A vertical strip on the left side of the slide shows a topographic map of the Nova Scotia coastline. The map features contour lines, a yellow road or path, and a green area representing water or a specific region. The rest of the slide has a dark teal background with light blue wavy lines.

Nova Scotia Department of
Transportation and Infrastructure
Renewal

Environmental Services Group

Jeffrey Pinhey, M.A.Sc., P.Eng.

A vertical strip on the left side of the slide shows a topographic map with contour lines. A green shaded area highlights a specific region, and a yellow line runs vertically through it. A white circle with a crosshair is positioned at the top of the green area, with a white arrow pointing to the right and another white arrow pointing downwards from the circle.

Erosion Control for Building Sites

Observations and Practical Techniques for
Builders, Designers, and Regulators



I wonder where this came from?
Must be the Government's Fault!



Sometimes, the project is in a tough place



Sometimes, we create our own problems

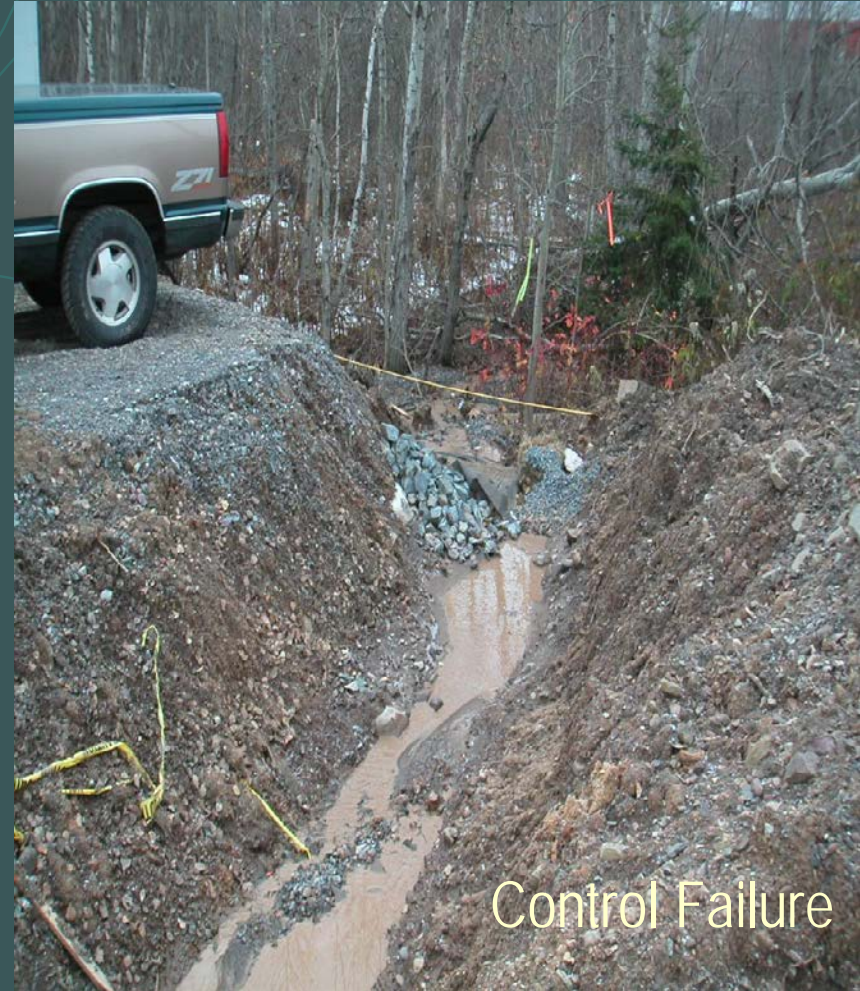
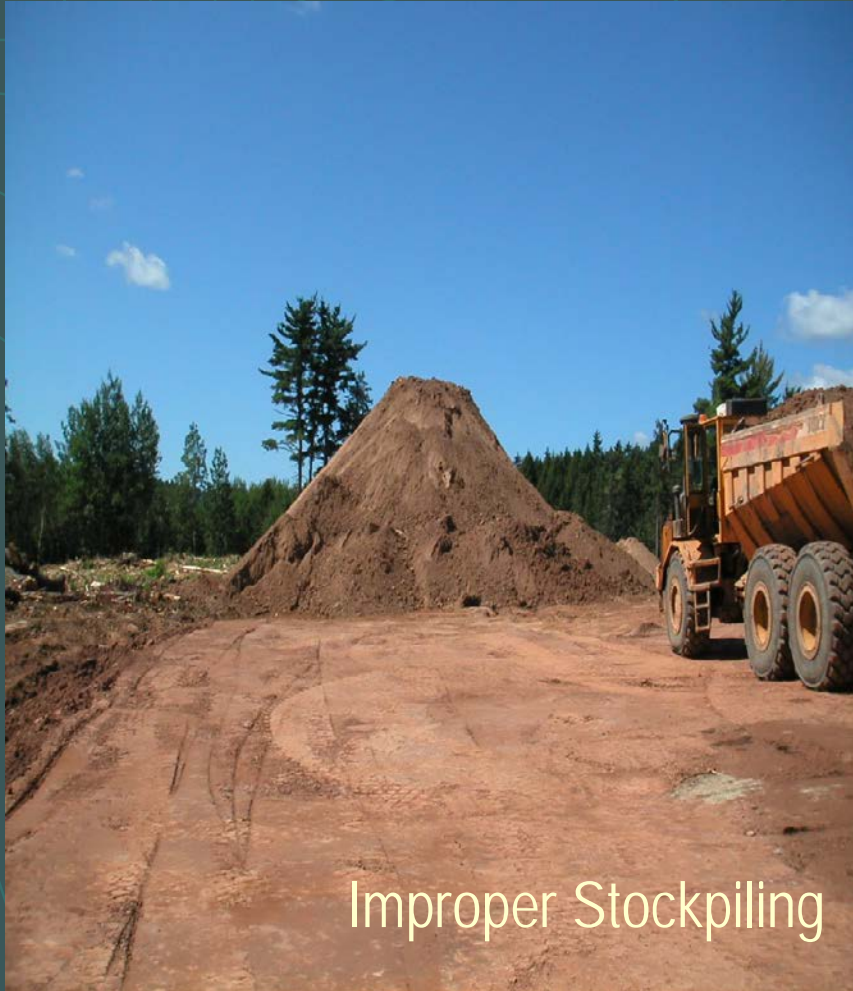




