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Toronto and Region Conservation Authority

Dave Williams, P.Eng.
Nick Emery, P.Eng.

Putting the Green Back into Green Energy Construction

Stantec

Agenda

1. Green Energy Sites
2. Importance of SWM/ESC
3. Design Considerations
4. Potential Solutions
5. Operation & Maintenance
6. Summary

Putting the Green Back into Green Energy

Green Energy Projects

Typical Green Energy Projects

- Wind Energy – windmill towers (7 – 75 MW)
- Solar Energy – ground mounted racking with either stationary or static panels (10 – 50 MW)
- Over 30 renewable energy projects in Ontario

Green Energy Projects

What makes green energy projects different?

Shorter construction duration (often <18 months);

Rural locations with limited drainage infrastructure;

Unique approvals;

Often completed using turn-key contracts.

Ultimate SWM strategy is reliant on restoration vegetation to mitigate the impacts of development

Putting the Green Back into Green Energy

SWM/ESC Approach

SWM Approach

Green energy projects result in an improvement of hydrologic characteristics on many sites by converting active agricultural lands to permanent meadow grass cover.

SWM design is most vulnerable during construction and becomes more resilient over time as vegetation establishes.

ESC Approach

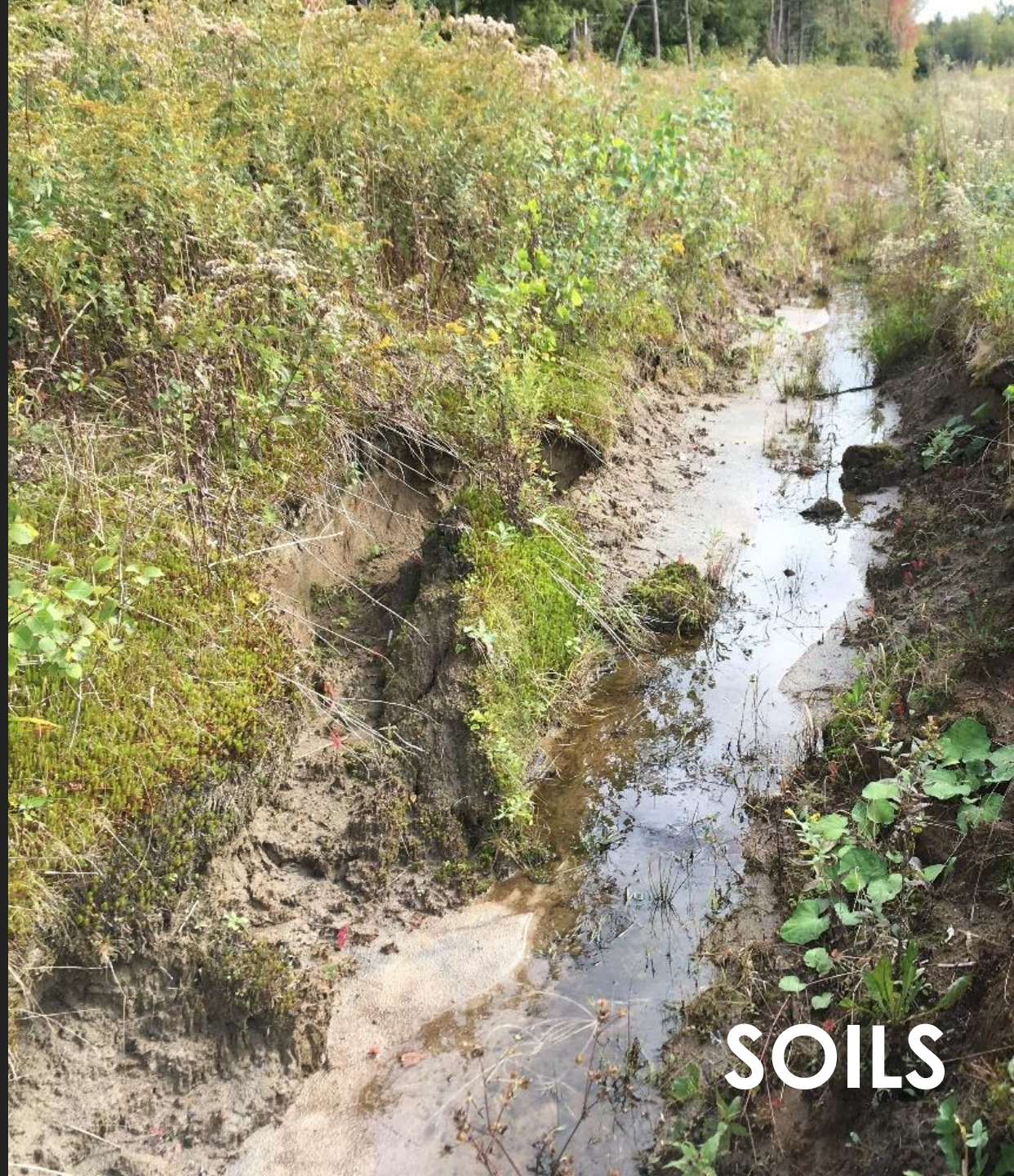
- Inextricably linked to SWM design
- Successful SWM plans must also mitigate erosion

