State of New Mexico
Continuing Planning Process

(Appendix A)

Antidegradation Policy Implementation Procedure

Adopted by the New Mexico Water Quality Control Commission
[insert date of adoption]

Table of Contents

ANTIDEGRADATION POLICY IMPLEMENTATION PROCEDURES

I. INTRODUCTION

The Antidegradation Implementation Procedures (Procedures) establish the process for implementing the Antidegradation Policy (Policy) in the *Standards for Interstate and Intrastate Surface Waters* (New Mexico Water Quality Standards), 20.6.4.8 NMAC. The Procedures should be construed in conjunction with other planning tools approved by the Water Quality Control Commission, including the Integrated Clean Water Act (CWA) Section 303(d)/305(b) List and Report, and the Statewide Water Quality Management Plan.

II. TIER DEFINITIONS

The Policy establishes three categories of waters. These categories are called "tiers". The tier designation requires different levels of review and allows different levels of degradation. Tier 1 and 2 designations are made on a parameter-by-parameter basis. As a result, a water may be Tier 1 for one parameter and Tier 2 for a different one. Tier 3 designation is made based on the special nature of the water.

Figure 1 illustrates the tier designation process.

A. Tier 1

Tier 1 applies to waters that do not meet or meet but are not better than the water quality standards for existing or designated uses.[1] Tier 1 waters that require Tier 1 review will be identified by assessing water quality information pursuant to established protocols. Waters identified as "impaired" for any existing or designated use according to the current *State of New Mexico Procedures for Assessing Standards Attainment for the Integrated §303(d) / §305(b) Water Quality Monitoring and Assessment Report: Assessment Protocol*[2] automatically will be Tier 1 for the parameter of concern. Waters not identified as impaired on New Mexico's Integrated CWA 303(d) / 305(b) List will be evaluated on a case-by-case basis. The Department will conduct the evaluation using

[1] The terms "existing use" and "designated use" are defined in the *Code of Federal Regulations* (40 CFR 131.3) and the New Mexico Water Quality Standards (20.6.4.7 NMAC). The terms are not interchangeable and are subject to different levels of protection depending on the specific use. *See, e.g.,* 40 CFR 131.10.

[2] The protocol is based in part upon USEPA's *2002 Integrated Water Quality Monitoring and Assessment Report Guidance*; 2001 Memorandum from Robert H. Wayland, Office of Wetlands, Oceans, and Watersheds. Washington D.C.

the available water quality information and the same protocols used to develop the Integrated 303(d) / 305(b) report.

The Policy defines the level of protection for Tier 1 waters: "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." 20.6.4.8.A.1 NMAC. Existing uses are uses "actually attained in a surface water on or after November 28, 1975, whether or not they are actually included in the water quality standards." *See* 40 CFR 131.3(e); 20.6.4.6.Q NMAC. Tier 1 defines the minimum level of protection afforded to all waters regardless of tier designation.

B. Tier 2

Tier 2 applies to waters whose quality is better than necessary to protect the CWA Section 101(a)(2) goals. Tier 2 applies to all classified waters (e.g., identified in the New Mexico Water Quality Standards, Sections101 through 899) that are not designated as Tier 1 on a parameter-by-parameter basis or as Tier 3. Tier 2 may apply to unclassified waters on a parameter-by-parameter basis depending on the available water quality information. Like Tier 1 waters, Tier 2 waters will be identified by assessing water quality information pursuant to established protocols.

The Policy defines the level of protection for Tier 2 waters:

> *Where the quality of a surface water of the state exceeds levels necessary to support the propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the commission finds,*[3] *after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic and social development in the area in which the water is located. In allowing such degradation or lower water quality, the state shall assure water quality adequate to protect existing uses fully. Further, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control. Additionally, the state shall encourage the use of watershed planning as a further means to protect surface waters of the state.*

20.6.4.8.A.2 NMAC.

[3] Pursuant to the New Mexico Water Quality Act, Section 74-6-4.E, the Commission delegated responsibility for implementing the antidegradation policy to the Department. *See* 20.6.4.8.E NMAC.

In Tier 2 waters, limited degradation may be allowed after consideration of several factors, including:

1) the discharge's potential to affect existing or designated uses or to interfere with CWA Section 101(a)(2) goals (water quality which provides for the "protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water"); [4]

2) the need to accommodate important economic and social development in the area in which the water is located; and

3) the availability of discharge alternatives, including no discharge, reuse, land disposal, pollution prevention or reduction, and pollutant trading with point and non-point sources.

Even if the decision is made to allow degradation in Tier 2 waters, water quality must be maintained to ensure the protection of existing uses. Water quality also must be maintained to ensure the protection of designated uses unless the designated uses are modified through a use attainability analysis, 40 CFR 131.10(j) and 20.6.4.14 NMAC, or adequately protected by segment-specific water quality standards. Finally, water quality must be maintained to ensure the protection of the CWA Section 101(a)(2) uses. The applicant for the new or increased discharge (or an existing discharge in certain circumstances as described on page 7) bears the burden of demonstrating the social and economic need for degrading water quality.

C. Tier 3

The Policy defines the level of protection for Tier 3 waters:

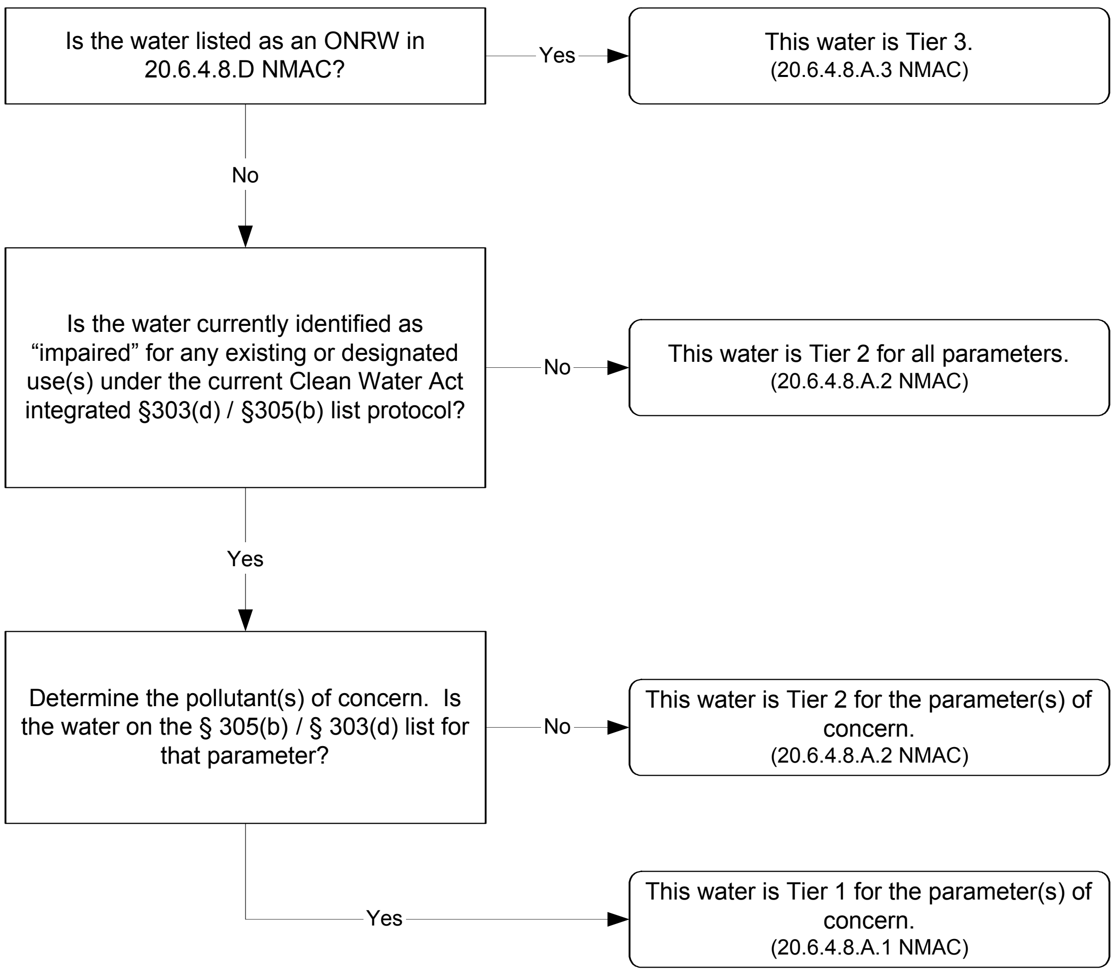
No degradation shall be allowed in high quality waters designated by the commission as outstanding national resource waters (ONRWs). ONRWs may include, but are not limited to, surface waters of the state within national and state monument, parks, wildlife refuges, waters of exceptional recreational or ecological significance, and waters identified under the Wild and Scenic Rivers Act.

Tier 3 applies to waters that are designated by the Commission as "outstanding national resource waters." The Commission designates Tier 3 waters after public notice and comment pursuant to procedures established in the New Mexico Water Quality Standards. *See* 20.6.4.8.B NMAC.