Common Causes of Problems on Construction Sites

- Improper Stockpiling of Materials
- Erosion Control Failure
- Vehicle Damage
- Poor Workmanship
- Lack of Proper Water Runoff Control

Typical Erosion on Building Sites



Typical Erosion on Building Sites



Vehicle Damage



Poor Workmanship

Typical Problems

Overland flow control and Management



Water Flow Wants to Concentrate



Sediment Collects in Ditches

A vertical strip on the left side of the slide shows a topographic map of a riverbank. The map features contour lines and a yellow line that likely represents a proposed path or boundary. The background of the slide is a dark teal color with faint, light blue contour lines.

Principles of Effective Site Erosion Control

1. Go Gently into this Good Site
2. Keep Clean Water Clean
3. Minimize the Amount of Exposed Soil
4. Minimize the Time of Exposure
5. Keep the Sediment on the Site
6. Steep Slopes mean Steep Costs

A vertical strip on the left side of the slide shows a topographic map with contour lines and a yellow line. The rest of the slide has a dark blue background with light blue contour lines.

Principles of Effective Site Erosion Control

1. Go Gently into this Good Site

- Examine the site – understand where drainage is coming from and going to before during and after construction
- Work with the site not against it
- Use the appropriate equipment and techniques – less is more
- Do as little as possible - its cheaper that way



Context



Appropriate Equipment

A vertical strip on the left side of the slide shows a topographic map of a site. The map features contour lines, a network of roads or paths, and several yellow arrows pointing to specific locations. The background of the entire slide is a dark teal color with faint, light blue contour lines.

Principles of Effective Site Erosion Control

2. Keep Clean Water Clean

- **Divert** Off-Site drainage from entering working areas of the site
- **Direct** On-site drainage from undisturbed areas from entering working areas of the site
- **Control** and treat dirty water at source before it mixes with clean water



Up-grade diversion/cutoff



Up-grade diversion/cutoff



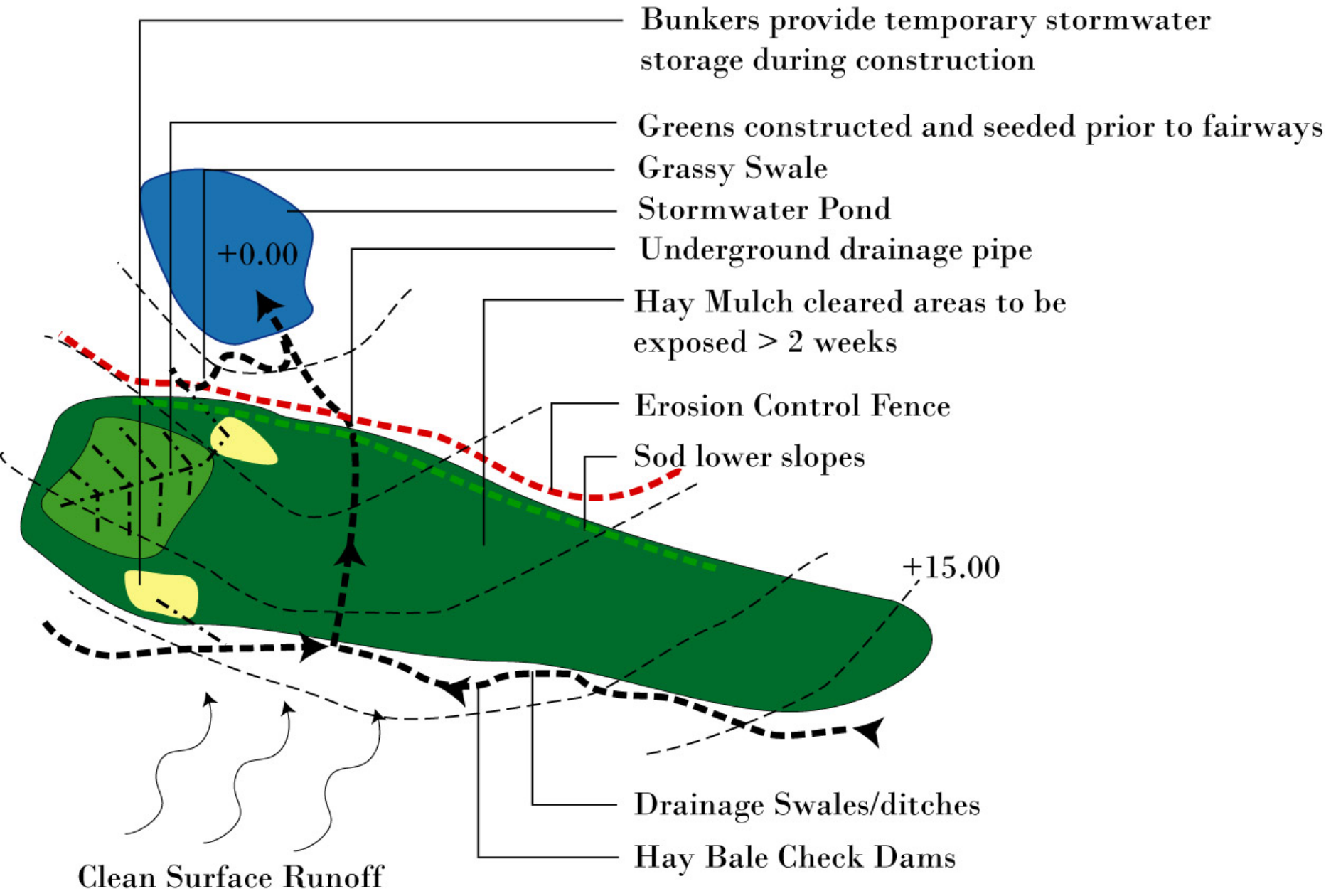
Up-grade diversion/cutoff



On-site Systems Use Intercepts in a Similar Way



Relief Drains in Cut Slopes



Surface Water Runoff Control - Golf



Principles of Effective Site Erosion Control

3. Minimize the Amount of Exposed Soil

- Never “Clear the Site”
- Disturb only the area you need to work in now
- Cover it up or stabilize surfaces temporarily when necessary
- Use vegetation in any form to stabilize areas



