Strangemore's Electrical Ltd.

Water Management Plan

St. Anthony Gravel Quarry Extension

Environmental Assessment #2392

Quarry Permit Application File # 71113404

May 6/2026

Quarry Water Management Plan

1. Site Context & Key Risks

- **Site area:** 5 hectares (50,000 m²)
- **Topography:** Sloping toward a stream located 70 m outside the project boundary
- **Hydrology:** No internal streams or water bodies
- **Primary risks:**
  - High-volume stormwater runoff during extreme rainfall events
  - Sediment transport to nearby stream
  - Erosion of exposed quarry surfaces
  - Water quality degradation (turbidity, suspended solids, hydrocarbons)

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2. Stormwater Runoff Estimation (1:100 Year, 24-hr Event)

Assumptions (typical for Atlantic Canada with climate change factor)

- **Rainfall depth (1:100 yr, 24 hr + climate change):** ~150 mm (0.15 m)
- **Runoff coefficient (C):**
  - Quarry (exposed rock, compacted surfaces): **0.7–0.9**
  - Use **C = 0.8** (conservative)

Runoff Volume Calculation

$$\text{Runoff Volume} = \text{Rainfall} \times \text{Area} \times C$$
$$\text{Runoff volume} = 0.15 \times 50{,}000 \times 0.8 = 6{,}000 \text{m}^3$$

Peak Flow (simplified Rational Method for context)

Assuming:

- Rainfall intensity (short critical duration): ~75 mm/hr
- Area = 5 ha

$$Q = 0.278 \text{xCxIxA.}$$
$$Q = 0.278 \text{x} 0.8 \text{x} 75 \cdot 5 \approx 83.4 \text{ L/s}$$

☞ **Design implication:**

- Storage capacity should safely handle **~6,000 m³**
- Conveyance systems should handle **~80–100 L/s peak flow**

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3. Stormwater Management Strategy

A. Collection System

- Perimeter diversion ditches upslope to prevent clean water entering quarry
- Internal drainage network:
  - Graded haul roads (2–4% slope)
  - Rock-lined channels
- Direct runoff toward controlled low points
- Allow runoff to drain slowly through the vegetation buffer between the Quarry boundary an existing stream

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4. Erosion Prevention Measures

A. Surface Stabilization

- Progressive rehabilitation of inactive quarry areas
- Apply:
  - Crushed rock cover
  - Hydroseeding where feasible
  - Erosion control blankets on slopes

B. Slope Management

- Bench slopes to reduce runoff velocity
- Limit slope gradients (<2H:1V where possible)
- Install berms to interrupt flow paths

C. Drainage Protection

- Line ditches with:
  - Riprap
  - Geotextile underlay
- Install check dams in channels

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5. Water Quality Protection

A. Sediment Control

- Settling ponds (primary method)
- Silt fences at perimeter (temporary control)

B. Pollution Prevention

- Designated fueling/maintenance areas:
  - Impermeable pads
  - Spill containment kits
- No direct discharge of process water

C. Monitoring

- Inspect after major storm events

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6. Protection of Nearby Stream (70 m Downslope)

Key Risk:

Uncontrolled runoff could carry sediment directly into the stream due to slope.

Mitigation Measures:

A. Buffer Zone

- Maintain **minimum 30–50 m vegetated buffer**
- Preserve natural vegetation within 70 m corridor

B. Flow Attenuation

- Ensure **no direct flow path** from quarry to stream
- Use:
  - Level spreaders
  - Vegetated swales

C. Emergency Controls

- Overflow directed to vegetated infiltration area, not stream
- Armoured spillways to prevent erosion during extreme events

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7. On-Site Drainage Water Management

- Separate **clean water** (run-on) from **dirty water** (quarry runoff)
- Clean water diverted around site
- Dirty water routed to sedimentation system
- Regular maintenance:
    - Remove accumulated sediment
    - Inspect drainage channels

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8. Climate Change Adaptation

- Increase design storm intensity by **15–25%**
- Oversize pond capacity (≥10–20% extra storage)
- Design for more frequent extreme events
- Include redundancy (secondary pond or overflow system)

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9. Maintenance & Inspection

- Inspect after every major rainfall event
- Quarterly:
    - Pond sediment levels
    - Channel integrity
- Annual:
    - Capacity reassessment
    - Erosion audit

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10. Summary of Key Design Elements

- Runoff volume: **~6,000 m³**
- Peak flow: **~80–100 L/s**
- Core controls:
    - Sedimentation pond
    - Diversion ditches
    - Stabilized drainage channels
    - Vegetated buffer to stream
- Objective:

- **No untreated discharge to nearby stream**
- **No increase in downstream erosion or turbidity**

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