Dairy Effluent Management System Report for Myall River Pastoral Company Ltd

313-317 Markwell Road, Bulahdelah NSW
Contents
1. Overview 1
2. Siting and integration 5
3. Estimated Costs 5
4. Design Summary 6
5. System components and design factors
   5.1 Effluent collection 7
   5.2 Solids trap 7
   5.3 Pipelines 7
   5.4 Effluent Ponds 7
   5.5 Irrigation of effluent 10
6. Management and maintenance 13

Figures
Figure 1 Proposed effluent system 2
Figure 2 Proposed liquid effluent reuse areas 3
Figure 3 Trafficable solids trap 4
Figure 4 Results of ERIM analysis 9

Tables
Table 1 Estimated costs of construction 5
Table 2 Design Summary 6
Table 3 Estimated composition of effluent 12
Table 4 Management of system 13
Table 5 Maintenance schedule 16

This report has been prepared based on an honest appraisal of the opportunities and constraints that exist at the time of investigation, subject to the limited scope and resources available. Within the confines of the above statements and to the best of my knowledge, this report does not contain any incomplete or misleading information.

Nick Bullock
Director, Nick Bullock & Associates
Feb 2019

Prepared by Nick Bullock & Associates February 2019
1. OVERVIEW

This report details the design and management of the effluent system for the proposed new robotic dairy on Lots 2 DP 558790 and Lot 2 DP615391 at 313-317 Markwell Road, Bulahdelah.

The proposed dairy will be operated by John and Kay Smith as the Myall River Pastoral Company.

The new dairy will be a robotic dairy, installed in 2 stages, which may be 2-5 years apart.
- Stage 1: 3 robots, 210 cows
- Stage 2: 4 robots (total), 280 cows (total)

The proposed dairy effluent system has been designed for 280 cows and includes:

1. Concrete holding yards to capture manure whilst cows are milked
2. A drainage system to direct effluent into the treatment system
3. A solids trap with “weeping wall” to screen solids and allow liquid to drain into a pipeline
4. Two effluent storage ponds
5. An effluent irrigation system

Figures 1 and 2 illustrate the proposed system.

This report provides details on the system sizing and design capacities.

The following guidelines have been used in the development of the effluent system design:
- Environmental Management Guidelines for the Dairy Industry NSW (July 2008)
- Environmental Guidelines: Use of Effluent by Irrigation (DEC 2004)

Design parameters and characteristics detailed in the Effluent & Manure Management Database for the Australian Dairy Industry (Dairy Australia) have been used in the design and are referred to in this report.


The effluent system proposed meets the dairy industry guidelines noted above.
Effluent management system report

Figure 1: Effluent Ponds and solids trap layout

313-317 Markwell Road, Bulahdelah

Prepared by: Nick Bullock
Date: 22 Feb 2019
Figure 2  Effluent Reuse areas
313-317 Markwell Road, Bulahdelah
Prepared by: Nick Bullock
Date: 22 Feb 2019
2. Siting and integration

The potential constraints and limitations for the proposed robotic dairy include:
   1. Zoning
   2. Flooding
   3. Soils and landforms
   4. Buffer distances

These are detailed and discussed in Section 5 of the “Statement of Environmental Effects”.

3. Estimated costs

The estimated cost for the proposed shed, yards and effluent system is detailed in Table 1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shed for dairy</td>
<td>$ 95,000</td>
</tr>
<tr>
<td>Concrete for shed and yards</td>
<td>$ 70,000</td>
</tr>
<tr>
<td>Earthworks</td>
<td>$ 20,000</td>
</tr>
<tr>
<td>Effluent system: solids trap, pumps, sprays</td>
<td>$ 55,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$ 240,000</td>
</tr>
</tbody>
</table>
4. Design Summary

A summary of the design is listed in Table 2 and includes capacities, requirements and limitations of the system proposed.