[4] Commonly referred to as the "fishable/swimmable goals".

The Policy prohibits any degradation in Tier 3 waters. 20.6.4.8.A.3 NMAC. However, this prohibition does not mean that all discharges are prohibited. In special circumstances, a discharge may be allowed if it does not cause degradation or causes only temporary and short-term changes in water quality that do not impair existing uses or if the activity is intended to implement the §101(a) objectives of the CWA. Such special circumstances must undergo antidegradation review.

Figure 1. Tier Determination Flowchart
(Flow chart summarizes preceding narrative description, refer to narrative for complete detail)



III. IMPLEMENTATION

The Procedures apply to every proposal for a new or increased discharge of a pollutant to a "surface water of the State."[5] "New or increased discharge" includes NPDES permits issued by the USEPA pursuant to CWA Section 402 and Dredge-and-Fill Permits issued by the U.S. Army Corps of Engineers (Army Corps) pursuant to CWA Section 404. The Procedures also apply to the renewal of permits for existing discharges in certain circumstances as determined by the Department, including a single discharge causing degradation over time, a single source contributing to cumulative degradation, and a single source with a history of permit noncompliance. The Procedures do not apply to other water quality-related actions, including revision of Commission documents (e.g., New Mexico Water Quality Standards, Continuing Planning Process, Water Quality Management Plan, and Nonpoint Source Management Program), the Commission's establishment of Total Maximum Daily Loads (TMDLs), or the conduct of studies, including use attainability analyses, by any party, including the Department.[6] These types of water quality-related actions already are subject to extensive requirements for review and public participation, as well as various limitations on degradation imposed by state and federal law.

A. POINT AND REGULATED SOURCES

1. Tier 1

The Department employs the CWA Section 401 certification process to ensure that water quality that does not meet or that meets but is not better than the water quality standards for existing uses in Tier 1 waters is not degraded by a new or increased discharge or the renewal of a permit for an existing discharge. *See Continuing Planning Process - Process for the Development of Effluent Limitations*. Section 401 certification ensures that NPDES and Dredge-or-Fill permits are consistent with state law, protect the water quality standards, and implement the water quality management plan, including TMDLs. Section 401 certification also ensures that NPDES permits comply with the federal requirement that a new or increased discharge will not cause or contribute to a violation of water quality standards, unless such discharge is authorized by a TMDL waste load allocation or similar mechanism prior to TMDL establishment. *See* 40 CFR 122.4(i).[7]

---

[5] The term "surface water of the State" is defined in the New Mexico Water Quality Standards, 20.6.4.7.RR NMAC.

[6] *See* Section 4.8, *Water Quality Standards Handbook* (USEPA 1994).

[7] There is no comparable federal requirement for Dredge-or-Fill Permits, but the Department uses Section 401 certification to ensure that a new or increased discharge complies with TMDL waste load allocations.

There are a number of opportunities for public participation in the review of new and increased discharges into Tier 1 waters. The Commission adopts TMDLs for Tier 1 waters not meeting water quality objectives. This process includes public notice and comment. The USEPA and Army Corps follow detailed procedures requiring public notice and comment when issuing NPDES and Dredge-or-Fill permits. Finally, the Department's Section 401 certification can be appealed and a full hearing held before the Commission.

2. Tier 2

a. Determination of Necessity

Tier 2 screening is triggered when a new or increased discharge or the renewal of a permit for an existing discharge is proposed for a receiving water with existing water quality better than necessary to support the propagation of fish, shellfish, and wildlife, or recreation in and on the water. The initial focus is the magnitude of the effect on water quality. If the magnitude of the effect on water quality exceeds a specified level, Tier 2 review will be conducted. Below that specified level, Tier 2 review will not be conducted. By establishing a *de minimis* level above which Tier 2 review will be conducted, limited state resources are directed to new or increased discharges and the renewal of permits for existing discharges with the likelihood of causing significant degradation of water quality. Establishing *de minimis* action levels also helps reduce overall costs for the Department the general public and dischargers.

In rare instances the WQCC may consider either establishing or revising a TMDL – Waste Load Allocation (WLA) in a Tier 2 water. This situation might arise where a previously established TMDL for a former Tier 1 water has been successful in restoring water quality and there is a subsequent application to revise the TMDL-WLA to allow an increase in the discharge of pollutants. In this situation two processes come into consideration, the public and commission review of the TMDL and the Department's review of the TMDL under the antidegradation policy. When this situation occurs, the two processes may for efficiency be held simultaneously or sequentially depending on the specific circumstances of the case.

The Department will evaluate whether the magnitude of the effect on water quality exceeds a specific level on a parameter-by-parameter basis. The evaluation will be conducted using numeric criteria only, because of the impracticability of applying the process to narrative criteria. It should be noted that the decision to use numeric criteria does not expose Tier 2 waters to substantial degradation of water quality because these waters are protected by overlapping designated and existing uses and their associated criteria, as well as by the NPDES and Dredge-or-Fill permits and Section 401 certification which must be written to protect the narrative criteria.

Figure 2 illustrates the process for determining whether a new or increased discharge is subject to Tier 2 review. The following text explains the figure in more detail.

i) Publicly Owned and Private Domestic Treatment Work Discharges

For purpose of Tier 2 review, the following new or increased discharges and the renewal of permits for existing discharges by publicly owned treatment works (POTWs) and privately owned domestic treatment works (PODTWs) are considered *de minimis* and are not subject to Tier 2 review provided that the assimilative capacity is more than 10% of the criterion for the parameter of concern and:

1) the POTW or PODTW has a design capacity of 0.1 million gallons per day or less and is eligible to omit Part B of the NPDES permit application form (OMB Number 2040-0086, Approved 1/14/99);[8]

2) the design capacity of the POTW or PODTW or the pollutant load (measured on a parameter-by-parameter basis) will increase 10 percent or less in a five-year period, and the exemption is not used for two consecutive permits;

3) the design capacity of the POTW or PODTW will increase by 10 to 25 percent in a five-year period, the POTW or PODTW demonstrates to the Department's satisfaction that it is implementing a water conservation or wastewater reuse or diversion program designed to reduce the discharge volume by at least 10 percent in that five-year period, and the exemption is not used for two consecutive permits;

4) the design capacity of the POTW or PODTW is 10 percent or less of the critical low flow of the receiving stream (as defined in the water quality standards);

5) the POTW or PODTW demonstrates to the Department's satisfaction that its pollutant load (measured on a parameter-by-parameter basis) will be offset by enforceable reductions by other point or nonpoint sources within the same waterbody segment as the new or increased discharge; or

[8] During the development of the revised NPDES permit application form, USEPA studied the potential for minor POTWs and PODTWs to cause violations of water quality standards. USEPA found that these facilities posed an extremely low probability of causing a violation of water quality standards because of their low volume and effluent quality (even without considering the ameliorative effect of dilution). 64 Fed. Reg. 42433 (August 4, 1999).

6) the new or increased discharge or the renewal of a permit for an existing discharge was reviewed in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) that considered water quality impacts and the social and economic development in the area in which the water is located and that was conducted in accordance with federal regulations, and in the case of an EA, the responsible federal agency made a Finding of No Significant Impact (FONSI).

Notwithstanding these *de minimis* activities, the Department shall conduct Tier 2 review for any new or increased discharge or the renewal of a permit for an existing discharge by a POTW or PODTW when the discharge, taken together with all other activities allowed after the baseline water quality is established[9], would cause a reduction in the available assimilative capacity of 10 percent or more for the parameter of concern.

For purpose of this section, available assimilative capacity is defined as the difference between the baseline water quality and the water quality criterion for the parameter of concern. (See Appendix C to this document for guidelines for calculating assimilative capacity).

Figure 2 illustrates the process for determining whether a new or increased discharge or the renewal of a permit for an existing discharge by a POTW or PODTW is subject to Tier 2 review. Figure 2 is presented for illustration only and may not address all possible circumstances. In the event of omission, ambiguity or conflict, the written provisions of these procedures will control.

ii) Industrial Discharges

For purpose of Tier 2 review, the following new or increased discharges and the renewal of permits for existing discharges by industrial activities are considered *de minimis* and are not subject to Tier 2 review provided that the assimilative capacity is more than 10% of the criterion for the parameter of concern and:

1) the discharger demonstrates to the Department's satisfaction that the new or increased discharge will consume 10 percent or less of the available assimilative capacity for the pollutant of concern;

2) the discharger demonstrates to the Department's satisfaction that its pollutant load (measured on a parameter-by-parameter basis) will be offset by enforceable reductions by other point or nonpoint sources within the same waterbody segment as the new discharge; or

[9] When evaluating the "baseline" condition, the Department will consider any previous antidegradation reviews for the same body of water to prevent cumulative impacts.

3) the new or increased discharge or the renewal of a permit for an existing discharge was reviewed in an EA or EIS that considered water quality impacts and the social and economic development in the area in which the water is located and that was conducted in accordance with federal regulations, and in the case of an EA, the responsible federal agency made a FONSI.

