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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

JUN 5 2013

Ref: 8EPR-EP

Mr. Walter L. Baker, Director
Division of Water Quality
Utah Department of Environmental Quality
P.O. Box 144870
Salt Lake City, UT 84114-4870

Re: TMDL Approvals
Jordan River UT16020204-001 –Dissolved Oxygen
Jordan River UT16020204-002 –Dissolved Oxygen
Jordan River UT16020204-003 –Dissolved Oxygen

Dear Mr. Baker:

The Environmental Protection Agency (EPA Region 8) has completed the review of the total maximum daily loads (TMDL) for *organic matter* that address dissolved oxygen impairments in the Jordan River as submitted by your office on October 14, 2012 for the Jordan River segments *UT16020204-001, -002, and -003*. In accordance with the Clean Water Act (33 U.S.C. 1251 et. seq.), the EPA approves all aspects of TMDLs as developed for certain pollutants in water quality limited waterbodies as described in Section 303(d)(1). Based on the review, the EPA finds that the separate TMDL elements for the pollutant listed in the enclosed table are adequately addressed, taking into consideration seasonal variation and a margin of safety.

Thank you for submitting these TMDLs for review and approval. If you have any questions, the most knowledgeable person on my staff is Sandra Spence and she can be reached at (303) 312-6947.

Sincerely,

Martin Hestmark
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Enclosures

Document Date 6/11/2013

DWQ-2013-004141

ENCLOSURE 1: APPROVED TMDLs

Jordan River TMDL Water Quality Study

3	Pollutant TMDLs completed.
3	Causes addressed from the 2010 303(d) list.
0	Determinations that no pollutant TMDL needed.

Submitted: 10/14/2012

Segment: JORDAN RIVER-1

303(d) ID: UT16020204-001

Parameter/Pollutant (303(d) list cause): ORGANIC ENRICHMENT/LOW DO - 35

Water Quality Targets: Minimum dissolved oxygen of 5.5 mg/L. Organic Matter load of 1,373,630 kg/yr (3,763 kg/day).

Allocation*	Value	Units	Permits
LA	684586	KG/YR	
WLA	689044	KG/YR	UT0025852, UT0024384, UT0024392, UT0021628

Notes:

ENCLOSURE 1: APPROVED TMDLs

Date Submitted: 10/14/2012

Segment: JORDAN RIVER-2

303(d) ID: UT16020204-002

Parameter/Pollutant (303(d) list cause):	ORGANIC ENRICHMENT/LOW DO - 35	Water Quality Targets:	Minimum dissolved oxygen of 5.5 mg/L. Organic Matter load of 1,373,630 kg/yr (3,763 kg/day).	
	Allocation*	**Value**	**Units**	**Permits**
	LA	684586	KG/YR	
	WLA	689044	KG/YR	UT0025852, UT0024384, UT0024392, UT0021628

Notes:

Segment: JORDAN RIVER-3

303(d) ID: UT16020204-003

Parameter/Pollutant (303(d) list cause):	ORGANIC ENRICHMENT/LOW DO - 35	Water Quality Targets:	Minimum dissolved oxygen of 5.5 mg/L. Organic Matter load of 1,373,630 kg/yr (3,763 kg/day).	
	Allocation*	Value	Units	Permits
	LA	684586	KG/YR	
	WLA	689044	KG/YR	UT0025852, UT0024384, UT0024392, UT0021628

Notes:

ENCLOSURE 1: APPROVED TMDLs

Date Submitted: 10/14/2012

* LA = Load Allocation, WLA = Wasteload Allocation, MOS = Margin of Safety, TMDL = sum(WLAs) + sum(LAs) + MOS

ENCLOSURE 2

EPA REGION 8 TMDL REVIEW FORM AND DECISION DOCUMENT

TMDL Document Info:

Document Name:	**Jordan River TMDL Water Quality Study**
Submitted by:	**Utah Department of Environmental Quality Division of Water Quality**
Date Received:	**October 14, 2012**
Review Date:	**May 27, 2013**
Reviewer:	**Sandra Spence**
Rough Draft / Public Notice / Final Draft?	**Final Document**
Notes:	

Reviewers Final Recommendation(s) to EPA Administrator (used for final draft review only):

- ☒ Approve
- ☐ Partial Approval
- ☐ Disapprove
- ☐ Insufficient Information

Approval Notes to the Administrator:

This document provides a standard format for EPA Region 8 to provide comments to state TMDL programs on TMDL documents submitted to EPA for either formal or informal review. All TMDL documents are evaluated against the TMDL review elements identified in the following 8 sections:

1. Problem Description
   - 1.1. TMDL Document Submittal
   - 1.2. Identification of the Waterbody, Impairments, and Study Boundaries
   - 1.3. Water Quality Standards
2. Water Quality Target
3. Pollutant Source Analysis
4. TMDL Technical Analysis
   - 4.1. Data Set Description
   - 4.2. Waste Load Allocations (WLA)
   - 4.3. Load Allocations (LA)
   - 4.4. Margin of Safety (MOS)
   - 4.5. Seasonality and variations in assimilative capacity
5. Public Participation
6. Monitoring Strategy
7. Restoration Strategy
8. Daily Loading Expression

Under Section 303(d) of the Clean Water Act, waterbodies that are not attaining one or more water quality standard (WQS) are considered "impaired." When the cause of the impairment is determined to be a pollutant, a TMDL analysis is required to assess the appropriate maximum allowable pollutant loading rate. A TMDL document consists of a technical analysis conducted to: (1) assess the maximum pollutant loading rate that a waterbody is able to assimilate while maintaining water quality standards; and (2) allocate that assimilative capacity among the known sources of that pollutant. A well written TMDL document will describe a path forward that may be used by those who implement the TMDL recommendations to attain and maintain WQS.

