## RAINY RIVER MINE

# OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL

## PART III – WATER MANAGEMENT POND

**New Gold Inc.**
**Rainy River Project**
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**September 2022**

**Version 2022-1**

## REVIEW AND REVISION HISTORY

The OMS Manual shall be reviewed annually and following any significant changes at the site to assess if the document is representative of the current condition and operation of the dam at the time of the review. Revisions to the manual should be undertaken within six months of changes. It is the responsibility of the Tailings Dam Engineer to initiate the OMS review.

The review team and approval record are given in Table 1. The version history of the OMS Manual is shown in Table 2.

**Table 1 - Review Team**

| | Name | Company /Department | Position | Signature | Date |
|---|---|---|---|---|---|
| Prepared by | Winston Ding | NG Capital Projects | Tailings Dam Engineer | | Oct 14, 2022 |
| Reviewed by | Travis Pastachak | NG Capital Projects | Capital Projects Manager | Travis Pastachak (Oct 14, 2022 11:40 CDT) | Oct 14, 2022 |
| | Gord Simms | NG Mine Operations | Mining Manager | Gord Simms (Oct 17, 2022 12:18 CDT) | Oct 17, 2022 |
| | Garnet Cornell | NG Environment | Environmental Superintendent | | Oct 25, 2022 |
| | Derek McKinnon | NG Maintenance | Maintenance Superintendent | Derek McKinnon (Oct 25, 2022 16:51 CDT) | Oct 25, 2022 |
| | Michael Dabiri | SRK | Interim EOR | | Nov 1, 2022 |
| Approved by | Mohammad Taghimohammadi | NG | Mill Manager | Taghimohammadi | Nov 1, 2022 |

**Table 2 - Revision Summary**

| Revision Number | Details of Revision | Date of Issue | Comment |
|---|---|---|---|
| Rev. A | Issued for EOR review | August 15, 2022 | Review received on Sept. 2, 2022 |
| Rev. B | Addressed review comments | | |
| Rev. 0 | Issued for use | Sept. 30, 2022 | |
| | | | |

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## 1.0 OBJECTIVE

The operation, maintenance, and surveillance manual (OMS Manual, the Manual) provides procedures and reference for the safe operation of the structures related to tailings, and water management structures at the New Gold Inc. (NGI) Rainy River Mine (RRM), located near Emo, Ontario. For readability, the OMS Manual has been separated into “Parts” as listed below. This is Part 3 for Water Management Pond (WMP).

- Part 1: General
- Part 2: TMA
- **Part 3: WMP**
- Part 4: MRP
- Part 5: SEDIMENT CONTROLS
- Part 6: FRESHWATER DIVERSIONS
- Part 7: WATER DISCHARGE
- Part 8: EPRP

To simplify and condense the OMS Manual, the overall site conditions were removed from the individual structure parts and covered in Part 1 of the OMS Manual. This part is only about the operation, maintenance, and surveillance of the WMP and its dams.

# 2.0 FACILITY DESCRIPTION

## 2.1 Construction History

WMP Dam 1 through Dam 5 contain the WMP pond with a crest elevation of 371.5 m for Dam 1, 2 and 3 (homogenous clay fill dams). Dam 4 and Dam 5 (clay core) comprising of West Dam (WD) are being raised annually together with other part of the TMA perimeter dams. The WTP (Water Treatment Plant)-treated water is transferred to the WMP before it is discharged to the environment (through BCR 2 and outflow basin) or used as recycle water in the mill when needed. Any effluents planned for discharge to the environment must meet discharge criteria, otherwise, will be pumped back to the WMP for further treatment.

Construction of the WMP dams and ancillary structures under the original LRIA work permit No. FF-2015-04 began in September 2015. Construction of the dams, spillway, and intake channel were completed in early August 2017 followed by completion of the seepage collection system in September 2017. Works were completed in 2017 under amended LRIA work permits FF2015-04A and FF2015-04B based on revised design details.

