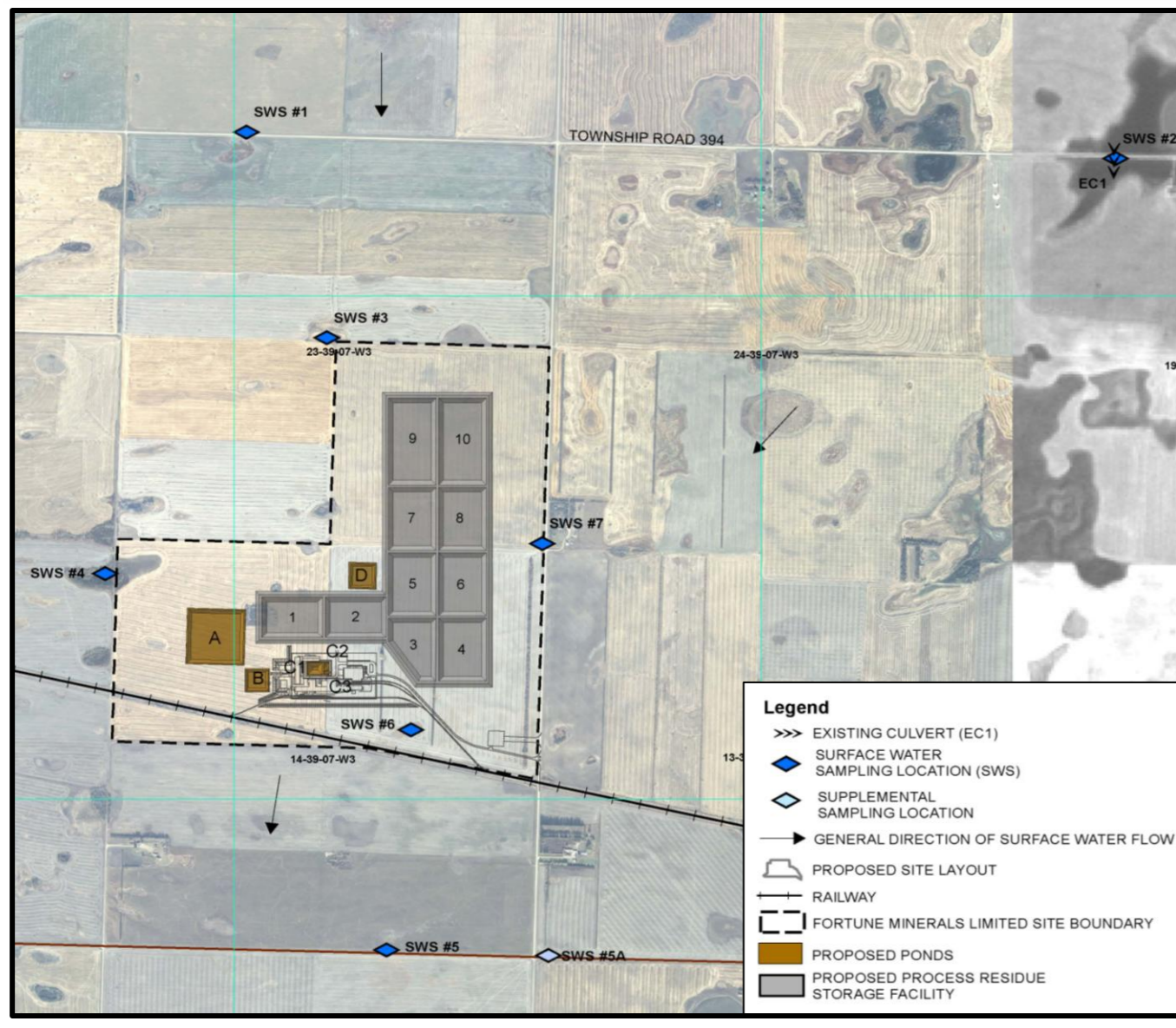


Hydrology Surface Water Assessment



FORTUNE
MINERALS LIMITED



MDH Engineered Solutions Corp. (MDH) completed a Surface Water Hydrology Assessment in support of the Environmental Impact Statement for the proposed Fortune Minerals Limited (FML) **Saskatchewan Metals Processing Plant (SMPP)** near the Town of Langham, Saskatchewan. The assessment included an examination of:

- The dominant hydrological processes and features;
- Topography, soils, and land use at the FML site and surrounding area;
- The impacts of the proposed facility on the hydrological processes and water features in the region; and
- The surface water chemistry (samples were collected from seven locations within a 4 km radius of the proposed SMPP to provide a baseline).

