APPENDIX H – RESPONSE TO PUBLIC COMMENTS

H1.0 PUBLIC COMMENTS AND DEQ RESPONSES

From Patrick J. Flowers, Region 3 Supervisor, Montana Fish, Wildlife and Parks.

Comment #1
FWP is discouraged to find that two of the main threats to salmonid life are not addressed in the lower sections of the East Gallatin and mainstem Gallatin rivers (i.e., high water temperatures and excessive sediment). For these rivers, FWP anticipates seeing these waterbodies listed in future assessments of the 303(d) list for thermal and sediment impairments.

Of greatest concern to FWP, elevated water temperatures do not appear to be considered a 'pollutant' in this TMDL document. High water temperatures can be as limiting to salmonid life as chemical or sediment impacts. A wealth of temperature data are available for this watershed, in addition to knowledge of thermal loading sources. FWP encourages DEQ to further develop the document to discuss existing data regarding thermal impacts and potential remediation.

The primary objective of the Clean Water Act is to restore and maintain the chemical, physical and biological integrity of the nation's waters, therefore, thermal pollution and sedimentation must be paramount within this TMDL plan. Continued degradation of thermal and sediment conditions will further degrade the aquatic ecosystem of the Lower Gallatin River drainage, effectively reducing the economically and culturally valuable fisheries. Thank you again for allowing FWP to provide comments.

Response to #1
Thank you for providing comment. TMDLs are required for pollutant-waterbody segment combinations on the 303(d) list. The Lower Gallatin TMDL document addresses all 303(d) listings that require TMDL development and was not limited to tributaries. The East Gallatin River from Bridger Creek to Smith Creek is listed as impaired from low flow alterations and alterations in streamside or littoral vegetative covers, and the Gallatin River from Spanish Creek to the mouth is listed for low flow alterations. Although these are impairments that may be associated with temperature and/or sediment impairment, that linkage has not been identified by DEQ at this time. Low flow and habitat alterations are not pollutants and therefore do not require TMDL development. DEQ realizes that there can be additional impairment causes not on the most recent 303(d) list that are not addressed during TMDL development because of resource limitations. However, DEQ's Monitoring and Assessment Section continues to collect and compile data throughout the state, and DEQ updates the 303(d) list biannually based on the monitoring results and/or the type and quality of the data received from outside entities. Annually, DEQ puts out a call for data notice so that local, state, federal agencies and watershed groups and private citizens may submit data to the department. If FWP has data available that they would DEQ to include in future assessments they are encouraged to submit it to DEQ.

Wherever there is a temperature impairment in Montana, the DEQ addresses this impairment as a pollutant cause that requires TMDL development. Therefore, future TMDL development in the Gallatin could require temperature TMDL development. In watersheds like the lower

Gallatin, the loss of riparian area shade is often the most influential impact linked to human activity addressed via temperature TMDL allocations. Given the linkage between riparian health and the sediment and nutrient allocations in this document, meeting the sediment and nutrient allocations for most tributaries in the Lower Gallatin project area should significantly help achieve cooler stream temperatures.

From Clint Nagel, private citizen in Lower Gallatin project area

Comment #2

I would like to thank the Montana Department of Water Quality for the opportunity to comment on the draft to improve water quality in the Gallatin Watershed. Well it is sad to think that the once pristine waters of Montana have come to the need of establishing TMDLs, I guess it is understandable and not surprising of the need to do so. With the increase growth and use of the water resource, water becomes more and more valuable and not just water quantity, but water quality. As the climate warms, weather patterns have and will change and it is not completely known how this will affect water supplies in the west. But in my opinion, early indications do not bode a good report. And usually as water quantity decreases, so does water quality. According to the draft, TMDLs are needed for sediment, nutrients and E Coli within the Gallatin Watershed. The fact that these three TMDLs need to be established is not a surprise as it is commonly understood these three water quality parameters are negatively affected by an increase in growth and use. As a result of the increase in quantities of these pollutants, the designated uses receiving a negative impact in the waters of the Gallatin Watershed are aquatic life, primary contact, recreation and agricultural use. Obviously the degradation of these waters which prevent these uses is a potential health risk for aquatic life and humans. It not only affects our health but also affects our lifestyle and detracts from the reason why we choose to live here in the first place. My concern of the document is how much "teeth" will this have in order to make a positive difference. The mitigated steps mentioned in the draft should make a difference if the "follow through" is followed through. In my past experience, I have seen the need for water quality and water quantity monitoring. Frequency, location of monitoring sites and number of monitoring sites are necessary for proper determination. My concern here is if this plan has enough impetus to provide the necessary data for scientific reasoning. In **Section 10** it states the following "Funding for future monitoring is uncertain and can vary with economic and political changes. Prioritizing monitoring activities depends on stakeholder priorities for restoration and funding opportunities." Sometimes the best intentions still don't provide the necessary answers because of short-sided approaches. Not only is the necessary monitoring a concern for me, but mitigation steps must also be undertaken. If the mitigation steps are not implemented as stated, then the desired results may not be achieved as desired. I believe the steps as stated and as I understand them now should be effective. But the steps must be taken. I believe that we know how to solve environmental problems. But I think the problem is as stated above. Do we have the will and do we want to pay the price? This will be the question that we still must answer. I applaud the effort and I think it has stated the problem correctly. Continue monitoring is a must and mitigation is a must. They both work together. Thank you for the opportunity again for comment.

Response to #2

Thank you for providing comment to the Lower Gallatin TMDL document. The document will be used to help guide and implement existing regulations applicable to point source dischargers that received a wasteload allocation. Nonpoint sources of pollutant loading to impaired waterbodies participate in load reduction via voluntary implementation of best management practices. In the Lower Gallatin project area, there are 3 active watershed/conservation groups; the Greater Gallatin Watershed Council, the Gallatin Local Water Quality District and the

Gallatin Conservation District. These groups have received funding grants to pursue TMDL implementation as well as additional water quality sampling and will be the strongest vehicles for identification and achievement of specific restoration activities in impaired basins. Ultimately, it will be up to the citizens who live in the project area to work towards restoration of impaired uses in the identified waterbodies. The impetus and resolve to restore watershed health is strong in the Lower Gallatin project area.