Each of the following eight sections describes the factors that EPA Region 8 staff considers when reviewing TMDL documents. Also included in each section is a list of EPA's review elements relative to that section, a brief summary of the EPA reviewer's findings, and the reviewer's comments and/or suggestions. Use of the verb "must" in this review form denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable.

This review form is intended to ensure compliance with the Clean Water Act and that the reviewed documents are technically sound and the conclusions are technically defensible.

1. Problem Description

A TMDL document needs to provide a clear explanation of the problem it is intended to address. Included in that description should be a definitive portrayal of the physical boundaries to which the TMDL applies, as well as a clear description of the impairments that the TMDL intends to address and the associated pollutant(s) causing those impairments. While the existence of one or more impairment and stressor may be known, it is important that a comprehensive evaluation of the water quality be conducted prior to development of the TMDL to ensure that all water quality problems and associated stressors are identified. Typically, this step is conducted prior to the 303(d) listing of a waterbody through the monitoring and assessment program. The designated uses and water quality criteria for the waterbody should be examined against available data to provide an evaluation of the water quality relative to all applicable water quality standards. If, as part of this exercise, additional WQS problems are discovered and additional stressor pollutants are identified, consideration should be given to concurrently evaluating TMDLs for those additional pollutants. If it is determined that insufficient data is available to make such an evaluation, this should be noted in the TMDL document.

1.1 TMDL Document Submittal

When a TMDL document is submitted to EPA requesting review or approval, the submittal package should include a notification identifying the document being submitted and the purpose of the submission.

Review Elements:

☒ Each TMDL document submitted to EPA should include a notification of the document status (e.g., pre-public notice, public notice, final), and a request for EPA review.

☒ Each TMDL document submitted to EPA for final review and approval should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter should contain such identifying information as the name and location of the waterbody and the pollutant(s) of concern, which matches similar identifying information in the TMDL document for which a review is being requested.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information ☐ N/A

Summary: *Jordan River Total Maximum Daily Load Water Quality Study – Phase 1 was received for review and Agency action on October 14, 2012.*

Comments: ***none***

1.2 Identification of the Waterbody, Impairments, and Study Boundaries

The TMDL document should provide an unambiguous description of the waterbody to which the TMDL is intended to apply and the impairments the TMDL is intended to address. The document should also clearly delineate the physical boundaries of the waterbody and the geographical extent of the watershed area studied. Any additional information needed to tie the TMDL document back to a current 303(d) listing should also be included.

Review Elements:

☒ The TMDL document should clearly identify the pollutant and waterbody segment(s) for which the TMDL is being established. If the TMDL document is submitted to fulfill a TMDL development requirement for a waterbody on the state's current EPA approved 303(d) list, the TMDL document submittal should clearly identify the waterbody and associated impairment(s) as they appear on the State's/Tribe's current EPA approved 303(d) list, including a full waterbody description, assessment unit/waterbody ID, and the priority ranking of the waterbody. This information is necessary to ensure that the administrative record and the national TMDL tracking database properly link the TMDL document to the 303(d) listed waterbody and impairment(s).

☒ One or more maps should be included in the TMDL document showing the general location of the waterbody and, to the maximum extent practical, any other features necessary and/or relevant to the understanding of the TMDL analysis, including but not limited to: watershed boundaries, locations of major pollutant sources, major tributaries included in the analysis, location of sampling points, location of discharge gauges, land use patterns, and the location of nearby waterbodies used to provide surrogate information or reference conditions. Clear and concise descriptions of all key features and their relationship to the waterbody and water quality data should be provided for all key and/or relevant features not represented on the map

☒ If information is available, the waterbody segment to which the TMDL applies should be identified/geo-referenced using the National Hydrography Dataset (NHD). If the boundaries of the TMDL do not correspond to the Waterbody ID(s) (WBID), Entity_ID information or reach code (RCH_Code) information should be provided. If NHD data is not available for the waterbody, an alternative geographical referencing system that unambiguously identifies the physical boundaries to which the TMDL applies may be substituted.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
The Jordan River is divided into 8 segments and is 51 miles long originating at Utah Lake (segment 8) and terminating in wetlands that discharge to the Great Salt Lake (segment 1). This waterbody flows through highly urbanized Salt Lake City and carries storm water and point source discharges.

The following beneficial uses that apply to the 8 segments of the river include:

- *Class 2B: Protected for secondary contact recreation such as boating, wading, or similar uses (segments 1 – 7).*
- *Class 3A: Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain (segments 4 – 8).*
- *Class 3B: Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain (segments 1- 4).*
- *Class 4: Protected for agricultural uses including irrigation of crops and stock watering (segments 1- 8).*

Based on current Utah water quality standards, the 2010 303(d) list identifies seven segments of the Jordan River as impaired as shown in figure 1.1 on page 5 of the draft submittal. Segments UT16020204_001, 002, and 003 are addressed in this TMDL submittal. These segments of the Jordan River are clearly identified in maps and within the body of the document and are impaired for dissolved oxygen (DO). Other impairments in the waterbody are delineated and further TMDL efforts will address these impairments and are not included in this submittal.

Comments: *none*

1.3 Water Quality Standards

TMDL documents should provide a complete description of the water quality standards for the waterbodies addressed, including a listing of the designated uses and an indication of whether the uses are being met, not being met, or not assessed. If a designated use was not assessed as part of the TMDL analysis (or not otherwise recently assessed), the documents should provide a reason for the lack of assessment (e.g., sufficient data was not available at this time to assess whether or not this designated use was being met).