Putting the Green Back into Green Energy

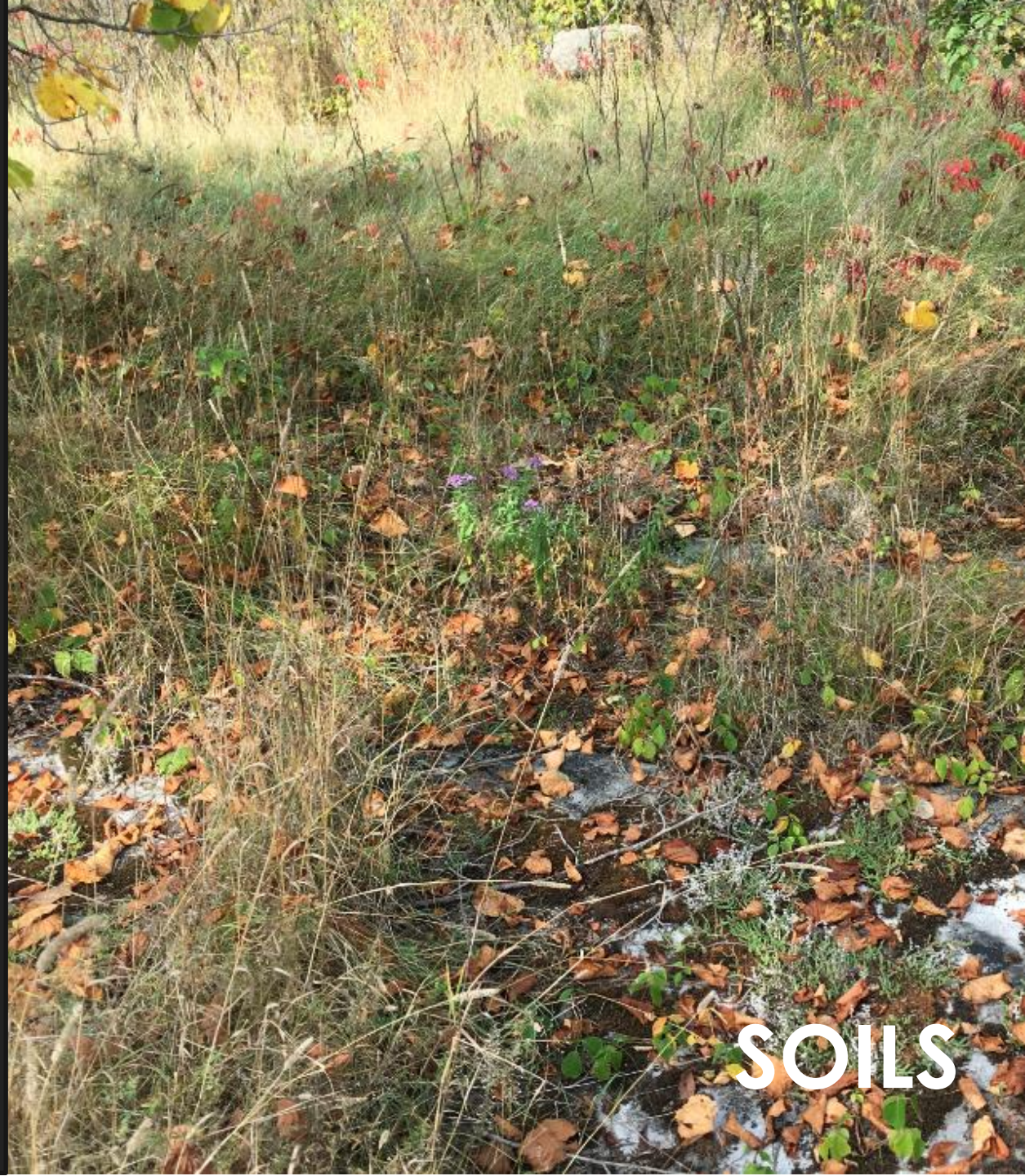
Site Challenges

SITE CHALLENGES


SLOPES



SOILS



SOILS

EXTERNAL FLOWS

