



Prosperity

People

Planet

Forest Road  
Management  
Trends in Sappi

FOCUS on Forest  
Engineering 2009

**sappi**

# Roads management trends

## Its all about the money



**GP=Groot Potholes**



**MP=Moerse Potholes**



**FS=F'n Slote**

**Its all about the money**

# Forest Road Management Trends in Sappi



- Roads are part of the supply chain
- The challenge is to reduce delivered costs
- **Three examples:**
  - Paved roads
  - Network analysis
  - Increased direct loading

# Paved road, Clivia Pass In Situ Material Used to Build Road Base



The road was built on shales and red clay of poor carrying capacity





# General View of Surface Breakdown



# Rehabilitation and Maintenance Strategies



Rehabilitation and Maintenance Strategies

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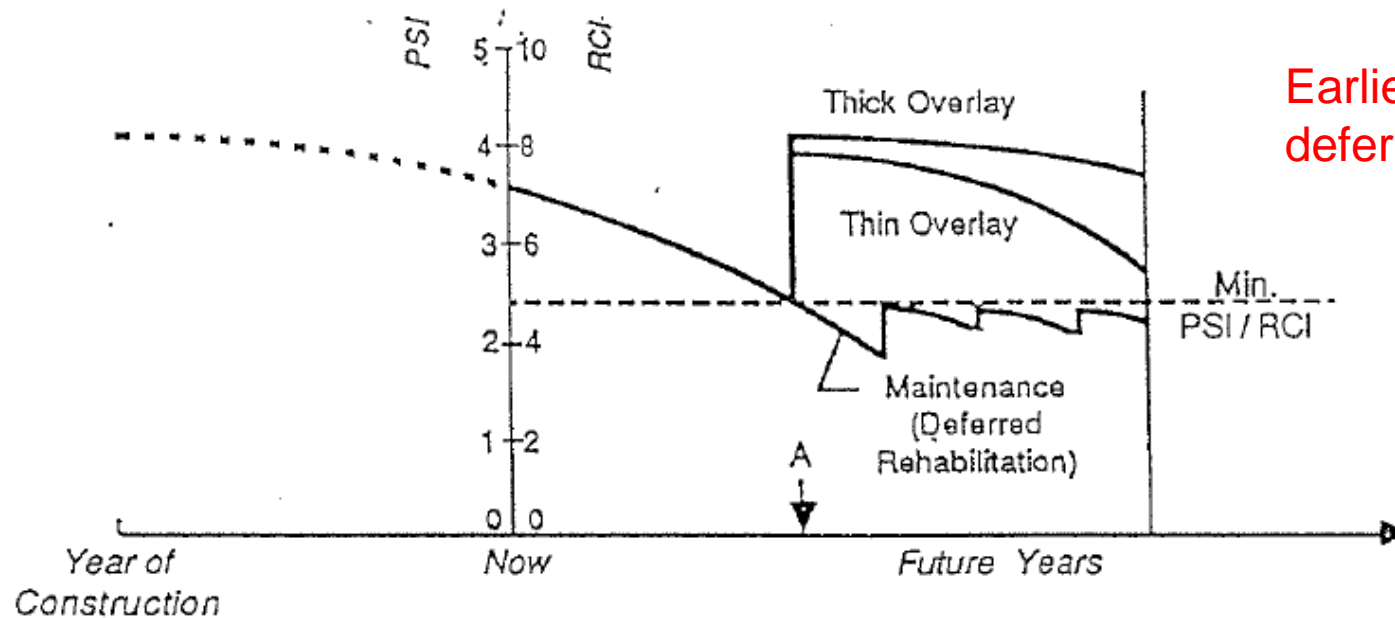


Figure 18.7 Typical serviceability versus age relationship for a life cycle with rehabilitation at age  $A$ , and with only maintenance.

