RRSSC TAG Action Item 3.1: OPTIONS HIGH LEVEL RISK ASSESSMENT

ISSUE: DRAFT DATE: 23-Jul-14 AUTHOR: Jim Bradley, Riaan Rossouw

| | | | Option 1: Piped to Rotorua | | Single treatme | Option 2: ent plant and land tre | atment system | Two treatmer | Option 3: nt plants and land trea | atment systems | Urine separati | Option 4: ion, septic tanks, 9 cl | uster schemes | ! | Option 5: Small Biolytix clusters | 5 | Small Bioly | Option 6: ytix clusters with urin | ne separation | OSET compl | Option 7: ant on-site treatmen | it systems |
|----------------|---|----------------|-------------------------------|------------------|----------------|-------------------------------------|------------------|----------------|--------------------------------------|------------------|----------------------|--------------------------------------|------------------|----------------------------|--------------------------------------|----------------|----------------------|--------------------------------------|------------------|----------------------------|-----------------------------------|------------------|
| Source / | g Hazard Threat Risk | Likelihood | Con-sequence | Risk | Likelihood | Con-sequence | Risk | Likelihood | Con-sequence | Risk | Likelihood | Con-sequence | Risk | Likelihood | Con-sequence | Risk | Likelihood | Con-sequence | Risk | Likelihood | Con-sequence | Risk |
| | Lakes Natural Environment | | | | | | | | | | | | | | | | | | | | | |
| 1 | Lakes Quality: Expected Improvement not achieved | Rare | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Possible | Severe | High | Almost Certain | Severe | High | Possible | Severe | High | Almost Certain | Severe | High |
| 2 | Lakes Quality: P to lakes more complicated than expected/ not achieved | Rare | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Possible | Severe | High | Almost Certain | Severe | High | Possible | Severe | High | Almost Certain | Severe | High |
| 3 | Unexpected other contaminant issues, e.g. micro-organisms | Rare | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Possible | Severe | High | Almost Certain | Severe | High | Possible | Severe | High | Almost Certain | Severe | High |
| 4 | Soils become saturated and P breakthrough More nitrogen being flushed out to lakes than expected | Rare Rare | Minor | Low | Rare Rare | Minor Minor | Low | Rare Rare | Minor | Low | Possible Possible | Severe Severe | High High | Almost Certain Possible | Severe Severe | High High | Possible Possible | Severe Severe | High High | Almost Certain Possible | Severe Severe | High High |
| | More introgen being nashed out to lakes than expected | Naic | Willion | LOW | Nate | WIIIO | LOW | nare | Willion | LOW | 1 OSSIDIC | Severe | riigii | 1 0331016 | Severe | riigii | 1 OSSIDIE | Severe | riigii | 1 0331516 | Jevere | riigii |
| Fc | Economic - Capital, Operating, Community | | | | | | | | | | | | | | | | | | | | | |
| 1 | Capital cost: Unexpectedly higher than estimates/reviews | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium |
| 2 | Operating cost: Unexpectedly significantly higher than estimates/reviews e.g. power cost | Unlikely | Course | Medium | Unliber. | C | Medium | Halibak. | Severe | Medium | Dansible | Course | High | Possible | Course | 1 Cala | Possible | Severe | real. | Rare | Minor | Leve |
| | increase; chemical usage; transport cost of urine to farms increase | Unlikely | Severe | Medium | Unlikely | Severe | Wedium | Unlikely | Severe | Wedium | Possible | Severe | nigii | Possible | Severe | High | | Severe | High | Rare | MILLOL | Low |
| 3 | Subsidies: DoH acceptance/approval not obtained - Rotoma | Rare | Catastrophic | High | Rare | Catastrophic | High | Rare | Catastrophic | High | Almost Certain | Catastrophic | Extreme | Almost Certain | Catastrophic | Extreme | Almost Certain | Catastrophic | Extreme | Not Applicable | Not Applicable | Not Applicable |