From the city of Bozeman Director of Public Works, Craig Woolard, PhD.

Thank you for providing comment on the Lower Gallatin TMDL document. Comments from the city of Bozeman included edits for references, word choice, reading comprehension and grammar. These were all addressed within the document and are not referenced in this section.

Comment #3
The city Bozeman is a proud steward of the East Gallatin River. This community invested more than $53 million to support nutrient removal and improve the East Gallatin River; however we do not believe additional investment would materially improve water quality.

Response to #3
DEQ recognizes the significant resources the city of Bozeman invested into the Water Reclamation Facility (WRF) and specifically allows for phased implementation that takes these recent treatment upgrades into account. The TMDL establishes the wasteload allocation for the East Gallatin River based on the river's nutrient targets, existing WRF discharge loads, and the magnitude of WRF nutrient discharge concentrations, which are significantly greater than the nutrient target concentrations even after the above referenced upgrades. In addition, as the city is aware, once numeric nutrient criteria are adopted, the target nutrient concentrations will probably decrease. However, MCA 75-5-313 authorizes the department to grant a variance allowing for affordable water quality improvements in a staged manner if requested by the facility. This variance provides relief from the numeric nutrient criteria and from TMDL wasteload allocations, which will be based on the numeric nutrient criteria. This variance information was used to establish the appropriate effluent concentrations as part of the phased implementation.

Comment #4
We believe the science behind the proposed nutrient TMDL is not fully developed. No water quality modeling has been done on the East Gallatin River, and MDEQ (Montana DEQ) used limited water quality data to determine impairment in the upstream reaches. The city of Bozeman is willing help to develop this required scientific documentation and has submitted a sampling plan on July 3 of this year for additional work to MDEQ. To date, MDEQ has not responded to our request for review of the plan to collect a better dataset to support decision making.

Response to #4
The upper segment of the East Gallatin River was first listed for TN and TP nutrient impairments in 2006 and data collected since 2006 affirm the original listing (**Section 6.4.3.6**). Downstream of the WRF discharge, the impairment determination is based on WRF discharge loads (after upgrades) and mixing results within the river. Even if upstream nutrient concentrations approached reference or pristine conditions, nutrient concentrations below the WRF discharge

would still be significantly above the nutrient target concentrations applicable to the river given the significant flow and nutrient concentration additions from the WRF discharge.

The proposed nutrient modeling and associated sampling plan link to a desired effort by the city of Bozeman to modify the instream targets. If modified, these could then be used to update impairment determinations using different baseline target values than those applied within the TMDL document. A model to evaluate biologic response and possibly modify the nutrient targets below the WRF discharge was outside the scope of the Lower Gallatin TMDL development given the significant effort and science DEQ put into the development of draft numeric nutrient criteria, which form the basis for the nutrient targets within this document. Nevertheless, DEQ encourages locally led efforts to evaluate potential target modifications via site-specific criteria and biological response modeling as suggested in the comment.

DEQ has responded to the proposed sampling plan and sent the city of Bozeman a sampling plan and potential approaches that would satisfy DEQ data and modeling requirements in order to develop reach-specific nutrient target concentrations.

A simple, concentration-based model was developed for the East Gallatin River downstream of the WRF discharge location (**Appendix G**). The model was used to develop nutrient TMDLs for TN and TP in the middle and lower segments of the river.

Comment #5

We understand there is a variance process in place that allows near-term permit levels consistent with its current level of treatment. However, the proposed variance process makes it difficult to plan long term capital investments.

Response to #5

These considerations have been incorporated into ongoing variance process implementation planning taking place between DEQ and the Nutrient Work Group. In addition to variances, DEQ has been working with stakeholders on other options that may help reduce nutrients. For example, DEQ's nutrient trading policy has been adopted into rule by the Board of Environmental Review and would encourage point to nonpoint source trading. In situations where use support can be demonstrated, adoption of site-specific criteria may be warranted. This concept is outlined in DEQ's draft document "Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances and Guidelines for Determining if a Waste Water Treatment Facility can Remain at a Previous General Variance Concentration" (page 9).

Other options available to stakeholders include House Bill 52, now codified in MCA 75-6-102 & 103. HB 52 gave DEQ the authority to allow municipalities options for wastewater use with minimal treatment (i.e. dust abatement, fire suppression, irrigation).

Additionally, permit limits are currently in statute and are required to be set in rule prior to 2017 when the city of Bozeman WRF permit expires. Any changes to the permit limits will only be made in consultation with the Nutrient Work Group.

> **Demonstration of Use Support Based on Empirical Data.** Permittees may begin at any time to collect nutrient concentration, benthic and phytoplankton algae,

and other water quality data in the receiving waterbody downstream of their mixing zone. In cases where the base numeric nutrient standard for the waterbody were developed using a specific water quality endpoint (for example, pH), data collection must include that parameter. Data collection shall follow Department SOPs. Permittees are strongly encouraged to coordinate with the Department on study design and data collection protocols upfront, to assure that the data will be acceptable to the Department when the time comes for evaluating the outcomes. For example, it has been shown that chlorination of effluent can, in some cases, mute the effects of nutrients for some distance downstream (Gammons et al., 2010); this would need to be accounted for in any study design. Subject to Department approval, these data may be used to demonstrate that remaining at the previous general-variance treatment level (assumed here to have been achieved by the permittee) was adequate to support beneficial uses of the waterbody. If the collected data conclusively indicate that beneficial uses of the waterbody are fully supported, then a site-specific base numeric nutrient standard may be in order. Any site-specific nutrient standard so determined may be adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA.

Comment #6

We believe a Phased TMDL that caps nutrient loads at current levels and allows additional data to be collected is the wisest course of action. We are willing to participate in developing that science.

Response to #6

The WLA is phased within this document via a process that essentially mirrors the variance process. The city of Bozeman will be eligible for a variance or phased implementation values that under the variance process would cap the effluent concentrations, but under existing circumstances would not cap the load. Since the city currently meets the initial phased implementation concentration values (i.e. discharge concentrations are already below 1 mg/l TP and 10 mg/l TN), there is no loading cap if integrated into effluent permits using concentrations as suggested within this document and as allowed via the variance process. In fact, DEQ purposely avoids implying loading caps in order to help facilitate sewering of existing septic systems as part of the long-term water quality protection approach defined by the allocations within this document.

