

Lake Powell Pipeline

Draft Surface Water Resources Work Plan

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Section 1 Introduction

The purpose of this work plan is to define the methods for planning and analysis of surface water resources for the Lake Powell Pipeline (LPP). This work plan presents the issues and concerns, defines the impact area and significance criteria, describes the analysis methodology, reviews existing data and identifies data needs, provides an outline of the Surface Water Resources Technical Report, identifies dependency items and relationships to other disciplines and resources, and identifies potential problems and recommendations for resolving problems.

Section 2 Issues

Surface water-related issues and concerns identified during the formal scoping process will be addressed in the analysis for the LPP alternatives. Related questions raised during the informal scoping process and work plan preparation have been consolidated into the following issue(s).

- What impacts would occur on streams and washes during construction, and which channels would be selected for trenchless versus open cut crossings?
- What Standard Construction Procedures (SCPs) would be adopted to protect crossings of streams and washes?
- What impacts would occur on water levels in existing reservoirs that would be integrated into the LPP system?
- What operating levels would be expected in new reservoirs in the LPP system?
- What effects would the Project operation have on existing reservoirs?
- How will the long-term drought affect the Colorado River water supply?

Additional issues that arise during the formal scoping process, or during the preparation of the analysis, will be added and addressed.

Section 3 Impact Topics

The Surface Water Analysis impact topics include the following:

- Streamflows and river stages
- Reservoir storage amounts and water levels
- Construction effects on channels

Section 4

Impact Area and Significance Criteria

4.1 Impact Area

The surface water hydrology impact area includes each of the streams, lakes, and reservoirs that would be affected by the construction or operation of the project alternatives. The areas of potential impact are similar for each of the LPP alternatives; each alternative takes water from the same intake location in Lake Powell and delivers it to roughly the same locations near Kanab, St. George and Cedar City. The general potential impact areas are listed below.

- Lake Powell
- Existing reservoirs that could serve as terminal storage or regulating storage reservoirs (Sand Hollow Reservoir, Quail Creek Reservoir)
- All stream channels and washes that would be crossed by the pipeline, at and immediately downstream of the crossing location
- All channels and washes that accept return flows along the pipeline
- All channels and washes that receive blowoff discharges along the pipeline

4.2 Significance Criteria for Each Impact Topic

Impacts on surface water resources are considered significant if construction, operation or maintenance activities would result in any of the following conditions:

- Reservoir storage amounts and water levels - Changes in reservoir storage and water level will be reported to other resource teams, who will establish criteria to determine if those changes have significant impacts on their resources.
- Construction effects on channels – Effects on stream channels and washes will be considered significant if significant effects on other resources (e.g., wetlands, aquatic habitat, erosion and sedimentation) could occur. This will require coordination with other resource studies.

Section 5

Methodology

5.1 Introduction and Overall Approach

Analysis of surface water resources will be performed by a combination of detailed and approximate methods. A MODSIM model will be developed for the LPP pumping, pipeline and reservoir facilities to simulate hydrologic operations. No new analyses will be performed by the MWH Team for the Colorado River system.

5.2 Definition of Baseline Conditions

The following methods will be used to define surface water baseline conditions in the potentially affected study area.

- Baseline daily average flows and annual peak discharges in gaged perennial or ephemeral streams will be determined using published streamflow data from the Utah Division of Water Resources and U. S. Geological Survey. Baseline conditions will be expressed in terms of a flow-frequency curve (i.e., the frequency of given flows being equaled or exceeded) and the mean annual discharge.
- Baseline reservoir levels will be determined using data available from reservoir owners, and will be expressed in terms of a water level-frequency curve.

5.3 Alternative Analysis

The following methods will be used to evaluate surface water impacts associated with the LPP alternatives.