VEGETATION

Putting the Green Back into Green Energy

SWM and ESC Strategies

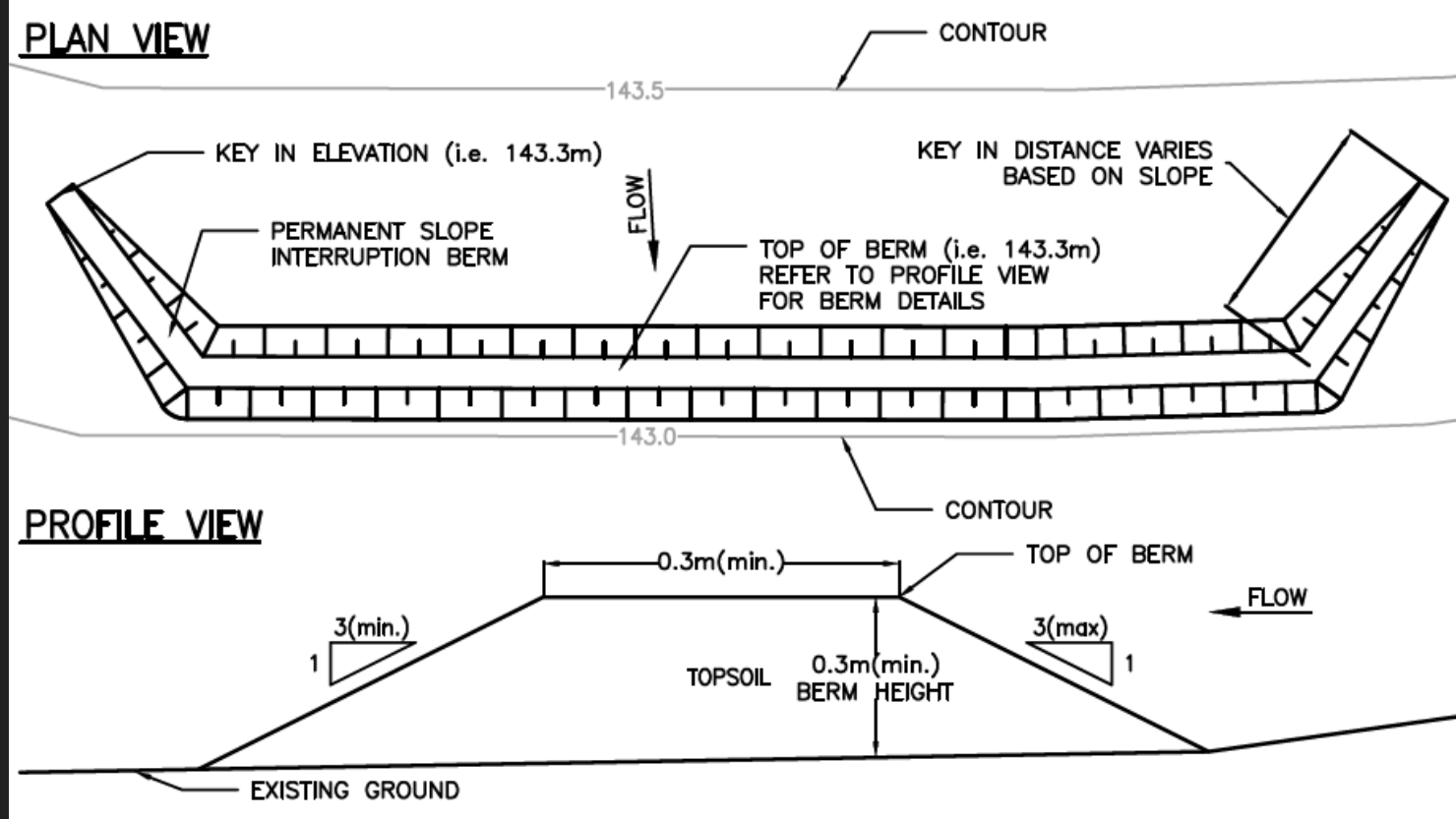
Stormwater Impacts of Green Energy Projects