DEQ is open and interested in working with the city. Should a water quality model and field sampling yield a reach-specific water quality standard for the middle segment of the East Gallatin River that is accepted by DEQ, the TMDL and WRF Wasteload Allocation (WLA) for the East Gallatin River will be amended to reflect a reach specific water quality target different from the Level III Middle Rockies ecoregion target.

Comment #7

We believe the East Gallatin watershed would be best served by a wider watershed-based look at nutrient inputs and thresholds for beneficial use impairment. Nutrient-based control of algae is merely one of many techniques that could be used to improve stream health.

Response to #7
The TMDL is the first step towards completing a watershed-scale evaluation of impacts to beneficial uses. Nutrients represent one of several pollutants affecting beneficial-use support. DEQ supports watershed based efforts to improve water quality within the watershed and have provided technical and financial assistance to several watershed groups operating in the area.

It should be noted that DEQ evaluates attainment of beneficial-use support by evaluating multiple water quality indicators, one of which is nuisance algae levels. Diatom and macroinvertebrate composition is another indicator often considered by DEQ in determining aquatic life use support. As noted in **Section 6.4.2** of the TMDL document, DEQ established the draft nutrient criteria based on a) reference conditions; and b) stressor-response studies that evaluated nutrient impacts on several biological indicators (e.g., fish, macroinvertebrates, periphyton, chlorophyll-*a*) and c) the results of public perception surveys regarding algal densities.

Comment #8
For sediments and pathogens the impaired beneficial uses are identified. Please specifically identify the beneficial use(s) impaired by nutrients.

Response to #8
Table ES-1 in the Executive Summary identifies the uses impaired for nutrients. Aquatic life was the primary use impaired by nutrients along with contact recreation.

Comment #9
Table 1-1, please also include how the cause of impairment was determined.

Response to #9
Causes of impairment are explained in detail in the appropriate section (**Section 5** – sediment, **Section 6** – nutrients, **Section 7** – pathogens).

Comment #10
Please link the TMDL (sediment, nutrients, and/or pathogen) to the streams and designated uses.

Response to #10
Addressed in **Section 3.1** in the document.

Comment #11
Section 4.3 provides an example of how sediment TMDLs may be expressed. Please also include examples of how nutrients and pathogen TMDLs have and may be expressed.

Response to #11
Addressed in **Section 4.3**. in the document.

Comment #12
Regarding the MS4 Permit, use of the existing SWMM model is a very poor tool for developing the TMDL background load and proposed allocation. The SWMM model was conducted on a very limited portion of the City's MS4 system, is not representative of the entire MS4 system, and was not calibrated at the time of original development. The data used and shown in **Figures 5-5** and **5-6** are from our very limited

DMR sampling and only uses the two sampling locations selected for our MS4 permit. Not only is the data set small, but the locations used are very limited in encompassing the characteristics of the City's stormwater. The 'industrial site' sampled near our shops is consistently very high in pollutants and isn't indicative of Bozeman stormwater.

Response to #12

Because the allocation is intended to be met by adhering to the MS4 permit conditions (as stated in **Section 5**), DEQ determined that the staff and financial resources required to collect stormwater data and develop a more robust stormwater model was unnecessary and that modifying the existing SWMM model would satisfy the project goals and desired level of detail. None of the other sediment source assessments were calibrated, and for the same reasons described above, no attempt was made to develop a calibrated stormwater model. The model was used to estimate relative loading, not absolute loads, and the output was not used to set the allocations.

The DMR data were the only available stormwater TSS data. Although the data used for **Figures 5-5** and **5-6** are limited, they do span 3.5 years and were helpful in performing a coarse evaluation of the stormwater quality in relation to regional values and the national values used in the permit. Other than following the permit conditions, the allocation does not specify any actions required by the city as a result of values in the data set. However, please note that the permit conditions require the city to compare the water quality results to the values in the permit, and if there is an exceedance of that value, evaluate the source and reason, and consider additional BMPs and/or other management measures.

The permit specifies that monitoring must occur at a site representing runoff from a commercial and/or industrial area and at a site representing runoff from a residential area, and that the location must be representative. If the city feels as if the current industrial sample location is not representative of stormwater from commercial/industrial areas, perhaps a new location should be selected. Additionally, although the permit requires biannual sampling from two sites, it does not limit the city from collecting data more frequently or from additional sites.

Comment #13

In addition, the City's stormwater system is poorly mapped and incapable of being utilized for a system-wide stormwater model. If the department utilized this model, please provide additional data indicating what modifications were made to the original model and associated calibration data. A synopsis of the changes should be included in the TMDL document and, at a minimum, input and output data from the model run should be included within an appendix at the end of the TMDL.

Response to #13

DEQ agrees that the City's stormwater system is poorly mapped. DEQ also agrees that the available data was inadequate to build a hydraulic stormwater model. However, this particular application of SWMM focused on the hydrologic properties of the system – the loading response to climatic data, infiltration rates, event mean concentrations, and generalized watershed boundaries. It is true that the generalized watershed boundaries may or may not be altered by the existence of unknown sub-surface stormwater conveyance systems, however the changes to watershed loading would likely be minor. Thus, DEQ decided the system information contained in the model provided by the city was sufficient to estimate relative loading at the watershed scale for the reasons described in Response 14. A synopsis of the model inputs and

modifications has been added to the document as Attachment D. To conserve resources, the output is not included in the appendix but is available from DEQ by request. DEQ would like to emphasize the point made in Response 12: the model was used to estimate relative loading and ***the output was not used to set the allocations***.

Comment #14

A 62% reduction of sediments from commercial sites (37% reduction overall) will be difficult to achieve, especially given the fact that many of these sites have already been developed. The installation of BMPs at existing facilities is much more difficult than at new development or redevelopment sites due to existing grading and site constraints. New development and redevelopment is currently occurring very slowly given the condition of the current economy, and sediment reduction BMPs will not be installed at a rate that will meet reduction goals in a timely manner. We believe that a reduction of 62% of TSS from new development and redevelopment sites is more reasonable through the use of BMPs. In addition, the city will work within the MS4 to improve existing practices and implement new BMPs, where feasible, to further reduce the sediment load.