Surveyed Limit of Clearing



Grubbing to Rock on Same Site (use of low area)



Principles of Effective Site Erosion Control

4. Minimize the Time of Exposure

- Disturb only the area you need to work in now
- Rehabilitate Disturbed Areas Promptly
- Watch the weather – bad things happen at night and on weekends!



Looks Bad, to the Civilian, but.....



Slopes Erode



Slopes Erode, Especially on Preferential Paths



Flatter Site = Lower Velocity = Less Erosion
Compacted Soils = Less Surface Friction = Less Erosion

A vertical strip on the left side of the slide shows a topographic map of a site. The map features contour lines, a road, and several yellow rectangular markers indicating the locations of erosion control measures. The background of the slide is a dark teal color with faint, light blue contour lines.

Principles of Effective Site Erosion Control

5. Keep the Sediment on the Site

- Collect and confine sediment laden water within the site
- Use ponds, infiltration strip, vegetation
- Control traffic to and from the site, parking and equipment access on the site
- Plan ahead



Slow Down Runoff with Site Features



Take advantage of existing site features



Take advantage of existing site features



An “interim” sediment control pond

A vertical strip on the left side of the slide shows a topographic map of a coastline. A yellow line runs vertically along the coast, possibly indicating a road or a specific boundary. The map features contour lines and a grid.

Principles of Effective Site Erosion Control

6. Steep Slopes Mean Steep Costs

- Minimize creating steep slopes in either cuts or fills
- Dispersion is better than concentration
- Slow it down – slow drainage = low erosion



Vegetate ASAP



Settling Ponds need maintenance...





Use of grassed or wooded areas for dispersion

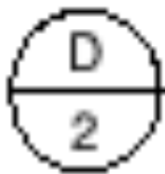
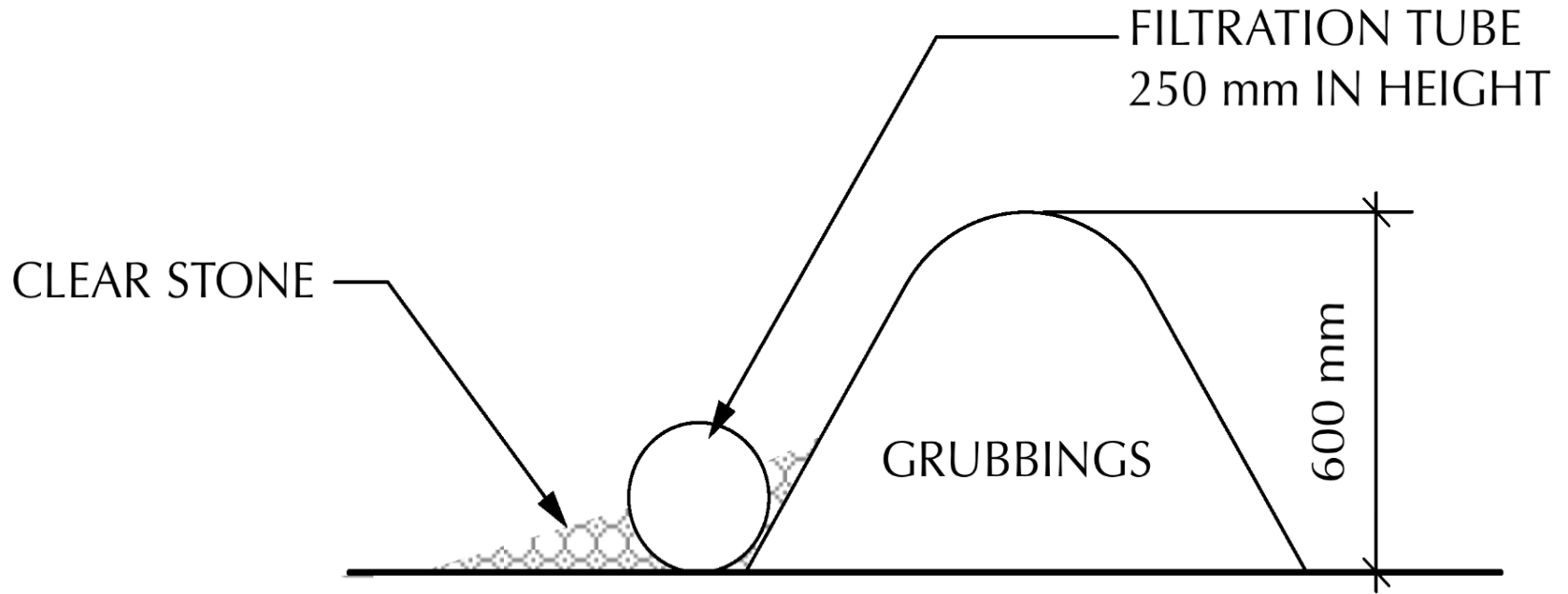
A vertical strip on the left side of the slide shows a topographic map of a coastline. A yellow vertical line runs down the map, and a green shaded area is visible along the coast. The rest of the slide has a dark blue background with faint, light blue contour lines.