Notwithstanding these *de minimis* activities, the Department shall conduct Tier 2 review for any new or increased discharge or the renewal of a permit for an existing discharge by an industrial activity when the discharge, taken together with all other activities allowed after the baseline water quality is established, would cause a reduction in the available assimilative capacity of 10 percent or more for the parameter of concern.

For purpose of this section, available assimilative capacity is defined as the difference between the baseline water quality and the water quality criterion for the parameter of concern. (See Appendix C to this document for guidelines for calculating assimilative capacity).

iii) General Permits

New or increased discharges and the renewal of permits for existing discharges covered by NPDES General permits and Dredge-or-Fill Nationwide and Regional permits present special considerations regarding Tier 2 review because of their approach of authorizing categories of discharges over a broad geographic range. Three categories of NPDES General permits (No Discharge, Storm water, and Aquifer Remediation) and several categories of Nationwide (Dredge-or-Fill) permits have been issued in New Mexico.

EPA has not issued any national guidance regarding Tier 2 review for general permits. Accordingly, the Commission adopts the following approach for general permits in New Mexico. Further, the Department reserves the right to require that any new or increased discharge or the renewal of a permit for an existing discharge (1) be subject to Tier 2 review if warranted by the facts and circumstances, or (2) be required to obtain an individual NPDES or Dredge-or-Fill permit (and thereby subject to Tier 2 review).[10]

a) No Discharge General Permits

[10] Federal regulations for NPDES General Permits (40 CFR 122.28) and Dredge-and-Fill Nationwide and Regional Permits (33 CFR 325.7) require a discharger to obtain an individual NPDES or Dredge-and-Fill permit if, *inter alia*, circumstances have changed since the original authorization or the discharge is deemed to be "significant".

Existing and former “No Discharge General Permits” include NPDES General Permits for Oil and Gas Facilities in the Onshore Subcategory of the Oil and Gas Extraction Point Source Category (Onshore O&G)[11] and Concentrated Animal Feeding Operations (CAFOs).

The Onshore O&G NPDES General Permit prohibited all discharges of pollutants to waters of the United States. 56 Fed. Reg. 7698 (February 25, 1991). Because discharges covered by this general permit were prohibited, water quality would not be degraded. In addition, Onshore O&G activities generally are considered to have social and economic importance to New Mexico.

The CAFO General Permit prohibits all discharges unless caused by (1) a storm event greater than the 25-year 24-hour storm for the CAFO location; (2) chronic rainfall greater than the 25-year 24-hour storm for the CAFO location; or (3) a catastrophic event, such as a tornado, provided that the CAFO is properly designed and operated. 58 Fed. Reg. 7611 (February 8, 1993). Because discharges covered by this general permit are prohibited except in exceptional circumstances beyond the control of the CAFOs, the degradation of water quality, beyond temporary or short-term impacts, is unlikely. In addition, CAFOs - primarily dairies and cattle feedlots - generally are considered to have social and economic importance to New Mexico.

b) Storm Water General Permits

Storm Water General Permits include the NPDES General Permits for Storm Water Discharges from Construction Activities, 68 Fed. Reg. 39087 (July 1, 2003), and the NPDES General Permit for Storm Water from Industrial Activities, 65 Fed. Reg. 64746 (October 30, 2000). Storm water discharges are transient in nature, particularly in the desert climate of New Mexico. Storm water discharges from construction activities are even more transient because they occur only during the construction itself. Further, storm water dischargers seeking coverage under these general permits are required to identify pollutants on a parameter-by-parameter basis and to design and implement controls to prevent or reduce their discharge. As a result, storm water discharges that comply with general permits are not likely to cause significant degradation of water quality. In addition, industrial and

[11] The oil & gas permit expired on February 25, 1996. As of August 2004, EPA has no plan to reissue the permit. It is included in this discussion as an example of the types of general permits that have occurred in NM and therefore may occur in the future.

construction activities generally are considered to have social and economic importance to New Mexico.

c) Aquifer Remediation General Permits

The Aquifer Remediation General Permit was the NPDES General Permit for Discharges Resulting from Implementing Corrective Action Plans for Cleanup of Petroleum UST Systems. 62 Fed. Reg. 61116 (November 14, 1997). These discharges resulted from projects implemented to remediate groundwater contaminated with petroleum products from leaking underground storage tanks. The general permit imposed stringent effluent limitations on these discharges, even though they are considered to be relatively clean. Accordingly, these kinds of discharges are not expected to cause degradation to water quality. Moreover, because 90 percent of New Mexico's population relies on groundwater for drinking water (2000 CWA § 305(b) Report, page 87), these discharges are considered to have social and economic importance to New Mexico.

d) Dredge or Fill General Permits

The Dredge-or-Fill General Permit authorizes the discharge of fill material within the ordinary high water mark of waters of the United States. The Army Corps under CWA Section 404 regulates these discharges. The Department, pursuant to its CWA Section 401 certification of this general or "Nationwide" permit, requires dischargers to obtain specific authorization before commencing the discharge. As a result, dischargers are subject to Section 401 certification review. Based on this review, the Department may grant the authorization, grant the authorization with conditions, or deny the authorization. To implement the Policy, the Department will use the authorization process to evaluate whether a discharge will cause significant degradation of water quality. A discharge will be deemed to cause significant degradation of water quality if the load of pollutants is quantifiable[12] and

[12] Pollutant loads from Dredge or Fill permits are often difficult or impossible to quantify in the same manner as practiced in NPDES permits. Dredge or Fill permits are often temporary construction measures in or near a watercourse that may result in disturbance or deposition of sediments in the water. The primary tool for limiting the discharge of pollutants (e.g., sediment and contaminated sediment) from these activities is through permit requirements mandating the installation and operation of best management practices (BMPs) that prevent pollutant transport to a watercourse and thereby degradation. The SWQB reviews dredge or fill projects pursuant to conditions of the State's CWA Section 401 certification of the Nationwide permits. The SWQB has long employed a strategy of requiring the implementation of BMPs, necessary to protect state water quality standards that are designed to prevent [footnote continued on next page]

(1) the new or increased discharge or the renewal of a permit for an existing discharge will consume 10 percent or more of the total assimilative capacity for the pollutant of concern, or (2) the new or increased discharge or the renewal of a permit for an existing discharge, taken together with all other activities allowed after the baseline water quality is established, would cause a reduction in the available assimilative capacity of 10 percent or more for the parameter of concern.

For purpose of this section, available assimilative capacity is defined as the difference between the baseline water quality and the water quality criterion for the parameter of concern.

If the Department determines that a discharge will cause significant degradation, the Department will either impose conditions to avoid significant degradation or require Tier 2 review.

e) Future General Permits

General permits are an important tool in addressing categories of discharges where large numbers of facilities are engaged in similar activities such as those described above. Review of future proposed general permits will be on a case-by-case basis. The Department will consider the nature of the permit requirements and determine a course of action.

As practical guidance:

1. No Discharge general permits such as the no discharge CAFO and Oil & Gas cited above may be considered *de minimis* impacts and may not be required to proceed through full Tier 2 antidegradation review. The Department may at its discretion initiate a review if it deems the case-by-case circumstances warrant such action;
2. Storm water general permits for industrial activities such as those cited above may be considered *de minimis* and may not be required to proceed through full Tier 2 antidegradation review. The Department may at its discretion initiate a review if it deems the case-by-case circumstances warrant such action;
3. Storm water general permits for municipal or urban runoff may be proposed to comply with CWA Section 402(p). Urban runoff from municipalities has existed historically but has not been regulated under the NPDES program. Consideration should be given that these discharges may be from existing systems and as such are existing discharges. New permit requirements such as implementation of best