Response to #14

As described in **Section 5.7.4.5**, 62% is the average achievable reduction based on the International Storm Water BMP Database but because some BMPs are already in place for all land use categories, a smaller reduction is needed at a watershed scale. Therefore, a weighted approach was used to approximate the loading reductions that additional BMPs could achieve "across all land-use categories". This means that 37% is the average reduction for both commercial and residential areas, as well as other land uses. DEQ acknowledges that certain areas (such as new developments and redeveloped areas) likely have a greater potential for reduction that retrofitting developed areas. Regardless, this approach was used to approximate achievable BMP-related reductions within the MS4, but as stated previously, the reduction is not binding and the allocation is intended to be met by following permit conditions.

The stormwater source assessment and feedback from residents in the watershed indicate stormwater from the MS4 is a source of excess sediment; DEQ is glad the ity plans to work to improve existing practices and implement new BMPs, where feasible.

Comment #15

We agree with the Department that using the BMPs described in the MS4 General Permit is the most effective way to minimize stormwater discharges, rather than implementing numeric loads. The city is committed to improving the MS4 and recently formed a stormwater utility. We agree that the proposed allocations can be satisfied by adhering to the MS4 permit requirements.

Response to #15

DEQ is glad the city agrees with the allocation approach used for the MS4 and commends it on the formation of a stormwater utility and for being committed to improving the MS4.

Comment #16

Page 6-2, **Section 6.3**. Please define the difference between primary and secondary data sources, how this was determined and what it means for the assessment.

Response to #16

This has been addressed in **Section 6.3** in the document. Primary data sources include those collected in the assessment units and within the specific waterbody segment(s). Secondary data sources include data collected as part of Discharge Monitoring Reports (DMR) by MPDES permitees and other groundwater and surface water data sources used to quantify or describe point and nonpoint sources within a sub-basin. This includes surface water data collected outside the summer period (July 1 – September 30) when nutrient water quality targets apply. Impairment determinations are based only on primary data sources collected during the applicable summer period when the targets apply.

Comment #17

Please describe how and what standards were used to review the data and deem the values relevant and credible to use for assessment.

Response to #17

DEQ's nutrient water quality assessment method has specific objectives and decision-making criteria for assessing the validity and reliability of data. DEQ uses a Data Quality Assessment (DQA) process to evaluate data for use in assessments and decision making. The DQA considers the technical, representativeness, currency, quality, and the spatial and temporal components of the readily available data. The specific data requirements are detailed in the nutrient assessment method which is located on DEQ's website at: http://deq.mt.gov/wqinfo/qaprogram/sops.mcpx. Only data that passes DEQ's DQA requirements are used for impairment determinations described in **Section 6.4.3**.

Comment #18

Page 6-5. Total Persulfate Nitrogen is not an EPA approved method for wastewater. Our MPDES permit (page 6 of 35) defines TN as the sum of nitrite + nitrate (as N) and TKN (as N) concentrations. Please clarify.

Response to #18

By DEQ's definition, total nitrogen can be determined via persulfate digestion or from the sum of TKN and NO_2/NO_3. For assessment purposes, TPN is the preferred method for DEQ's monitoring program as it has proved to be more sensitive and accurate without the blank bias. DEQ recognizes that both methods for determining TN are appropriate. The definition of TN in DEQ-12 covers both analytical methods:

Total nitrogen means the sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined via persulfate digestion, or as the sum of total Kjeldahl nitrogen plus nitrate plus nitrite.

Comment #19

Page 6-5. "The target concentrations of nitrogen and phosphorus are established at levels believed to prevent excess algae growth..." While we understand that studies indicate the numeric nutrient criteria are set to prevent excess algae growth, DEQ is ignoring the fact that below the City's outfall, in two different rounds of sampling, excess algae growth was not present prior to the upgrade. Both lab data and photos taken at the time the samples were collected confirm this fact. We have every reason to believe that after our WRF upgrade algae densities are now even lower. DEQ's assumption that the city

of Bozeman needs to make an additional nutrient reduction of 94% beyond current performance levels is not supported by current algal density data.

Response to #19
An impairment determination is not based solely on the presence/absence of nuisance algae but on multiple indicators of impairment to beneficial uses. The target concentrations for nitrogen and phosphorus are established at levels to protect aquatic life. As previously noted, DEQ is open to working with the City. If it can be demonstrated that the East Gallatin River is meeting its beneficial uses, then site-specific criteria may be warranted.

Comment #20
Page 6-6. **Section 6.4.3**. In the following sentence, "Where water chemistry and algae data do not provide a clear determination of impairment status, or when other limitations exist, macroinvertebrate biometrics (HBI >4.0) are considered", please explain what is meant by a "clear determination". What was the evaluator's general definition or guidelines between clear and unclear? The text says the HBI was then considered, yet the text in the following sections for each waterbody seems to heavily rely on the HBI for determining impairment rather than just being considered. The methodology described and the actual evaluations do not seem to match.

Response to #20
An example of a 'clear determination' is where both statistical tests (T-test and exact binomial) for a water chemistry parameter (TP, TN or inorganic N) yield the same result of impaired or unimpaired. Where the signal is mixed, other parameters are considered to make an impairment determination. The assessment does not rely heavily upon the HBI score. The data descriptions in the body of document include the HBI scores as an additional point of evidence. Clarity in regards to the above comment was provided in the document.

Comment #21
Page 6-6. The paragraph between **Tables 6-2** and **6-3** needs significantly more explanation. Exactly how the nutrient target values were set should be explained more explicitly. What does the following sentence mean and how was this done? "Water quality target values were used with relative flow contributions to calculate segment specific water quality targets." Please include a table or appendix showing the calculations.

Response to #21
Clarification was added to the description of the alterations to instream water quality targets for TN and TP for streams draining the Absaroka-Gallatin-Volcanics Level III ecoregion in the document. A description of the water quality targets and how they were calculated for streams draining the Absaroka-Gallatin-Volcanics Level IV ecoregion may be found in Suplee and Watson, 2012 (http://www.deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx - click on Addendum 1 (Final Draft) under Scientific and Technical Basis for Montana's Nutrient Criteria).