Erosion and Sediment Control Plan

1. Required for all TPW Projects
2. LEED Certified Buildings require a plan
3. Must be submitted to TPW Project manager and accepted prior to entering the site
4. Sealed by a Professional Engineer Licensed to practice in the Province of Nova Scotia
5. Is a START - needs to be updated as construction proceeds, a “Living Plan”
6. Work progression notes to anticipate progress

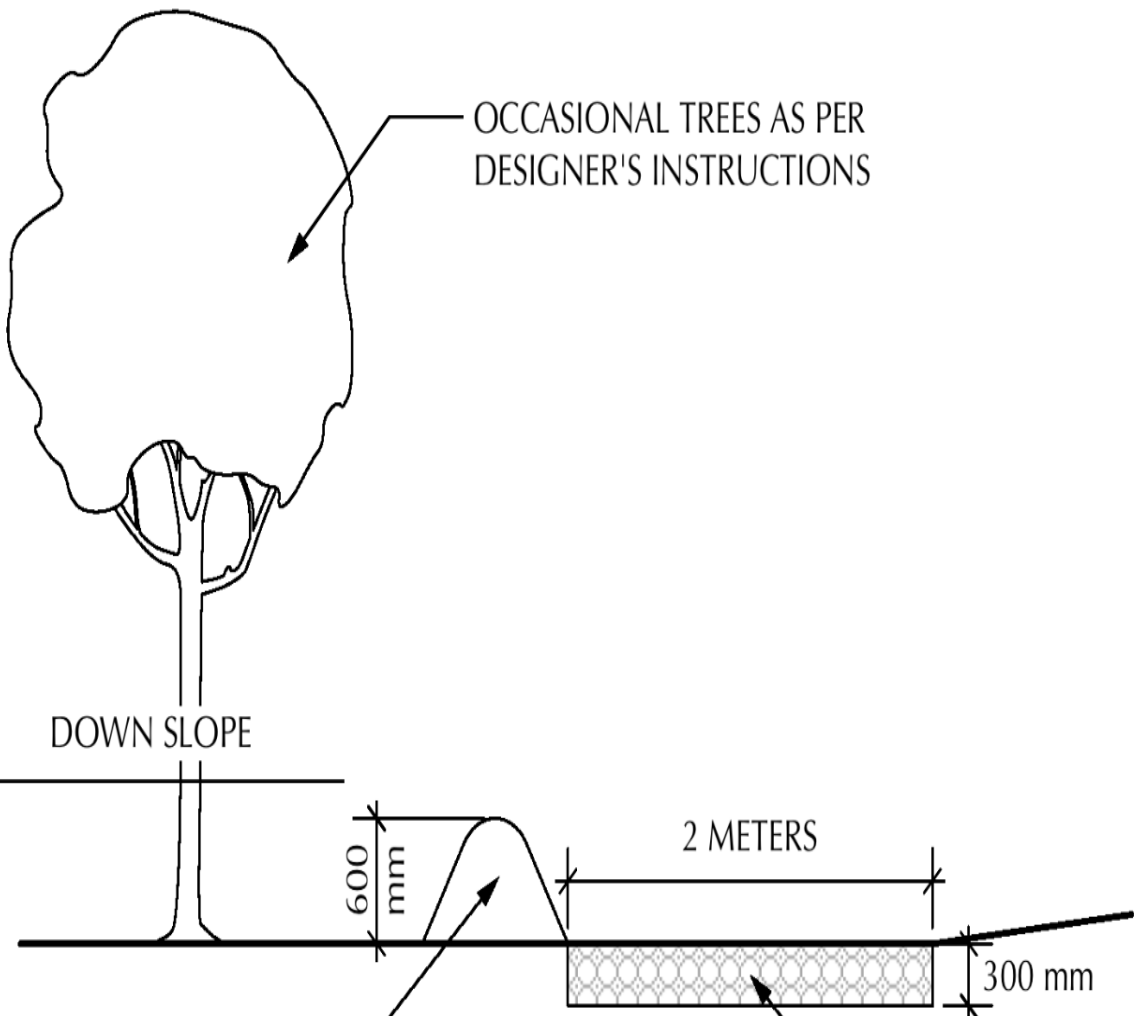






FILTRATION TUBE AND BERM DETAIL

SCALE 1:20



OCCASIONAL TREES AS PER
DESIGNER'S INSTRUCTIONS

DOWN SLOPE

2 METERS

600
mm

300 mm

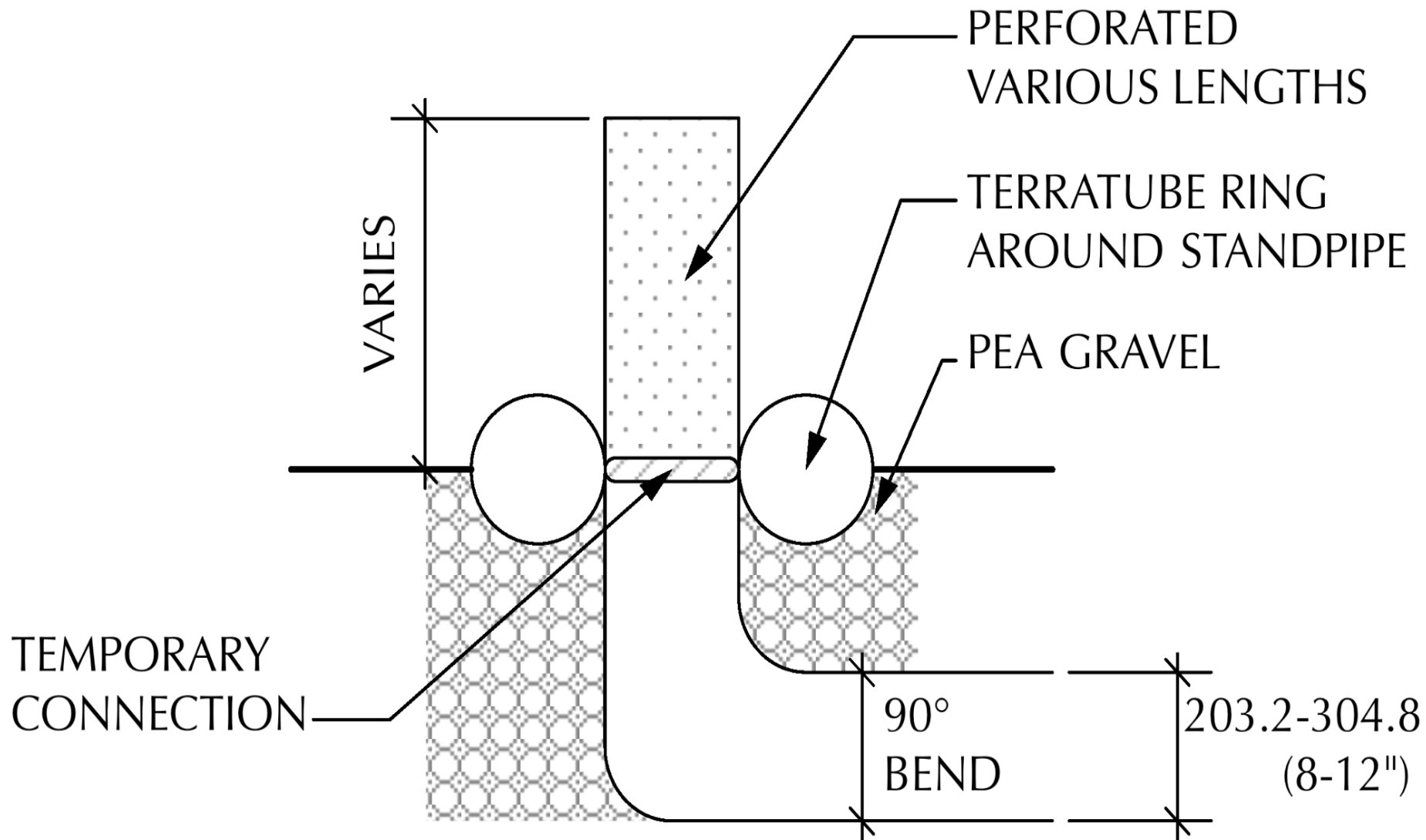
GRUBBINGS BERM FROM CART PATH
600 mm HIGH; 1000 mm BASE

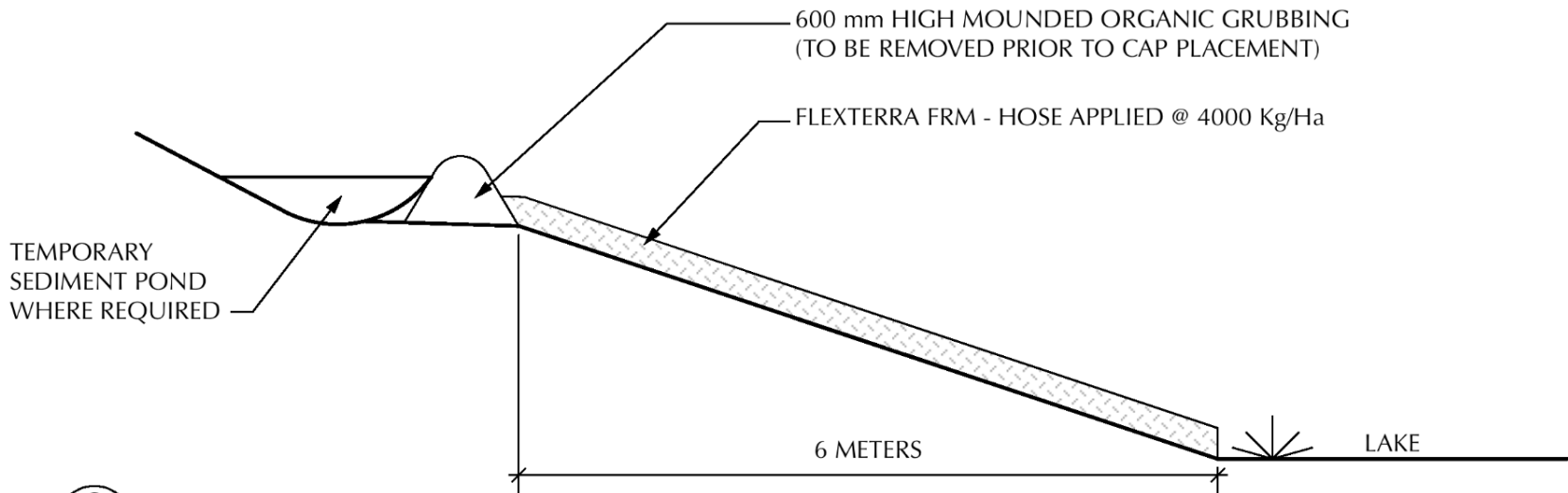
FUTURE CART PATH EXCAVATED TO TILL,
300 mm CLEAR STONE