Water quality criteria (WQC) are established as a component of water quality standard at levels considered necessary to protect the designated uses assigned to that waterbody. WQC identify quantifiable targets and/or qualitative water quality goals which, if attained and maintained, are intended to ensure that the designated uses for the waterbody are protected. TMDLs result in maintaining and attaining water quality standards by determining the appropriate maximum pollutant loading rate to meet water quality criteria, either directly, or through a surrogate measurable target. The TMDL document should include a description of all applicable water quality criteria for the impaired designated uses and address whether or not the criteria are being attained, not attained, or not evaluated as part of the analysis. If the criteria were not evaluated as part of the analysis, a reason should be cited (e.g. insufficient data were available to determine if this water quality criterion is being attained).

Review Elements:

☒ The TMDL must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the anti-degradation policy. (40 C.F.R. §130.7(c)(1)).

☒ The purpose of a TMDL analysis is to determine the assimilative capacity of the waterbody that corresponds to the existing water quality standards for that waterbody, and to allocate that assimilative capacity between the identified sources. Therefore, all TMDL documents must be written to meet the existing water quality standards for that waterbody (CWA §303(d)(1)(C)). *Note: In some circumstances, the load reductions determined to be necessary by the TMDL analysis may prove to be infeasible and may possibly indicate that the existing water quality standards and/or assessment methodologies may be erroneous. However, the TMDL must still be determined based on existing water quality standards. Adjustments to water quality standards and/or assessment methodologies may be evaluated separately, from the TMDL.*

☒ The TMDL document should describe the relationship between the pollutant of concern and the water quality standard the pollutant load is intended to meet. This information is necessary for EPA to evaluate whether or not attainment of the prescribed pollutant loadings will result in attainment of the water quality standard in question.

☒ If a standard includes multiple criteria for the pollutant of concern, the document should demonstrate that the TMDL value will result in attainment of all related criteria for the pollutant. For example, both acute and chronic values (if present in the WQS) should be addressed in the document, including consideration of magnitude, frequency and duration requirements.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
The State of Utah has EPA approved numeric DO criteria that apply to the Jordan River as shown below in Table 1.1 excerpted from the submittal for the three segments of interest. These numeric values were used in development of this TMDL submittal. Beneficial uses for each segment of the Jordan are clearly identified in the document. The aquatic life uses (3B and 3C) are the most sensitive uses for DO and organic enrichment; hence attaining DO conditions for aquatic life will ensure protection of other uses.

Table 1.1. DWQ segments of the Jordan River included on the Utah 2008 303(d) List (Utah DWQ 2008a).

DWQ Segment	Beneficial Use and Support Status[1]							(Beneficial Use) Pollutant of Concern	Standard or Pollution Indicator Level[1] for Pollutant of Concern
	River Mileage	1C	2B	3A	3B	3C	4		
1	0–6.9				NS	NS		(3B) Benthic Macro Impairment[2] (3B) Organic Enrichment/Low DO (3C) Organic Enrichment/Low DO	(3B) O/E ratio[3] < 0.74 or < 0.54 per sample size (3B) Min. Aug–Apr = 4 mg/L, May–Jul = 4.5 mg/L (3C) 30-day avg DO = 5 mg/L
2	6.9–11.4		NS		NS			(2B) *E. coli* (3B) Benthic Macro Impairment (3B) Organic Enrichment/Low DO	(2B) Max=940 col/100 mL, Geo. Mean=206 col/100 mL (3B) O/E ratio > 0.74 or < 0.54 per sample size (3B) Aug–Apr = 4 mg/L, May–Jul = 4.5 mg/L
3	11.4–15.9		NS		NS			(2B) *E. coli* (3B) Organic Enrichment/Low DO (3B) Total Phosphorus	(2B) Max=940 col/100 mL, Geo. Mean=206 col/100 mL (3B) Aug–Apr = 4 mg/L, May–Jul = 4.5 mg/L (3B) 0.05 mg/L (pollutant indicator level)

[1] Shaded cells indicate beneficial uses assigned to each DWQ segment. NS indicates non-support of the assigned beneficial use
[2] Benthic macroinvertebrate impairment is based on pollution indicator values
[3] O/E ratio = the measured ratio of observed macroinvertebrate species to expected macroinvertebrate species (Utah DWQ 2008b)
[4] Beneficial use class 3A applies to DWQ Segment 4 above the confluence with Little Cottonwood Creek

Comments: *none*

2. Water Quality Targets

TMDL analyses establish numeric targets that are used to determine whether water quality standards are being achieved. Quantified water quality targets or endpoints should be provided to evaluate each listed pollutant/water body combination addressed by the TMDL, and should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the water quality target. For pollutants with narrative standards, the narrative standard should be translated into a measurable value. At a minimum, one target is required for each pollutant/water body combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial uses (e.g., for a sediment impairment issue it may be appropriate to include a variety of targets representing water column sediment such as TSS, embeddedness, stream morphology, up-slope conditions and a measure of biota).

Review Elements:

☒ The TMDL should identify a numeric water quality target(s) for each waterbody pollutant combination. The TMDL target is a quantitative value used to measure whether or not the applicable water quality standard is attained. *Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. Occasionally, the pollutant of concern is different from the parameter that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as a numerical dissolved oxygen criterion). In such cases, the TMDL should explain the linkage between the pollutant(s) of concern, and express the quantitative relationship between the TMDL target and pollutant of concern. In all cases, TMDL targets must represent the attainment of current water quality standards.*

☐ When a numeric TMDL target is established to ensure the attainment of a narrative water quality criterion, the numeric target, the methodology used to determine the numeric target, and the link between the pollutant of concern and the narrative water quality criterion should all be described in the TMDL document. Any additional information supporting the numeric target and linkage should also be included in the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
For modeling purposes, UDWQ used the approved criterion of 4.5 mg/L DO as an instantaneous minimum value. In addition, they included a margin of safety of 1.0 mg/L DO. Hence their instantaneous target is 5.5 mg/L DO. Attainment of this target will ensure attainment of both the acute and chronic site specific standards for the Jordan River.