Comment #22
Page 6-11. **Section 6.4.3.6**. It seems counterintuitive to state that a TP TMDL is needed and then later state, "It does appear that the upper segment is not impaired for TP"? The structure of these waterbody sections should be reviewed and revised to present a more methodical and logical presentation of how the determinations of impairment and need for a TMDL was determined.

Response to #22
That will certainly be taken into consideration moving forward in the program. The Upper East Gallatin River has 2 water quality targets as defined by the entry of Bozeman Creek which does complicate the analysis. Fortunately, segments can be broken into separate reaches for impairment determinations per DEQ's nutrient assessment methods. This provides a mechanism to address this type of segment concern. Therefore, AUs as they are delineated in the 2012 IR will not be changed for the Lower Gallatin TMDL document.

Comment #23
Page 6-12. The second table in each of the waterbody evaluations is very misleading. For example, **Table 6-15** for TP shows PASS, NA, and PASS, yet the "Indicates Impairment" column is YES. There should be a another column or a footnote for YES to indicate how the data passed the numerical tests yet the reach was still determined to be impaired.

Response to #23
This is an example where data was divided into 2 reaches with different water quality targets on the upper segment of the East Gallatin River. In that specific table, the 'indicates impairment' column was changed to NO. In the text, it was clarified that the assessment unit includes both reaches and therefore, if one fails they both fail.

Comment #24
Page 6-12. Given that the upstream stretches of the East Gallatin River are listed as impaired for nutrients (TN and TP), the point source dischargers are then limited to the instream nutrient numeric criteria applied to discharge flow at the end of pipe (**Section 6.6.1.1**). This assumes no assimilative capacity in the river and is applied without any modeling or mixing zone. The Upper East Gallatin River stretch to the confluence of Bozeman Creek is listed as impaired, where none of the TP or TN samples exceed the numeric criteria, nor do the chlorophyll-*a* samples. The single macroinvertebrate sample exceeds the benchmark of 4 HBI by a value of 0.24. This is a tenuous argument to conclude impairment at best. In the Upper East Gallatin to the confluence of Bridger Creek, while there are TN and TP exceedances, the samples are very limited and statistical analysis is not possible. The chlorophyll-*a* samples are considerably below the target, and the two macroinvertebrate samples barely exceed the target of 4 HBI. By DEQ's own analysis, there is limited data on the stretch of the river upstream of the WRF discharge, and without further analysis or modeling the numeric criteria is applied end of pipe. Due diligence indicates that further sampling and modeling should occur to ensure sensible application of the criteria and a mixing zone explored.

Response to #24
The assessment unit for the upper segment of the East Gallatin River is from the confluence of Rocky and Bear Creeks to the confluence of Bridger Creek and the East Gallatin River. While there were no exceedances of water quality targets for TN or TP in the reach upstream of the Bozeman Creek confluence, there were multiple exceedances of water quality targets for TN and TP in the reach between the Bozeman Creek confluence and the Bridger Creek confluence with the East Gallatin River. Macroinvertebrate HBI scores also exceeded the threshold for impairment in the reach between the Bozeman Creek and Bridger Creek confluences. As noted in the document, if one reach of an assessment unit is identified as impaired, the entire assessment unit is considered impaired. The water quality data in the upper East Gallatin River supports the existing impairment listing for TN and TP.

Should future sampling on the East Gallatin River determine that the stream or segment is unimpaired for nutrients, assimilative capacity of the waterbody will be determined in future permit cycles as noted within **Section 6.6.1.1**. As previously noted, even if upstream nutrient concentrations approached reference or pristine conditions, nutrient concentrations below the WRF discharge would still be significantly above nutrient target concentrations given the significant total flow contribution from the WRF discharge. The limited upstream data really has no bearing on the existing impairment determination and has no foreseeable impact on the nutrient WLAs for the next 5 to 10 years since the existing WRF discharge concentrations satisfy all phased implementation scenario requirements through the next 5 year permit cycle and possibly beyond. During this time, additional data can be collected upstream of the discharge to determine whether or not upstream assimilative capacity exists. Even with significant upstream assimilative capacity, the WLA modification would result in discharge concentrations well below existing post-upgrade discharge values.

Comment #25

Page 6-13. "For assessment purposes, data were not adjusted to reflect the October 2011 completion of Bozeman's upgrade to its WRF." Please explain why DEQ would not assess the East Gallatin using post-upgrade analyses.

Response to #25

The assessment process uses actual data and does not attempt to alter or adjust data based on a change in conditions. While the 2011 upgrade certainly decreased the WRF nutrient load to the East Gallatin River, the relative flow and concentration of the discharge in comparison to the existing flow and condition of the receiving waterbody is still quite significant. Downstream of the discharge location, the impairment determination is based on simple mixing calculations using established instream flows and concentrations and WRF flows and nutrient concentrations post-upgrade. Post-upgrade the WRF is still discharging to the East Gallatin River at average flows of 7.9 cfs and at concentrations approaching 5.0 mg/L TN and 0.7 mg/L TP and according to plant operators not all the systems are online yet suggesting that the WRF load to the East Gallatin River will increase in the future. These WRF flows and post-upgrade concentrations lead to 100% exceedance of instream water quality targets for the East Gallatin River under all upstream water quality scenarios (impaired or not impaired), thus leading to conditions that will fail both the binomial and t-tests 100% of the time.

Even if DEQ assumed the reach immediately upstream of the WRF was not impaired, the 80^{th} percentile of the upstream data would likely be used to determine potential mixing zone conditions. The 80^{th}percentile of the upstream reach data is 0.472 mg/L for TN and 0.0238 mg/L for TP. As 0.472 mg/L is greater than the instream TN target of 0.300 mg/L there is zero assimilative capacity for TN. For TP, using a 14Q5 low flow value of 33.3 cfs in the East Gallatin River downstream of the Bridger Creek confluence, allowance of a mixing zone would calculate to discharge concentration requirements of 0.056 mg/l TP in comparison to the existing required WLA concentrations of 0.030 mg/l for TP.

Also, refer to response to #24 above.