Suspended construction periods occurred on two separate occasions for WMP Dam 3 due to high porewater pressure detected in the foundation. This occurred on December 15, 2015, and January 26, 2016. This information is documented in WMP As-Built Report (RRP-GEO-REP-030 R1) provided by then-EOR, Amec Foster Wheeler (AFW).

Settlement cracking in WMP Dam 5 was observed in December 2015 and a Stop Work Order was issued by the MNRF in January 2016. A geotechnical investigation was completed, and remedial design measures were implemented. An amended LRIA approval was received in September 2016.

Major design revisions at the WMP included:

- Lowered the dam crest from original design elevation of 373.0 m to 371.5 m because additional volume of borrow material inside the WMP impoundment area was taken for construction of WMP dams (AFW, RRP-GEO-REP-030 R1).
- Addition of toe berms to WMP Dams 2, 3, 4 and 5 following supplemental geotechnical investigations to satisfy revised design criteria.
- Revised toe-drain details to suit interim 2015/early 2016 As-Built conditions and mitigate potential stability issues.
- Remedial works to the interim clay fill placed in 2015/early 2016 at WMP Dam 3 which included a 14 m wide key trench through the existing crest of the dam.
- Utilization of additional thickness of Zone 8 (Dam 2) and Zone 3 (Dam 4) to address underbuilt or trimmed clay fill slopes to satisfy the neat line geometry.
- Re-alignment of the emergency spillway to avoid in-place infrastructure.

## 2.2 Water Treatment Train

The water treatment train is in the northern WMP and consisted of three components: Lime WTP (Water Treatment Plant), Nitrification Cells, and BCR #1 (Biochemical Reactor 1).

Water from the TMA is pumped to the Lime WTP for treatment of TSS (total suspended solids), as well as the metals and metalloids.

After the TSS and these metals and metalloids are removed, the treated water is then discharged into the Nitrification Cell where the microbial process termed 'nitrification' is performed for treatment of ammonia. The Nitrification Cell uses microbial nitrification to convert the nitrogen compounds to nitrate. Some amount of manganese is also expected to be removed in the Nitrification Cell. Additional settling of TSS is performed in the first section of the Nitrification Cell.

Water from the Nitrification Cell is then pumped to BCR #1 for nitrate and nitrite treatment through a microbial process termed 'denitrification'. The outflow from BCR #1 then reports to the WMP (Section 3, Rainy River Mine–Water Treatment Train Design Report, Document # 053_0719_20B, by Alexco and Contango dated July 2019).

Table 1- 1 outlines the expected flow rates entering each component in the treatment train. Inflow water to the Lime WTP is higher than the remainder of the treatment train as clarifier underflow will be returned to the tailings facility as sludge. Inflow rates then remain the same from the Nitrification Cell to BCR #1.

**Table 1- 1: Expected inflow rates for each component of the treatment train[1,2]**

| Treatment Train Component | Expected Inflow Rate ($m^3$/day) |
|---|---|
| Lime WTP | 24,000 (up to 26,400) |
| Nitrification Cell | 20,000 (up to 24,000) |
| BCR #1 | 20,000 (up to 24,000) |

1. from the original design by Alexco and Contango in July 2019 (Rainy River Mine – Water Treatment Train Design Report, Document # 053_0719_20B).
2. historical flow rates are in the range of 14,000-17,000 $m^3$/day for the Lime WTP.

## 2.3 Pumps and Pipelines

The WMP pumps and pipelines are owned by Mill and operated by Site Service. The WMP pipelines include:

- Wastewater line from TMA pumpstation to Water Treatment Train (Lime WTP).
- Sludge return line from Lime WTP to TMA Cell 1.
- Discharge water lines from WMP pumpstation
    - to EDL1
    - to WDP

- to BCR #2

A pilot project has been approved in which water from MRP may be pumped to BCR #2 for treatment and then pumped to WMP. The pilot was successful in meeting water quality criteria and this method of treatment is currently underway.

The pumpstation sits on the upstream of WMP Dam 1.
This section will be better delineated after SRK completes its side-wide management review.