- Changes to internal drainage
- Creation of impervious areas
- Reduction in vegetated cover

How do we mitigate?


Slopes

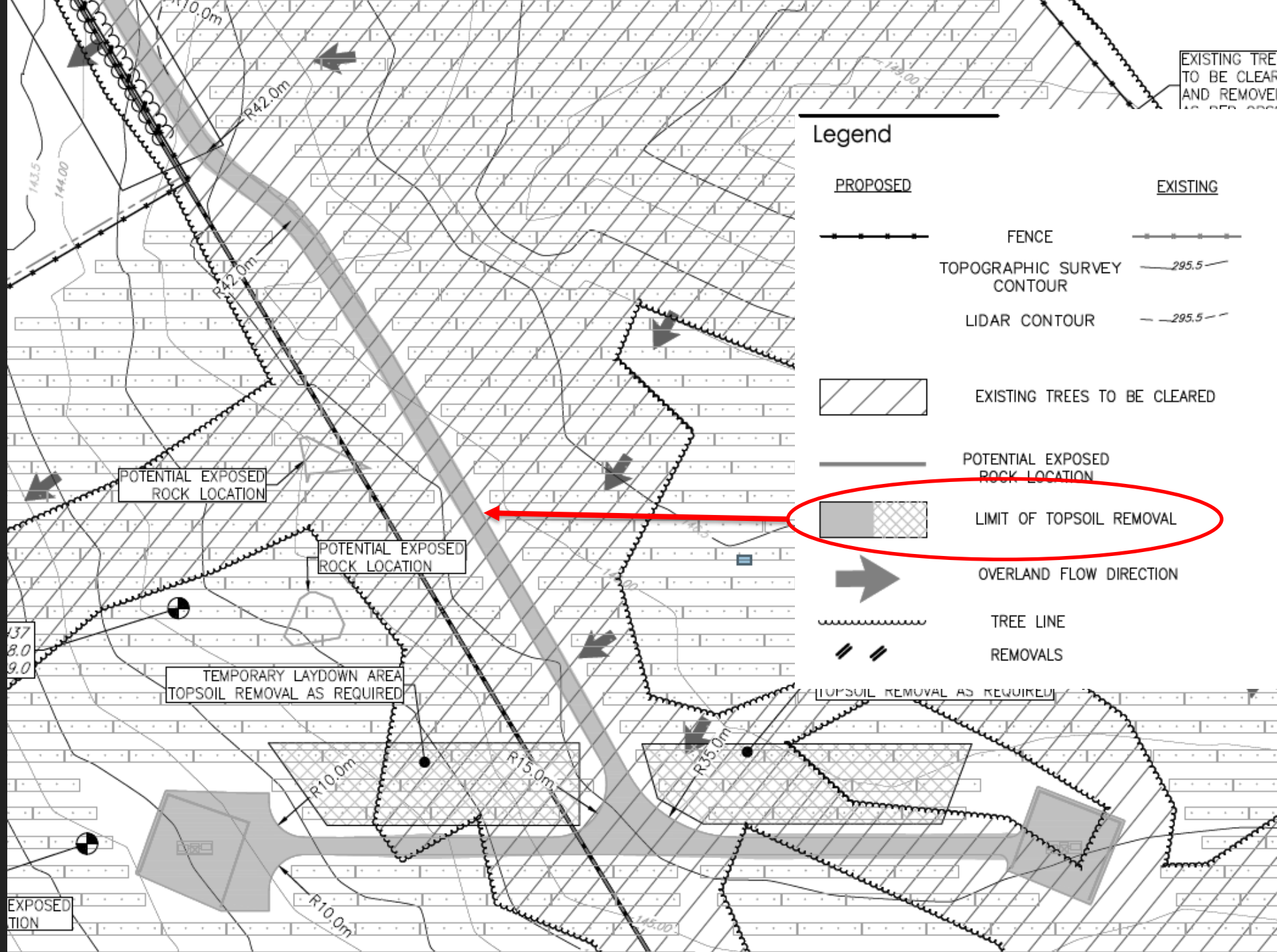
Slope Interruption



SLOPE PROTECTION


SOILS

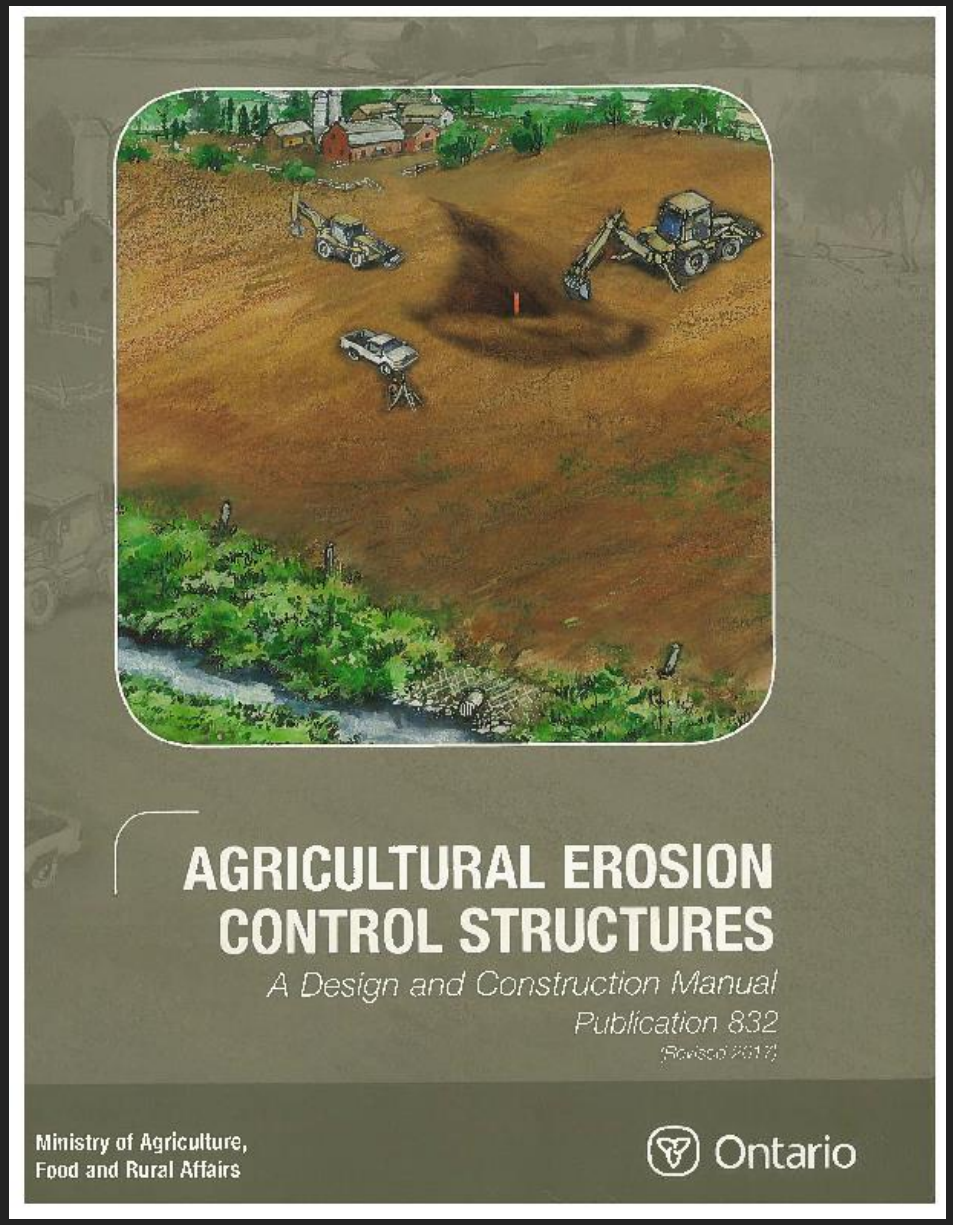
Minimize Soil Disturbance



Minimize Soil Disturbance

