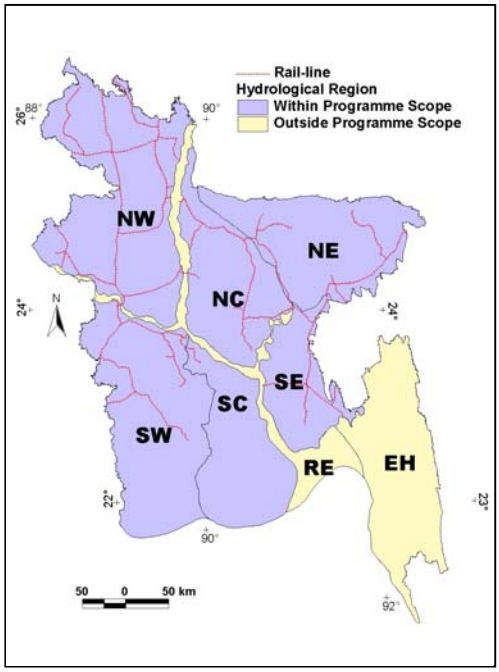
Railway Flood Proofing Ref: **DM 005**

Basic Data

NWMP Sub-sector **Disaster Management**

Region(s) **All regions except RE and EH**



Relevance to NWPo

Article 4.2(o) requires the Government, through its responsible agencies, to develop flood proofing systems as a response to natural disasters, and Article 4.2(p) requires that appropriate measures are provided, in designated flood risk zones, to protect life, property and vital infrastructure etc. This Article also stipulates that national communications infrastructure such as roads and railways should be constructed (whether new or rehabilitated) above the highest ever-recorded flood and provided with adequate cross-drainage facilities.

Purpose of Programme

A basic theme of the NWPo concerns the desirability of coping with inland flooding rather than "managing" them. In line with Policy, therefore, this programme is targeted at the flood proofing needs of key portions of Bangladesh's railway network. Specifically, some 78km of railway lines in high risk areas will be raised by 1m and 47km in low risk areas will be raised by 0.5m. Apart from transport benefits, the raised embankments can act as safe havens and can facilitate the movement of relief goods during flood emergencies.

Programme Outline

This is a long-term programme involving six of the country's eight regions and is expected to proceed as part of the network upgrading programmes. Since the work would involve simply the raising of existing rail lines, environmental impacts would be minimal. The expected regional distribution of the works is shown in the following table:

Risk level	Length of railway raised, by region (km)						
	SW	SC	NW	NC	NE	SE	Total
High	17.1	3.6	22.1	27.1	2.4	5.5	77.8
Low	6.0	0.0	18.4	9.2	3.6	10.0	47.1

Total Programme cost has been estimated at Tk977M. Incremental annual railway maintenance costs resulting from the raising are assumed to be 4% of capital costs.

Financing Arrangements

The Programme would be financed by GoB, possibly with donor assistance.

Objectives and Indicators

Objective	Suffix	Indicators/Means of Verification	Due
• Quantitative needs assessment	I1	• Needs assessment reports	2003
• Programme documents prepared	I2	• Programme documents	2003
• Programmes underway	I3	• Signed contracts/work orders	2004
• 100% of all high risk railways raised by 1m and 100% of low risk railway raised by .5m	K	• Construction records • Site visits	2025
• Lives and national infrastructure protected against inundation damage	D	• Risk of loss of life (human and livestock) as estimated actuarially • Risk of income disruption as estimated actuarially • Risk of damage as estimated actuarially	2025

Institutional Arrangements

Implementation will be the responsibility of the Railways Department.

Existing Documentation

NWMP DSR Section 9.8, the National Water Resources Database (NWRD). No other relevant existing documentation has been identified.

Linkages

During implementation it will be advantageous if the implementing agency maintains coordination with BWDB especially with respect to cross drainage issues (NWPO Article 4.2(p.iii) refers). An operational linkage should also be established with the Department of Fisheries, as the many borrow pits which will result from the Programme could be used for aquaculture.

Risks and Assumptions

There are three risks associated with this Programme. The first is easily dealt with, however, and concerns the fact that the need for mild gradients along railway lines means that they will have to be raised for much longer distances than suggested by localised topography; this leads to "end effects" which have to be added to target lengths of line. Even so, it is assumed that, since railway alignments will follow largely flat terrain, the ratio of such "end effects" will be low in relation to overall raised lengths and that the extra costs involved can be contained within the 15% cost contingency. The second risk is not so easily addressed, however. The disruption to services that is inevitable when line raising is in progress may well persuade the railway operators that it is cheaper to lose income through flooding for a few days each year than to incur expenditure raising lines while simultaneously losing revenues for extended periods while raising works are in progress. The likelihood of this attitude being adopted is increased by the privatisation of rail transport in Bangladesh. Nonetheless, it is assumed that optimisation on a case-by-case basis, along with the temporary provision of revenue earning alternatives (i.e. road transport), will result in at least significant portions of the Programme being carried out. There is also a risk that increased cross drainage needs caused by raising the embankments will be ignored.