Table 2 Design Summary

<table>
<thead>
<tr>
<th>Milking herd size</th>
<th>280 cows</th>
<th>average cow weight: 600 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robotic dairies</td>
<td>Normally</td>
<td>During wet periods</td>
</tr>
<tr>
<td></td>
<td>4,000 L/day</td>
<td>4,000 L/day</td>
</tr>
<tr>
<td></td>
<td>250 L/day</td>
<td>250 L/day</td>
</tr>
<tr>
<td>Vat</td>
<td>9,750 L/day</td>
<td>5,750 L/day</td>
</tr>
<tr>
<td>Yards and shed</td>
<td>TOTAL</td>
<td>14,000 L/day</td>
</tr>
<tr>
<td></td>
<td>10,000 L/day</td>
<td></td>
</tr>
<tr>
<td><strong>Restriction times</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During milking</td>
<td>1.33 hours/day</td>
<td></td>
</tr>
<tr>
<td><strong>Stormwater</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yards</td>
<td>Stormwater diverted off majority of yards by roof.</td>
<td></td>
</tr>
<tr>
<td>Roof areas</td>
<td>All stormwater runoff from roof areas will be diverted out of the effluent system.</td>
<td></td>
</tr>
<tr>
<td>Unroofed concrete</td>
<td>All runoff from unroofed concrete yards and manure storage areas will be collected in the effluent system</td>
<td></td>
</tr>
<tr>
<td>yards and manure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>storage areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solids trap</strong></td>
<td>A 12m x 3.5m concrete solids trap with screen will be constructed with capacity 20m3 with a cleanout frequency of 12 weeks.</td>
<td></td>
</tr>
<tr>
<td><strong>Effluent ponds</strong></td>
<td>Total capacity for wet weather storage: 2.3 ML adequate for a 1 in 10 year wet year with restricted water use at the dairy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two ponds, each with 1.15 ML capacity, and each with dimensions: Internal bank top dimensions: 35m x 25m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total depth</td>
<td>4.0m</td>
</tr>
<tr>
<td></td>
<td>Batters:</td>
<td>1 to 3</td>
</tr>
<tr>
<td></td>
<td>Freeboard:</td>
<td>0.60m</td>
</tr>
<tr>
<td><strong>Effluent Re-use</strong></td>
<td>Minimum area required</td>
<td>8.9 Ha</td>
</tr>
<tr>
<td></td>
<td>Area available</td>
<td>25.75 Ha</td>
</tr>
</tbody>
</table>
5. System Components

This section details the main components and features of the proposed effluent system.

5.1 Effluent collection

The proposed effluent will capture all wash-down water and contaminated runoff from:
- the milking shed
- concrete holding yards and exit races

An open drain at the end of the concrete yards will capture washdown water runoff from the concrete yards and direct it into a solids trap.

Sumps in the dairy shed will drain via 100mm upvc pipelines to:
- the drain at the end of the concrete yards (where sufficient fall), or
- into the sump of the proposed solids trap (ie behind the screen) where limited fall
- effluent from the sumps in the dairy shed will contain few solids and not require solids separation

5.2 Solids trap

A standard trafficable solids trap will be constructed with a weeping wall. The trap will be 12m x 3.5m internal dimensions – this has capacity of 20m³, or up to 16 weeks storage for the proposed herd and cow holding times.

A plan of the trafficable solids trap is shown in Figure 3.

5.3 Pipelines

Pipelines from sumps in the dairy shed will be 100mm diameter upvc installed at a minimum grade of 1 in 40 where no solids are not in the flow and 1 in 25 where solids are in the flow.

The pipeline draining the solids trap will be 150mm diameter upvc and installed at a minimum grade of 1 in 60 (ie after screening).

Inspection ports will be installed every 30m minimum, or at a change of pipeline direction or grade.

5.4 Effluent Ponds

Two effluent pond will be constructed with a total capacity of 2.3 ML. Each pond will be 1.15 ML capacity with internal bank dimensions of 35m x 25m and a total of 4.0m depth.

- Freeboard of 0.60m will be maintained
- Bank batters of 1:3 will be used in construction

Both ponds are storage ponds. The 1st pond will normally be kept as empty as possible and the 2nd pond will be kept as a reserve storage.
The effluent ponds will primarily function as a wet weather storage but the 1st pond will also provide anaerobic treatment when in use.