C
2

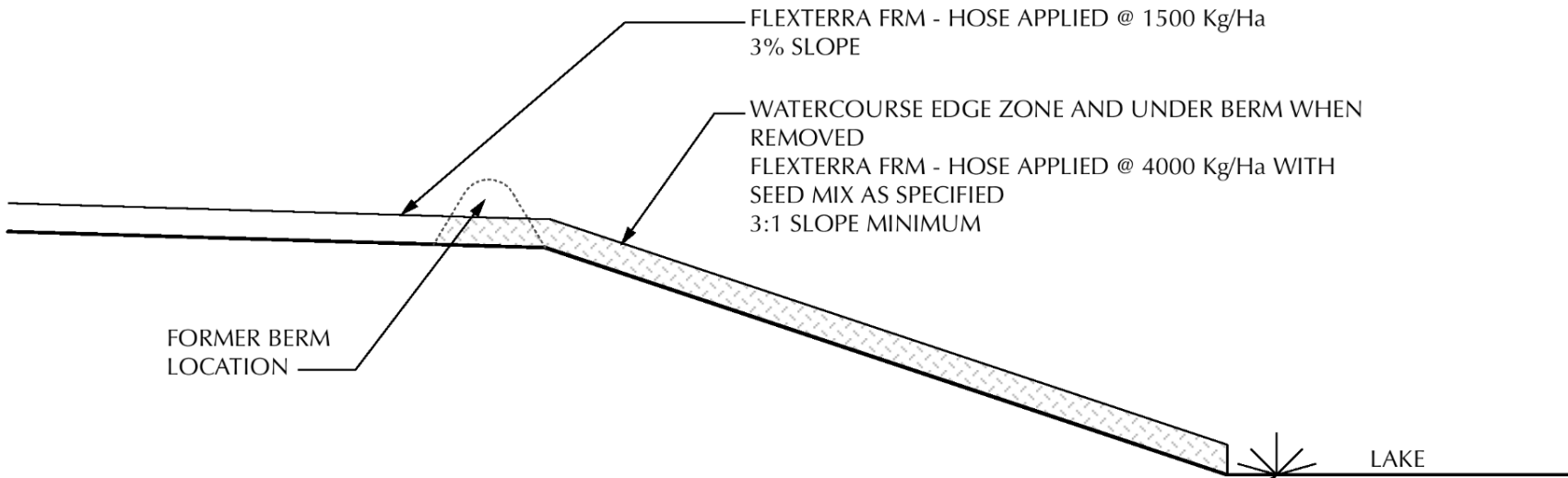
SECTION VIEW: CART PATH AS EROSION CONTROL

SCALE 1:50





C
1 ORGANIC BERM DETAIL
SCALE 1:50



D
1 FINAL LAKE EDGE DETAIL
SCALE 1:50

A vertical strip on the left side of the page shows a topographic map of a wetland area. The map features contour lines and a yellow line that likely represents a proposed construction path or boundary. The map is partially obscured by a green vertical bar.

WORK SEQUENCE FOR GOLF HOLE CONSTRUCTION:

1. INSTALL TWO TURBIDITY CURTAINS ALONG THE SHORE LINE AFFECTED PRIOR TO THE COMMENCEMENT OF ANY EARTHWORK DIRECTLY ON LAKE FRONTAGE. TURBIDITY CURTAINS SHALL REMAIN IN PLACE UNTIL THE SITE IS STABILIZED.

2. CLEAR THE AREA BETWEEN THE EDGE OF LAKE AND THE TOP OF THE LAKE EMBANKMENT SLOPE (6M +/-) BY HAND. **(WORK COMPLETED)**

3. CONSTRUCT AN ORGANIC BERM AT THE TOP OF THE EMBANKMENT SLOPE WHERE INDICATED, THAT IS APPROXIMATELY 600MM IN HEIGHT USING A SMALL DOZER PRIOR TO THE GRUBBING OF THE SITE SUCH THAT NO RUNOFF CAN ENTER THE LAKE WITHOUT HAVING TO FILTER THROUGH THE BERM SITED ON THE ORIGINAL SOIL PROFILE. AREAS WHERE SURFACE RUNOFF WILL POND BEHIND THE BERMS WILL BE FACED WITH A FILTRATION TUBE THAT WILL PROVIDE ADDITIONAL FILTERING CAPACITY AT THOSE LOCATIONS. **(REFER TO DETAILS B/2, C/1 AND D/1, FILTRATION TUBE AND BERM, ORGANIC BERM AND FINAL LAKE EDGE DETAILS)**

4. STABILIZE THE BERM AND THE CLEARED STRIP BETWEEN THE ORGANIC BERM AND WATERCOURSE USING A 3,500 kg/ha APPLICATION RATE OF FLEXTERRA FGM (INCLUDING SEED MIX SPECIFIED BY NICKLAUS GOLF).

CONSTRUCT SEDIMENT PONDS AT APPROXIMATE LOCATIONS AS SHOWN ON THE DRAWING. IT MAY BE NECESSARY TO DEWATER THE SEDIMENT PONDS DURING PRECIPITATION EVENTS BY PUMPING SEDIMENT-LADEN WATER TO 15-m PVC HEADER PIPE LOCATED IN AN AREA OF DENSE VEGETATIVE GROWTH, LOCATED MORE THAN 30M FROM THE WETLAND UNTIL THE UNDERGROUND DRAINAGE SYSTEM FOR THE HOLE IS INSTALLED.

5. INSTALL PERFORATED STANDPIPES WITHIN THE TEMPORARY SEDIMENT PONDS. USE THE FUTURE CATCH BASIN LEADS AS OUTLET CONTROL DEVICES. **(REFER TO DETAIL E/1, ORGANIC BERM DURING CONSTRUCTION DETAIL)**

6. EXCAVATE AND INSTALL THE UNDERGROUND DRAINAGE SYSTEM (INCLUDING HOOK UPS TO THE STANDPIPES LOCATED IN THE SEDIMENT PONDS) SUCH THAT SURFACE RUNOFF THAT COLLECTS IN THE SEDIMENT PONDS IS DIRECTED TOWARDS THE WETLAND AND DISCHARGED VIA THE EXFILTRATION TRENCH. **(REFER TO DETAIL A/1, EXFILTRATION/DISPERSAL TRENCH SECTION)**

A vertical strip on the left side of the page shows a topographic map of a golf course hole. The map features contour lines and a yellow line representing the hole's path. Several yellow arrows point to specific locations along the hole, likely indicating where construction or maintenance activities should take place.

7. COMMENCE AND COMPLETE THE ROUGH GRADING OF THE HOLE, INCLUDING HOOKUPS OF THE UNDERGROUND DRAINAGE SYSTEM TO THE GREEN AND BUNKERS AND THE INSTALLATION OF THE IRRIGATION SYSTEM.