## 2.4 Seepage Collection System

Seepage collection system is located at downstream toe of WMP dams. The design criterion is to manage a 1:25 year 24h rainfall. WMP seepage involves 2 sumps. They are

- Sump 1 is located at downstream of Dam 2, and the storage capacity is 18,200 $m^3$.
- Sump 2 is located at downstream of Dam 3, and the storage capacity is 11,800 $m^3$.

Because of local topographic highs between Sump 1 and 2, Sump 2 and Sump 3 (downstream south end of North Dam), the seepage collection ditches do not connect. The seepage collection ditch at the toe of Dam 1 reports to Sump 1. The seepage collection ditch at the downstream toe of Dam 3 reports to Sump 2.

Sump water is pumped to WMP.

## 2.5 WMP Closure

The WMP dams will be breached to prevent retention of water once it no longer has a water management function. Upstream dam faces that become exposed will be revegetated.

The constructed wetlands will be left in place as this system is designed to operate passively. It is expected to stabilize as a wetland complex during operations.

# 3.0 OPERATION

## 3.1 Pond Storage Capacity

Estimates of storage capacity with respect to elevations are based on comparison with as-built drawings. Table 3- 1 provides the stage storage for the WMP.

**Table 3- 1: Stage Storage for WMP**

| Elevation (m) | Water Storage ($m^3$) | Elevation (m) | Water Storage ($m^3$) | Elevation (m) | Water Storage ($m^3$) |
|---|---|---|---|---|---|
| 355.0 | 0 | 361.0 | 409,425 | 367.0 | 3,142,089 |
| 355.5 | 169 | 361.5 | 541,181 | 367.5 | 3,486,292 |
| 356.0 | 1,016 | 362.0 | 687,276 | 368.0 | 3,846,892 |
| 356.5 | 2,384 | 362.5 | 845,119 | 368.5 | 4,229,229 |
| 357.0 | 4,803 | 363.0 | 1,012,352 | 369.0 | 4,625,413 |
| 357.5 | 11,417 | 363.5 | 1,223,489 | 369.5 | 5,033,241 |
| 358.0 | 21,533 | 364.0 | 1,452,674 | 370.0 | 5,451,690 |
| 358.5 | 38,013 | 364.5 | 1,698,321 | 370.5 | 5,879,025 |
| 359.0 | 75,235 | 365.0 | 1,958,559 | 371.0 | 6,314,382 |
| 359.5 | 132,541 | 365.5 | 2,233,087 | 371.5 | 6,757,239 |
| 360.0 | 207,591 | 366.0 | 2,520,422 | | |
| 360.5 | 299,155 | 366.5 | 2,821,561 | | |

## 3.2 Flood, Pond and Dam Operation Criteria

See Section 3.1 of Part 2 for TMA of this Manual for definition of ENL, EIL, DSN and DSI.

- ENL (Environment Notice Level) is assigned to be the same as NOWL which is Elev. 369.7. If reached and the water quality doesn't meet discharge criteria, RRM need to initiate Environment Contingency Plan to bring down the pond level.
- EIL (Environment Incident Level) is assigned to be the same as the MOWL (EDF event), i.e., the invert of spillway which is Elev. 370.5. If reached and the water quality doesn't meet discharge criteria, RRM need to continue the Environment Contingency Plan to bring down the pond level and report to the regulator.
- DSN (Dam Safety Notice Level) for WMP dams is assigned to be the same as EIL which is Elev. 370.5. If reached, RRM needs to initiate Enhanced Surveillance.
- DSI (Dam Safety Incident Level) for WMP dams is Elev. 371.1 m corresponding to the IDF level. If reached, RRM need to report to the regulator and initiate EPRP.

Summary of WMP operation elevation data is shown in Table 3- 2.

