

**Geoguide 5 – Guide to Slope Maintenance****Third Edition****AMENDMENT NO.: GG5/01/2021****BACKGROUND**

This Amendment Sheet updates the Geoguide 5 pertaining to Routine Maintenance Inspections and routine maintenance works for steel flexible barriers with reference to the experience gained from recent field trials conducted by the Geotechnical Engineering Office.

This Amendment Sheet also incorporates updates of technical guidance pertaining to the maintenance of wire mesh on rock slopes.

The amendments are given below.

**AMENDMENTS****CHAPTER 4****TECHNICAL ASPECTS OF MAINTENANCE FOR MAN-MADE SLOPES AND RETAINING WALLS****(a) Section 4.5**

**Amend paragraph 7** as follows:-

‘The condition of existing stabilisation and surface protection measures should be assessed. Anchorage points for rock mesh netting should be examined to ensure that they remain intact and are firmly fixed to the rock slope rather than loosened rock blocks. Severely corroded components, e.g. rock mesh, netting, anchorage points and wire ropes, should be replaced. If obvious defects are identified, e.g. rock mesh netting does not closely follow or detaches from the rock slope profile, additional anchorage points should be provided. A bottom wire rope and anchorage points, if not present, should be provided as part of the slope maintenance works to secure the rock mesh netting to the slope toe for improved robustness as far as practicable. The personnel undertaking Routine Maintenance Inspections and Engineer Inspections for Maintenance should also note the presence of any dislodged blocks or trapped loose rock fragments behind the mesh and these should be duly removed in particular where the slope toe adjoins vulnerable facilities, e.g. roads or footpaths. Damaged mesh should be replaced.’

**CHAPTER 7****MAINTENANCE REQUIREMENTS FOR NATURAL  
TERRAIN HAZARD MITIGATION MEASURES**

(b) Section 7.1

**Amend paragraph 1 item (b) after** ‘earth bunds’ to:-  
‘, rigid barriers and flexible barriers (including boulder fences).’

(c) Section 7.3

**Add the following after paragraph 2:-**

For steel flexible barriers, the Routine Maintenance Inspections should also assess the need for carrying out maintenance works for the following additional items:

- (a) trimming or removal of undesirable trees from the barriers, and
- (b) removal of accumulated debris behind the barriers.

Indicative record sheets for Routine Maintenance Inspections and works specific to steel flexible barriers are shown in Appendix B1.

(d) Section 7.5

**In the 2<sup>nd</sup> sentence in paragraph 1, insert** ‘the requirements under the Natural Terrain Clause or’ **before** ‘delineation of “Green-hatched-black” area’.

**APPENDIX B1****INDICATIVE RECORD SHEETS FOR ROUTINE  
MAINTENANCE INSPECTIONS AND WORKS SPECIFIC TO  
STEEL FLEXIBLE BARRIERS AND SUPPLEMENTARY  
NOTES**

(e) Appendix B1

**Add Appendix B1 (as attached) after Appendix B.**

**APPENDIX G****INDICATIVE FORMAT FOR MAINTENANCE MANUAL  
FOR NATURAL TERRAIN HAZARD MITIGATION  
MEASURES**

(f) Appendix G

**In Sheet 1 of 4** under ‘Defence Measures’, **replace** ‘boulder fence’ by ‘Rigid Barrier / Flexible Barrier’ and **add** ‘(e.g. make/model of flexible barrier)’ **after** “Others:”.

## Appendix B1

### Indicative Record Sheets for Routine Maintenance Inspections and Works Specific to Flexible Barriers and Supplementary Notes

<b>RECORD OF ROUTINE MAINTENANCE INSPECTION</b>	<b>(SHEET 1 OF 3)</b>
<b>FLEXIBLE BARRIER REFERENCE NO.</b>	
Location of Flexible Barrier (address):	
Date of Inspection:	
Weather Condition at Time of Inspection:	
LOCATION PLAN AND SITE PLAN (Reference numbers should be assigned to locations where (i) general maintenance action items and/or (ii) observations triggering Special Follow-up Review are identified. The corresponding reference numbers should be quoted in the photographic records.)	
Notes: (1) Add additional record sheets as necessary. (2) The plan scale and access should be indicated. (3) Specific number should be assigned for each bay (i.e. between two posts) of the flexible barrier.	