5.4.1 Anaerobic function check
Anaerobic ponds are normally designed on the basis of the maximum volatile solids loading (VSLR$_{\text{max}}$) and the pond activity ratio developed by Cassey et al. VSLR$_{\text{max}}$ normally adopted for design = 170 kg VS/ML/day.

For the location of the proposed storage at Bulahdelah, Cassey's charts show a $K$ factor of 0.75.

From Table 12, VS load from the solids trap into the 1st pond is 56 kg VS/day.

The minimum treatment capacity = \[
\frac{56}{0.75 \times 170} = 0.44 \text{ ML}
\]

The 1st pond has a capacity of 1.15 ML so the load well within allowable anaerobic limits.

5.4.2 Sludge build-up
The contents in the 1st pond will be continually stirred using an agitator on a pontoon in the pond. In this way, the fines than pass through the solids trap into the 1st pond will be kept in suspension and irrigated out onto pastures, minimizing any sludge build-up in the 1st pond.

5.4.3 Wet weather storage requirement
The DEC model Effluent Reuse Irrigation Model (ERIM) has been used to calculate the wet weather storage capacity

The total water use at the dairy is estimated to be 14 kL/day made up of:

- 4,000L/ day to wash the robots
- 500 L/ 2 days to wash the vat
- 5,000 – 9,750 L/ day to wash the shed and concrete yards.

During wet weather the water use at the dairy will be restricted to reduce the volume of wet weather storage required. It is estimated the minimum water use to wash the concrete yards and shed is 5,750 L/ day which equates to washing the concrete yards once/ day and the shed and around the robots twice/day. A total restricted water use of 10,000 L/ day has been adopted for design.

The results of ERIM are shown in Figure 4.

This analysis shows that a wet weather storage capacity 2.00 ML is required for a 1 in 10 year wet year based on:

- Effluent supply 10,000 L/ day
- Catchment area 400m$^2$ (ie uncovered yard areas)
- Crop Kikuyu/ ryegrass pastures
- Soil type Loam
5.4.4 Construction notes for pond earthworks

1. Soil tests at the pond location indicate that the soil to 800mm is suitable for effluent pond construction with careful compaction and management of soil moisture during compaction. During construction, samples will be taken at all dissimilar layers down to 0.5m below the base of the pond and be tested to be impermeable and structurally sound.
   - Minimum tests required are: particle size analysis and Emerson aggregate test;
   - Optional testing includes saturated hydraulic conductivity, bulk density measurement, dispersion, volume expansion, USCS. Optional tests should be carried out where contractor is not satisfied with material on site.

2. The contractor must be fully satisfied with the material at the site.

3. The ground water level will be at least 0.5m below the design base of the pond.

4. Before construction is commenced, the topsoil over the area to be covered by the pond will be removed to a depth of 150mm and deposited clear of the works.

5. To prevent seepage, a cut-off trench will be dug under the entire length of the embankment. The cut-off trench will be at least 3m wide and extend at least 300mm into impermeable material with a minimum depth of 600mm.

6. The soil forming the embankment will be placed in layers not exceeding 100mm loose thickness and compacted to at least 90% Proctor maximum dry density at the optimum moisture content. The Contractor will ensure that the soil is maintained at optimum moisture content.

7. To ensure an adequate seal, the entire storage area is to be scarified and compacted in accordance with Note 7.

8. If any rock or permeable seam is exposed in the storage area during excavation it shall be backfilled and compacted with a minimum of 300mm of impervious fill.
9. On completion, the embankment is to be covered with the stockpiled topsoil, spread uniformly over the whole surface of the embankment to assist in the establishment of a grass cover.

10. Immediately after construction, the entire surface of the embankment will be planted to a good holding grass for erosion control.

11. Ponds will be adequately fenced to protect children and livestock with any gates locked. A clearly visible sign will be erected adjacent to the pond and trap warning of deep water and the presence of a surface crust which may hide the water surface. Fences will be sited a sufficient distance away from the banks to allow access by machinery.