Section 2 of the document provides a nice description of all the processes that affect DO concentrations in a river system (see Figure 2.3). The QUAL2Kw model was used to determine pollutant linkages that could result in impairment of DO in the Jordan based on this conceptual model. The document identifies the pollutant of concern as organic matter from external sources entering the Jordan resulting in DO impairment in the Segments 1, 2, and 3. The model was initially calibrated to three synoptic events, each in different seasons including October 2006, February 2007, and August 2009. The model was revised in December 2009 based on stakeholder review and validated with data from a separate synoptic sampling event (data was from 2007). The model was calibrated again in July 2010. An external expert technical review was conducted on the model and the choice of rate constants by Dr. Steve Chapra, the original developer of the QUAL2K models.

The WQU notes that the document addresses critical conditions and identifies a target concentration of organic matter necessary to achieve a conservative DO endpoint that is consistent with approved DO standards. Organic matter targets determined via modeling include total organic matter of less than or equal to 1,373,630 kg/yr to the lower Jordan and a total organic matter load reduction of 38%. Critical conditions occurred in late summer/early fall. Endpoints were established following a thorough scientific analysis and modeling effort detailed in Chapters 2 through 5 of the submittal. However, future studies are needed to help refine the understanding of OM sources, loading, and impact and

importance of coarse organic matter to the Jordan River. Therefore, a phased approach is appropriate for updating this TMDL, including specific recommendations and a timeline as described in Chapter 5.

Comments: *We concur that the QUAL2Kw modeling of DO in the Jordan demonstrates that organic matter loading may be addressed to achieve DO standards in the Jordan segments 1, 2, and 3. The residence time of nutrients entering the Jordan likely is insufficient for conversion of nutrients into organic matter resulting in reduction in DO in the segments of interest. We acknowledge the efforts made to calibrate the model, obtain stakeholder and expert input into the modeling efforts, and document uncertainties.*

The document identifies the uncertainty in the analysis including the limited dataset for coarse organic matter contributing to oxygen demand in the Jordan (including organic matter not included in the fine particulate organic matter fraction or volatile suspended solids (VSS)), lack of worst-case DO data, influence of sediment oxygen demand on the Jordan, and modeling uncertainties. Additionally, assumptions were made that management practices used to reduce VSS in the system would result in a corresponding reduction in other larger forms of organic matter that are accounted for in the model by prescribing SOD. Further data is required to determine the accuracy of this assumption, validate the prescribed SOD in the model, and predict the attainable nonpoint source reductions. For these reasons, a conservative DO endpoint was chosen for the TMDL development to ensure attainment of the daily minimum, 7-day average, and 30-day average DO standards. This is an appropriate approach for setting a margin of safety, which is a required element for a TMDL. In addition, this TMDL was submitted using a phased approach such that further study can be undertaken to reduce uncertainties in the TMDL and the allocation scenario through the collection of additional data, model refinements, phased implementation, and effectiveness monitoring.

In addition, the concentration of organic matter found to result in attainment of the DO endpoint under critical conditions was applied year-round as data were not available to determine if seasonal relaxation of this target concentration would result in attainment of DO water quality standards. Given the uncertainty, this is an approvable approach for load capacity establishment as a TMDL must be calculated to at least achieve water quality standards and may not be less conservative.

3. Pollutant Source Analysis

A TMDL analysis is conducted when a pollutant load is known or suspected to be exceeding the loading capacity of the waterbody. Logically then, a TMDL analysis should consider all sources of the pollutant of concern in some manner. The detail provided in the source assessment step drives the rigor of the pollutant load allocation. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each identified source (or source category) when the relative load contribution from each source has been estimated. Therefore, the pollutant load from each identified source (or source category) should be specified and quantified. This may be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques. If insufficient time or resources are available to accomplish this step, a phased/adaptive management approach may be appropriate. The approach should be clearly defined in the document.

Review Elements:

☒ The TMDL should include an identification of the point and nonpoint sources of the pollutant of concern, including the geographical location of the source(s) and the quantity of the loading, e.g., lbs/per day. This information is necessary for EPA to evaluate the WLA, LA and MOS components of the TMDL.

☒ The level of detail provided in the source assessment should be commensurate with the nature of the watershed and the nature of the pollutant being studied. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of both the natural background loads and the nonpoint source loads.

☐ Natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g. measured in stream) unless it can be demonstrated that the anthropogenic sources of the pollutant of concern have been identified, characterized, and quantified.

☒ The sampling data relied upon to discover, characterize, and quantify the pollutant sources should be included in the document (e.g. a data appendix) along with a description of how the data were analyzed to characterize and quantify the pollutant sources. A discussion of the known deficiencies and/or gaps in the data set and their potential implications should also be included.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: *Based upon monitoring data, stakeholder input, and modeling information, sources of organic matter to the lower Jordan River were identified in the submittal. Point sources include discharges from wastewater treatment plants (see excerpted Table 3.1) and stormwater discharges (see the excerpt list in Table 1.). Nonpoint source contributors include Utah Lake discharge, tributaries that carry stormwater and run off, direct diffuse runoff to the river, irrigation return flows and natural background.*

Table 3.1. UPDES facilities discharging to the Jordan River and tributaries.

Name	UPDES Permit	Location	Receiving Water
South Davis South Wastewater Treatment Plant	UT0021628	2500 West Center Street, North Salt Lake City	Jordan River below Cudahy Lane
Central Valley Water Reclamation Facility	UT0024392	800 West Central Valley Road, Salt Lake City	Mill Creek ½ mile above Jordan River confluence
South Valley Water Reclamation Facility	UT0024384	7495 South, 1300 West, West Jordan	Jordan River ½ mile downstream of 7800 South crossing
Jordan Basin Water Reclamation Facility	UT0025852	13826 South Jordan Basin Lane (1300 West), Riverton	Jordan River at Bangerter Highway

Table 1. Excerpted information regarding permitted stormwater sources.