**Table 3- 2: WMP Operation Criteria**

| Description | Elevation (m) |
|---|---|
| Dam Crest | 371.5 |
| IDF (Inflow Design Flood, Maximum Flood Level) | 371.1 |
| DSI (Dam Safety Incident Level) | |
| Sill / Invert of Emergency Spillway | 370.5 |
| DSN (Dam Safety Notice Level) | |
| EIL (Environment Incident Level) | |
| MOWL (Max. Operation Water Level) | |
| NOWL (Normal Operation Water Level) | 369.7 |
| Pond Level for the Increased Surveillance (High Pond) | |
| ENL (Environment Notice Level) | |
| Min. Operation Water Level | 362.5 |

## 3.3 Environmental Protection

The WMP as part of RRM facilities is surrounded by a wildlife fence installed to reduce wildlife contact. The wildlife fence is inspected for any damage at least once per month.

Environmental operation of WMP has been carried out by RRM Environment according to Amended Environmental Compliance Approval (ECA 2290, Doc. #: MECP-IFI-0000.001), dated April 14, 2022.

### 3.3.1 Effluent Discharge

Treated effluent shall only be discharged to the Pinewood River via EDL1 (Effluent Discharge Line 1) and/or EDL2 seasonally. No water shall be discharged after December 1st of each year until spring melt when the Pinewood River is largely ice free and meets the minimum flow threshold (Section 4 (8), ECA 2290).

EDL1 is the first effluent discharge pipeline approximately 500 meters long and ties into the WMP Water Discharge Pipeline which is equipped with a diffuser and discharges to the Pinewood River downstream of the McCallum Creek confluence. EDL2 pipeline is approximately 2,000 m long and is equipped with a diffuser and discharge to the Pinewood at the Loslo Creek confluence.

The WMP discharges water through WDP to the OB (Overflow Basin), or to BCR #2 for further treatment, or EDL1 if water meets receiving environment criteria.

WMP Water Discharge Pipeline is an approximately 10 km long, 24-inch (60 cm) diameter, HDPE above ground, non-insulated pipeline, except at the Pinewood River and Tait Creek water crossings where the pipeline is buried for discharging treated effluent from the WMP or the OB to the Pinewood River at EDL1; fitted with variable frequency drive and diffuser.

### 3.3.2 Discharge Criteria

See Section 4 of ECA (2290) for the operation and maintenance requirements of the Works and related equipment and appurtenances which are installed or used to achieve compliance with the Approval (ECA, 2290) are properly designed, constructed, operated, and maintained.

Table 1 in Section 5 (ECA, 2290) presents the respective monthly average concentration objective for effluent discharges from EDL1, EDL2, Sediment Pond 1, and Sediment Pond 2.

Table 2 in Section 6 (ECA, 2290) presents respective daily maximum concentration limit, and the respective monthly average concentration limit for effluent discharges from EDL1 and EDL 2.

### 3.3.3 Monitoring and Recording

Table 5 in Section 8 (ECA, 2290) presents the samples shall be collected and analyzed at EDL1 and EDL2 during the active discharge period, at the sampling frequencies and using the sample type(s) specified for each effluent parameter listed.

### 3.3.4 Reporting

See Section 12 of ECA (2290) for the reporting requirements for the environment purposes.

# 4.0 MAINTENANCE

## 4.1 Type and Procedure

Refer to Section 4.1 of Part 2 for TMA of the Manual.

## 4.2 Preventative and Predictive Maintenance

### 4.2.1 Roads and Gates

Roads and gates are maintained by Site Service Department as required.

### 4.2.2 Pipelines and Pumps to WMP

Refer to Section 4.2.2 of Part 2 for TMA of the Manual.

### 4.2.3 Mobile Equipment

Refer to Section 4.2.3 of Part 2 for TMA of the Manual.

### 4.2.4 Geotechnical Instruments and Water Monitoring Instruments

Refer to Section 4.2.4 of Part 2 for TMA of the Manual.

### 4.2.5 Dam Inspection and Predictive Maintenance

Refer to Section 4.2.5 of Part 2 for TMA of the Manual.

## 4.3 Event-Driven Maintenance

Refer to Section 4.3 of Part 2 for TMA of the Manual.