5.5 Irrigation of Effluent

Effluent in the 2 storage ponds will be irrigated onto the liquid effluent reuse areas.

- The 1st pond will be emptied by an effluent pump located in the pond either on a pontoon or on the pond bank
- A stirrer will also be installed in the 1st pond to keep sludge that is not removed by the solids trap mixed in the water column. In this way, sludge build-up in the pond will be minimised.
- The 2nd pond will be emptied by a diesel firefighter pump or equivalent located on the pond bank.
- Liquid from both ponds will be irrigated onto pastures using an effluent irrigator
- The pump and irrigator will be connected using a combination of 90mm and 63 mm poly pipelines.
- Pipelines will be above ground, located at fencelines and fitted with quick release couplings where necessary.

5.5.1 Nutrient applications

Nutrient removal by dairy effluent systems is documented in the Effluent Manure and Management Database, Dairy Australia 2008. Estimates of the composition of the liquid in the 1st effluent pond can be calculated based on these removal rates and estimates of the nutrients deposited by cows in the milking shed.

From these guidelines:

- 280 cows held for up to 1.33 hours/day will deposit 2.23 t/year of nitrogen, 0.36 t/year of phosphorous, and 1.00 t/year of potassium
- the trafficable solids trap typically removes 30% nitrogen, 40% phosphorous and 15% potassium
- which means nutrients that enter the 1st pond: 1.56 t/year nitrogen, 0.22 t/year phosphorous, 0.86 t/year potassium

The guidelines also estimate that ponds lose 50% of nitrogen as volatilization (as a gas), and spray application of effluent a further 20% of the nitrogen is lost; but the total amount of phosphorous and potassium remain in the liquid or sludge in the pond.
Since it is proposed to stir the 1st pond continuously, the liquid and sludge component of the 1st pond will be irrigated onto pastures, ie:

- 0.54 t/ year nitrogen
- 0.22 t/ year phosphorous
- 0.86 t/ year of potassium

Whilst 100% of nutrients will not be available in the first year of application, after a number of years, application of effluent on the reuse areas, the slowly breaking down components will be added to those immediately available.

- For the design of the reuse area the full amount of nutrients discharged by the effluent system each year are used to calculate the size of the liquid effluent reuse area.

For minimum reuse area of 8.9 Ha the applications from the effluent system are:

- 77 kg/ Ha/ year of nitrogen, which are significantly lower than typical rates for actively growing dairy pastures
- 24 kg/ Ha/ year of phosphorous, which is a typical maintenance rate for dairy pastures
- 96 kg/ Ha/ year of potassium, which is lower than the maximum recommended under Fertsmart (120 kg P/ Ha/ year) but careful management of paddocks will be carried out to prevent animal health issues

The estimated nutrients applied by the liquid effluent from the 1st pond are sustainable and lower than maintenance requirements of high production dairy pastures.

There are at least 25.75 Ha available on the proposed robotic dairy site for reuse of liquid and solids effluent. These 25.75 Ha meet all minimum buffer distances.

5.5.2 Organic matter applications

A secondary factor to be checked for effluent irrigation is organic matter loading.

EPA Guidelines allow up to 40 kg BOD/ Ha/ day for continuous application irrigation systems and up to 400 kg/ Ha/ day for intermittent irrigation systems where there is a resting period (EPA, 1995 and Overcash et al 1983).

Based on 280 cows held for 1.33 hours/ day on concrete depositing 14.9 kg BOD/ day, losses of 40% in the solids trap, 30% loss in the pond, means 6.3 kg BOD/ day are available in the pond for spreading.

- With daily water use at 14 kl/ day
- If in one day the effluent traveler applies 25mm over an area of 35m x 200m or 175 kl of effluent
A total of 79 kg BOD would be applied over 0.7 Ha.
This is equivalent to 112 kg BOD/ha/day, which is within the guidelines for intermittent irrigation of effluent.

5.5.2 Composition of effluent

The estimated composition of the effluent in the 1st and 2nd pond are summarized in Table 3 and compared to typical effluent pond characteristics.