Railway Flood Proofing

Ref : **DM 005**

Cluster :	**Disaster Management**	Region(s) :	**SW, SC, NW, NC, NE, SE**
Focus/Foci :	**Flood Proofing**	Location :	**Regions SW, SC, NW, NC, NE, SE**
Start Year[1] :	**2001** Duration[2] : **25 year(s)**	Agency(s) Responsible :	**BR (Lead)** None (Supporting)
Short Description :	In line with Policy's call for coping with floods in relation to vital infrastructure (NWPo §4.2.p.ii), this programme targets at the flood proofing needs of key portions of Bangladesh's railway network. The Railway Department will be responsible for implementation of this programme. The programme has collateral benefits since the raised embankments comprise safe havens while facilitating the movement of relief goods during flood emergencies. This is a long term programme with coverage in six hydrological regions and work is expected to proceed as part of the network upgrading programmes. However, a significant risk to this programme is that the disruption to services that is inevitable when line raising is in progress, may well persuade the railway operators that it is cheaper to lose income for a few hours or days each year than to incur expenditure raising lines while simultaneously losing revenues for that period.		

MIS Links

Cost Calculation :	DM Programme costing.xls	Map :	DM 005 Map.jpg
Disb't Schedule :	DM Programme costing.xls	Description :	DM 005 PgP.doc

Finance

	Costs		Private	Funding (%) GoB	Beneficiaries	Expected by Programme Year
Total Capital[3]	**977.00**	MTk	**0%**	**100%**	**0%**	**25**
Ultimate Recurring	**39.10**	MTk/yr	**n/a**	**100%**	**0%**	**26**

Date of Data : **31** (dd) **07** (mm) **01** (yy)

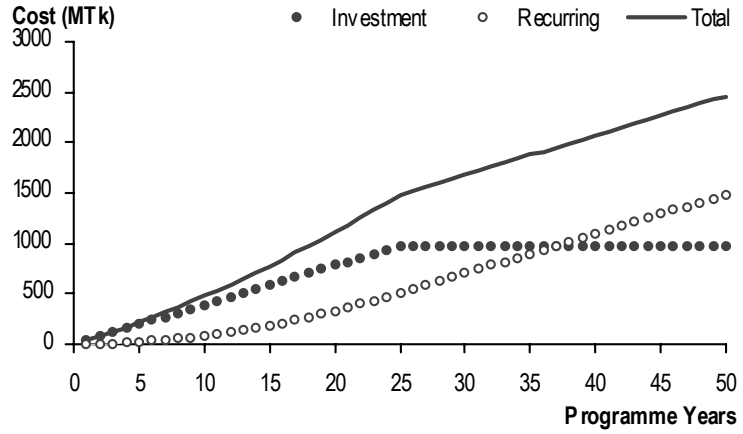
Status : **Identified**

Financial Base Year: **mid-2000**

Planned Expenditure (to date) : **33** MTk

Actual Expenditure[4] (to date) : MTk

Stacked Cumulative Cash Flow Chart



Monitoring

Objective	Indicator	Present Status[5]
• Quantitative needs assessment	• Needs assessment reports	NYD
• Programme documents prepared	• Programme documents	NYD
• Programmes underway	• Signed contracts/work orders	NYD
• 100% of all high risk railways raised by 1m and 100% of low risk railway raised by .5m	• Construction records • Site visits	NYD

Notes : 1. Indicative 2. Until commissioning 3. Inclusive of planning, design _supervision 4. For future monitoring purposes and NWMP updates
5. Present Status keys: NYD- Not yet due, IP- In progress, D- Done

National Water Management Plan

Programme Costing Sheet

Programme Ref	**DM 005**
Title	**Railway Flood Proofing**

Assumptions:

Taka/US$ 51.000 | TA duration 0.0 years | Investment duration 25.0 years | All prices in mid-2000 values

Item	Unit	Quantity	Rate US$	Rate Tk'000	Amount TkM	O&M %	O&M/yr TkM
Technical Assistance							
Expatriate consultants (all-in rate)	p-m	-	20,000		-		
Senior National consultants (all-in rate)	p-m	-		150	-	*0.0%*	-
Mid-level National consultants (all-in rate)	p-m	-		90	-	*0.0%*	-
Sub-totals					-		-
Other general TA programme costs		*25%*			-		-
Specific other TA programme costs					-	*0.0%*	-
Total TA Costs					**-**		**-**
Other Programme Costs							
1. Raising railways in high risk areas					608.0	*4.0%*	24.3
2. Raising railways in lowv rsk areas					369.0	*4.0%*	14.8
3.					-	*0.0%*	-
4.					-	*0.0%*	-
5.					-	*0.0%*	-
6.					-	*0.0%*	-
7.					-	*0.0%*	-
8.					-	*0.0%*	-
9.					-	*0.0%*	-
10.					-	*0.0%*	-
Total Other Programme Costs					977.0		39.1
Overall Programme Costs					**977.0**		**39.1**

Costs of Raising Railways	Length Km	% protected in 2000	% protected in 2025	Rate TkM/km	Total TkM	Allow for	Net Total TkM
Railways							
In high flood risk Thanas	77.7	90%	100%	7.83	608	100%	608
In low flood risk Thanas	47.2	90%	100%	7.83	369	100%	369
Total	**124.9**				**977**		**977**