---

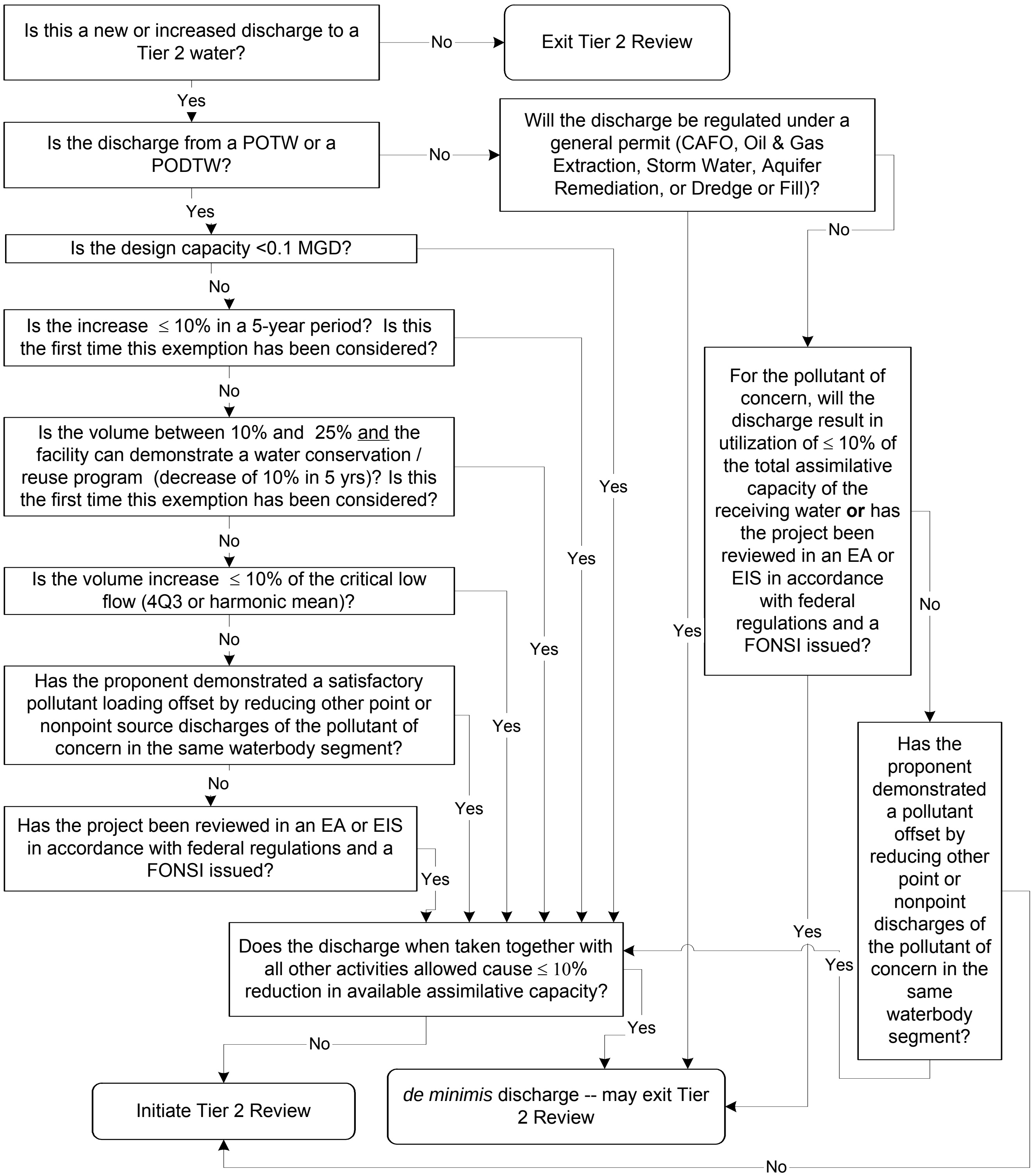
to maximum extent possible the discharge of pollutants instead of allowing a particular quantity of pollutant to be discharge.

management practices will reduce existing loads of pollutants entering the storm sewer system and therefore the receiving water. Therefore these permit actions should be considered as reducing any degradation that may result from these discharges and therefore not require Tier 2 antidegradation review.

4. Environmental remediation permits such as the aquifer remediation general permit cited above may be considered *de minimis* impacts and in the public interest for social and economic benefit and may not be required to proceed through full Tier 2 antidegradation review. The Department may at its discretion initiate a review if it deems the case-by-case circumstances warrant such action;
5. Dredge or Fill Permits General Permits (or Nationwide Permits) should continue to be reviewed in the same manner as existing Dredge or Fill permits. The Department may at its discretion initiate a review if it deems the case-by-case circumstances warrant such action;
6. The Department should consider other types of general permits on a case-by-case basis with the same principles as considered in the above examples. The Department shall advise the Commission of *de minimis* determinations in respect to general permit certifications at the first WQCC meeting after the permit certification is completed.

Figure 2. Tier 2 Review - Eligibility Flowchart

(Flow chart summarizes preceding narrative description, refer to narrative for complete detail)



b. Conducting Tier 2 Review

The steps for reviewing whether a new or increased discharge or the renewal of a permit for an existing discharge to a Tier 2 water may cause significant degradation are: 1) information gathering, 2) preliminary decision-making, 3) public-intergovernmental participation and 4) final decision-making.

i) Information Gathering

Within 30 days of receipt of the complete permit application, the Department shall notify the applicant regarding the standard of review for the new or increased discharge or the renewal of a permit for an existing discharge and its obligation to submit the information described below, as well as any other information that the Department may require to conduct the review. Within 30 days of receipt of the Department's notification, the applicant shall submit the required information. Within 30 days of receipt of the applicant's response, the Department shall notify the applicant whether the response is adequate and whether additional information is required. Upon the applicant's satisfaction of the Department's requests for information, the Department shall determine that the application is complete and initiate the antidegradation review. The applicant's failure to submit the requested information may result in certification denial or delay in permit issuance.

The Department shall request at least the following information:

1) An analysis of important social or economic activities and development in the area in which the water is located that may be *beneficially* impacted by the new or increased discharge or the renewal of a permit for an existing discharge;

2) An analysis of important social or economic activities and development in the area in which the water is located that may be *adversely* impacted by the new or increased discharge or the renewal of a permit for an existing discharge;

3) An analysis of the following factors, quantified to the greatest extent possible;

    a) employment;

    b) production of goods and services;

    c) tax base;

    d) housing;

    e) effect on existing or expected environmental and public health problems;

f) any other relevant information; and

4) An analysis of alternative disposal options (including no discharge to a surface water) or discharge reduction options, including any option that would minimize degradation.

The Department also may require, in its discretion, that the applicant complete the Antidegradation Data Worksheets in Appendix A or Appendix B.

ii) Preliminary Decision-Making

Within 60 days of the Department's determination that the information submitted pursuant to the above paragraph is complete, the Department shall make a preliminary decision to deny or authorize the degradation. The Department shall prepare a written statement of basis for the preliminary decision containing the following information (as applicable):

a) Applicant's name, facility, and location;

b) Description of the discharge, including the nature and concentration of pollutants;

c) Description of receiving water, existing and designated uses, and applicable criteria;

d) Identification of the permit and the facility's permitting and enforcement history;

e) Description of treatment or best management practices to be employed and a brief description of alternative disposal options evaluated by the applicant.

f) Estimation of the amount of requested degradation and impact on receiving water and existing and designated uses;

g) Analysis of economic or social importance and whether and what magnitude of degradation is necessary to accommodate it;

h) Description and brief discussion of conditions to be imposed upon discharge; and

j) Description of the procedures for reaching a final decision including:

1) The comment period and address where comments may be sent;

2) Procedure for obtaining a public hearing;

3) Other procedures for public participation in the final decision;

4) Departmental contact for additional information.

iii) Public Comment and Intergovernmental Coordination

The Department will publish notice and provide an opportunity to comment on the preliminary decision and statement of basis. The public comment period shall be no less than 30 days. During the public comment period, any interested person may submit written comments and request a public hearing. A request for a public hearing must be in writing and must state the nature of the issues to be raised. If the Department determines that the request for public hearing raises issues of significant public interest within the scope of the antidegradation policy, the Department will hold a public hearing. The public hearing will be held in a location near the water affected by the discharge.

With respect to the public notice, the Department shall:

1) Publish legal notice in a newspaper of general circulation in the affected area;

2) Post the legal notice on the Department website;

3 Mail the legal notice to all persons who have submitted a written request to the Commission for advance notice of preliminary decisions and provided the Commission with a mailing address; and

4) The legal notice shall describe where a copy of the preliminary decision and statement of basis may be obtained.

iv) Final Decision

Within 60 days after the later of the close of the public comment period or the public hearing, the Department shall issue a final decision and a written statement of basis. The statement of basis shall:

1) Review the relevant facts, including the applicant, facility, water, uses, and criteria;

2) Identify changes from the preliminary decision and statement of basis;

3) Identify and summarize the basis for any conditions to be imposed on the discharge, including citations to applicable statutory and regulatory provisions;

4) Respond to comments on the preliminary decision and statement of basis, including comments during the public comment period and public hearing, if any; and

5) Describe the process for filing an appeal with the Commission.

The Department shall send the final decision to the applicant and to each person who submitted written comments or requested notice of the final decision. The final decision shall be effective immediately.

3. Tier 3

The Policy prohibits the degradation of Tier 3 waters by a new or increased discharge or the renewal of a permit for an existing discharge, but this prohibition is not the same as prohibiting any new or increased discharge or the renewal of a permit for an existing discharge. It is theoretically possible for an applicant to make a case-by-case demonstration that a new or increased discharge or the renewal of a permit for an existing discharge will not cause degradation or will cause only temporary and short-term changes in water quality that do not impair existing uses. Any application for a new or increased discharge or the renewal of a permit for an existing discharge in a Tier 3 water will be considered on a case-by-case basis applying the Tier 2 review process as modified by the Department to reflect unique factors associated with the Tier 3 water. The unique factors should include the specific goal and the environmental impact of these activities, and the intensity and duration of those impacts and how the impacts will be minimized.

B. NONPOINT SOURCES

Federal law does not require the Commission to apply the Policy to nonpoint sources. *American Wildlands v. Browner*, 260 F.3d 1192 (10th Cir. 2001); 40 CFR 131.12(a)(2) (encouraging but not mandating enforceable controls on nonpoint sources). The Water Quality Standards Implementation Plan "… encourages, in conjunction with other state agencies, voluntary implementation of the best management practices set forth in the New Mexico statewide water quality management plan and the nonpoint source management program." 20.6.4.8.E(13) NMAC. The *New Mexico Nonpoint Source Management Program*[13] also …uses a voluntary approach to

[13] New Mexico Nonpoint Source (NPS) Management Program. 1999. Executive summary page viii. The program was approved by USEPA January 6, 2000. The NPS Management Program is incorporated by reference in the *Statewide Water Quality Management Plan* (Work Element 4).

achieve water quality improvements." Accordingly, the Policy does not apply to nonpoint sources.