Comment #26
Page 6-14. DEQ further supports an impairment listing by again, taking a limited dataset, four samples for macroinvertebrate HBI, taken in 2005, again prior to the upgrade, to support the impairment listing and the call for reduction in nutrients in its discharge.

Response to #26
See response to comment #25.

Comment #27
Page 6-14. In **Table 6-18** it shows the chlorophyll *a* data well below the nuisance algae threshold, but it then fails the algae test with a single AFDW sample.

Response to #27
See response to #25. Clarification was also provided in the document to point out that failing the AFDW is the equivalent to failing the chlorophyll-*a* analysis.

Comment #28
Page 6-24. In **Section 6.5.1.5**, the discussion does not indicate if or how the age of the septic system was considered, please explain.

Response to #28
The MEANSS model is a steady-state tool, it assumes that all septic systems identified are currently contributing wastewater to the surface waters in the watershed. This assumption may not be accurate for some septic systems depending on when they were built and the time it takes their effluent to migrate into surface waters. This is a simplifying assumption that greatly reduces the complexity and time necessary to provide an estimate of the nutrient loading from septic systems. While the steady-state assumption will overestimate the nutrient loading from septic systems in the short-term, the model does not account for approved but not yet constructed septic systems which underestimates long-term nutrient loading. These two assumptions are believed to roughly balance each other out for the purposes of the nutrient loading estimates.

Comment #29
Section 6.5.1.5. Please explain what is meant by "estimates do not take into account higher uptake rates" in regard to septic systems.

Response to #29
Nitrogen attenuation in the environment is a temperature dependent variable that increases with increasing temperatures. During the summer months there may be slightly higher nitrogen attenuation rates of effluent as it migrates through shallower soils that have seasonal temperature fluctuations. MEANSS is a steady-state model that does not account for those types of minor seasonal fluctuations. Due to the uncertain effluent travel times in the subsurface, correlating seasonal nutrient attenuation in soils with impacts to surface waters would not provide any additional accuracy to the model results.

Comment #30
Page 6-25. Please provide the MEANSS model described in this section.

Response to #30
The MEANSS model has been incorporated into Appendix A of the Department's draft Policy for Nutrient Trading – a copy of that policy can be found at http://deq.mt.gov/wqinfo/NutrientWorkGroup/default.mcpx.

Comment #31
Page 6-26. Please note that at the moment, the Bozeman WRF is surpassing the plant's anticipated design criteria for performance. It is important to recognize that, to date, the plant's new thickening and dewatering systems have not been put into service and because we are not returning any side-stream flows to the head of the plant, and the plant is significantly under loaded. The design performance for the facility is 7.5 mg/L TN and 1 mg/L TP. DEQ should use these values in its analysis rather than our short term early performance values that are not indicative of long term performance expectations.

Response to #31
A concentration-based model was developed to determine the relative contribtuitons from the WRF at points downstream of the discharge. The model used the design performance values of 7.5 mg/L TN and 1.0 mg/L TP to establish the initial condition. The model was not used to calculate the Wasteload Allocation (WLA) for the WRF which was based on the impairment status of the receiving waterbody and the instream target concentrations for TN and TP in the Level IV Middle Rockies ecoregion. The WLA is essentially independent of existing discharge concentrations although it does provide flexibility should upstream assimilative capacity exist in the future. On the other hand, the existing treatment capabilities were taken into account when allowing for a somewhat lenient phased WLA implementation approach. Given the relatively high percentage of WRF discharge flow relative to summer river flow, DEQ encourages the city of Bozeman to pursue the greatest degree of nutrient removal possible to obtain the most benefit from the $53 million invested in the treatment plant upgrade.

Comment #32
Page 6-28. **Section 6.5.2.2**, including **Table 6-39**. Please revise the text to clarify what is meant by the term "allowable" in this section. Is this the allowable load in the MS4 permit or something else?

Response to #32
This was addressed in **Section 6.5.2.2** in the document. Allowable load was calculated using the median flow in the receiving waterbody and the applicable water quality target.

Comment #33
Page 6-29. The data in **Table 6-40** don't translate in a readily understandable way to the graphs shown on pages 6-31 to 6-35. Please explain how MDEQ translated these values to the percentages shown.

Response to #33
Table 6-40 was deleted because it did not translate well to the graphs. This was especially true for the East Gallatin River segments.

Comment #34
Page 6-29. **Section 6.5.3**, please explain what the area-based evaluation approach is and provide a reference. Are these from land use based export coefficients? Why are some of the entries NA, and what does this mean?

Response to #34
The area-based evaluation approach is outlined in **Section 6.5** and further explained in **Appendix F**.

Comment #35
Page 6-30. Please provide the documentation for how the flows from the East Gallatin via Buster Gulch were derived and how the city's WRF flow component was determined. Similarly, please explain how the city's WRF flow component was determined to contribute to the Dry Creek irrigation canal. To the city of Bozeman's knowledge, no mixing zone study or other study has been done to determine what fraction of its flow makes it into these diversions, or what fraction of its nutrients makes it to their outlets given the irrigation uses and groundwater seepage along the route. Without this type of analysis, it would be impossible to say what fraction of the loads is transferred. If this analysis has been done, please provide it. If it has been done in the past, it most certainly would have changed with the plant's new outfall location.

Response to #35
A USGS mixing zone study which included analysis of the city of Bozeman WRF discharge was used to understand the flow characteristics immediately downstream of the outfall location (Cleasby, T.E. and Dodge, K.A. 1999. Effluent Mixing Characteristics below Four Wastewater Treatment Facilities in Southwestern Montana, 1997. Water-Resources Investigation Report 99-4026). The outfall has since been moved further upstream but the basic findings of the research project are still accurate in describing mixing of the WRF discharge and the East Gallatin River (See response to #41). The WRF discharge is completely mixed with East Gallatin River flows upstream of the Buster Gulch diversion. Calculations to determine loading to Buster Gulch and the Dry Creek irrigation canal used channel measurements, water rights investigation, flow measurements, and the WRF discharges to estimate flow and load diversions to these systems as part of source allocation. The analysis was done to determine existing nutrient loads in nutrient impaired waterbodies downstream of the WRF discharge and included an assessment of all nutrient sources including nonpoint nutrient loads from adjoining lands and East Gallatin tributaries.

