduction in hydraulic conductivity. In the unlikely event that hydraulic conductivity is reduced by 50%, model simulations indicate that flow to the adjacent resident sumps would increase by only 3%.

Slide 9:

Comment: "Maybe we lose a couple of feet of the saturated zone. A couple of feet out of 9-10 feet total is a big percentage" Compaction of the soil and footers will create a dam that will cause water to back up behind the dam..."

Response: As described in the response to Slide 8, it is not possible for compression of the silt layer to affect ground water flow. Also, according to the test pit logs, the silt layer is a maximum of 2 feet thick and cannot be compressed "a couple of feet."

Slide 10:

Comment:

1. *Developer's ground water evaluation is based on the model*
2. *Ground water model is incorrect in many aspects*
3. *Errors in key inputs*
4. *Unrealistic simulation of dominating features*
5. *Resulting impacts are biased low*

Response:

1. Telesto's evaluation is based on a water balance that quantifies the recharge to ground water under flood irrigation conditions and developed conditions. The numerical model was used to quantify the change in ground water levels and sumping rates as a function of changes in recharge. The model has also been used to evaluate various what-if scenarios.

2, 3, 4, 5. The ground water model is sufficient for its intended purpose and meets the standard of care required of our industry. Regardless of the numerical modeling results, the water balance clearly shows that recharge rates are lower under developed conditions compared to flood irrigation conditions.

Slides 11 & 12:

Comment: Significant error in model inputs leads to wrong conclusions. GW Model Error in Summer Recharge. Pre-Development Recharge = 0.00822 ft/day = 36 in/yr. Post-Development Recharge = 0.00251 ft/day = 11 in/yr. Assumes flood irrigation at 36 in/yr & 100% recharge. Should have used native soil recharge of 0 - 2 in/yr.

Response: The water balance clearly shows that recharge rates are lower under developed conditions compared to flood irrigation conditions.

To use the suggested 0-2 in/yr recharge rates would be to ignore the historical use of the site, and violate the intent of the analysis and standard engineering practices. The recharge rates used in modeling and the water balance are based upon proven engineering principals. The intent of using the pre-development irrigation rate of 36 in/yr was to calibrate the model to historical conditions that existed when the residents first started using their sump pumps. This helps to confirm that the modeling results are realistic.

The model has been recently run with a 2 in/yr recharge rate on the property and the resulting change in the estimated flow to resident sumps of 0.5%. Simulated water levels within the project area decreased 1 to 3.5 inches and the simulated resident sumping rate decreased by 0.2 gpm (0.05%). These minor changes indicate that precipitation recharge from the Hogan-Pancost property is a very small percentage of the ground water flow reporting to the resident sumps.

Slide 13:

Comment:

1. *Ground water levels are very high and will remain so due to many factors*
2. *Development will increase ground water levels and the related problems in surrounding homes*
3. *Attempts to mitigate ground water will impact wetlands, stream flows and water rights*

Response:

1. Ground water levels are high during the spring and summer in response to hydrologic events occurring throughout the water shed.
2. Telesto has demonstrated that piping Dry Creek Ditch No. 2 will reduce recharge to ground water. The water balance shows that recharge rates are lower under developed conditions compared to historical flood irrigation conditions. Reduced recharge will translate to lower local ground water levels, and decreased pumping from the resident's sumps.
3. Any wetlands impacted by the development will be mitigated at a ratio of 2 to 1. Development is sufficiently removed from South Boulder Creek so that stream flows will not be negatively impacted in any way by the development. Finally, the property has its own water rights and thus has the right to use this water to its benefit.