Although the Policy does not apply to nonpoint sources, the Commission implements a straightforward approach to address degradation of water quality by nonpoint sources. First, the Commission adopted the *Water Quality Management Plan*, which requires TMDLs for waters affected by nonpoint source pollution that contain Best Management Practices (BMPs). Second, the Commission adopted the *Nonpoint Source Management Program*, which awards Section 319(h) funds for persons to implement those BMPs. *See Section VII - Impaired Waters Identification and Abatement Strategy*.

IV. APPEALS

Persons adversely affected by any final decision of the Department may appeal to the Commission in accordance with the New Mexico Water Quality Act.

APPENDIX – A Tier 2 Review of a Public Facility

Appendix A includes additional information that may be required by the Department to evaluate socio-economic factors of a public facility during a Tier 2 review. This evaluation is based on two types of impacts, referred to as “substantial” and “widespread”. The Substantial Impacts analysis is found in Tables A-3 – A-7. The Widespread Impacts[14] analysis is found in Table A-8.

SUBSTANTIAL IMPACTS - SUMMARY

Purpose of Substantial Impacts analysis: Determine whether a public facility can afford pollution controls in order to avoid any degradation of water quality.

The first step in a Substantial Impacts analysis is to provide data on the socio-economic factors listed in the worksheets in Tables A-1 and A-2. This data is then used to determine two indicators called the “Municipal Affordability Screener” (Table A-3) and the “Secondary Affordability Test” (Tables A-4 – A-6). The results of these indicators are then compared in the “Assessment of Substantial Impacts Matrix” (Table A-7) as a way to determine overall affordability to the community.

Widespread Impacts - Summary

Purpose of widespread impacts analysis: Evaluates the social costs of pollution control requirements by: 1) Defining the affected community; 2) Evaluating the community’s current characteristics; and 3) Evaluating how community characteristics would change if discharger must avoid degradation to water quality.

If the conclusion from the Substantial Impacts analysis is “Questionable Affordability” or “Community cannot afford the pollution control”, then a Widespread Impacts analysis may be completed to further resolve the affordability issue. This analysis is primarily a qualitative evaluation based on community socioeconomic factors that are expanded to a larger scale than the Substantial Impacts analysis.

[14] Widespread Impact Analysis forms derived from EPA’s Water Quality Standards Academy Participant Manual Update-4, 2000 [EPA 823-B-00-005].

Table A-1. Antidegradation Data Worksheet

SOCIO-ECONOMIC INDICATORS	DATA
CITY'S DEMOGRAPHICS	
Population __________(year)	
Current Population ___________(year)	
Type of household moving away from _____________________________(city)	
Number of households	
Median Household Income (U.S. Census, Census Designated Place)	
Median Household Income (Local Planning Board Estimates, City)	
Median Household Income (U.S. Census, State)	
Median Household Income (U.S. Census, County)	
Major Type of Employment	
Regional Economic Conditions	
% of Total Wastewater Flow from Residential & Municipal Sources	
Unemployment Rate (City)	
Unemployment Rate (County)	
Unemployment Rate (State)	
CITY'S FINANCIAL HISTORY	
Property Tax Revenues ____________(year)	
Sales Tax & Miscellaneous Revenues ___________(year)	
Total Government Revenues __________(year)	
Property Tax Revenues (FY_____________)	
Sales Tax & Miscellaneous Revenues (FY__________)	

Total Government Revenues (FY___________)	
Current Market Value of Taxable Property (FY___________)	
Property Tax Delinquency Rate	
Bond Rating - insured sewer	
Bond Rating - non insured sewer	
Overall Net Debt (FY ____________)	

Table A-2. Antidegradation Data Worksheet

SOCIO-ECONOMIC INDICATOR	DATA
Cost of Treatment Options (pollution controls) that will Avoid Degradation of Water Quality	
Capital Improvements	
OPTION 1. (year) ____________ dollars	
OPTION 2. (year) _____________ dollars	
Annual Operating Costs	
OPTION 1. (year) _____________ dollars	
OPTION 2. (year) _____________ dollars	
FINANCING FOR WASTEWATER TREATMENT OPTIONS	
OPTION 1. Source of Financing	
Repayment Term, Vehicle	
Bond Rate	
Total Annual Cost of Existing Plant	
OPTION 2. Source of Financing	
Repayment Term, Vehicle	

Bond Rate	
Total Annual Cost of Existing Plant	

Table A-3. Substantial Impacts Analysis – Part I

PART I. CALCULATING THE MUNICIPAL AFFORDABILITY SCREENER	
This screener is used to evaluate expected impacts to households. It indicates whether community households can afford to pay the total annualized pollution control costs to avoid water quality degradation.	
A. Calculate Average Annualized Cost Per Household	
1. Calculate the Total Annual Cost of the Project	
Interest Rate for Financing (*i*) =	______________(expressed as a fraction)
Time Period for Financing (*n*) =	______________(years)
Annualization Factor: $\frac{i}{(i+1)^n - 1}$ $(+\, i)$ =	________________________ (1)
Total Capital Cost of Project to be Financed =	________________________ (2)
Annual Operating Costs of Project =	________________________ (3)
Annualized Capital Cost [(1) *x* (2)] =	________________________ (4)
Total Annual Cost of Project [(3) + (4)] =	________________________ (5)
2. Calculate the Total Annual Cost to Households	
Total Annual Cost of Project (5) x Percentage of Total Wastewater Flow Attributable to Residential and Municipal Wastewater Flows =	________________________ (6)
Total Annual Cost of Existing Plant ($) *x* Percentage of Total Wastewater Flow Attributable to Residential and Municipal Wastewater Flows =	________________________ (7)
Total Annual Cost to Households [(6) + (7)] =	________________________ (8)
3. Calculate the Average Annualized Cost Per Household $\frac{\text{Total Annual Cost to Households (8)}}{\text{Number of Households}}$ =	________________________ (9)
B. Calculate Screener Value:	
$\frac{\text{Average Annualized Cost Per Household (9)}}{\text{Median Household Income}}$ (*x 100)* =	________________% municipal affordability screen (10)

What type of impact does the Municipal Affordability Screener Indicate in table below?

Little Impact	Mid-Range Impact	Large Impact
< 1.0 %	1.0% - 2.0%	> 2.0%

Explanation of Impacts:
Little Impact – high affordability; households can afford to pay pollution control costs
Mid-Range Impact – uncertain affordability
Large Impact – low affordability; pollution control costs may cause economic hardship on households

_________________ impact

Is there a need to proceed to the Secondary Affordability Test? (yes, if large impact or mid-range impact)

___________________(yes/no)

Table A-4. Substantial Impacts Analysis – Part II

PART II. APPLYING THE SECONDARY AFFORDABILITY TEST	
A. EVALUATING THE DEBT INDICATORS	
Bond Rating: This is a Measure of the Credit Worthiness of a Community	
What is Bond Rating of (name of municipality)____________________?	___________________
What is the resulting score? (assign score from table below)	__________score points (11)
Overall Net Debt to Market Value of Taxable Property: This measures Debt Burden on Residents within the Community	
(municipality) ___________________Overall Net Debt =	_____________________ (12)

Source of Bond Rating	Weak	Mid-Range	Strong
S&P	below BBB	BBB	above BBB
Moody's	below Baa	Baa	above Baa
Score	1	2	3

(municipality) ___________________Market Value of Taxable Property =	____________________ (13)
Overall Net Debt (12) (x 100) = Market Value of Taxable Property (13)	__________________ % (13a)
What is the resulting score? (assign score from table below)	__________score points (14)

	Weak	Mid-Range	Strong
Compare % from 13a	>5%	2% - 5%	<2%
Score	1	2	3

Explanation of Ratings:

Weak = negative effect on indicator from increased costs for pollution controls

Mid-Range = uncertain effect on indicator

Strong = indicator can withstand increased costs for pollution controls

Table A-5. Substantial Impacts Analysis – Part II

PART II. APPLYING THE SECONDARY AFFORDABILITY TEST (continued)	
B. EVALUATING THE SOCIOECONOMIC INDICATORS	
Unemployment Rate: This measures the General Economic Health of the Community	
What is (municipality) __________________Unemployment Rate?	__________________
Is this above, below, or equal to the State's rate?	__________________
What is the resulting Score? (assign score from table below)	___________score points (15)

	Weak	Mid-Range	Strong
Compare unemployment rate	Above State Average	State Average	Below State Average
Score	1	2	3

Median Household Income: This Measure Provides an Overall Indication of Community Earning Capacity	
What is (municipality)________________Median Household Income?	____________________
Is this above, below, or equal to the State's rate?	____________________
What is the resulting Score? (assign score from table below)	____________score points (16)