### 4.3.1 Pipeline Leaks or Breaks

Refer to Section 4.3.1 of Part 2 for TMA of the Manual.

### 4.3.2 Earthquake Occurrence

Refer to Section 4.3.2 of Part 2 for TMA of the Manual.

### 4.3.3 Flood Event

Refer to Section 4.3.3 of Part 2 for TMA of the Manual.

## 4.4 Reporting Requirements

Refer to Section 4.4 of Part 2 for TMA of the Manual.

# 5.0 SURVEILLANCE

## 5.1 General

The objective of the surveillance program is to provide confirmation of the adequate performance of the facility, including containment, stability, and operational function by observing, measuring, and recording data relative to potential failure modes and specific operational controls.

The surveillance at WMP dams involves:

- Visual Inspections
  - Daily pipeline inspection
  - Monthly dam inspection
  - Drone inspection when needed
- Annual Dam Safety Inspections
- ITRB
- Dam Safety Reviews
- Special Inspections and Increased Levels of Surveillance
- Instrumentation

## 5.2 Visual Inspection

### 5.2.1 Pipeline Inspection

Part of site-wide pipeline inspection conducted twice per 12-hour shift by the Mill. Refer to Section 5.2.1, Part 2 for TMA of this Manual.

### 5.2.2 Dam Inspection

Part of site-wide monthly inspections. See Appendix A: WMP Dam Monthly Site Inspection Checklists. Refer to Section 5.2.2, Part 2 for TMA of this Manual.

## 5.3 Dam Safety Inspections

Part of annual site-wide dam safety inspections carried out by the EOR. Refer to Section 5.3, Part 2 for TMA of this Manual.

## 5.4 ITRB

Part of site-wide water management review in ITRB meeting. Refer to Section 5.4, Part 2 for TMA of this Manual.

## 5.5 Dam Safety Reviews

Part of site-wide dam safety review. Refer to Section 5.5, Part 2 for TMA of this Manual.

## 5.6 Special Inspections and Increased Levels of Surveillance

### 5.6.1 Pond Surcharge

High Pond is defined as NOWL and higher. When the pond exceeds NOWL, special surveillance and increased surveillance is required for every other day. When the pond exceeds MOWL, special surveillance and increased surveillance is required for every day.

See Appendix B – Site Inspection Checklist for WMP High Pond.

### 5.6.2 Earthquakes

The TDE in conjunction with the Capital Project Manager and other teams will confirm the significance of the seismic event and level of response required. If the seismic event is significant, an inspection of the facilities must be conducted.

See Appendix B – Site Inspection Checklist for WMP Post-Earthquake Evaluation.

### 5.6.3 Increased Seepage through the Dams

Unusual leakage from the dam which may indicate damage to the perimeter dams. TDE will determine a specific surveillance for the increase seepage through the dams is required.

See Appendix B – Site Inspection Checklist for the Increased Seepage at WMP.

### 5.6.4 Observed Dam Deformation

Settlement, sinkhole formation, cracking, offsets, leaking or other signs of substantial distress of the perimeter dams. TDE together with the Capital Project Manager will determine a specific surveillance for the observed dam deformation is required.

See Appendix B – Site Inspection Checklist for Observation of Deformation at WMP.

### 5.6.5 Other Unusual Conditions

Other conditions that may require increased surveillance, such as rapid snowmelt, heavy rainstorm, or wind, or snowpack is same as for TMA in Part 2 of the Manual.

## 5.7 Instrumentation

### 5.7.1 Instrumentation Data Reading Frequency

Instrument data reading and report frequency following Operation condition outlined in Table 4- 3 according to the Stage 4 Instrumentation Thresholds for TMA and Water Management Dams (BGC-4910-DT00-MEM-0030).

### 5.7.2 Instrument Thresholds and Action Plan

Refer to Section 5.7.2 of Part 2 for TMA of the Manual.

### 5.7.3 PWP Thresholds

Refer to Section 5.7.3 of Part 2 for TMA of the Manual.