- Effluent composition is estimated using typical deposition rates of manure and urine on the yards and in the dairy and discounting by the removal rates in the solids trap and effluent ponds, plus the average daily water use/effluent volume.

Table 3 Estimated composition of effluent in Ponds

<table>
<thead>
<tr>
<th>Element</th>
<th>Estimated concentration</th>
<th>Typical values*1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pond 1 mg/L</td>
<td>Pond 2 mg/L</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>305</td>
<td>91</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>42</td>
<td>17</td>
</tr>
<tr>
<td>Potassium</td>
<td>168</td>
<td>151</td>
</tr>
<tr>
<td>BOD</td>
<td>638</td>
<td>447</td>
</tr>
</tbody>
</table>

*1 from D Hopkins, DPI Victoria, data from 2 pond systems

These figures indicate the estimated effluent in the 1st and 2nd ponds are in-line with typical dairy effluent in ponds.
6. Management and maintenance

Table 4 summarises the management of the effluent system that ensures the effluent infrastructure operates within design limitations.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Management of effluent system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow management at dairy</td>
<td>Cows may choose to be on concrete yards for an average of up to 1.33 hours/day</td>
</tr>
<tr>
<td>Milking plant &amp; vat</td>
<td>Milking equipment will be washed clean two to three times per day, using an average of 1,000 L per robot per day. The milk vat will be washed once every 2 days with an average of 500L per wash</td>
</tr>
<tr>
<td>Yards &amp; shed</td>
<td>Yards and shed will be washed at least once per day. An allowance of 10,000 L/day has been made for cleaning of the concrete holding yards and milking shed. DURING PROLONGED WET WEATHER The volume of water used to wash the concrete holding yards and milking shed will be restricted to a maximum of 5750 L/day.</td>
</tr>
<tr>
<td>Yard drainage</td>
<td>All concrete holding yards, milking and milk holding areas will be maintained to drain into the effluent system.</td>
</tr>
<tr>
<td>Stormwater runoff</td>
<td>All run off from all roof areas will be diverted out of the effluent system. Runoff from unroofed concrete areas will be maintained to drain into the effluent system.</td>
</tr>
<tr>
<td>Solids separation and storage</td>
<td>The solids trap will be cleaned out approximately 3 months or when the solids are within 100mm of the top of the concrete wall. Manure storage areas will be selected to meet all minimum buffer distances.</td>
</tr>
<tr>
<td>Effluent ponds</td>
<td>Effluent in the 1st pond will be irrigated out at every opportunity (when soil moisture conditions are suitable for irrigation) to ensure adequate storage capacity for prolonged wet weather. Sludge build-up in the 1st pond will be removed by continual stirring of the pond contents and irrigated over pastures. The 2nd pond will be used as a reserve storage during prolonged wet periods. When the 2nd pond is in use, the water use at the dairy shed for yard washdown will be restricted to prevent overtopping.</td>
</tr>
</tbody>
</table>
Effluent in the 2nd pond will be irrigated out at every opportunity (when soil moisture conditions are suitable for irrigation) and should normally be empty.

Vegetation growing on the banks of the effluent ponds will be controlled to allow easy access and to prevent vegetation growth.

### Liquid Effluent reuse areas

1. Irrigation of effluent will cease **before** the soil is saturated, indicated by ponding on the ground and surface runoff.
2. Irrigation of effluent will cease during strong winds to prevent effluent spray encroaching on buffer zones.
3. Application rates of effluent irrigation will match the ground slope, soil type and ground cover to prevent runoff.
4. Calves less than 12 months old will not be allowed to graze the re-use areas to prevent the spread of Johne's disease. NB whole farm has current score of 7 – ie herd tested negative every 2 years
5. Grazing of the re-use areas by springers will be minimised to prevent the incidence of mastitis and pathogens entering the milk.
6. Effluent will be sprayed out immediately after grazing and left for at least 3 weeks before the next grazing.
7. The minimum buffer distances will be maintained.

### Effluent irrigation equipment

All effluent irrigation equipment will be regularly serviced and maintained so that it is always in serviceable condition and irrigation can take place when soil moisture conditions are suitable.