	Weak	Mid-Range	Strong
Compare median income	Below State Average	State Average	Above State Average
Score	1	2	3

Table A-6. Substantial Impacts Analysis – Part II

PART II. APPLYING THE SECONDARY AFFORDABILITY TEST (continued)	
C. EVALUATING THE FINANCIAL MANAGEMENT INDICATORS	
Property Tax Revenue to Full Market Value of Taxable Property: This Measures Funding Capacity Available to Support Debt Based on Community's Wealth	
What is (municipality) ________________Property Tax Revenue?	______________________ (17)
What is the Full Market Value of Taxable Property?	______________________ (18)
Property Tax Revenue (17) / Full Market Value of Taxable Property (18) (*x* 100) =	___________________% (18a)
What is the resulting Score? (assign score from table below)	___________score points (19)

	Weak	Mid-Range	Strong
Compare % from 18a	<2%	2% - 4%	>4%
Score	1	2	3

Property Tax Collection Rate: This Measures How Well the Local Government is Administrated	

<table>
<tr><td>What is the Property Tax Collection Rate of (municipality) ____________________</td><td>____________________%_</td></tr>
<tr><td>What is the resulting Score? (assign score from table below)
<table>
<tr><td></td><td>Weak</td><td>Mid-Range</td><td>Strong</td></tr>
<tr><td>Compare tax collection rate</td><td><94%</td><td>94% - 98%</td><td>>98%</td></tr>
<tr><td>Score</td><td>1</td><td>2</td><td>3</td></tr>
</table></td><td>__________score points (20)</td></tr>
<tr><td>D. CALCULATE THE CUMULATIVE SECONDARY AFFORDABILITY TEST SCORE: This is the average score of all the indicators calculated above.</td><td></td></tr>
<tr><td>$\frac{(11) + (14) + (15) + (16) + (19) + (20)}{6} =$</td><td>______cumulative score (21)</td></tr>
<tr><td>In what impact range does the cumulative secondary score fall?
<table>
<tr><td></td><td>Weak</td><td>Mid-Range</td><td>Strong</td></tr>
<tr><td>Compare cumulative score from 21</td><td>< 1.5</td><td>1.5 – 2.5</td><td>> 2.5</td></tr>
</table></td><td>____________ impact range</td></tr>
</table>

Table A-7. Substantial Impacts Analysis – Part III

Part III. Assessment of Substantial Impacts Matrix

THE MUNICIPAL AFFORDABILITY SCREENER (10) =	_______________%
THE CUMULATIVE SECONDARY AFFORDABILITY TEST SCORE (21) =	____________score points
Where does (municipality)________________________appear in the Substantial Impacts Matrix below?	

Substantial Impacts Matrix

Secondary Assessment Score	Municipal Affordability Screener		
	<1.0%	1.0% - 2.0%	>2.0%
< 1.5	?	X	X
1.5 – 2.5	√	?	X
> 2.5	√	√	?

? = Questionable affordability
√ = Community can afford the pollution control
X = Community cannot afford the pollution control

Based on the Substantial Impacts Matrix above, what is the affordability status (afford, not afford, or questionable) of the (municipality) _______________? In other words, can the project proponent afford to upgrade the facility in order to avoid water quality degradation?	_____________________ Matrix Result
If the conclusion from the Substantial Impacts analysis is either “Cannot Afford” or “Questionable Affordability”, then proceed to the Widespread Impacts analysis for further evaluation.	Complete Widespread Impacts Analysis? __________(yes/no)

Table A-8. Widespread Impacts Analysis – Public Facility

1. Define the Affected Community

Evaluate the Discharger's Contribution to the Community:

- o Contribution to economic base (e.g., property taxes and employment)
- o Provides product or service upon which other businesses or the community depend

2. <u>Evaluate Community's Current Characteristics</u>

Evaluate how community's current socioeconomic health may change if proposed project must avoid degradation to water quality by considering the following factors:

- o Median household income
- o Unemployment rate
- o Rate of industrial development
- o Developing and declining industries
- o Percent of households below poverty line
- o Ability of community to carry more debt
- o Local and regional factors

Other applicable information on the local and regional economy that should also be reviewed includes:

- o Annual rate of population change
- o Current financial surplus as a percentage of total expenditures
- o Percentage of property taxes actually collected
- o Property tax revenues as a percentage of the market value of real property
- o Overall debt outstanding as a percentage of market value of real property
- o Overall debt per capita
- o Percentage of outstanding debt due within 5 years

3. <u>Evaluate How Community Characteristics Would Change if Discharger Must Avoid Degradation to Water Quality</u>

Evaluate the projected adverse socioeconomic impacts of adding pollution controls to the project to meet antidegradation requirements by considering the following:

- o Property Values
- o Employment Rate
- o Commercial Development Opportunities
- o Tax Revenues
- o Expenditure on Social Services
- o State level impacts such as loss of revenues and increased expenditures

APPENDIX – B Tier 2 Review of a Private Facility

Appendix B includes additional information that may be required by the Department to evaluate socio-economic factors of a private facility during a Tier 2 review. This evaluation is based on two types of impacts, referred to as “substantial” and “widespread”. The Substantial Impacts analysis is found in Table 2. The Widespread Impacts analysis is found in Table 3.

SUBSTANTIAL IMPACTS - SUMMARY

Purpose of Substantial Impacts analysis: Determine whether a private facility can afford pollution controls in order to avoid any degradation of water quality.

The first step in a Substantial Impacts analysis is to provide data on the socio-economic factors listed in the worksheet in Table 1. This data is then used to calculate four financial tests that in turn indicate the financial health of a private entity (Table 2).

WIDESPREAD IMPACTS - SUMMARY

Purpose of widespread impacts analysis: Evaluates the social costs of pollution control requirements by: 1) Defining the affected community; 2) Evaluating the community’s current characteristics; and 3) Evaluating how community characteristics would change if discharger must avoid degradation to water quality.

If the Substantial Impacts analysis (i.e., the four financial tests) indicates that the private entity’s financial health is questionable, then a Widespread Impacts analysis may be completed to further resolve the affordability issue. This analysis is primarily a qualitative evaluation based on community socioeconomic factors that are expanded to a larger scale than the Substantial Impacts analysis.

Table B-1. Data Worksheet for Financial Factors

Financial Factor	Data
Current Assets	
Current Liabilities	
Cash flow per given year	
Total debt of the entity	
Amount firm has borrowed (debt)	
Amount of stockholders' capital (equity)	
Pre-tax earnings	
Annualized pollution control cost	

Table B-2. Substantial Impacts Analysis - Financial Tests Used to Measure the Financial Health of a Private Entity

1. Liquidity Test - Indicates how easily an entity can pay its short-term bills.

Current Ratio = Current Assets / Current Liabilities

NOTE: A ratio greater that 2 indicates affordability

---

2. Solvency Test - Indicates how easily an entity can pay its fixed and long-term bills.

Beaver's Ratio = Cash flow per given year / Total debt of the entity

NOTE: > 0.20 Indicates private entity is solvent
< 0.15 Indicates private entity may go bankrupt

---

3. Leverage Test - Indicates how much money the entity can borrow.

Debt-to-Equity Ratio = Amount firm has borrowed (debt) / Amount of Stockholders' capital (equity)

NOTE: The larger the Debt-to-Equity Ratio, the less likely that the entity will be able to borrow funds

---

4. Earnings Test - Indicates how much the entity's profitability will change with the additional pollution control needed to avoid degradation of water quality.

Earnings = Pre-tax – Annualized Pollution Control Cost

NOTE: Compare earnings result with entity's revenues to measure post-compliance profit rate

---

Guidelines to evaluate financial tests:

- Results of all four tests above should be considered jointly
- Ratios and tests should be compared over several years
- Financial ratios should also be compared against those of "healthy" entities
- The role the entity plays in a parent firm's operations should also be considered

Table B-3. Widespread Impacts Analysis – Private entity/facility

1. Define the Affected Community

Evaluate the Discharger's Contribution to the Community:

- o Contribution to economic base (e.g., property taxes and employment)
- o Provides product or service upon which other businesses or the community depend

2. Evaluate Community's Current Characteristics

Evaluate how community's current socioeconomic health would change if proposed project must avoid degradation to water quality by considering the following factors:

- o Median household income
- o Unemployment rate
- o Rate of industrial development
- o Developing and declining industries
- o Percent of households below poverty line
- o Ability of community to carry more debt
- o Local and regional factors

Other applicable information on the local and regional economy that should also be reviewed includes:

- o Annual rate of population change
- o Current financial surplus as a percentage of total expenditures
- o Percentage of property taxes actually collected
- o Property tax revenues as a percentage of the market value of real property
- o Overall debt outstanding as a percentage of market value of real property
- o Overall debt per capita
- o Percentage of outstanding debt due within 5 years

3. Evaluate How Community Characteristics Would Change if Discharger Must Avoid Degradation to Water Quality

Evaluate the projected adverse socioeconomic impacts of adding the pollution control to the project to meet antidegradation requirements by considering the following:

- o Property Values
- o Employment Rate
- o Commercial Development Opportunities
- o Tax Revenues
- o Expenditure on Social Services
- o State level impacts such as loss of revenues and increased expenditures

APPENDIX – C Assimilative Capacity Calculation Guideline

The intent of this guideline is to provide a screening tool that will allow an estimate of the magnitude of the impact of a discharge on receiving water (i.e., *de minimis* or not).