Stormwater discharge is regulated by the Utah DWQ as delegated by the EPA in accordance with the Clean Water Act. These regulations are incorporated into Phase 1 and Phase 2 stormwater permits. Stormwater systems that serve populations greater than 100,000 are regulated with Phase 1 permits while Phase 2 permits are applied to small populations. Three Phase 1 permittees are located in the study area including Salt Lake County, Salt Lake City, and Utah Department of Transportation (UDOT). The following 14 communities have Phase 2 permits within the study area including:

Bluffdale	Midvale	South Salt Lake
Draper	Murray	Taylorsville
Herriman	Riverton	West Jordan
Holladay	Sandy	West Valley
Lehi	South Jordan	

Comments: *none*

4. TMDL Technical Analysis

TMDL determinations should be supported by an analysis of the available data, discussion of the known deficiencies and/or gaps in the data set, and an appropriate level of technical analysis. This applies to **all** of the components of a TMDL document. It is vitally important that the technical basis for **all** conclusions be articulated in a manner that is easily understandable and readily apparent to the reader.

A TMDL analysis determines the maximum pollutant loading rate that may be allowed to a waterbody without violating water quality standards. The TMDL analysis should demonstrate an understanding of the relationship between the rate of pollutant loading into the waterbody and the resultant water quality impacts. This stressor → response relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and load allocations needs to be clearly articulated and supported by an appropriate level of technical analysis. Every effort should be made to be as detailed as possible, and to base all conclusions on the best available scientific principles.

The pollutant loading allocation is at the heart of the TMDL analysis. TMDLs apportion responsibility for taking actions by allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or division of responsibility.

The pollutant loading allocation that will result in achievement of the water quality target is expressed in the form of the standard TMDL equation:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

Where:

TMDL	=	Total Maximum Daily Load (also called the Loading Capacity)
LAs	=	Load Allocations
WLAs	=	Wasteload Allocations
MOS	=	Margin Of Safety

Review Elements:

☒ A TMDL must identify the loading capacity of a waterbody for the applicable pollutant, taking into consideration temporal variations in that capacity. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

☒ The total loading capacity of the waterbody should be clearly demonstrated to equate back to the pollutant load allocations through a balanced TMDL equation. In instances where numerous LA, WLA and seasonal TMDL capacities make expression in the form of an equation cumbersome, a table may be substituted as long as it is clear that the total TMDL capacity equates to the sum of the allocations.

☒ The TMDL document should describe the methodology and technical analysis used to establish and quantify the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

☒ It is necessary for EPA staff to be aware of any assumptions used in the technical analysis to understand and evaluate the methodology used to derive the TMDL value and associated loading allocations. Therefore, the TMDL document should contain a description of any important assumptions (including the basis for those assumptions) made in developing the TMDL, including but not limited to:

- the spatial extent of the watershed in which the impaired waterbody is located and the spatial extent of the TMDL technical analysis;
- the distribution of land use in the watershed (e.g., urban, forested, agriculture);
- a presentation of relevant information affecting the characterization of the pollutant of concern and its allocation to sources such as population characteristics, wildlife resources, industrial activities etc…;
- present and future growth trends, if taken into consideration in determining the TMDL and preparing the TMDL document (e.g., the TMDL could include the design capacity of an existing or planned wastewater treatment facility);
- an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

☒ The TMDL document should contain documentation supporting the TMDL analysis, including an inventory of the data set used, a description of the methodology used to analyze the data, a discussion of strengths and weaknesses in the analytical process, and the results from any water quality modeling used. This information is necessary for EPA to review the loading capacity determination, and the associated load, wasteload, and margin of safety allocations.

☒ TMDLs must take critical conditions (e.g., steam flow, loading, and water quality parameters, seasonality, etc…) into account as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable critical conditions and describe the approach used to determine both point and nonpoint source loadings under such critical conditions. In particular, the document should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

☒ Where both nonpoint sources and NPDES permitted point sources are included in the TMDL loading allocation, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document must include a demonstration that nonpoint source loading reductions needed to implement the load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

The technical analysis used in this phased TMDL is quite complex and is well documented in the submittal. Only a brief summary is provided here. QUAL2Kw model was used to estimate the amount of organic matter loading to the Jordan segments 1, 2, and 3 that would allow for attainment of the 5.5 mg/L DO target for this TMDL analysis. The organic matter target was estimated using this model.

Components of organic matter that are important in this analysis include fine particulate organic matter (FPOM)– represented by volatile suspended solids(VSS) measurements, biological oxygen demand (BOD) and total suspended solids (TSS) relationships, and a portion of measured and modeled sediment oxygen demand (SOD). Another important form of organic matter is the coarse particulate organic matter (CPOM)– estimated using modeled SOD. CPOM is very difficult to measure and best estimated loads were used in Phase I of this TMDL.

A combination of historic data and synoptic data were used to determine the loading of FPOM (VSS) from sources. The relationship between VSS and BOD and VSS and TSS were determined such that historic measurements of BOD and TSS could be used to estimate VSS when no VSS data were available and to supplement the data set.

During model calibration, SOD was prescribed to adjust modeling results to fit actual conditions. This prescribed SOD represents the organic matter present in the sediments deposited prior to the modeled period (both FPOM and CPOM) as well as CPOM that is present and not captured in the VSS, BOD, and TSS measurements used to determine water column FPOM.