- A MODSIM model will be developed for the LPP system of pipelines, pump stations and reservoirs. MODSIM is a water resources simulation model developed by Colorado State University for analysis of rule-based allocation systems. MWH has used MODSIM on multiple water resources planning projects. A monthly simulation model will be developed to determine flows in pipeline segments and storage and water levels in reservoirs in the LPP system. The model will be developed for a historical hydrologic period to be determined based on discussion with Utah Division of Water Resources staff. MODSIM results will be summarized for each alternative to describe flow and reservoir level frequency distributions in each LPP component.
- Effects of return flows on flows in streams and washes will be estimated based on current return flow percentages of water deliveries calculated from water application data in the study area, and locations of existing and future development.

5.3 Analysis of Cumulative Impacts

The same methods as described above will be used to evaluate cumulative impacts of the LPP alternatives and reasonably foreseeable actions in the potentially affected areas.

Section 6 Data Needs and Analysis

6.1 Data Needed

The data needed to perform the analysis include:

- Storage-area-elevation data and historical records of Quail Creek Reservoir and Sand Hollow Reservoir water levels
- Published floodplain studies of affected stream channels and regional regression analyses for determining peak discharges
- Topographic, land use and soil type data for watersheds requiring flood hydrograph modeling
- Historical data on return flows as a percentage of water deliveries in St. George, Cedar City, Kanab, and typical rural areas

- Observations (e.g., photographs) of channel conditions at pipeline crossings

6.2 Data Available and Adequacy

The data required to complete the surface water analysis can be acquired from the following identified and existing sources:

- Streamflow data and peak discharge data is available from Utah Division of Water Resources and U.S. Geological Survey
- Quail Creek Reservoir and Sand Hollow Reservoir data are available from Washington County Water Conservancy District
- Floodplain studies are available from local communities and the Utah State Floodplain Coordinator. Past flood studies are available from Utah Division of Water Resources.
- Watershed data is available in GIS format from several sources including Utah DWRe and County sources.
- Water use and return flow data is available from Washington County Water Conservancy District, Kane County Water Conservancy District, and Central Iron County Water Conservancy District.

6.3 Additional Data Needs

6.3.1 Primary

The following data will be required in addition to the data described in Section 6.2:

- Low-altitude aerial photographs or field photographs of locations where proposed pipeline alignments cross channels and washes

6.3.2 Secondary

The following data will be required in addition to the data described in Section 6.2:

- None identified to date

Section 7 Procedures For Development of Mitigation

The analysis of impacts on surface water hydrology will be based on the procedures associated with each affected resource. If adverse impacts on other resources are caused by surface water hydrology, mitigation measures would be developed to offset significant impacts. The mitigation measures will be based on applicable state and Federal statutes and regulations, past experience and best professional judgment to either satisfy a legal requirement or to satisfy the public interest requirement. In some cases significant impacts may not be able to be mitigated. All reasonably foreseeable mitigation options will be evaluated by the Federal Energy Regulatory Commission, Bureau of Land Management, and other responsible federal agencies and factored into the respective decision documents.

Section 8

Technical Report

A technical report will be necessary to document in detail baseline conditions for surface and ground water quality. The technical report will follow the resource technical report outline common to all resource work plans (see Resource Technical Report Outline).

Section 9

Dependency Items From Other Disciplines

The following items are required from other MWH Team discipline specialists:

- **Pipeline Engineering:** Location of pipeline crossings of streams and washes for each alternative; pipeline capacity; anticipated long-term average down-time for maintenance or outages
- **Reservoir Engineering:** Location, storage-area- elevation data and operating plans for proposed reservoirs
- **Water Needs Assessment:** Annual and monthly LPP deliveries to each project participant
- **Wetlands, Aquatic Habitat, Vegetation, Wildlife Resources:** Information on potential critical resources at proposed pipeline crossings of streams and washes

Section 10

Potential Problems and Recommendations

If climatologic and hydrologic analyses of the Colorado River system are necessary, these would have to be performed by the Bureau of Reclamation and would not be under the control of the MWH Team. In this case the preliminary assessments may need to proceed without this information and the final project schedule may have to be modified.