Comment #36
Page 6-43. Would MPDES permits written to meet this criterion also allow a 20 percent exceedance rate? Please clarify.

Response to #36
Upstream conditions do allow for 20% exceedance based on the binomial test statistic, such that when the WLA is calculated using a discharge concentration equal to the target values, this 20% allowable exceedance rate still exists downstream of the permitted discharge.

Comment #37
Page 6-45. **Section 6.6.1.1**. The reach immediately upstream of the discharge is not already consistently exceeding the standard. The approach applied assumes that the upstream reach always has nutrient concentrations greater than the selected target. The data in **Section 6.4.3.6** show the upstream at times below the target. Bozeman should be provided a greater WLA to account for variability both in the upstream conditions and their treatment process. Additionally, a rate of 20-percent excursions (**Section 6.6**) above the target is allowed. This should be included in the computation of the Bozeman WRF WLA since nutrients are not toxic and because of the variability of conditions.

Response to #37
Mixing zones are not permissible when discharging to an impaired waterbody as in this situation. DEQ evaluated the potential implications if the reach immediately upstream of the discharge was delisted for a nutrient impairment and concluded that there would be no impact to the WRF WLA in the foreseeable future as discussed above in the response to comment #24. Also see response to comments #24, #25, #36 and #38.

Comment #38
Page 6-45. A "mixing zone approach is used to ensure that the discharge does not cause a standard violation." The city of Bozeman would like permission to implement a water quality model to develop appropriate wasteload allocations rather than the mixing zone approach described here. This would be similar to the approach that was used on the VNRP on the Clark Fork, which was approved by both DEQ and USEPA. This approach is a much more suitable tool to develop important wasteload values rather than a simple mixing zone approach which was based on extremely limited data. It is for these reasons, the city of Bozeman is willing to support and fund the development of a water quality model.

Response to #38
DEQ is willing to work with and support efforts by the city to collect the necessary data and develop a water quality model for the East Gallatin River.

Comment #39
Page 6-45. This section should mention the fact that the city of Bozeman also moved its outfall with this upgrade which would naturally change mixing conditions in the river and its impact on the near field water quality.

Response to #39
This change in outfall location was noted in **Section 6.6.3.2**. In a letter to Jim Lloyd, DEQ from the city of Bozeman dated October 29, 2007 and signed by city Engineer Rick Hixson, P.E., a request to revise the outfall location was outlined. From the letter: *Regarding the mixing zone, the characteristics of the river at the proposed location are very similar to the river characteristics at the existing location.* This suggests that the city Engineer does not agree that mixing conditions are substantially different at the new location.

Also see response to #37.

Comment #40
Page 6-46. "There is no upper limit or load cap." This statement does not seem appropriate here. The idea that these numbers don't have a cap when they are so far away from what is technologically feasible seems disingenuous.

Response to #40
The WRF discharges to an impaired reach of the East Gallatin River. As a point source cannot contribute or cause an impairment, the Wasteload Allocation is equal to the end-of-pipe concentration equal to the instream water quality target for the Middle Rockies Level III ecoregion. There is no load limit or cap as long as the discharge meets the end-of-pipe concentration. Language has been added to **Sections 6.6.1.1** that points out that even under phased implementation, there are no load caps if the permit limits are set based on the phased

implementation concentrations. DEQ considers this an important clarification so that there is no implied growth limit on the city and so that the city can move forward with efforts to hook up existing septic systems to the city sewer system consistent with the goals of the TMDL LA for subsurface wastewater disposal.

Comment #41
Page 6-47. The sections on Total Phosphorus Discharge Limits and Total Nitrogen Discharge Limits need to be rewritten completely to describe the variance process. The city of Bozeman does not agree that it would need to have a facility designed to meet 0.07 mg/L TP and 4 mg/L TN by 2017. A facility designed to consistently meet those limits would represent a capital investment of more than $30 million, beyond the $53 million this community of 30,000 people has already invested. Given the very preliminary nature of the data used to develop this assessment, this section should be modified.

Response to #41
It was not the intention of DEQ to require a new facility be designed by 2017. The description of the phased implementation approach was rewritten prior to the public comment draft to reflect how DEQ anticipates the WLA for the WRF will be applied in future permit cycles and to ensure that it does not imply what you state above in your comment.

Comment #42
Page 6-49, **Section 6.6.1.2**. Regarding the stormwater permit, the justification for the TN and TP load reductions (22% and 46%, respectively) required for the MS4 are not adequately discussed. Please provide additional justification (document citation or mathematical calculation) for these values.

Response to #42
Addressed in **Section 6.6.1.2** in the document and response to comments #12-#14.

Comment #43
Page 6-52. "Mass balance equations were used to reduce load estimates to reflect upgrades to the WRF." Again, as in the comment above mass balance equations are not the most appropriate tool for developing wasteload allocations intended to control algae growth. Rather, a water quality model would be a more appropriate tool to conduct this analysis.

Response to #43
Please see response to #45.

Comment #44
Page 6-52 and 6-53. It looks like these loads were calculated based on plant performance, rather than design performance as indicated above. In addition, these loads should be calculated using the 20 year flow for the facility, which is 13.9 MGD.

Response to #44
Loads from the WRF were calculated using design performance (7.5 mg/L TN; 1.0 mg/L TP) and the long-term monthly mean discharge from the facility during the period July 1 – September 30 (5.34 MGD). The TMDL is to determine the existing condition and not some potential future condition.

Comment #45
Page 6-53. The 139 lb/d load referenced in **Table 6-44** does not match the 244.79 lb/d referenced on page 6-26 and cannot be readily made congruent with **Table 6-46**. Please explain the discrepancy. **Appendix F** doesn't seem to clearly explain the loading from the WRF on various segments of the East Gallatin.

