Professional Services

EA-01

Figure 1. Professional services can support industry in decision-making and reducing risk.

Independent, experienced professional consultants provide knowledge-based solutions to assist producers and contractors in sustainable tile drainage solutions.

What do professional services accomplish?

The objective of ***Professional Services*** is to provide support to the tile drainage industry in Manitoba for improved decision-making.

Professional consulting support is applied to various aspects of tile drainage projects for improved project outcomes, including system and environmental performance.

Professionals work with tile drainage contractors and agricultural producers to help:

- Obtain permits and approvals.
- Develop cost-effective and efficient tile drainage system design.
- Reduce environmental and financial risk.

Overview of professional planning

Contractors and producers regularly engage professionals to provide guidance and advice on their projects. Services are applied through various project phases and can also include education and training (Figure 2).

Professional services rendered during planning and design can provide the foundation on which to get project approvals. Design advice and training provide industry a level of assurance for system performance and environmental protection.

In addition to planning, professionals can provide support during the construction phase, at the request of clients. This may include quality control oversight and advice when conditions encountered on the job require modifications to the plan.

Services through management and operation can optimize the system for crop productivity and environmental performance. Monitoring supported by experienced professionals can provide assurance that the system is performing as anticipated.

Planning and Design – desktop and field investigations (e.g. soil, surface water, groundwater), elevation, texture and salinity mapping, advice on system design and layout, and permitting/approvals support.

Construction – quality control and advice during installation (e.g. conditions encountered in the field requiring modifications to the planned design).

Management/Operation and Monitoring – crop and nutrient management, water table fluctuation, tile flow, water quality, weather, and infrastructure condition to optimize operational performance.

Education and Training – education and training opportunities to industry, including presentations, workshops, field days, webinars, informational documents and coaching.

Figure 2. Overview of professional services provided to the tile drainage industry in Manitoba.

Applicability of professional services in Manitoba

Professional planning is broadly applicable and can provide value anywhere in agri-Manitoba. Many soils in Manitoba will not benefit from tile drainage (such as well-drained soils). Others should be avoided altogether (such as wetlands). For those soils where tile drainage could solve an excess water problem there are different levels of complexity. Some landscapes are relatively straight forward, whereas others are more complicated or have hydrogeologic conditions that present increase risk to the environment, downstream infrastructure or system performance. In these cases, a more intensive level of planning is warranted. As well, it may be necessary to hire a professional engineer to meet regulatory requirements.

Planning and design

Figure 3. Field investigation using EM38 mapping for soil texture variability and salinity.

Timely and proper planning provides a strong foundation for a successful project. Some key planning considerations include:

- Site-specific environmental and field evaluation.
- Local and regional drainage considerations (e.g. downstream drainage system capacity, culvert capacity).
- Evaluation of cost, performance, environmental and agronomic risks.
- Permitting and approval requirements, including municipal approvals, drainage permits, and approvals related to downstream infrastructure (e.g. Manitoba Infrastructure, railways).

Site specific field characterization is comprised of a suite of professional services provided through all project phases. These services support appropriate design of sustainable systems, effective management for environmental and agronomic performance, and monitoring options.

Services include review of existing information and field investigations. An overview of various assessments by specialty area is provided below.

Pedological (soil) assessments

- Review of existing soil resource information for risk identification and suitability recommendations.
- Field investigations for soil classification, texture confirmation, percolation testing and other soil water properties, salinity/sodicity sampling and mapping (Figure 3).

Hydrogeological (groundwater) assessments

- Risk identification based on desktop and field analyses.
- Review of available information such as geologic maps, drill logs, etc.
- Field reconnaissance including non-intrusive testing (e.g. EM31 mapping; Figure 4), and follow-up test drilling and interpretation.
- Response characterization based on installed monitoring equipment (e.g. piezometer), groundwater flow analysis/modelling.

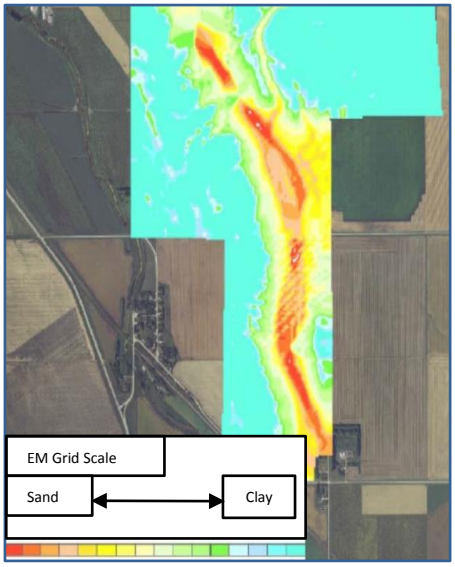

Figure 4. Mapping (EM31) to detect a buried sand channel and shallow groundwater risk north of Portage (AAFC, unpublished).