This guideline and accompanying spreadsheets are intended to serve as a guideline for calculation of assimilative capacity for purposes of the Antidegradation Implementation Procedure. This procedure is intended only for use in these guidelines. Where the Procedure calls for calculation of assimilative capacity, the value is used as a screening tool to determine if a proposed discharge will have *de minimis* effects or not. Since this is a screening tool, that is not being used for more rigorous determinations such as calculating enforceable NPDES permit effluent limits or TMDL waste load allocations, the method has been kept as simple as possible and is viewed as an estimate. Users of this guideline may find it necessary in the course of events to slightly modify the process in order to accommodate unique problems with data sets or circumstances that might occur.

The spreadsheets illustrate the calculations to estimate assimilative capacity. The first set of calculations addresses pollutants other than Biochemical Oxygen Demand (BOD). The second set of calculations addresses BOD. The second set of calculations is necessary because BOD is the parameter regulated in discharge permits to prevent undue depletion of Dissolved Oxygen (DO) in receiving waters.

The following data gathering guidelines should be used to compile the information required for the two sets of calculations. However, because of variations in data availability, as well as other relevant case-specific factors, the guidelines may be adjusted to ensure the compilation of appropriate information. In circumstances indicating the need to adjust the guidelines, the reviewer should consult with the Department, as well as other NMED water quality assessment protocols and Quality Assurance Plans.

Data Gathering Guidelines.

1) Obtain ambient water quality data for the pollutant of concern in the receiving water upstream but as close to the discharge as possible. Optimally, use the water quality station and data used by NMED SWQB in the most recent evaluation of the stream segment for purposes of the biennial Clean Water Act Section 303(d) evaluation.
   a) Possible sources of data include:
      i) NMED SWQB water quality database
      ii) USEPA STORET
      iii) USGS water quality monitoring stations
   b) Use all valid data points regardless of the stream flow or time of year when collected
   c) Valid data is data that has met quality assurance / quality control protocols established by the SWQB
2) Obtain data about the discharge.

- a) Possible sources of data include:
  - i) NPDES Permit Applications
    - (1) Supplemental sampling requested by the permitting authority to support the permitting process may be used.
  - ii) USEPA STORET
  - iii) USEPA Permit Compliance System (PCS)
  - iv) Other valid data that has met quality assurance / quality control protocols established by the SWQB

3) Summarize the data by calculating the arithmetic mean for all parameters except bacteria. Use geometric mean to summarize bacteria data. This value will be used as the upstream concentration in the calculation below.
   - a) If the data value is reported as less than a number, that usually means the test result was below the lab's minimum quantification level.
     - i) If all data points are "less than"; treat them all as zeros.
     - ii) If some of the data are "less than" and some are quantified values, use the actual quantified values and one half of the "less than" value to calculate the geometric mean.
       - (1) For example in a data set that has the following 4 values: 1.2, <0.5, <0.6 and 1.4, input the following numbers into the calculation 1.2, 0.25, 0.3 and 1.4. The result in this example would be 0.6

4) Obtain critical low flow data for the stream above the discharge.
   - a) Critical low flow for purpose of the calculation is the minimum average four consecutive day flow which occurs with a frequency of once in three years (4Q3)
     - i) In most cases it will only be necessary to find the 4Q3. However if the only concern is estimating the assimilative capacity necessary to meet a human health criterion then the harmonic mean flow may be substituted.

Calculation of Assimilative Capacity -- Parameters other than BOD

Step 1 - Collect Basic Information

(Instructions: Fill in yellow boxes - Spreadsheet will calculate blue boxes)

Upstream Data	Symbol	Value	Units
critical low flow of stream (4Q3)	Qu	22	cfs
pollutant concentration	Cu	0.01	mg/L
Effluent Data			
design flow (existing) -- [if new discharge use 0]	Qe	1.50	cfs
design flow (proposed)	Qp	2.30	cfs
existing pollutant limit concentration -- [if new discharge use 0]	Ce	0.10	mg/L
proposed pollutant limit concentration -- [use Ce if no change is proposed]	Cx	0.10	mg/L
Downstream Data			
water quality criterion for pollutant of concern	Cs	0.50	mg/L
downstream flow under 4Q3 conditions with existing discharge (Qu + Qe)	Qd	23.50	cfs
downstream flow under 4Q3 conditions with proposed discharge (Qu + Qp)	Qx	24.30	cfs
Constants			
conversion factor for (mg/L to lbs/day)	cf	8.34	

Step 2 - Determine Available Pollutant Assimilative Capacity with the Discharge at Existing & Proposed Design Flows

	Symbol	Value	Units
waterbody pollutant assimilative capacity (Qx*Cs*cf)	Ac	101.33	lbs/day
background pollutant load (Qu*Cs*cf)	Lb	1.83	lbs/day
existing permit load (Qe*Ce*cf)	Le	1.25	lbs/day
proposed permit load (Qp*Cu*cf)	Ln	1.92	lbs/day
Remaining Assimilative Capacity with existing discharge (Ac-Lb-Le)	Ae	98.25	lbs/day
Remaining Assimilative Capacity with proposed discharge (Ac-Lb-Ln)	An	97.58	lbs/day

Step 3 - Determine if proposed new or added discharge is *de minimis* or if a full antidegradation review will be required. Antideg review is required if the new discharge will consume greater than 10% of the remaining assimilative capacity. Discharges that consume 10% or less of the remaining assimilative capacity will be considered "*de minimis*" and do not require a full antidegradation review.

	Symbol	Value	Units
10% of Remaining Assimilative Capacity [prior to new discharge] (Ae*0.1)	Ar	9.82	lbs/day
Added Capacity Utilization by new discharge (Ae-An)	Au	0.67	lbs/day
Determine if Antideg review is required or if new discharge is "*de minimis*" *If Ar > Au then the discharge is de minimis. If Ar < or = Au then an antidegradation review is required.*		**de minimis discharge**	

Helpful Tools

Convert million gallons per day [mgd] to cubic feet per second [cfs] (mgd / 0.646272)	1.50	mgd	2.32	cfs
Convert micrograms [ug] to milligrams [mg] (ug / 1000)	1.00	ug	0.001	mg

	A	B	C	D
1	**Calculation of Assimilative Capacity -- BOD/DO**			
2	Based upon Streeter-Phelps Model in Hammer, M.J., 1975. *Water and Waste-Water Technology.* Wiley & Sons, Inc.			
3	**Step 1 - Collect Basic Information**			
4	(Instructions: Fill in yellow boxes - Spreadsheet will calculate blue boxes)			
5				
6	**Upstream Data**	Symbol	Value	Units
7	critical low flow of stream (4Q3)	Q1	22	cfs
8	Biochemical Oxygen Demand - 5-day (BOD5)	B1	2	mg/L
9	Dissolved Oxygen (DO)	D1	8.2	mg/L
10	Temperature	T1	17	Deg.C.
11	Conductivity	C1	500	uS/cm
12				
13	**Effluent Data**			
14	design flow (existing)	Q2	1.5	cfs
15	design flow (proposed)	Q3	1.8	cfs
16	Biochemical Oxygen Demand - 5-day (BOD5) [use current permit limit or secondary treatment limit - usually 30 mg/l]	B2	30	mg/L
17	Biochemical Oxygen Demand - 5-day (BOD5) [use proposed permit limit or secondary treatment limit - usually 30 mg/l]	B3	30	mg/L
18	Dissolved Oxygen (DO) (existing)	D2	3	mg/L
19	Dissolved Oxygen (DO) (proposed)	D3	3	mg/L
20	Temperature (existing)	T2	18	Deg.C.
21	Temperature (proposed)	T3	18	Deg.C.
22	altitude of facility (feet above sea level)	a	5000	feet
23	conductivity (existing)	C2	500	uS/cm
24	conductivity (proposed)	C3	500	uS/cm
25				
26	**Downstream Data**			
27	enter water quality criterion for D.O. below discharge	WQ	5.0	mg/L
28	enter mean velocity of flow, feet per second (below discharge)	v	0.6	ft./sec
29	enter mean depth of flow, feet (below discharge)	h	4	feet
30	deoxygenation rate, per day @ 20 deg C -- (A deoxygenation rate may be determined in the laboratory, typical rates vary between 0.05 and 0.2. If unknown use 0.1. The actual rate is not greatly important to this exercise because the intent is to estimate the relative impact of a new discharge not a precise impact.)	k1	0.1	
31				
32	**Step 2 - Calculate Downstream Concentrations Based Upon Mixing**			
33	**Downstream Data**			
34	calculate **existing** BOD concentration based upon mixing (existing scenario) [cbe=((Q1*B1)+(Q2*B2))/(Q1+Q2)]	Cbe	3.8	mg/L
35	calculate **existing** DO concentration based upon mixing (existing scenario) [Cde=((Q1*D1)+(Q2*D2))/(Q1+Q2)]	Cde	7.9	mg/L
36	calculate **existing** Temperature based upon mixing (existing scenario) [Cte=((Q1*T1)+(Q2*T2))/(Q1+Q2)]	Cte	17.1	Deg.C.
37	calculate **existing** Conductivity based upon mixing (existing scenario) [Cce=((Q1*C1)+(Q2*C2))/(Q1+Q2)]	Cce	500.0	uS/cm
38				
39	calculate **projected** BOD concentration based upon mixing (proposed scenario) [Cbp=((Q1*B1)+(Q3*B3))/(Q1+Q3)]	Cbp	4.1	mg/L
40	calculate **projected** DO concentration based upon mixing (proposed scenario) [Cdp=((Q1*D1)+(Q3*D3))/(Q1+Q3)]	Cdp	7.8	mg/L
41	calculate **projected** Temperature based upon mixing (proposed scenario) [Ctp=((Q1*T1)+(Q3*T3))/(Q1+Q3)]	Ctp	17.1	Deg.C.