### 5.7.4 SI Thresholds

Refer to Section 5.7.4 of Part 2 for TMA of the Manual.

### 5.7.5 Dam Settlement Threshold

Refer to Section 5.7.5 of Part 2 for TMA of the Manual.

### 5.7.6 Action Plan for Threshold Exceedance

Refer to Section 5.7.6 of Part 2 for TMA of the Manual.

## 5.8 Other Surveillances

### 5.8.1 Pond Level

Part of site-wide pond level survey. Refer to Section 5.8.1, Part 2 for TMA of this Manual.

### 5.8.2 Water License Sampling and Testing

Part of site-wide Water License Sampling and Testing program by Environment Department. Section 3.3 provides the sampling, testing, and reporting requirement specific to WMP according to ECA (2290).

Refer to Section 5.8.2, Part 2 for TMA of this Manual.

### 5.8.3 Other Survey

All dam crest elevations and spillway/diversion channel invert elevations will be surveyed annually to check the dam settlement threshold.

## 5.9 Summary of Surveillance Frequency

Refer to Section 5.9 of Part 2 for TMA of the Manual.

## 5.10 Reporting

Refer to Section 5.10 of Part 2 for TMA of the Manual.

## 6.0 EMERGENCY PREPAREDNESS AND RESPONSE PLAN

Emergency preparedness aims to ensure that the strategic direction and required building blocks for an eventual response are in place. A detailed Emergency Response and Preparedness Plan (ERPP) is outlined in Part 8 of the OMS.

# APPENDIX A

## INSPECTION CHECKLISTS

The following inspection checklists are prepared and issued by the Tailings Dam Engineer.

- Monthly Site Inspection Checklist

## WMP DAMS – MONTHLY INSPECTION CHECKLIST

Inspector:_____

Date:_____

Weather:_____

Reservoir Water Level (m):_____

Inspect the following items for safety, general appearance, and evidence of damage or potentialinstability.

Legend: ✓ = No change since previous inspection or normal

D = Defect or deterioration since previous inspection. (Add details under "Remarks")

\- = Not inspected (explanation)

| ITEM | Check | REMARKS |
|---|---|---|
| **1. ACCESS AND SECURITY** | | |
| 1.1 Access Road | | |
| 1.2 Security (gates and locks) | | |
| 1.3 Fence | | |
| **2. DAM 1** | | |
| **2.1 Dam Crest** | | |
| 2.1.1 Cracking | | |
| 2.1.2 Settlement | | |
| 2.1.3 Erosion | | |
| 2.1.4 Other Movement, such as Alignment | | |
| **2.2 Upstream Slope** | | |
| 2.2.1 Angles | | |
| 2.2.2 Bulging/Cracking | | |
| 2.2.3 Erosion | | |
| 2.2.4 Non-Uniform Slope | | |
| 2.2.5 Settlement | | |
| 2.2.6 Sloughing | | |
| **2.3 Downstream Slope** | | |
| 2.3.1 Angles | | |
| 2.3.2 Bulging/Cracking | | |
| 2.3.3 Erosion | | |
| 2.3.4 Non-Uniform Slope | | |
| 2.3.5 Settlement | | |
| 2.3.6 Sloughing | | |
| **2.4 Downstream Toe** | | |
| 2.4.1 Vegetation | | |
| 2.4.2 Wet Spot/ Ice | | |
| 2.4.3 Bulging | | |
| 2.4.4 Piping | | |
| **2.5 Spillway** | | |
| 2.5.1 Erosion | | |
| 2.5.2 Sill | | |
| 2.5.3 Toe | | |
| **2.6 Seepage Collection Ditch** | | |
| 2.6.1 Estimate Flow | | |
| 2.6.2 Sloughing | | |
| 2.6.3 Vegetaion | | |
| 2.6.4 Sump | | |