Current and future loads of organic matter were estimated as well as contributions from the sources listed in Section 3 of this document. The document recognizes the uncertainties associated with these estimates of the organic matter loading determinations and various source contributions. This TMDL was submitted as a phased TMDL so that targets, loads, and allocation uncertainties can be reduced

through further study prior to full implementation. The milestones and schedule for future phases are presented in Table 5.1 of the submittal. Estimated loads for each type of source are provided in Table 3.9. Table 1 below provides a summary of the TMDL information.

Table 1. Jordan River TMDL Summary

Jordan River TMDL

Waterbody ID	Jordan River – 1 (UT16020204-001) Jordan River – 2 (UT16020204-002) Jordan River – 3 (UT16020204-003)
Parameter of Concern	Dissolved Oxygen
Pollutant of Concern	Total Organic Matter
Impaired Beneficial Use	Class 3B Protected for warm water species of game fish and aquatic life, including the necessary aquatic organisms in their food chain
Loading Assessment	
Current Load	2,225.523 kg/yr Total Organic Matter
Loading Capacity	1,373.630 kg/yr or 3.763 kg/day Total Organic Matter (38% reduction)
Margin of Safety	Load capacity based on OM concentrations that result in DO model endpoint of 5.5 mg/L, including 1.0 mg/L implicit MOS added to the instantaneous DO water quality standard of 4.5 mg/L
Bulk Load Allocation	684.586 kg/yr Total Organic Matter (35% reduction)
Bulk Waste Load Allocation	689.044 kg/yr Total Organic Matter (41% reduction)
Defined Targets/Endpoints	Total OM load to lower Jordan River (kg/yr) <= 1,373,630 kg/yr Dissolved Oxygen >= 4.5 mg/L

Comments: *none*

4.1 Data Set Description

TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis. An inventory of the data used for the TMDL analysis should be provided to document, for the record, the data used in decision making. This also provides the reader with the opportunity to independently review the data. The TMDL analysis should make use of all readily available data for the waterbody under analysis unless the TMDL writer determines that the data are not relevant or appropriate. For relevant data that were known but rejected, an explanation of why the data were not utilized should be provided (e.g., samples exceeded holding times, data collected prior to a specific date were not considered timely, etc…).

Review Elements:

☒ TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis such that the water quality impairments are clearly defined and linked to the impaired beneficial uses and appropriate water quality criteria.

☒ The TMDL document submitted should be accompanied by the data set utilized during the TMDL analysis. If possible, it is preferred that the data set be provided in an electronic format and referenced in the document. If electronic submission of the data is not possible, the data set may be included as an appendix to the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
Section 2.0 of the submittal provides a summary of the data demonstrating water quality impairments in the lower three segments of the Jordan River. Table 2.1 provides a summary of the monitoring stations, inflow sources, and diversion locations along the river.

The Jordan River watershed is highly managed in terms of hydrology. Inflow sources considered include Utah Lake, tributary flows, irrigation return flows, stormwater inputs, permitted discharges, diffuse runoff, and groundwater. Diversions occur along the length of the river as well. Numerous studies have been undertaken to document the water budget for the Jordan. These studies are referenced along with the budget prepared by Cirrus (Cirrus 2009b) used for this analysis. Flow data from 1980 to 2005 were considered in creating the water budget provided in Appendix C. In the budget, flow contributions for each source were quantified. Generally, monthly average flow gage data were used when available for the Jordan. When not available, gage data in combination with other flow information and deductive reasoning was used to determine volumes from Utah Lake, ungaged tributary flows, stormwater inputs, diffuse runoff, irrigation return flows and ground water contributions.

Section 3.3 of the draft submittal provides a summary of the data used in the TMDL analysis and describes how VSS, TSS, BOD, and modeled SOD values were used to estimate the loading of FPOM and total organic matter to the Jordan. Additional data will be collected to improve estimates of CPOM and SOD and source contributions in futures phases of the TMDL. All data have either been made available during the development of the TMDL or are available from DWQ upon request. More than 1300 data points have been incorporated into a database for this TMDL effort which is too large to provide as an appendix to the document.

Comments: none

4.2 Waste Load Allocations (WLA):

Waste Load Allocations represent point source pollutant loads to the waterbody. Point source loads are typically better understood and more easily monitored and quantified than nonpoint source loads. Whenever practical, each point source should be given a separate waste load allocation. All NPDES permitted dischargers that discharge the pollutant under analysis directly to the waterbody should be identified and given separate waste load allocations. The finalized WLAs are required to be incorporated into future NPDES permit renewals.

Review Elements:

☒ EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit. If no allocations are to be made to point sources, then the TMDL should include a value of zero for the WLA.

☒ All NPDES permitted dischargers given WLA as part of the TMDL should be identified in the TMDL, including the specific NPDES permit numbers, their geographical locations, and their associated waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
Point source contributors of organic matter in the lower Jordan River are clearly identified in the draft submittal. These include wastewater treatment plants and permitted stormwater discharges. Because of the uncertainty present in the current loading and allocation estimates in this Phase I document, the authors have provided a bulk WLA to represent point source discharges to the river. Separate WLAs are not provided for each facility or permit. Section 4.0 of the document provides a summary of the allocations for this TMDL. Allocations are made for each source type in proportion to their contribution to the total load to the lower Jordan. Percent reductions needs are distributed among sources based on their percent contribution to the impaired segments. Reductions needed for FPOM are assumed to be equivalent to percent reductions needed for CPOM.

Table 4.1 of the document shows the allocations for Phase I that will likely change in Phase II.