CONNECT IRRIGATION PIPE CLEANOUTS FOR WINTER FREEZE PROTECTION (IF LOCATED ON THE HOLE) DIRECTLY TO THE UNDERGROUND DRAINAGE SYSTEM.

SEDIMENT-LADEN RUNOFF WILL CONTINUE TO BE DIRECTED TO THE DESIGNATED SEDIMENT PONDS (AND BUNKERS ONCE CONNECTED TO THE UNDERGROUND DRAINAGE SYSTEM). IT MAY BE NECESSARY TO ASSIST DEWATERING OF THE SEDIMENT PONDS DURING HEAVY PRECIPITATION EVENTS, BY PUMPING SEDIMENT-LADEN WATER TO 15-m PVC HEADER PIPE LOCATED IN AN AREA OF DENSE VEGETATIVE GROWTH, LOCATED MORE THAN 30M FROM THE WETLAND.

8. ONCE UNDERGROUND DRAINAGE AND IRRIGATION SYSTEMS ARE INSTALLED, COMMENCE FINAL GRADING AND PLACEMENT OF FAIRWAY SAND CAP REMOVE THE ORGANIC BERM IN COORDINATION WITH THE PLACEMENT OF THE SAND CAP.

STABILIZATION OF THE SAND CAP WILL COMMENCE WITH THE APPLICATION OF HYDRAULIC MULCH (FLEXTERRA FGM) PLACED AT AN APPLICATION RATE OF 1,500 kg/ha, WHICH ALSO INCLUDES THE FERTILIZER AND SEED MIX SPECIFIED BY NICKLAUS GOLF.

NICKLAUS GOLF MAY WANT TO MECHANICALLY FERTILIZE PRIOR TO THE APPLICATION OF HYDRAULIC MULCH.

9. A WORK PROGRESSION SCHEDULE WILL BE IMPLEMENTED ON THIS HOLE THAT REQUIRES THE CONTRACTOR TO LIMIT THE AREA BETWEEN THE PLACEMENT OF SAND CAP AND THE APPLICATION OF HYDRAULIC MULCH TO AN AREA NO GREATER THAN 0.5ha (5,000 SQ. METERS) AT ANY ONE TIME.

10. IN SITUATIONS WHERE THE ORGANIC BERM IS REMOVED AND A PRECIPITATION EVENT IS PREDICTED BY ENVIRONMENT CANADA OR THE WEATHER NETWORK TO BE ≥ 5 MM, THE CONTRACTOR WILL BE RESPONSIBLE TO INSTALL A FILTRATION TUBE ALONG THE TOP OF THE LAKE EMBANKMENT SLOPE OVER THE LENGTH OF BERM SECTION REMOVED OR TO APPLY HYDRAULIC MULCH, AT AN APPLICATION RATE OF 1,500 kg/ha, OVER THE AREA OF EXPOSED SOIL THAT COULD POTENTIALLY CONTRIBUTE RUNOFF TO THE LAKE. **(REFER TO MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION OF FILTRATION TUBE)**

11. MAINTAIN THE USE OF THE SEDIMENT BASINS (PERFORATED STANDPIPE) TO DIRECT RUNOFF BACK TO THE WETLAND AREA, UNTIL THE SITE IS STABILIZED AND THE PERMANENT CATCH BASINS ARE INSTALLED.



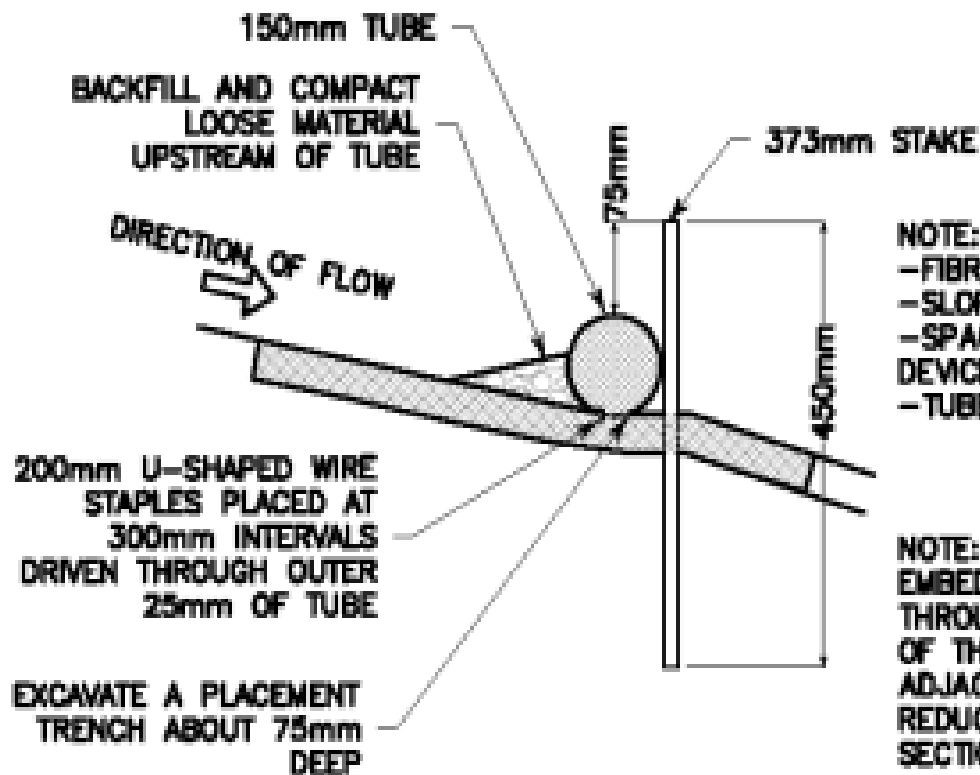


Enforcement

1. Is everywhere
2. You don't want to go there
3. Costs everyone money
4. Is not just done by government employees on weekdays



11/16/2007 02:24 PM



NOTE:

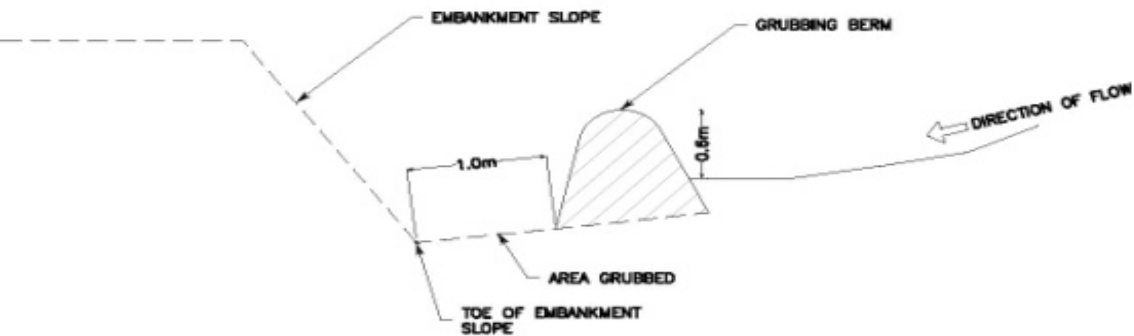
- FIBRE FILTRATION TUBES USED ON EMBANKMENT SLOPES.
- SLOPE INTERRUPTION DEVICES USED ON BACK SLOPES.
- SPACING OF FILTRATION TUBES AND SLOPE INTERCEPTION DEVICES SHALL BE 8-10m
- TUBES SHALL BE INSTALLED ALONG SAME CONTOUR LINE

NOTE: USE 375mm STAKE WITH 150mm MINIMUM EMBEDMENT SPACED AT 600mm INTERVALS DRIVEN THROUGH OUTER 25mm OF TUBE, LEAVING ABOUT 75mm OF THE STAKE PROTRUDING ABOVE THE TUBE. OVERLAP ADJACENT ROLL ENDS BY A MINIMUM OF 300mm AND REDUCE STAKING INTERVAL TO 300mm WITHIN OVERLAP SECTION USED ON EMBANKMENT SLOPES.

INSTALLATION OF FIBER FILTRATION TUBES AND SLOPE INTERRUPTION DEVICES

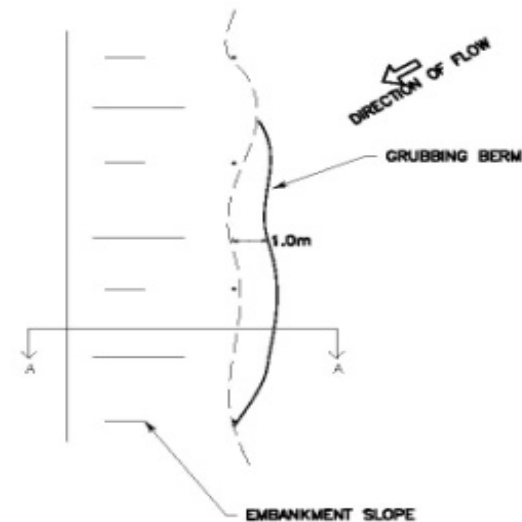
5
22ES

SCALE: N.T.S.

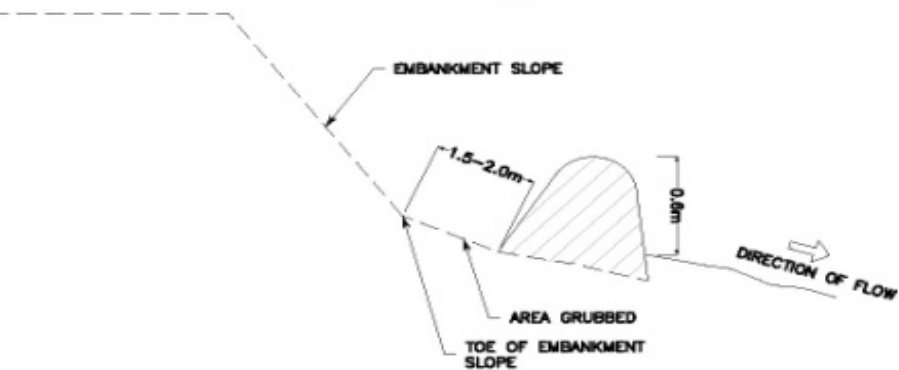


SECTION A-A

7A GRUBBING BERM ALONG
TOE OF EMBANKMENT SLOPE
2.3ES SCALE: N.T.S.

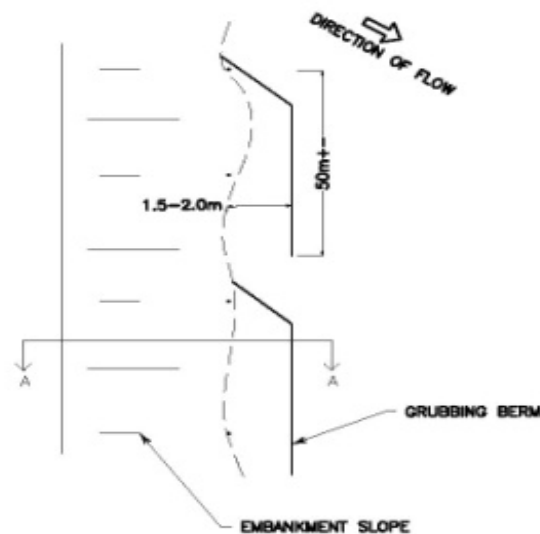


7A GRUBBING BERM ALONG
TOE OF EMBANKMENT SLOPE (PLAN VIEW)
2.3ES SCALE: N.T.S.



SECTION A-A

7B GRUBBING BERM ALONG
TOE OF EMBANKMENT SLOPE
2.3ES SCALE: N.T.S.



7B GRUBBING BERM ALONG
TOE OF EMBANKMENT SLOPE (PLAN VIEW)
2.3ES SCALE: N.T.S.