| ITEM | Check | REMARKS |
|---|---|---|
| **DAM 2** | | |
| **2.1 Dam Crest** | | |
| 2.1.1 Cracking | | |
| 2.1.2 Settlement | | |
| 2.1.3 Erosion | | |
| 2.1.4 Other Movement, such as Alignment | | |
| **2.2 Upstream Slope** | | |
| 2.2.1 Angles | | |
| 2.2.2 Bulging/Cracking | | |
| 2.2.3 Erosion | | |
| 2.2.4 Non-Uniform Slope | | |
| 2.2.5 Settlement | | |
| 2.2.6 Sloughing | | |
| **2.3 Downstream Slope** | | |
| 2.3.1 Angles | | |
| 2.3.2 Bulging/Cracking | | |
| 2.3.3 Erosion | | |
| 2.3.4 Non-Uniform Slope | | |
| 2.3.5 Settlement | | |
| 2.3.6 Sloughing | | |
| **2.4 Downstream Toe** | | |
| 2.4.1 Vegetation | | |
| 2.4.2 Wet Spot/ Ice | | |
| 2.4.3 Bulging | | |
| 2.4.4 Piping | | |
| **2.6 Seepage Collection Ditch** | | |
| 2.6.1 Estimate Flow | | |
| 2.6.2 Sloughing | | |
| 2.6.3 Vegetaion | | |
| 2.6.4 Sump | | |

| ITEM | Check | REMARKS |
|---|---|---|
| **DAM 3** | | |
| **2.1 Dam Crest** | | |
| 2.1.1 Cracking | | |
| 2.1.2 Settlement | | |
| 2.1.3 Erosion | | |
| 2.1.4 Other Movement, such as Alignment | | |
| **2.2 Upstream Slope** | | |
| 2.2.1 Angles | | |
| 2.2.2 Bulging/Cracking | | |
| 2.2.3 Erosion | | |
| 2.2.4 Non-Uniform Slope | | |
| 2.2.5 Settlement | | |
| 2.2.6 Sloughing | | |
| **2.3 Downstream Slope** | | |
| 2.3.1 Angles | | |
| 2.3.2 Bulging/Cracking | | |
| 2.3.3 Erosion | | |
| 2.3.4 Non-Uniform Slope | | |
| 2.3.5 Settlement | | |
| 2.3.6 Sloughing | | |
| **2.4 Downstream Toe** | | |
| 2.4.1 Vegetation | | |
| 2.4.2 Wet Spot/ Ice | | |
| 2.4.3 Bulging | | |
| 2.4.4 Piping | | |
| **2.6 Seepage Collection Ditch** | | |
| 2.6.1 Estimate Flow | | |
| 2.6.2 Sloughing | | |
| 2.6.3 Vegetaion | | |
| 2.6.4 Sump | | |

# APPENDIX B

## SURVEILLANCE RESPONSE PLANS

The Surveillance response Plans (SRP) are intended to provide initial guidance to the first on-site inspector until the extent of the situation has been identified and further surveillance plans and/or remedial options developed.

Surveillance Response Plans for the following scenarios are included in this Appendix:

- High Pond
- Post-Earthquake
- Increased Seepage through the Earth Dam
- Observation of Dam Deformation

The failure mode, duties, and actions are like those developed for TMA dams. Only site inspection checklist has been developed specific for WMP dams.

## SITE INSPECTOR CHECKLIST
## for WMP High Pond

Name:_____

Date: _____

Time of arrival: _____

**Inspect the condition of the dams and Spillway**

1. From a safe vantage point check that it is safe to approach the dam. Call the Capital Project Manager if the dam is not considered safe to approach.
2. Record weather conditions: _____
3. Record Pond level_____
4. Is there any sign of new deformation such as: cracking, slumping, change of alignment and depressions? YES NO
    a. If yes use deformation checklist to record details of the observations.
5. Is there any sign of new or increased seepage? YES NO
    a. If yes use seepage checklist to record the details of the observations.
6. Is there damage to the spillway? YES NO
    a. If yes use seepage checklist to record the details of the observations