Table 4.1. Bulk allocations of existing total OM loads (kg/yr) to meet DO water quality standards in the lower Jordan River.					
Source	Loads into Lower Jordan River	Contribution into Lower Jordan River (%)	Permissible Loads into Lower Jordan River	Daily Permissible Loads into Lower Jordan River (kg)	Percent Reduction into Lower Jordan River (%)
Point Sources Upstream of 2100 South	469,062	21%	283,185	776	40%
Point Sources Downstream of 2100 South	700,282	31%	405,858	1,112	42%
Nonpoint Sources Upstream of 2100 South	752,429	34%	545,532	1,495	27%
Nonpoint Sources Downstream of 2100 South	303,749	14%	139,055	381	54%
Total	**2,225,523**	**100%**	**1,373,630**	**3,763**	**38%**

Comments: *EPA typically requests that individual WLAs be provided in TMDL analyses. This ensures that WLAs can be implemented in a transparent manner. However, as this is a phased TMDL, we agree that there is significant uncertainty in the allocations and find that providing a bulk allocation at this time is reasonable for several reasons. First, it is not logical to implement individual WLAs that require expenditure of capital funds at this time as it is not clear how the WLAs may change in the near future as this project progresses into Phase II. Second, individual WLAs would simply be best estimates as this time and provide no additional utility as compared to a bulk WLA. Third, we recognize the concerns of the regulated community in having individual WLAs applied given the uncertainties and potential implications for their effluent limits. We support use of science-based efforts to reduce uncertainties in this analysis prior to allocation of appropriate WLAs through the phased TMDL process.*

4.3 Load Allocations (LA):

Load allocations include the nonpoint source, natural, and background loads. These types of loads are typically more difficult to quantify than point source loads, and may include a significant degree of uncertainty. Often it is necessary to group these loads into larger categories and estimate the loading rates based on limited monitoring data and/or modeling results. The background load represents a composite of all upstream pollutant loads into the waterbody. In addition to the upstream nonpoint and upstream natural load, the background load often includes upstream point source loads that are not given specific waste load allocations in this particular TMDL analysis. In instances where nonpoint source loading rates are particularly difficult to quantify, a performance-based allocation approach, in which a detailed monitoring plan and adaptive management strategy are employed for the application of BMPs, may be appropriate.

Review Elements:

☒ EPA regulations require that TMDL expressions include LAs which identify the portion of the loading capacity attributed to nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Load allocations may be included for both existing and future nonpoint source loads. Where possible, load allocations should be described separately for natural background and nonpoint sources.

☒ Load allocations assigned to natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g., measured in stream) unless it can be demonstrated that the anthropogenic sources of the pollutant of concern have been identified and given proper load or waste load allocations.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:

Nonpoint source contributors of organic matter in the lower Jordan River are clearly identified in the submittal. Because of the uncertainty present in the current loading and allocation estimates in this Phase I document, the authors have provided only a bulk LA to represent nonpoint source discharges to the river. Separate LAs are not provided for each source. Section 4.0 of the document provides a summary of the allocations for this TMDL. See section 4.2 of this document for the table showing the bulk LAs. Further refinement of nonpoint source allocations and natural background will be accomplished in future TMDL phases.

Comments: *none*

4.4 Margin of Safety (MOS):

Natural systems are inherently complex. Any mathematical relationship used to quantify the stressor → response relationship between pollutant loading rates and the resultant water quality impacts, no matter how rigorous, will include some level of uncertainty and error. To compensate for this uncertainty and ensure water quality standards will be attained, a margin of safety is required as a component of each TMDL. The MOS may take the form of a explicit load allocation (e.g., 10 lbs/day), or may be implicitly built into the TMDL analysis through the use of conservative assumptions and values for the various factors that determine the TMDL pollutant load → water quality effect relationship. Whether explicit or implicit, the MOS should be supported by an appropriate level of discussion that addresses the level of uncertainty in the various components of the TMDL technical analysis, the assumptions used in that analysis, and the relative effect of those assumptions on the final TMDL. The discussion should demonstrate that the MOS used is sufficient to ensure that the water quality standards would be attained if the TMDL pollutant loading rates are met. In cases where there is substantial uncertainty regarding the linkage between the proposed allocations and achievement of water quality standards, it may be necessary to employ a phased or adaptive management approach (e.g., establish a monitoring plan to determine if the proposed allocations are, in fact, leading to the desired water quality improvements).

Review Elements:

☒ TMDLs must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d) (1) (C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).

☒ If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS should be identified and described. The document should discuss why the assumptions are considered conservative and the effect of the assumption on the final TMDL value determined.

☐ If the MOS is explicit, the loading set aside for the MOS should be identified. The document should discuss how the explicit MOS chosen is related to the uncertainty and/or potential error in the linkage analysis between the WQS, the TMDL target, and the TMDL loading rate.

☒ If, rather than an explicit or implicit MOS, the TMDL relies upon a phased approach to deal with large and/or unquantifiable uncertainties in the linkage analysis, the document should include a description of the planned phases for the TMDL as well as a monitoring plan and adaptive management strategy.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
An implicit margin of safety is included in the TMDL target as it is more conservative than the applicable water quality criterion for DO. The submittal uses an instantaneous minimum DO of 5.5 mg/L rather than the approved water quality criterion of 4.5 mg/L. This would be equivalent to a 19% explicit MOS. In addition, a phased approach is applied for this TMDL analysis with additional phases planed to reduce uncertainty in the target, loading estimates, and allocations. A description of the future phases, tasks, and schedule is provided in the document.

Comments*: none*

4.5 Seasonality and variations in assimilative capacity:

The TMDL relationship is a factor of both the loading rate of the pollutant to the waterbody and the amount of pollutant the waterbody can assimilate and still attain water quality standards. Water quality standards often vary based on seasonal considerations. Therefore, it is appropriate that the TMDL analysis consider seasonal variations, such as critical flow periods (high flow, low flow), when establishing TMDLs, targets, and allocations.