Hydrologic and hydraulic (surface water) modelling

- Review of project specific soil, groundwater and surface water conditions that influence infiltration, drainage flows and surface runoff.
- Hydrologic modelling using rainfall runoff methods (e.g. Soil Conservation Service, USDA, 1986, 2007) and/or tile drainage models (Skaggs et al., 2012).
- Hydraulic modelling of receiving channels (e.g. ditches and culverts) to assess impact of drainage on capacity and performance.
- Reports on pre-project and post-project specific impacts to support design modifications and regulatory approvals.

Agronomic (crop) assessments

- Crop production advice, nutrient management planning, and manure management support.

Review of Tile drainage system design can result in a more environmentally sustainable system. Please refer to *Site-Specific Tile Drainage Design* (see *BMP IF-05*) for tile drainage design options.

Construction

While professional services are not always required during the construction phase of tile drainage projects, certain circumstances and/or system components do require or benefit from professional support. During the construction phase of even conventional tile drainage systems, professional services may be required if challenging conditions are encountered in the field or if conditions encountered require a change relative to the planned design. In these situations, professional guidance may aid the contractor in making appropriate changes to the design or construction approach to provide assurance of an effective and environmentally sustainable system installation. Certain tile drainage system components require professional guidance during the construction phase, including *Tile Water Recycling (*see *BMP WS-01), Constructed Wetlands (*see *BMP WS-02)* and *Saturated Buffers (*see *BMP EF-02)*, while other components, including *Controlled Tile Drainage (*see *BMP IF-04)* and *Bioreactors (*see *BMP EF-01)* may benefit from professional advice during this project phase.

System and environmental monitoring

Monitoring is a generally beneficial activity to confirm operational and environmental performance related to a tile drainage system. Monitoring can be used to confirm the system is operating according to design parameters and agronomic performance and environmental objectives are being met.

Parameters that may be monitored are listed below:

- Tile outflow (Figure 5)
- Water table depth fluctuations
- Soil moisture status
- Water quality (e.g. nutrients, salts)
- Crop performance and yield
- Soil nutrient status
- Land/soil quality (e.g. soil salinity, sodicity, and compaction)
- Weather conditions (current and forecast)

Figure 5. Example of monitoring a gravity outlet.

Monitoring can document potential off-site impacts (e.g. downstream flooding and infrastructure damage, land quality and water quality).

The application of instrumentation and communication technology can be used to cost-effectively meet monitoring requirements and objectives.

Education and training

Professionals provide support to industry through various educational and training activities, including tile drainage courses, informational webinars (e.g. Red River Basin Commission tile drainage webinars), and presentations at conferences, workshops and field days to transfer knowledge.

Outstanding questions and potential future improvements

Potential future improvements to professional services to the tile drainage industry in Manitoba include:

- Developing of Manitoba-specific design guidelines and standards, including addressing Manitoba soil-landscape conditions, limitations and risks, and beneficial management practices directed to contractors and producers (i.e. system design, implementation and management).
- Reviewing the certification (e.g. training) requirements for professionals and contractors.

Complementary Practices

Professional services are strongly recommended or required for the following BMPs:

- *IF-01 – Nutrient Management;*
- *IF-05 – Site-Specific Tile Drainage Design;*
- *EF-01 – Bioreactors;*
- *EF-02 – Saturated Buffers;*
- *WS-01 – Tile Water Recycling;*
- *WS-02 – Constructed Wetlands.*

Applicable professional designations

Professional consulting service providers are trained, recognized and regulated by professional organizations such as:

- Engineers Geoscientists of Manitoba;
- Manitoba Institute of Agrologists;
- Certified Crop Advisors.

Additional BMP resources

Minnesota Drainage Guide, 1984. United States Department of Agriculture, Soil Conservation Service.

Drainage Guide for Ontario – Publication 29, 2007. Ontario Ministry of Agriculture, Food and Rural Affairs.

B.C. Agricultural Drainage Manual, 1997. British Columbia Ministry of Agriculture, Fisheries and Food.

Informational webinars

Red River Basin Commission, 2017. Tile drainage webinars. https://www.redriverbasincommission.org/.

References

ASABE. 2008. ASABE Standard EP 480. Design of subsurface drains in humid areas. American Society of Agricultural and Biological Engineers. St. Joseph, MI.

Soil Conservation Service, USDA, 2007. National engineering handbook. USDA-SCS, Washington, D.C.

Soil Conservation Service, USDA, 1986. Urban hydrology for small watersheds. Technical release No. 55. USDA-SCS, Washington, D.C.