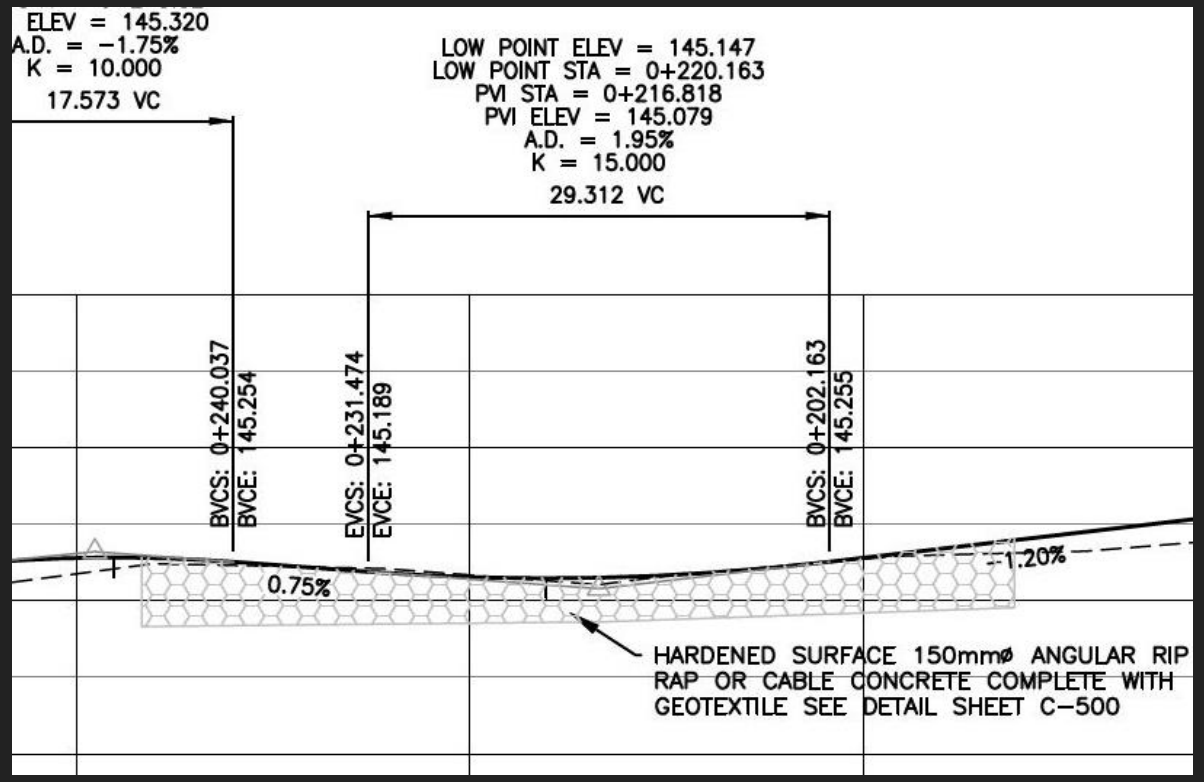
Soil Conservation Measures

- Tilling/contour ploughing
- Grassed waterways
- Berms



SOIL CONSERVATION MEASURES

SURFACE FLOWS



PROMOTE SHEET FLOW

VEGETATION

VEGETATION


VEGETATION

Putting the Green Back into Green Energy

Operation and Maintenance

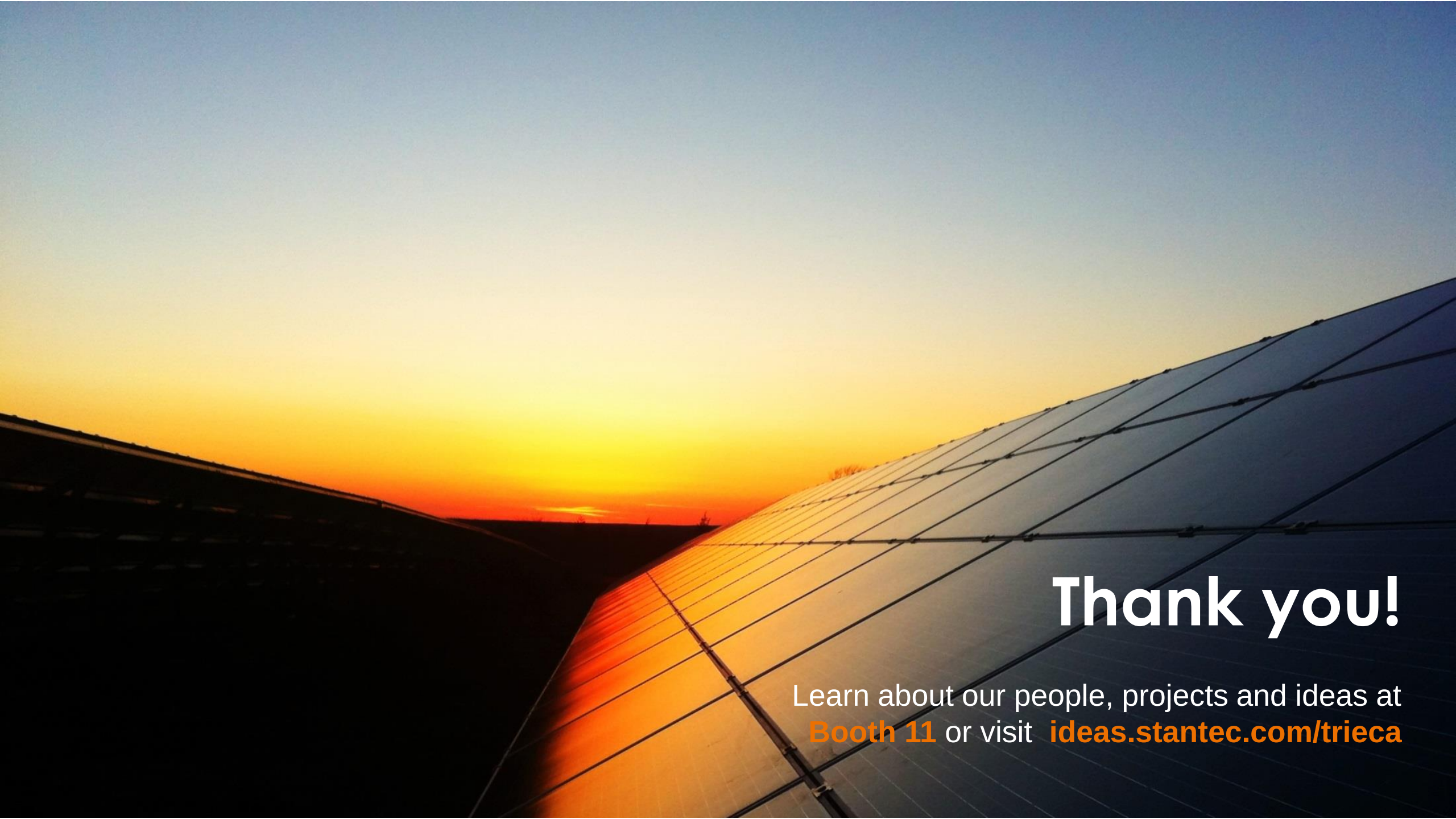
O&M MONITORING

Putting the Green Back into Green Energy

Summary

Summary

- Successful SWM design is dependent on rapid establishment of dense vegetation
- SWM design is most vulnerable during construction and becomes more resilient over time as vegetation establishes
- Site SWM/ESC design must consider the following site factors:
  - Slopes,
  - Soils,
  - Surface flow routes – both internal and external, and
  - Existing vegetation.
- Soil conservation strategies should be integrated to mimic existing hydrologic conditions
- Keep the green in Green Energy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