Hass R, Hudson WR, Zaniewski J (1994) Modern Pavement Management Krieger Publishing Company, Malabar, Florida

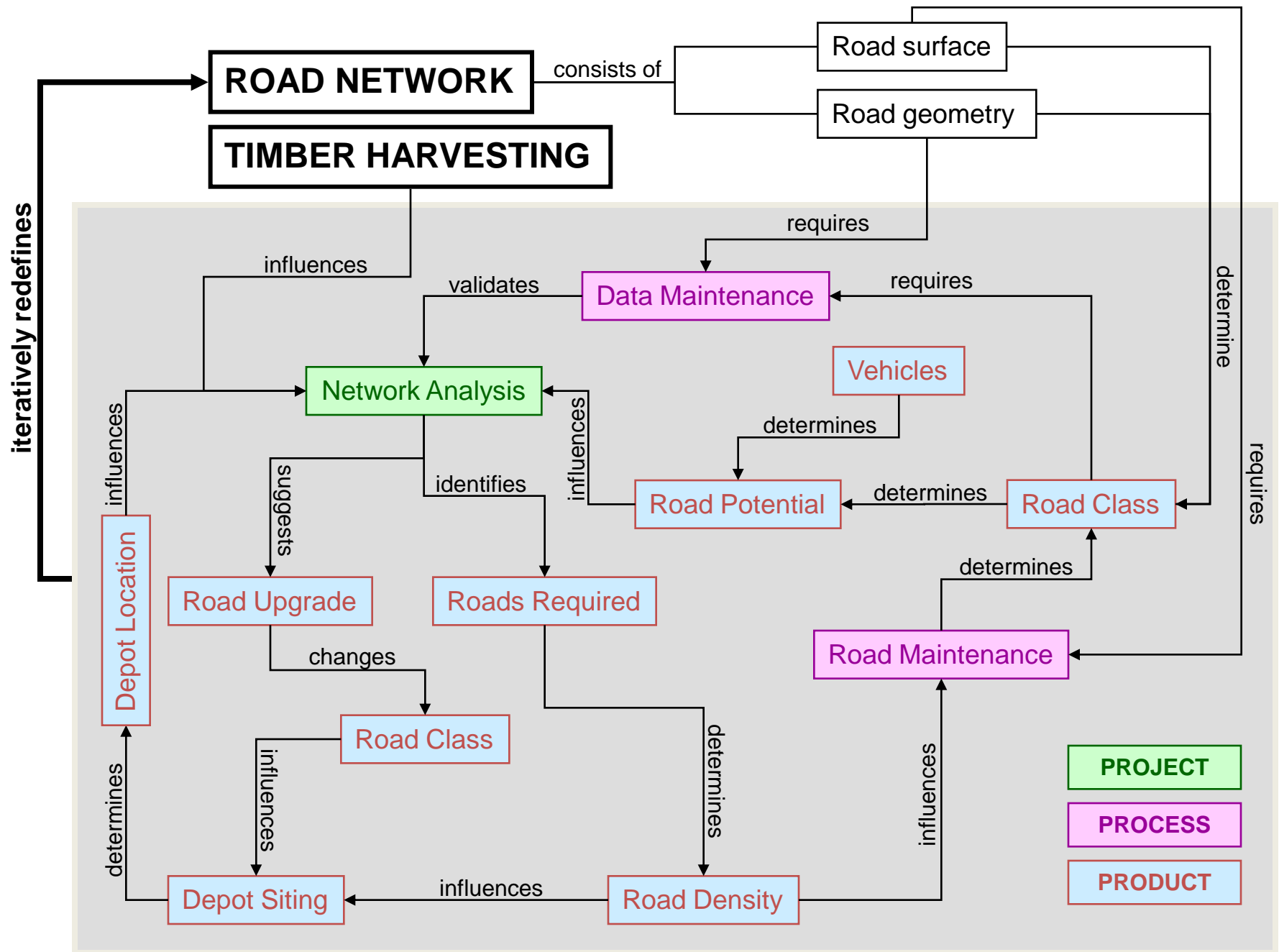


- Modelling procedure for solving variable and fixed cost, multiple period transportation problems
- Example:

Which roads should be upgraded over the next complete rotation for a given plantation, so as to minimise the transport costs?