	A	B	C	D
42	calculate **projected** Conductivity based upon mixing (existing scenario) [Ccp=((Q1*C1)+(Q3*C3))/(Q1+Q3)]	Ccp	500.0	uS/cm
43				
44	**Step 3 - Streeter-Phelps Estimate of Oxygen Sag - Deoxygenation and Reaeration Coefficients**			
45	**Estimate Deoxygenation Coefficients**			
46				
47	calculate temperature adjusted k1 rate for existing scenario [k1e=k1*1.047^(Cte-20)]	K1e	0.09	
48	calculate temperature adjusted k1 rate for proposed scenario [K1p=k1*1.047^(Ctp-20)]	K1p	0.09	
49				
50	**Estimate Reaeration Coefficients and Ultimate BOD**			
51	calculate reaeration rate, per day @ 20 deg C [k2=3.3*(v/(h^1.33)]	k2	0.31	
52	calculate temperature adjusted k2 rate for existing scenario [k2e=k2*1.015^(Cte-20)]	k2e	0.30	
53	calculate temperature adjusted k2 rate for proposed scenario [k2p=k2*1.015^(Ctp-20)]	k2p	0.30	
54				
55	**Step 4 - Streeter-Phelps - Estimate Dissolved Oxygen Deficits, Time & Distance to Minimum DO**			
56	Estimate Ultimate Biochemical Oxygen Demand, existing scenario [L0e=Cbe/(1-10^(-5*k1))]	L0e	5.5	
57	Estimate Ultimate Biochemical Oxygen Demand, proposed scenario [L0p=Cbp/(1-10^(-5*k1))]	L0p	6.0	
58				
59	**Calculate Initial Dissolved Oxygen Deficits**			
60	calculate Dissolved Oxygen Saturation for the facility's altitude at temp **cte** [Ide=(14.62-(0.3898*Cte)+(0.006969*Cte^2))-(0.00005897*(Cte^3)))*(1-0.00000697*a)^5.167]	Ide	8.0	mg/L
61	calculate Dissolved Oxygen Saturation for the facility's altitude at temp **ctp** [Idp = (14.62-(0.3898*ctp)+(0.006969*(ctp^2))-(0.00005897*(ctp^3)))*(1-0.00000697*a)^5.167	Idp	8.0	mg/L
62	calculate Initial Dissolved Oxygen Deficit for existing scenario [De=Ide-cde]	De	0.1	mg/L
63	calculate Initial Dissolved Oxygen Deficit for proposed scenario [Dp=Idp-cdp]	Dp	0.2	mg/L
64				
65	**Calculate Time of Travel to Minimum DO Sag**			
66	Calculate time of travel to minimum DO of sag curve for **existing** scenario [te=(1/(k2e-k1e))*(log(((k2e/k1e)*(1-(De*(k2e-K1e)/(k1e*L0e))))))]	te	2.4	days
67	Calculate time of travel to minimum DO of sag curve for **proposed** scenario [tp=(1/(k2p-k1p))*(log(((k2p/k1p)*(1-(Dp*(k2p-K1p)/(k1p*L0p))))))]	tp	2.4	days
68				
69	**Calculate Distance Downstream to Minimum DO Sag**			
70	calculate distance downstream to minimum DO sag **existing** scenario [Me=(te*v*86400 seconds per day)/5280 feet per mile)]	Me	23.5	miles
71	calculate distance downstream to minimum DO sag **proposed** scenario [Mp=(tp*v*86400 seconds per day)/5280 feet per mile)]	Mp	23.1	miles
72				
73	**Step 4 - Streeter-Phelps - Estimate Dissolved Oxygen Deficits at Critical Time**			
74	**Calculate DO Deficit at Critical Time**			
75	calculate DO deficit at critical time (te) for existing scenario [Dde=((k1e*L0e)/(K2e-L1e))*(10^(-K1e*te)-10^(-K2e*te))+(De*10^(-K2e*te))]	Dde	1.0	mg/L
76	calculate DO deficit at critical time (tp) for proposed scenario [Ddp=((K1p*L0p)/(C48-K1p))*(10^(-K1p*tp)-10^(-k2p*tp))+(Dp*10^(-k2p*tp))	Ddp	1.1	mg/L
77				
78	**Calculate Minimum DO**			
79	calculate minimum DO, **existing** scenario [DOe=Ide-Dde]	DOe	7.00	mg/L
80	calculate minimum DO, **proposed** scenario [DOp=Idp-Ddp]	DOp	6.91	mg/L

	A	B	C	D
81				
82	**WARNING #1**	**Proceed with model**		
83	If min. D.O. (DOe) is < water quality criterion, model is predicting a water quality impairment under **existing** conditions, no assimilative capacity is present, If D.O. is > or = criterion proceed with model.			
84	**WARNING #2**	**Proceed with model**		
85	If min. D.O. (DOp) is < water quality criterion, model is predicting a water quality impairment under proposed conditions, no assimilative capacity is present, If D.O. is > or = criterion proceed with model.			
86	**Step 5 - Determine Available Pollutant Assimilative Capacity with the Discharge at Existing & Proposed Design Flows**			
87	calculate the change in minimum DO resulting from the proposed discharge, [DOc=DOe-DOp]	DOp	0.10	mg/L
88	calculate remaining assimilative capacity, (**existing** scenario) [ACe=-(WQ-DOe)]	ACe	2.00	mg/L
89				
90	**Step 6 - Determine if proposed new or added discharge is *de minimis* or if a full antidegradation review will be required. Antideg review is required if the new discharge will consume greater than 10% of the remaining assimilative capacity. Discharges that consume 10% or less of the remaining assimilative capacity will be considered "*de minimis*" and do not require a full antidegradation review.**			
91	calculate 10% of remaining assimilative capacity, [Ar=ACe*0.1]	Ar	0.200	mg/L
92				
93	**Determine if Antideg review is required or if new discharge is *de "minimis*"**		**de minimis**	
94	If DOp > Ar then Antideg review required, if DOp < or = Ar then the discharge is de minimis			

Calculation of Dissolved Oxygen Solubility Corrected to Elevation and Salinity
Prepared by NMED-SWQB using references from USGS-WRD Colo. Dist.

Instructions: Enter Information on Local Water Quality Conditions in Yellow Boxes on the "Assimilative Capacity - BOD" worksheet of this workbook. Blue shaded boxes will automatically calculate.

	Temperature (deg C)	Elevation above Sea Level (feet)	Specific Conductance (uS/cm)	Dissolved Oxygen Solubility corrected to local Elevation and Salinity	
Scenario 1 (existing)	17.1	5000	500	8.0	mg/l
Scenario 2 (proposed)	17.1	5000	500	8.0	mg/l

Intermediate Operations	Value Scenario 1	Value Scenario 2	Formula
Calculate Salinity in 0/00 using Specific Conductance (Salinity)	0.28	0.28	Salinity=((0.0005572*Conductivity)+(0.00000000202*(Conductivity^2)))
Calculate natural log of DO Solubility at sea level in ml/l using salinity derived above (lnDO)	1.91	1.91	lnDO = -173.4292+249.6339*(100/(273.15+Temp))+143.3483*LN((273.15+Temp)/100)-21.8492*((Temp+273.15)/100)+Salinity*(-0.033096+0.014259*((Temp+273.15)/100)-0.0017*((Temp+273.15)/100)^2)
Calculate the DO (ml/l) from the natural log of DO (DOml)	6.73	6.73	DOml=EXP(lnDO)
Convert DO ml/l to mg/l (DOmg)	9.61	9.61	DOmg=DOml*1.4276
Calculate log of vapor pressure in mm Hg (log_v_press)	1.16	1.16	log_v_press=8.10765-(1750.286/(235+Temp))
Calculate vapor pressure from log_v_press (vapor pressure)	14.58	14.59	vap_press=10^log_v_press
Calculate D.O. Solubility (mg/l) at local altitude and specific conductance (DO')	8.0	8.0	DO'=DOmg*(((760-2.5*(Elevation/100))-vapor_press)/(760-vapor_press))