Fig 1. Plan View of WMP Dams

# SITE INSPECTOR CHECKLIST
# For WMP Post-EQ Evaluation

Name:_____ Date: ___

Time of arrival: _____

**Inspect the condition of the dam:**

1. From a safe vantage point check that it is safe to approach the dam(s). Call the Capital Project Manager if the dam is not safe to approach.
2. Record weather conditions: _____
3. Record Pond level_____
4. Is there any sign of new deformation such as: cracking, slumping, change of alignment (roads, no-post barrier, and fences) and depressions? YES NO
   • If yes use deformation checklist to record details of the observations.
5. Is there any sign of new or increased seepage? YES NO
   • If yes use seepage checklist to record the details of the observations

**Inspect the condition of the Spillway:**

6. Is there damage to the Sill? YES NO
7. Is there damaged to the toe? YES NO
8. Is there damaged to the side walls? YES NO

Fig 1. Plan View of WMP Dams

## SITE INSPECTOR CHECKLIST
## For Increased Seepage at WMP

Name:_____ Date: __

Time of arrival: _____

1. Check that it is safe to approach the seepage area.
2. Record location of seepage below and mark on attached plan drawing.
3. Measure / estimate rate of seepage.
4. Check to see if the seepage water is “dirty”.
5. Stake out and measure area where seepage is exiting the dam.
6. Dimensions of Seepage Zone
7. Check for any erosion or sloughing in area where seepage is exiting the dam.
8. Record weather conditions: _____
9. Record pond level_____
10. Photograph seepage area
11. Call details back to Capital Project Manager.

If no further direction given by Capital Project Manager/ TDE, continue with the following:

12. Inspect the rest of the dam using the Routine Weekly Inspection Checklist. Look for signs of deformation such as:
    - Depressions
    - Cracking
    - Sinkholes
    - Changes in the alignment along the crest
13. If anything looks unusual report back to Capital Project Manager immediately.
14. Continue to monitor and record seepage at least every hour and check that there are no changes in the flow or turbidity. Report any changes in the seepage flows to the Capital Project Manager immediately.
15. Continue to inspect the entire dam every two hours following the Routine Weekly Inspection Checklist.
16. Do not leave site until Capital Project Manager instructs you to do so.

Record of Seepage

| Time | Flow (L/min) | Dirty (Y or N) | Time | Flow (L/min) | Dirty (Y or N) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |
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Fig 1. Plan View of WMP Dams

## SITE INSPECTOR CHECKLIST
## for WMP Dam Deformation

Name:_____ Date: __

Time of arrival: _____

1. Check that it is safe to approach the deformed area.
2. Record Pond level_____
3. Estimate Freeboard _____
4. Record location of deformed area below and mark on attached plan drawing.
5. Deformation Type
    a. Cracking or Offset
        i. Along the crest or across the crest
        ii. Length_____Width_____of crack
        iii. Vertical offset _____
        iv. Depth of crack _____
    b. Slumping or Slide
        i. Length_____Width_____of slumped area
        ii. Vertical offset at top of slump_____
        iii. Estimated Volume
    c. Sinkhole
        i. Length_____Width _____
        ii. Depth _____
    d. Other types of deformations describe below:

    _____

    _____

6. Photograph deformed area.
7. Call details back to Capital Project Manager.
8. Once measurements are completed stake area and monitor for further movements.

If no further direction given by Capital Project Manager continue with the following:

9. Inspect the rest of the dam using the Routine Weekly Inspection

Checklist. Look forsigns of deformation such as:

- New or increased seepage (If observed go to the Increased Seepage SRP)
- Other areas of deformation

**10.** If anything looks unusual report back to Capital Project Manager immediately.

**11.** Continue to measure and record the Length, Width etc. every hour and check that there are nochanges. Report any changes in the measurements to the Capital Project Manager immediately.

**12.** Continue to inspect the entire dam every two hours following the Routine Weekly Inspection Checklist.

**13.** Do not leave site until manger instructs you to do so.

Fig 1. Plan View of WMP Dams