Methodology

A proper surficial drainage system for the SMPP site is fundamental for the sustainability of the development. The surface drainage of the study area depends on topography, on-site drainage features such as culverts, ditches, and wetlands, and climatic conditions.

During the initial assessment the data obtained included meteorological data, soil, land-use, and property boundary information, regional and local topography data, and satellite imagery.

The field investigation included a visual inspection of the area surrounding the proposed development to record the drainage conditions. The following features were examined as part of the drainage network assessment:

- Topography and land-use;
- Culvert locations;
- Ditch flow directions;
- Surface water drainage patterns; and
- Existing watercourses and wetlands that could impact the surface flow pattern.

Water samples were collected and analysed for routine water chemistry, dissolved and total metals, BTEX (Benzene, Toluene, Ethylbenzene, and Xylene), fecal and total coliforms, Polycyclic Aromatic Hydrocarbons (PAHs), and Polychlorinated Biphenyls (PCBs).

Results

Hydrology

The proposed development area is situated within a non-contributing drainage area (Rice Lake Watershed) located within the North Saskatchewan River Watershed, in the semi-arid region of the Canadian Prairies. The local and regional slope classes in the region vary from very gently sloping (0.5% to 2%) to moderately sloping (5% to 10%). The general surface drainage direction within and around the FML site is in a southerly direction. A nearby climate station in Saskatoon indicates that average annual precipitation in the study area is approximately 350 mm, with approximately 27% occurring as snowfall. Annual potential evaporation is approximately 900 mm. The project area has typical “knob and kettle” topography, with poorly defined drainage, characterized by small potholes and sloughs. Significant runoff events occur in the spring as snowmelt and during high intensity rainfall events in the summer. Drainage in the vicinity of the proposed site is poor with no well defined or continuous channels.

Results from the surface water hydrology assessment are summarized below:

- The runoff contribution of the project area varies from 0 mm to 31.4 mm for 1-hour and 24-hour duration rainstorms with return periods ranging from 1 in 2-year to 1 in 100-year, respectively.
- The surface drainage from the area around the proposed development flows away from the facility, except for a 22.2 ha area to the west, north, and east of the PRSF.



Typical wetland in the study area

- Drainage from the proposed SMPP footprint area (approximately 80.2 ha) and the surrounding catchment area (22.2 ha) will be contained and therefore will not flow into the natural drainage course. Removal of this runoff volume from the watershed will not have a significant impact.

- The 102.4 ha drainage area represents approximately 0.08% of the gross drainage area that contributes runoff to the North Saskatchewan River through the Rice Lake Watershed (approximately 131,175 ha). Therefore, the proposed development is not expected to disturb any regional surface drainage conditions.

- The impervious surface area will increase as a result of the development. This will have a negligible effect on evaporation and infiltration.

Water Quality

Surface water sampling was completed during spring runoff and after relatively heavy rainfall events in summer and fall to create a baseline inventory of surface water quality. Water samples were taken from seven locations (SWS #1 through SWS #7) and sent to ALS Laboratory Group (ALS) in Saskatoon for analysis. The results of the chemical analyses were compared to the Saskatchewan Surface Water Quality Objectives (SSWQO). Concentrations of total and dissolved aluminum in some of the selected surface water exceeded the SSWQO. Total and dissolved silver concentrations in sampled water were below the detection limit for the analysis. Subsequent testing of silver concentrations at a lower detection limit is recommended.

Mitigation & Monitoring

The proposed development does not intersect any significant watercourses and is not expected to disrupt the hydrology in the study area since the location is at a significant distance from major natural surface water features.

The hydrological sustainability of the area will be preserved by:

- Mitigation for the loss of wetlands. Mitigation plans will be determined through negotiation with Saskatchewan Ministry of Environment;
- Development of a surface water quality monitoring program for the water features (wetlands and road side runoff ditches) within and around the operational area over the life of the project;
- Possible installation of sediment and erosion control measures at locations where construction activities could cause eroded materials to enter surface drainage features; and
- Compliance with appropriate environmental regulations if pumps or culverts are installed to divert runoff from the natural drainage course.



Surface water sampling at a permanent wetland