Response to #45
Initially, the East Gallatin TMDLs were created using all data collected in a given segment and allocated based on the results of a source assessment. The results of the 2011 WRF upgrade on instream nutrient loads were identified using a mass balance approach. Subsequent reviews identified the shortfalls inherent to this approach, such as not accounting directly for losses in load and streamflow via irrigation diversions. The most recent version of the TMDLs for the East Gallatin River used a concentration reduction model to determine the relative allocation to the WRF and determine the loss of dissolved nutrient concentrations at distances downstream of the WRF outfall. This approach has identified sample locations on the East Gallatin River that best represent hydrologic and water quality conditions on a given segment. Data from these points were used to determine the existing load in a segment. In this way, the East Gallatin TMDLs were recalculated and more clearly defined. The new TMDL tables are in **Section 6.6.3** and an explanation of the model may be found in **Appendix G.**

Comment #46
Page 6-54. Please explain how the city of Bozeman's existing TN and TP loads increase in the Lower Section of the River (257.37 lb/d, 39.55 lb/d) when compared to the middle section of the River (138 lb/d, 3.78 lb/d).

Response to #46
This was due to the original approach used to calculate the existing load on each segment using instream data which did not adequately account for irrigation diversions and returns. The tables and calculations were redone using a different method. Please see response to #45.

Comment #47
Page 6-53. In **Table 6-44**, A TN allocation of 8.32 is not technologically feasible for the city of Bozeman WRF to achieve. Similarly, a TP allocation of 0.73 lb/d is not achievable in **Table 6-45**. Please provide an asterisk adjacent to these values and provide the current performance value and the technologically achievable value in a footnote so this is clear to the reader. The same comment applies to allocations for the WRF shown in **Tables 6-48** and **6-49**.

Response to #47
This is a good suggestion. Additional clarification was added to **Tables 6-43** through **6-48** in **Section 6.6.3** in the document.

Comment #48
Page 6-53. **Table 6-44** calls for the city of Bozeman to further reduce its TN load by 94%. This seems like an inequitable distribution of reduction in the nutrient load in this watershed, given the significant financial investment the city has recently made. In fact, as shown in **Table 6-44**, subsurface dischargers would be allowed to discharge 15.7 lb/d TN with 0% reduction called for, while the city of Bozeman and its 30,000 residents are allowed only 8.32 lb/d TN.

Response to #48

In Montana administrative rule, point sources cannot contribute or cause an impairment and if discharged to an impaired waterbody, must effectively meet the instream water quality target at the end-of-pipe. The current load from the WRF needs to be reduced to meet the end-of-pipe water quality target for the Middle Rockies Level II ecoregion. Subsurface dischargers including septic tanks are not regulated under MPDES. As discussed within responses to Comments #3 and #5 and within **Section 6.6.1.1** of this document, a phased WLA implementation is included in the document to address your above concerns.

Comment #49

Page 6-53. Please explain how the "Subsurface Wastewater Treatment and Disposal" was derived. It does not appear to include a load from the leaking Riverside lagoons, which could represent a significant N and P, as well as an E. coli load to the River.

Response to #49

The Riverside Subdivision was included in the MEANSS model based on county and DEQ data as a septic source. However, estimates from the load from the failing lagoon at the Riverside Subdivision were made based on available data and leakage rates from the system (**Section 6.5.1.5; Appendix F)**. Water quality influent data from the Amsterdam-Churchill system was used instead of the reported water quality data from Riverside which was deemed suspect. Estimated loads were compared with the synoptic water quality sampling in the river. Average wastewater flow is 20,000 gpd at the facility. A site visit by Montana DEQ estimated that Pond 2 is leaking ~20,000 gpd (0.031 cfs). The load estimate assumed that the retention time at the facility if 75% of the current minimum of 105 days which equals 79 days. The influent concentration is assumed to be reduced to 25.16 mg/L for TN based on the reduction formula (influent concentration * exp(-0.0075*Retention time) and TP reduced to 32.29 mg/L based on a 30% reduction in the system. These estimates were based on discussions with DEQ engineers.

If we assume that there is a pipe of the Riverside effluent directly to the river with no reduction; the load would be 7.58 lbs TN/day (3% of WRF load) and 7.69 lbs TP/day (31% of WRF load). However, there is uptake and reduction and some retention time in the system. Most telling, synoptic sampling downstream of the WRF outfall does not support these loads in the river downstream of the Riverside Subdivision.

Essentially, the system was looked at in the MEANSS model and in a separate analysis. Synoptic sampling did not observe large load increases in samples collected in the vicinity of the Riverside Subdivision.

Comment #50

Page 6-66. "DEQ assumed that sampling data for each waterbody segment represents conditions in each segment. Most segments have less than the desired 12 samples, which increases the uncertainty of the representativeness of the data." This is exactly why we believe DEQ should delay finalization of this document until better data and stream modeling can be completed to ensure the conclusions it draws are sound.

Response to #50

As outlined in responses to #4 and #6, DEQ has encouraged the city of Bozeman to pursue a water quality sampling plan and development of a water quality model. The 12 samples

represents a minimum sample size for planning purposes. Impairment determinations can be made with fewer samples if enough values above target concentrations exist.

Comment #51
Page 6-66. "DEQ assumed that background concentrations are less than the target values, and based on sample data upstream of known sources, this appears to be true. However it is possible that target values are naturally exceeded during certain times..." It is interesting to note that the source water to the city of Bozeman drinking water facility, with an average TP concentration of 0.06 mg/L would not be clean enough to discharge to the East Gallatin from its wastewater facility.

Response to #51
It is possible that target values are naturally exceeded during certain times and is the very reason that a 20% exceedance rate is allowed and not allocated to any single pollutant source. This is the margin of safety in the TMDL. The TP target for Bozeman Creek above the Limestone Creek confluence is 0.06 mg/L but ambient instream TP concentrations are less than 0.06 mg/L TP. In the Lower Gallatin TMDL project area, water quality target development did account for streams receiving natural flows from the Level IV Absaroka-Gallatin-Volcanics ecoregion. Artificial or man-made conveyance structures such as irrigation canals or municipal water supplies were not used to develop water quality targets.

Comment #52
Page 6-67. "One other area of uncertainly is the contribution from septic tanks." We also suggest that the existing Riverside sanitary sewer district load should be a component of this calculation. Groundwater sampling for both TN and TP should be taken to better characterize this load. If groundwater data was used in this calculation, please provide it.

Response to #52
The Riverside Water and Sewer District loading to groundwater was included within the subsurface wastewater discharge source category as also discussed in response to #49.