| 4 | Other Subsidies (than DoH) not available - Rotoma | Rare | Catastrophic | High | Rare | Catastrophic | High | Rare | Catastrophic | High | Almost Certain | Catastrophic | Extreme | Almost Certain | Catastrophic | Extreme | Almost Certain | Catastrophic | Extreme | Not Applicable | Not Applicable | Not Applicable |
| 5 | Other Subsidies (than DoH) not available - Rotoiti | Rare | Catastrophic | High | Rare | Catastrophic | High | Rare | Catastrophic | High | Almost Certain | Catastrophic | Extreme | Almost Certain | Catastrophic | Extreme | Almost Certain | Catastrophic | Extreme | Not Applicable | Not Applicable | Not Applicable |
| | | | | | | | | 1 | | | | | | | | | | | · | | | |
| T | Technical | D | Ca | Mark | D | Co. · · · | NA-P | P | Fa | March | Describit: | Carrier . | De-F | Day of L | Con | 100-6 | Daniel I. | Co. · · · | 10-5 | Describ! | Carrie | 115-5 |
| 1 | Nutrients: Predicted treatment/reduction not achieved | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Possible | Severe | High | Possible | Severe | High | Possible | Severe | High | Possible | Severe | High |
| 2 | Unexpected climate change impacts - peaked and prolonged wet weather and dry periods | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium |
| 3 | Equipment and System not as proven and reliable as thought | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Possible | Severe | High | Possible | Severe | High | Possible | Severe | High | Rare | Minor | Low |
| 4 | Future flexibility for capacity changes and changed consent conditions Unexpected Geotechnical risks (instability, water tables, fault lines) | Rare Rare | Severe Severe | Medium Medium | Rare Rare | Severe Severe | Medium Medium | Rare Rare | Severe Severe | Medium Medium | Possible Rare | Major Minor | Extreme Low | Possible Rare | Major Minor | Extreme Low | Possible Rare | Major Minor | Extreme Low | Possible Rare | Major Minor | Extreme Low |
| 5 | Unexpected construction delays and impacts | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Rare | Insignificant | Low |
| 0 | onexpected construction delays and impacts | Offlikely | Severe | Wediam | Offlikely | Severe | Wedium | Offlikely | Severe | Wediaiii | Offlikely | Severe | Mediam | Offlikely | Severe | Mediam | Offlikely | Severe | Wedidiii | naie | msignincant | LOW |
| | Onesating and Maintenance | | | | | | | | | | | | | | | | | | | | | |
| 1 | Operating and Maintenance | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Incincificant | Low |
| 2 | Odour nuisance: Unexpectedly more difficult to mitigate Technical and Operational: Operational Resiliency - unexpected critical failure to key | Kare | Severe | Medium | Kare | Severe | Medium | каге | Severe | Medium | Kare | Severe | Medium | kare | Severe | Medium | каге | Severe | Medium | Kare | Insignificant | LOW |
| - | elements of solution e.g. power failure at pump stations, urine storage significantly | | | | | | | | | | | | | | | | | | | | | |
| | longer/higher volumes, Economic cost of urine as fertilizer not competitive, etc | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Possible | Major | Extreme | Possible | Severe | High | Possible | Major | Extreme | Rare | Insignificant | Low |
| 3 | Natural hazard risks, e.g. earthquakes, floods, landslips, etc. | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Insignificant | Low |
| 4 | Prolonged power outages | Rare | Major | High | Rare | Major | High | Rare | Major | High | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Minor | Low |
| 5 | Blockage in pipelines | Unlikely | Minor | Low | Unlikely | Minor | Low | Unlikely | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Rare | Insignificant | Low |
| 6 | Infrastructure corrosion potential greater than anticipated | Unlikely | Minor | Low | Unlikely | Minor | Low | Unlikely | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Rare | Minor | Low | Rare | Insignificant | Low |
| | | | | | | | | | | | | | | | | | | | | | | |
| PC | Planning, Consenting, Approvals | | | | | | | | | | | | | | | | | | | | | |
| 1 | Land for treatment and disposal: Unexpectedly more difficult to find, purchase, and secure | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium |
| | long term lease | | | | | | | | | | | | | | | | | | | | | |
| 2 | RDC acceptance/approval not obtained Resource consents: Unexpectedly more difficult to obtain | Rare Rare | Severe Severe | Medium Medium | Rare Rare | Severe Severe | Medium Medium | Rare Rare | Severe | Medium Medium | Rare Rare | Severe Severe | Medium Medium | Rare Rare | Severe Severe | Medium | Rare Rare | Severe Severe | Medium Medium | Rare Rare | Severe Severe | Medium Medium |
| 4 | Transfer mains alignment: Unexpectedly more difficult to get approval | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium |
| 5 | Unexpected amenity effects experienced | nare | Severe | Median | nurc | SCICIC | Wicalam | nare | Severe | Medidiii | nurc | Severe | Wicdian | Nuite | Severe | Wicaldin | Hurc | Severe | Mediani | nare | Severe | Wedian |
| | | | | | | | | | | | | | | | | | | | | | | |
| DIT (C / CC | Public Health/Social/Community Environment | | | | | | | | | | | | | | | | | | | | | |
| PH/S/ CE | User perception and acceptance of urine separating toilets and urine storage | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Possible | Severe | High | Not Applicable | Not Applicable | Not Applicable | Possible | Severe | High | Not Applicable | Not Applicable | Not Applicable |
| 2 | Resistance to treatment and disposal facilities in individual properties | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Possible | Severe | High | Possible | Severe | High | Possible | Severe | High | Rare | Minor | Low |
| 3 | Public Health: Unexpectedly risks/ high impact e.g. micro-organisms not treated effectively | Rare | Severe | Medium | Rare | Severe | Medium | Rare | Severe | Medium | Possible | Major | Extreme | Possible | Major | Extreme | Possible | Major | Extreme | Possible | Major | Extreme |
| 4 | Unexpected Odours from facilities on individual properties | Rare | Insignificant | Low | Rare | Insignificant | Low | Rare | Insignificant | Low | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Rare | Insignificant | Low |
| 5 | Unexpected Noise from facilities on individual properties | Rare | Insignificant | Low | Rare | Insignificant | Low | Rare | Insignificant | Low | Rare | Insignificant | Low | Rare | Insignificant | Low | Rare | Insignificant | Low | Rare | Insignificant | Low |
| | | | | | | | | | | -5.11 | | | | | g | | | | | | | |
| C | Maori Cultural - Kepa to advise please | | | | | | | + | | | | | | | | | | | | | | |
| | Iniaon Culturai - Repa to auvise piease | | | | | | | + | | | | | | | | | | | | | | |
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| , ⁰ | Other | D. Pl. I | | | 11.19.1 | 6 | A A . d' | 11.191.1 | | A A . di | 11.191.1 | 6 | | DOM: I | 6 | | 0.00 | 6 | | D 201 | | F 1 |
| 1 | Change in political environment e.g. OSET/other? | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Unlikely | Severe | Medium | Possible | Major | Extreme |
| | | | | | | | | + | | | | | | | | | | | | | | |
| | | 1 | | 1 | 1 | 1 | | 1 | 1 | | | | | 1 | | | 1 | | | | | |

Notes:

1 High Level - Specific mitigation measures other than in concept work not yet considered will be developed for Preferred Option(s) approach

2 Follows AS/NZS 4360 Standard on Risk Management

| Likelihood | Con-sequence |
|----------------|----------------|
| Rare | Insignificant |
| Unlikely | Minor |
| Possible | Severe |
| Moderate | Major |
| Almost Certain | Catastrophic |
| Not Applicable | Not Applicable |

| Likelihood | Consequences | | | | | | | | | | | |
|----------------|--------------|---|---|---|---|--|--|--|--|--|--|--|
| | 1 | 2 | 3 | 4 | 5 | | | | | | | |
| Rare | L | L | M | Н | Н | | | | | | | |
| Unlikely | L | L | M | Н | E | | | | | | | |
| Possible | L | M | Н | E | E | | | | | | | |
| Moderate | M | M | Н | E | E | | | | | | | |
| Almost Certain | M | Н | Н | E | E | | | | | | | |

Key:

Consequence - 1: Insignificant, 2: Minor, 3: Severe, 4: Major, 5: Catastrophic
Risk - L: Low, M: Medium, H: High, E: Extreme