



## Erosion and Sediment Control on Landfill Sites

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## Disclaimer

The material set out in this presentation is based on an assignment from the Department of Environment and Conservation (DEC). At the time of this presentation the work had not been reviewed by DEC. The views expressed in this presentation are those of the author and have not been endorsed by DEC.



## Outline

- Landfill environmental performance
- What's new in the "Blue Book"?
- Key considerations for landfill sites
  - Site layout and planning
  - Erosion control measures
  - Soil stockpiles
  - Sediment control
  - Soil & Water Management Plans



## EPA Audit of Sydney, Hunter & South Coast Landfills (2000) 15 Sites

### Operational Issues

- Inadequate cover 50%
  - Unsuitable material
  - Inadequate compaction
  - Insufficient stockpile (2 weeks)
- Capping 20%
  - Erosion on batters
  - Erosion of cover
  - Completed areas inadequately capped and revegetated

## EPA Audit of Sydney, Hunter & South Coast Landfills (2000) 15 Sites



### Water Management

- Water Pollution 20%
  - Unlicensed discharge of leachate or sediment laden water
  - Discharge from green waste area
- Surface Water Management 20%
  - Separation of runoff from leachate
  - Significant erosion on landfill batters
  - Diversion of stormwater across disturbed areas
  - Inadequate capacity of sediment ponds

5

## What's new in the "Blue Book"?



- Simple procedure for assessing erosion hazard
- Works near creeks (not relevant to landfill sites?)
- Expanded sediment basin design criteria
- Expanded data on soil erodibility (Appendix C)
- Mechanisms for automatic addition of flocculant to sedimentation basins
- Suitability of erosion control products

7

## EPA Audit of Rural Landfills (2002) 30 Sites

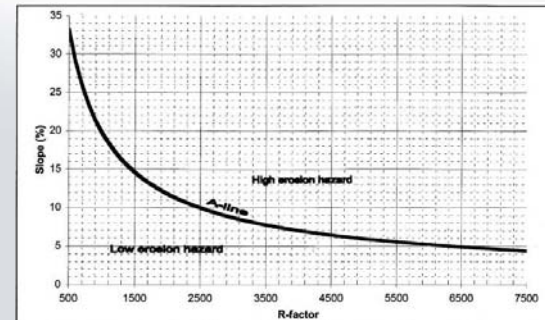


- Inadequate surface water controls 80%
- Maintenance of drains 17%
- Maintenance of silt fences 10%
- Surface drainage directed to waste areas 35%
- Inadequate leachate controls 73%
- Maintenance of leachate controls 13%
- Run-on to landfilled areas/leachate ponds 13%
- Inadequate compaction of daily cover 33%
- Inadequate/no sediment control ponds 30%
- Inadequate site capping and revegetation 10%
- Tracking of mud onto roads 13%
- Inadequate records and monitoring 70%

6

## What's new in the "Blue Book"?

### 1) Erosion Hazard



8



## Key Considerations: 2) Erosion Control Measures

- Erosion control = first line of defence
- Minimise disturbed area
- Control batter slope and length
- Revegetate/stabilise batters ASAP (within 10 days of construction?)
- Problem of runoff conveyance down steep batter slopes
- Management of soil stockpiles
- Suitable erosion control products

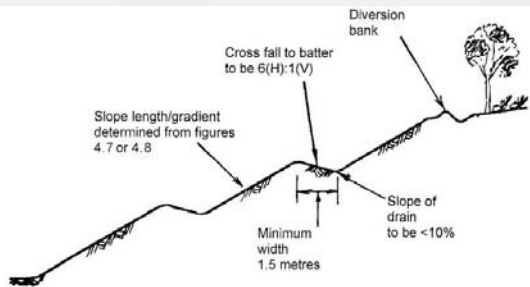
13

## Rock Protection on a Waterway



15

## Treatment for Steep Batters



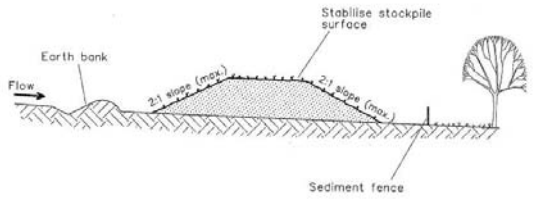
14

## Key Considerations: 3) Soil Stockpiles

- Create separate stockpile for topsoil
- Preferably handle soil when moist (not wet or dry)
- Place stockpiles > 5 m from concentrated flow
- Long flat mounds on the contour are preferred
- Keep less than 2 m high to preserve quality of topsoil
- Stabilise (mulch or temporary vegetation) if stockpile left > 10 days

16

## Soil Stockpiles



17

## Key Considerations: 4) Sediment Control



- Capture capacity must be restored within the specified number of days after the end of the storm.
- Restore basin capacity by:
  - treatment and discharge or
  - transfer to holding dam.
- Where dam serves dual function (water storage and sedimentation), vertical zones must be clearly defined.