<b>RECORD OF ROUTINE MAINTENANCE INSPECTION</b>				<b>(SHEET 2 OF 3)</b>	
<b>FLEXIBLE BARRIER REFERENCE NO.</b>					
<b>GENERAL MAINTENANCE ACTION ITEMS</b>					
Maintenance Action Items	Action Required		Location Reference	Remarks (e.g. Works Completion Date)	
	No	Yes			
A1. Trim/remove undesirable trees from the barrier					
A2. Remove accumulated debris from the barrier					
A3. Clear accumulated debris from drainage channels					
A4. Repair cracked/damaged drainage channels or maintenance access					
A5. Repair/replace rusted steel furniture (e.g. steel gates, handrailings, boundary fences and stairs)					
A6. Repair/reinstate the ground adjoining the measures affected by severe erosion					
A7. Repair/reinstate the pavement of the vehicular maintenance access					
A8. Repair, or notify relevant parties of, leaky exposed water-carrying services					
A9. Others (specify works and give details)					
Recommended Date for Completion of Above Works:					
<b>OBSERVATIONS TRIGGERING SPECIAL FOLLOW-UP REVIEW</b>					
Observations Triggering Special Follow-up Review	No	Yes	Location Reference	Remarks	
B1. Barrier affected by landslide/rockfall					
B2. Barrier affected by hill fire					
B3. Others					
<b>OTHER OBSERVATIONS / RECOMMENDATIONS (continue on separate sheets if necessary)...</b>					
Inspected by: ..... (Name of person undertaking inspection) of ..... (Organisation) Signature : ..... Date : ..... Due date of next inspection: ..... Received by : ..... (Name of owner or his authorised representative) of ..... (Organisation) Signature : ..... Date : .....					

<b>RECORD OF ROUTINE MAINTENANCE INSPECTION</b>		<b>(SHEET 3 OF 3)</b>
<b>FLEXIBLE BARRIER REFERENCE NO.</b>		
<p>RECORD PHOTOGRAPHS (with descriptions, date and reference numbers as given on the site plan)</p>		
Photo Ref.:	Description:	
Date:		
<p>Notes:</p> <ul style="list-style-type: none"> <li>(1) Add additional record sheets for photographs as necessary.</li> <li>(2) Record photographs showing the general view of each individual bay of the barrier (taken from the same vantage points as the last Routine Maintenance Inspection) should be provided.</li> <li>(3) Record photographs should show in detail areas where (i) general maintenance action items and/or (ii) observations triggering Special Follow-up Review are identified, and these should be annotated with descriptions.</li> </ul>		

RECORD OF ROUTINE MAINTENANCE WORKS		(SHEET 1 OF 1)
FLEXIBLE BARRIER REFERENCE NO.		
Maintenance works arranged by : .....(Name) of .....(Organisation) Signature : ..... Date : .....		
Maintenance works carried out by : .....(Name) of .....(Organisation) Signature : ..... Date : .....		
Maintenance works carried out on : .....		
RECORD PHOTOGRAPHS (with descriptions, date and reference numbers as given on the site plan)		
Photo Ref.:	Description:	
Date:		
Notes: (1) Add additional record sheets for photographs as necessary. (2) For clearing debris from barrier, the estimated volume of debris removed should be recorded. (3) Record photographs should show in detail areas where routine maintenance works have been carried out and these should be annotated with descriptions. (4) Record photographs before and after the execution of routine maintenance works should be taken from the same vantage points.		

**SUPPLEMENTARY NOTES**  
**TO THE ROUTINE MAINTENANCE INSPECTION/WORKS RECORD SHEETS**  
**SPECIFIC TO STEEL FLEXIBLE BARRIERS**

A. Routine Maintenance Inspections and Routine Maintenance Works

A1. The full extent of the barriers should be inspected. The inspections should ascertain whether the flexible barriers are affected by landslide, rockfall or hill fire. If affirmative, a Special Follow-up Review should be triggered.

A2. The inspections should also identify any routine maintenance works required, such as the trimming/removal of undesirable trees and/or removal of accumulated debris from the barriers. Other general maintenance action items may include clearance of debris from drainage channels, repair of cracked maintenance access and drainage channels, etc. Undesirable trees refer to those dislocating or intermingling with the barriers impairing their function, e.g. trees passing through the principal nets of barriers which would hinder their deflection upon impact and hence adversely affect the functioning of the barriers (see example). Such trees should be trimmed or as a last resort removed. Indiscriminate removal of other vegetation on the barriers should be avoided.



Tree passing through  
principal net of barrier

A3. The inspections do not demand professional knowledge and can be carried out by any technically-qualified person, e.g. staff at the rank of Assistant Clerk of Works, Technical Officer, Works Supervisor, etc.

A4. Routine maintenance works, if required as a result of the Routine Maintenance Inspections, can be carried out by general building or civil engineering maintenance contractors.

A5. The record sheets should be completed in two stages, namely, on completion of a Routine Maintenance Inspection and on completion of routine maintenance works.

B. Special Follow-up Review

B1. A Special Follow-up Review may be triggered on a need basis should anomalies or major defects (e.g. barriers severely damaged by landslide/hill fire) be identified. The review should be objective-oriented for assessing the implication of the subject matter and where required providing recommendations to rectify the defects or anomalies concerned.

B2. The review should be undertaken by professional engineers of appropriate discipline. Specialist advice from barrier manufacturers or suppliers should be sought if necessary.