Review Elements:

☒ The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variability as a factor. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary*:*
The TMDL submittal provides a description of the modeling and data analysis used to determine critical conditions for DO in the Jordan River (late summer/early fall). Organic matter loads were calculated to be protective of the critical condition and seasonality is addressed.

Comments*: none*

5. Public Participation

EPA regulations require that the establishment of TMDLs be conducted in a process open to the public, and that the public be afforded an opportunity to participate. To meaningfully participate in the TMDL process it is necessary that stakeholders, including members of the general public, be able to understand the problem and the proposed solution. TMDL documents should include language that explains the issues to the general public in understandable terms, as well as provides additional detailed technical information for the scientific community. Notifications or solicitations for comments regarding the TMDL should be made available to the general public, widely circulated, and clearly identify the product as a TMDL and the fact that it will be submitted to EPA for review. When the final TMDL is submitted to EPA for approval, a copy of the comments received by the state and the state responses to those comments should be included with the document.

Review Elements:

☒ The TMDL must include a description of the public participation process used during the development of the TMDL (40 C.F.R. §130.7(c)(1)(ii)).

☒ TMDLs submitted to EPA for review and approval should include a summary of significant comments and the State's/Tribe's responses to those comments.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:

An intensive stakeholder and public participation process has been undertaken in the development of this TMDL submittal. A summary of the significant comments received by the State for this submittal as well as the State's responses was provided for review.

Comments: *none*

6. Monitoring Strategy

TMDLs may have significant uncertainty associated with the selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For Phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL document to articulate the means by which the TMDL will be evaluated in the field, and to provide for future supplemental data that will address any uncertainties that may exist when the document is prepared.

Review Elements:

☒ When a TMDL involves both NPDES permitted point source(s) and nonpoint source(s) allocations, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring.

☒ Under certain circumstances, a phased TMDL approach may be utilized when limited existing data are relied upon to develop a TMDL, and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may be necessary to support a rationale for approving the TMDL. http://www.epa.gov/owow/tmdl/tmdl_clarification_letter.pdf

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:

A monitoring strategy is provided along with a schedule and milestones for future phases of the TMDL.

Comments: *none*

7. Restoration Strategy

The overall purpose of the TMDL analysis is to determine what actions are necessary to ensure that the pollutant load in a waterbody does not result in water quality impairment. Adding additional detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement, but is considered a value added component of a TMDL document. During the TMDL analytical process, information is often gained that may serve to point restoration efforts in the right direction and help ensure that resources are spent in the most efficient manner possible. For example, watershed models used to analyze the linkage between the pollutant loading rates and resultant water quality impacts might also be used to conduct "what if" scenarios to help direct BMP installations to locations that provide the greatest pollutant reductions. Once a TMDL has been written and approved, it is often the responsibility of other water quality programs to see that it is implemented. The level of quality and detail provided in the restoration strategy will greatly influence the future success in achieving the needed pollutant load reductions.

Review Elements:

☐ EPA is not required to and does not approve TMDL implementation plans. However, in cases where a WLA is dependent upon the achievement of a LA, "reasonable assurance" is required to demonstrate the necessary LA called for in the document is practicable). A discussion of the BMPs (or other load reduction measures) that are to be relied upon to achieve the LA(s), and programs and funding sources that will be relied upon to implement the load reductions called for in the document, may be included in the implementation/restoration section of the TMDL document to support a demonstration of "reasonable assurance".

Recommendation:

☐ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information ☒ NA

Summary:

Future phases of the TMDL will include a restoration strategy once additional monitoring is complete and there is more confidence in the nonpoint and point source allocations.

Comments:

Due to the uncertainties associated with target setting and allocating loads to sources, this TMDL was developed using a phased approach. The document provides a reasonable assurance demonstration by including a description of future phases of the process, a summary of milestones, a schedule to ensure progress, and a commitment by UDWQ to proceed with future phases to reduce uncertainties in the document and implement both point and nonpoint source controls in the future as needed to meet water quality standards. EPA will have the opportunity to review and approve future phases of the TMDL and track progress.

8. Daily Loading Expression

The goal of a TMDL analysis is to determine what actions are necessary to attain and maintain WQS. The appropriate averaging period that corresponds to this goal will vary depending on the pollutant and the nature of the waterbody under analysis. When selecting an appropriate averaging period for a TMDL analysis, primary concern should be given to the nature of the pollutant in question and the achievement of the underlying WQS. However, recent federal appeals court decisions have pointed out that the title TMDL implies a "daily" loading rate. While the most appropriate averaging period to be used for developing a TMDL analysis may vary according to the pollutant, a daily loading rate can provide a more practical indication of whether or not the overall needed load reductions are being achieved. When limited monitoring resources are available, a daily loading target that takes into account the natural variability of the system can serve as a useful indicator for whether or not the overall load reductions are likely to be met. Therefore, a daily expression of the required pollutant loading rate is a required element in all TMDLs, in addition to any other load averaging periods that may have been used to conduct the TMDL analysis. The level of effort spent to develop the daily load indicator should be based on the overall utility it can provide as an indicator for the total load reductions needed.

Review Elements:

☒ The document should include an expression of the TMDL in terms of a daily load. However, the TMDL may also be expressed in temporal terms other than daily (e.g., an annual or monthly load). If the document expresses the TMDL in additional "non-daily" terms the document should explain why it is appropriate or advantageous to express the TMDL in the additional unit of measurement chosen.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: *A daily load expression is provided along with an annual load expression. The annual load is more appropriate for this TMDL as the coarser fractions of organic matter loading that contribute to DO impacts in the Jordan occur throughout the year. These fractions of the organic matter may settle to the sediments and exerts influence on DO levels long after the loading event occurred. Hence, a longer term view of organic loading must be considered to understand the relationship between the overall load and the DO impairment.*

Comments: *none*