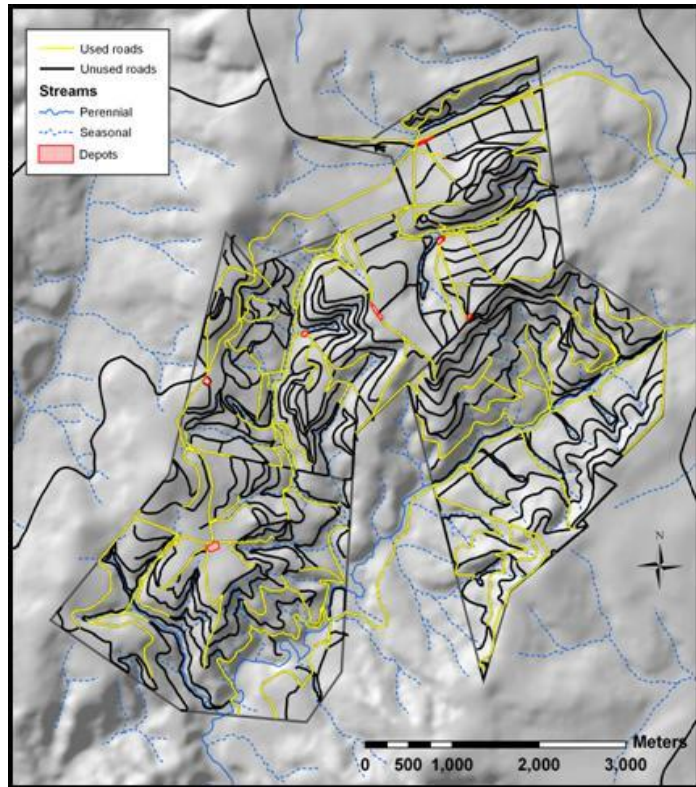
**OR**

What is the shortest route from a compartment to a given destination?





# “Evergreen” roads Cost scenarios

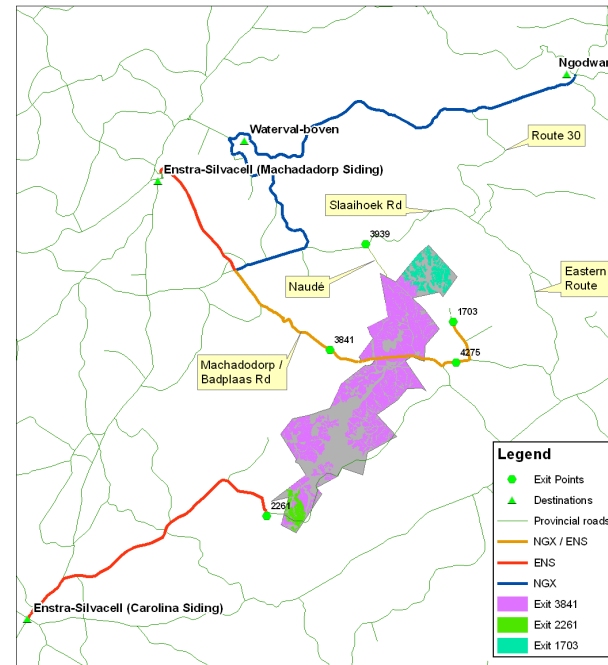


Which plantation roads will be used for transporting timber over a full rotation of the study area?

**Yellow roads are used**

## Ndubazi Network Analysis

Scenario 4: Ngodwana / Enstra. R30 and Naudé excluded  
Analysis Period: 20 years



Major Capex Requirements:  
Waterval Boven Route: R 1,300,000

Scenario Cost:  
R309,774,117

Various scenarios are costed,  
Risk and other factors are  
considered

**The best alternative can be** **sappi**  
**selected**

## Sappi Approach to Plantation Hauling Roads:

- Minimise extended primary transport
- Increase direct loading onto trucks



- C class roads are developed to the geometry that allows trucks into the plantation in dry weather, using B1 or B2 class roads.
- Roads are to be upgraded at a relatively marginal additional cost to class B geometry as opposed to the cost of upgrading a C class road in poor condition to a C class road for (shorthaul).
- Extended primary transport is to be reduced to the minimum required, ensuring security of supply in wet weather.
- This approach also aims at the reduction of the number of times we handle the timber.

Road use classification		
Configuration	Class	Sub-classes
Interlink	B	B1
Rigid-Drawbar/Express		
Rigid and pup		B2
Rigid only	C	
Tractor trailer		
Forwarder		
Bundle or self loader		

**Minimise extended primary transport**  
**Increase direct loading onto trucks**

# In support 1 Roads stds

## ROADS SPECIFICATION GUIDELINES FOR SAPPI FORESTS

### CLASSIFICATION

LH - LONG HAUL, RD- RIGID DRAWBAR, PT- PUP TRANSPORT.