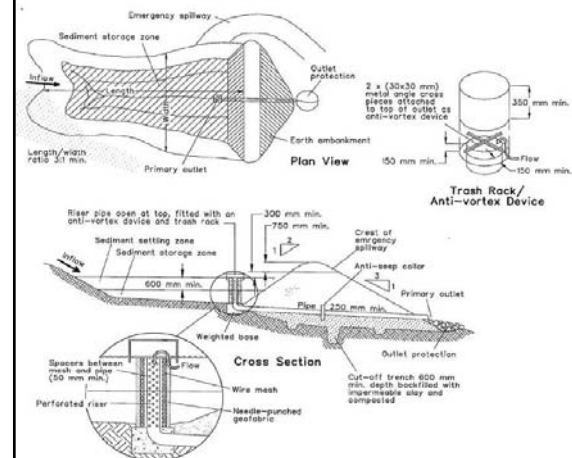
19

## Key Considerations: 4) Sediment Control



- Sediment control = second line of defence
- Default soil characteristics (unless tests confirm otherwise):
  - Type D (dispersive) soil,
  - Soil hydrologic group D (high runoff potential),
  - Soil erodibility 0.05 (high).
- Basins to be designed for Type F soil to reflect uncertainty about long term sources of cover.
- Design storm duration to reflect management ability to restore capture capacity.

18

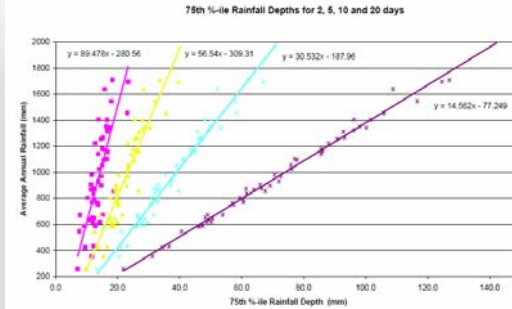


20

## Key Considerations: 4) Sediment Control

- For soils with >25% sand, “pre-treatment” basin (Type C design procedure) could be considered.
- To maximise effectiveness of basin in overflow events, length:width > 3:1
- Sediment storage = six month erosion (or 50% of settlement zone capacity)

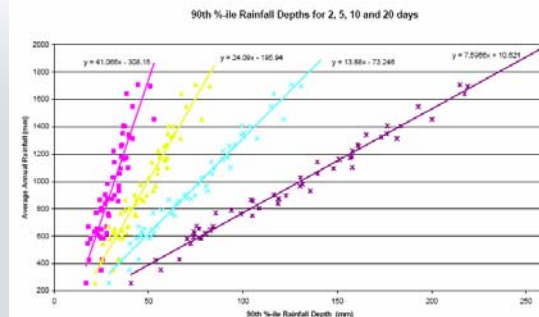
## 75th Percentile Rainfall



## Volumetric Runoff Coefficients (Table F2 - corrected)

Soil Hydrologic Group	Design Rainfall (mm/day)						
	<4	4 - 5	5 - 6	6 - 8	8 - 10	10 - 12	12 - 16
A	0.01	0.05	0.08	0.15	0.22	0.28	0.37
B	0.10	0.19	0.25	0.34	0.42	0.48	0.57
C	0.25	0.35	0.42	0.51	0.58	0.63	0.70
D	0.39	0.50	0.56	0.64	0.69	0.74	0.79

## 90th Percentile Rainfall



## Ratio of Basin Capacity to 5 day 75<sup>th</sup> Percentile Capacity



Duration (days)	Percentile				
	75%	80%	85%	90%	95%
2	0.8	1.1	1.6	2.3	3.6
5	1.0	1.4	2.0	3.1	5.2
10	1.6	2.1	2.9	4.2	7.1
20	3.0	3.7	4.7	6.5	10.1

25

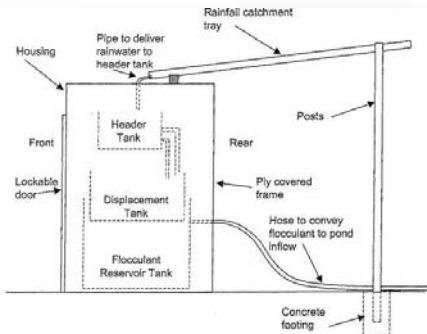
## Key Considerations: 5) Plans



- Simplified *Erosion and Sediment Control Plan* for small unsupervised sites (<2,500 tpa)
- *Soil and Water Management Plan* for existing non-metropolitan sites (<25,000 tpa)
- Detailed *Soil and Water Management Plan* for larger metropolitan sites (>25,000 tpa) and new landfills

27

## Automatic Flocculant Dosing



26

## Key Considerations: 5) Plan Contents



- Locality and setting;
- Site characteristics (soils, erosivity, topography, etc);
- Site plan, staging and final landform;
- Erosion control measures;
- Water management and sediment control;
- Inspection and maintenance.

28

### Typical Uncontrolled Rural Site - 1



29

### Typical Uncontrolled Rural Site - 3



31

### Typical Uncontrolled Rural Site - 2



30

### Typical Uncontrolled Rural Site - 4



32

## Typical Uncontrolled Rural Site - 5



33

## Typical Uncontrolled Rural Site - 6



34