2.9 Surface Water Management

The Site Water Management Program (SWMP) for the Rosemont Project (Tetra Tech 2007g) was developed to allow for the management of storm flows and sediment yield during the active mine life, as well as long-term for closure and reclamation. The SWMP includes storm water management provisions for the open pit, leaching facilities, dry-stack tailings facility, plant areas, waste rock storage facility, access roads, diversions, Process Water Temporary Storage (PWTS) pond, and compliance point dam. Many of the proposed site facilities will change with time as mining progresses. In order to account for the changes that occur over time, the SWMP considered the progression of the facilities at baseline conditions, Year 0 (pre-production), Year 5, Year 10, Year 15, and ultimate mine conditions. Figures 2-11 and 2-12 show the surface water management facilities (described below) at Years 0 and 10, respectively.

The Project water management facilities are intended to have sufficient capacity to handle runoff generated throughout the life of the Project for the 100-year, 24-hour storm events. Sediment control facilities are designed to reduce the total suspended solids (TSS) loads to the minimum practical level for the 10-year, 24-hour storm event, defined as TSS concentrations equal to existing conditions.

Surface water and sediment yield management concepts and features are discussed below. A more thorough discussion and evaluation is provided in *Site Water Management Plan, Rosemont Copper* (Tetra Tech 2007g).

2.9.1 Closed Systems

For the purposes of the SWMP, the open pit, the heap leach facility, and the plant site are considered closed systems, with all direct rainfall and local runoff contained on site. In the open pit, rainfall will be collected in a sump and incorporated into the process circuit during active operations. All rain falling on the heap leach pad will be captured and collected by the heap solution collection and drainage system, and then incorporated into the process flows.

Stormwater flows from the plant site will be collected in the lined PWTS Pond, located immediately downgradient of the plant site. The PWTS Pond is designed to provide lined storage for the equivalent of three days of process flows (69 million gallons) plus the 100-year, 24-hour storm event. The three days is to allow some flexibility and emergency storage in case of a service interruption at the plant facilities. The design criteria for the PTWS Pond attendant storage capacity are based on ADWR Dam Safety requirements for jurisdictional dams and ADEQ BADCT standards.

The PTWS Pond functions as a closed system with all water that is directed to the pond from the plant, and collected stormwater runoff, incorporated into the process water flows. The dam is designed as a rock fill structure with the upstream face and reservoir area lined with GCL and 80 mil high-density polyethylene (HDPE). It is anticipated that the pond will typically be at very low levels. Three vertical turbine pumps on barges in the pond will lift the water to a nearby tank, and from there it will be

distributed as appropriate. No low-level outlet will be incorporated into the PWTS Pond design, as the water in the pond is considered "contact" water per BADCT standards.

It is assumed that the dam will be classified as an intermediate size, "significant" hazard dam per ADWR dam safety regulations. The size classification is based on the height of the embankment at the maximum section (approximately 90 ft) and the storage volume, while the hazard classification is based on the assumption of unlikely loss of life, but potentially significant downstream damage if the dam were to fail. This assumption will be confirmed with ADWR and ADEQ during final design. As a result of the classification, the dam is required to have a spillway capable of safely passing the half probable maximum flood (PMF). The spillway is situated in the north saddle dam and discharges into the north diversion. Details related to the PWTS dam are provided in Tetra Tech 2007g.

2.9.2 Dry Tailings Facility

The general design concept for the dry tailings facility is to construct uniform lifts of dry tailings that are buttressed by starter buttresses. The buttresses will advance ahead of the tailings surface to provide containment while concurrent reclamation and best management practices (BMPs), such as settling ponds and other sediment control devices, will be used to limit erosion on the outer slopes. The top of the tailings area is relatively impervious and will be sloped inward (away from the buttresses) so that all precipitation that falls on top of the active tailings area will remain on top and evaporate. Ponded water may be pumped to the PWTS pond as needed to limit infiltration into the tailings mass. Minor diversion channels will be constructed to direct surface runoff from the outer waste rock shell slopes into sediment ponds. The sediment ponds are designed to store and release up to the 10-year, 24-hour storm event so that suspended sediment concentrations of discharged water are no greater than premining conditions. In addition, the central drain will function to transport stormwater between the north and south dry stack tailings (see below).

2.9.3 Waste Rock Facility

Stormwater management at the waste rock facilities will be similar to that for the dry tailings facility. For the construction of the initial perimeter buttresses, concurrent reclamation and appropriate BMPs will progress up the outer slopes as the buttresses are constructed. They will limit erosion potential while minor diversion channels will be used to direct runoff to downgradient sediment ponds. The exterior toe of the perimeter buttress is set back from the Barrel Canyon divide by approximately 100 ft so that runoff from the outer slopes will infiltrate back into the waste rock facilities rather than discharge downgradient. Where feasible, the top of the waste rock facilities will be sloped to facilitate stormwater draining towards the open pit. The sediment ponds at the toe of the outer slopes are designed to store and release up to the 10-year, 24-hour storm event so that suspended sediment concentrations of discharged water are no greater than background conditions.