CATEGORY/CLASS	A	B	B1	B2/B3	C	D
Notation		LH	LH	RD,PT		
Service level	Arterial	Transport	Transport	Work access	Work access	Edge tracks
<b>SERVICE REQUIREMENTS</b>						
Primary (P)						
Extended primary (EP)						
Secondary intermediate (SI)	<22m	<22m	<22m	13-19m	<13m	
Secondary terminal (ST)	<22m	<22m	<22m	13-19m	<13m	
Axle load (tons)	8.2	8.2	8.2	8.2	8.2	
Availability (season)	All weather	All weather	Dry season	Dry season	Dry season	

### STANDARDS

<b>CROSS SECTIONAL DATA</b>						
Road reserve (width m)	11	11	11	11-8	8	
Formation (m)	8	6	6	3-4	3-4	2-10
Gravel wearing course (width m)	6	4	4	3	3	
Shoulders	2x1	2x1	2x1	2x0,5	0 or 2x0,5	
Curve widening	11	9	9	5	5	
<b>CAMBER/CROSSFALL (%)</b>						
Camber	3-5	3-5	3-5	3-5	3-5	
Outsloping roads	3	3	3	3	3	
Insloping roads	3	3	3	3	3	

B=gravelled

B1,2 not gravelled

B1=curve widening 9m

B2=no curve widening

<b>ALIGNMENT</b>						
Vertical (gradient%)						
Adverse (maximum)	3-6	5-8.5	5-8.5	7-12	7-12	
Favourable (maximum)	3-6	7	7	7-12	7-12	
Length of grade	200-400	240-150	240-150	170-60	170-60	
Horizontal (curve m)						
Curve radii (minimum)	30	22	22	19,16	<15	
Sight distance	60	25	25	5	5	
<b>MATERIALS</b>						
Surface material	Gravel	Gravel	0-spot gravel	0-Spot gravel	0-Spot gravel	in-situ
Material selection	G5-G6>	G5-G7>	G8-G10	G8-G10	G8-G10	
Layer thickness (mm)	200>	150>	0-100	0-100	0-100	
<b>DRAIN AGE</b>						
Side drains and mitres	All	All	All	All	All	
Piped storm water	All	All	When req.	When req.	When req.	

### CONSTRUCTION COST

New roads (R 000's)	R 104,000.00	R 84,000.00	R 40,000.00	R 18,000.00	R 16,000.00	
Upgrade (R 000's)	R 30,000.00	R 45,000.00	R 30,000.00			



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# In support 2 BOP for operational roads planning



## Principles

- Reduce or eliminate the extended primary transport (short haul) phase
- Reduce or eliminate the secondary intermediate transport phase (from depot to another depot)
- Convert as many C-class roads to B2 class roads to allow for dry weather access for 15m trucks
- Convert as many C- class roads to B1 class roads to allow for dry weather access for 22 m trucks
- Extend B class roads as far as possible to allow all weather access for all truck configurations
- **Make use of combinations of roadside loading and depot loading to maintain security of supply but also reducing costs**

In support

## 3 Guidelines to decision-making on transport phase 1



### Detailed logistics analysis

- Obtain available volumes to be transported from APO
- Put together in blocks as far as possible keeping in mind fibre planning and infrastructure requirements
- Identify timber haulage routes from compartment to depot and/or main gravel/tar roads – use local knowledge, GIS
- Identify available depot sites – current depots
- Classify routes to be used in terms of the Sappi Forests roads classification
- Check routes for minimum truck requirements including items such as curve radii, truck length, steep inclines, road width, crossings, turning circles, by-passes, road surface condition, season – involve transporter
- When truck configuration is determined check for availability of configuration
- Classify what road upgrade is required - if any. Involve roads engineer, contractor, forester and transporter
- Identify areas that require work to allow minimum vehicle configuration to make use of the road. Involve roads engineer, contractor, forester, environmentalists and transporter
- Confirm work to be done with roads engineer for approval



# In support Guidelines to decision-making on transport phase 2



## Detailed volume and risk analysis

- Arrange for EIA if required
- Check for sufficient loading areas in vicinity of compartment. Area must be level (<2%), no high banks and must be accessible to loading equipment.
- Determine what loading equipment will be used
- Determine capacity of selected loading area
- Arrange for work to be done to facilitate loading if required.
- Loading area should preferably not be further than 85 m from exit from field onto plantation road – this will affect skidding productivity.
- Determine amount of timber to be transported by extended primary transport (short haul) to depot and also from which area of the compartment this will happen – taking into account wet areas and dry areas in the compartment
- **Agree on split between depot loading and roadside loading if applicable**
- Do average cost weighing on planned volume between extended primary transport (short haul) and roadside loading
- Compare costs to establish opportunity for saving
- **Verify field situation with contractor and transporter**
- Indicate changes of operations on compartment plan

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