### Monitoring and review

#### Soils in reuse area

The soils in the liquid, solids and sludge effluent re-use areas and will be monitored by soil tests. Potassium levels in the soil can build-up on effluent re-use areas, particularly on grazed paddocks, which can result in high levels of potassium in cow diets.

**Soil Testing requirements in effluent reuse areas: Every 2 years:** Soils in the reuse area will be tested every 2 years to ensure nutrients are not building up nor moving down the soil profile beyond the root zone.

At least 3 soil samples will be taken down the soil profile at 100mm depth intervals to a depth of 300mm. If this testing indicates movement of nutrients down the profile additional samples will be taken to a depth of 1.0m (see soil testing every 5 years below).

Tests will include: phosphorus, pH, EC, phosphorus buffering index (PBI), major cations (K, Mg, Ca, Na)
| Effluent in pond | **Every 5 years:** if the 2 yearly samples do not indicate movement of nutrients down the soil profile to 300mm, the soil profile to 1.0m will be tested every 5 years: samples will be taken in the top part of each soil horizon, using 100mm depth interval for sampling from at least 3 horizons. Tests will include: phosphorus, pH, EC, PBI.  
At least once every 24 months, the effluent in the pond will be sampled and tested to establish sustainable irrigation and spreading application rates by consultation with a qualified agronomist.  
Tests will include: total nitrogen, total phosphorous, major cations, pH, EC. |
Table 5 summarises the maintenance schedule for the effluent system

**Table 5. Maintenance schedule**

<table>
<thead>
<tr>
<th>Grates and sumps</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>6 months</th>
<th>1 year or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Check; Remove build-up of solids</td>
<td>Clean out grates and sumps</td>
<td>Spay or remove over-hanging vegetation</td>
<td>Check for sludge build-up. Clean out</td>
<td>Inspect sump for cracks or leaks &amp; repair.</td>
</tr>
<tr>
<td>Drains and pipelines</td>
<td>Check drains and inspection ports for blockages and remove</td>
<td>Check drains and inspection port for blockages and remove</td>
<td>Flush with fresh water at dairy</td>
<td>Clean out and hose clean solids trap, screen, sump and outlet pipes</td>
<td>Inspect for cracks or leaks &amp; repair.</td>
</tr>
<tr>
<td>Solids trap</td>
<td>Check screen and pipes and clear blockages.</td>
<td>Check volume of sludge in trap. Clean out if likely filled in next month Spay or remove over-hanging vegetation</td>
<td>Clean out and hose clean solids trap, screen, sump and outlet pipes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POND 1</td>
<td>Check Pond 1 water level. Empty when conditions are suitable for irrigation.</td>
<td>Check vegetation growth on banks and surface of ponds: spray &amp; kill growth. Check crust build-up: identify cause and rectify.</td>
<td>Check sludge level in Pond 1 when pumped out. If there is a build-up move stirrer to agitate and remove sludge.</td>
<td></td>
<td>Check pond banks for leaks, pest holes or erosion. Repair.</td>
</tr>
<tr>
<td>POND 2</td>
<td>Check Pond 2 water level. Empty when conditions are suitable for irrigation.</td>
<td>Check vegetation growth on banks and surface of ponds: spray &amp; kill growth. Check crust build-up: identify cause and rectify.</td>
<td>Check sludge level in Pond 2 when pumped out. If there is a build-up use excavator to desludge when pumped out and allowed to dry.</td>
<td></td>
<td>Check pond banks for leaks, pest holes or erosion. Repair.</td>
</tr>
<tr>
<td>Effluent pumps, pipelines and sprays</td>
<td>Check spray nozzles when effluent irrigation taking place.</td>
<td>Check equipment is serviceable. Repair if not functioning properly.</td>
<td>Service effluent equipment (or as per manufacturers instructions if more frequent)</td>
<td></td>
<td>Check whole system and check pressures achieved in the system. Replace any equipment not functioning as designed.</td>
</tr>
<tr>
<td>Monitoring Soils &amp; liquid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Every 2 years</td>
</tr>
</tbody>
</table>