2.9.4 Diversions

The primary diversions developed for the SWMP are the north central drain, access road, PWTS, and open pit diversions. In addition to the primary diversions, a storage and recovery system sump will be developed in the waste rock storage area.

2.9.4.1 North Diversion

The first phase of the north diversion, to be constructed by Year 0, channels flows from the upper McCleary Canyon basin around the north dry-stack tailings facility. The north diversion is a trapezoidal, riprap lined channel designed to divert runoff from the 100-year, 24-hour storm event. The diversion discharges downstream of the PWTS pond into a natural drainage that ultimately reports to the Barrel drainage.

2.9.4.2 Central Drain

As the north dry stack-tailings facility expands to the south and east, it will cover a portion of the Barrel drainage. The north diversion will be extended within the natural drainage as a porous rock drain, known as the central drain. The central drain will extend to the top of the south tailings stack and allow surface water from the top reclaimed surface to be conveyed through the drain following closure.

The attenuation pond, an upstream impoundment, will collect surface runoff and slowly feed stormwater into the central drain. The central drain and associated attenuation pond are sized so the 100-year, 24-hour storm will be drained within 30 days. Additional details of the central drain are provided in Tetra Tech 2007g.

2.9.4.3 Access Road Diversion

The Access Road Diversion, a small trapezoidal channel constructed in Year 0, is designed to collect flows from a small basin northeast of the upper McCleary Canyon basin, divert water away from the north dry-stack area, and discharge into the north diversion channel.

2.9.4.4 PWTS Diversion

The PWTS diversion, constructed in Year 0, collects flows from a small basin above the plant site and diverts flows away from the PWTS pond. This diversion is a trapezoidal, riprap lined channel designed to divert runoff from the 100-year, 24-hour storm event. The channel discharges into a natural drainage in the Wasp Canyon basin.

2.9.4.5 Open Pit Diversion

The open pit diversion collects flows from a small basin west of the open pit and diverts flows away from the pit highwall. The diversion is constructed in two phases with the initial diversion constructed in Year 0. The second phase of the diversion will be constructed around Year 5 as the pit expands and eliminates the initial phase. The design for both phases is a trapezoidal, riprap lined channel designed to divert

runoff from the 100-year, 24-hour storm event. Both phases of the channel discharge into a natural drainage west of the heap leach facility.

2.9.4.6 Storage and Recovery System

The storage and recovery system is a sump designed to collect infiltration and stormwater from the waste rock storage area in the Barrel Canyon drainage. This system will function to protect the south dry-stack area from contact with storm flows in the drainage. Stormwater runoff above the south dry-stack area will be controlled by impounding water above a haul road that forms the south terminus of the tailings facility and the north terminus of the waste rock storage area (Figures 2-11 and 2-12). Prior to placement of tailings in the south stack area, the south face of the haul road fill will be sealed with a low permeability geosynthetic clay liner (GCL). The GCL will be covered with drain rock for protection and to promote drainage to the low point within Barrel drainage where a sump will be constructed. The sump will be covered by waste rock starting in Year 10, and monitoring wells will be installed to measure the water level in the sump during the life of the facility. If required, submersible pumps can be installed to evacuate water from the sump and prevent water infiltration into the tailings mass. The pumps will be sized to evacuate infiltration from a 100-year, 24-hour storm event within 30 days. If necessary, a horizontal conduit may be bored from the sump area through the ridge east of Barrel drainage, to discharge in an adjoining basin. Preliminary seepage modeling suggests that significant water is not expected to infiltrate the waste rock to cause phreatic build-up behind the sealed haul road. Therefore, removal of water from the sump is considered for contingency purposes only.

2.9.5 Compliance Point Dam

At the beginning of the Project, a relatively small, porous dam constructed of local borrow or large waste rock materials will be constructed at the outlet of Barrel Canyon. Groundwater monitoring wells will be located downstream of the embankment. This is the final compliance point where groundwater and surface water flows can be monitored and tested prior to release to the downstream drainage. The dam is designed to be a non-jurisdictional dam six ft in height and with a total storage capacity equal to 2 af. Additional capacity may be provided as needed by excavation of sediments upstream of the compliance point dam. Larger flows will overtop the dam and continue downstream. If the dam is destroyed by an overtopping event, it will be rebuilt.