

Appendix G

Concept Erosion & Sediment Control Plan – Stage 2 & 3 (Opus)

1. Erosion and Sediment Control

A draft Erosion and Sediment Control Plan (ESCP) has been prepared for quarry development Stage #1, in accordance with the Waikato Regional Council *Erosion and Sediment Control Guidelines for Soil Disturbing Activities* (TR09/02, WRC, 2009). Universal Soil Loss Equation calculations for Stage #1 demonstrated that the highest risk of sediment discharge is associated with overburden removal, and stockpiling activity in particular.

Accordingly, the ESCP design approach for all stages is primarily focused on development activity (topsoil and overburden removal), with an emphasis on sub-catchment staging and use of localised sediment retention ponds (SRP's) for overburden removal and stockpile activity – refer Stage #2 and #3 Concept ESCP in the Appendix. Proposed sub-catchment and sediment pond dimensions for Stage 2 and 3 development activities and associated stockpile expansion are set out in Tables 1 and 2 below.

Table 1. Development Stage 2 Sub-Catchment Areas and SRP Dimensions

Sub catchment	Estimated Area (m ²)	ESC Type	Volume (m ³)	Length (m)	Width (m)	Depth (m)
2-1	9,375	SRP	281.3	24.6	8.2	1.4
2-2	4,425	SRP	132.8	18.2	6.1	1.2
2-3	19,500	SRP	585.0	33.1	11.0	1.6
2-4a	5,060	SRP	151.8	19.5	6.5	1.2
2-4b	8,025	SRP	240.8	23.6	7.8	1.3
2-5	10,940	SRP	328.2	25.6	8.5	1.5
2-6	16,880	SRP	506.4	30.8	10.3	1.6
2-7	10,000	SRP	300.0	25.4	8.4	1.4
14	14,720	SRP	294.4	25.1	8.4	1.4
14a	7,390	SRP	147.8	19.2	6.4	1.2

Table 2. Development Stage 3 Sub-Catchment Areas and SRP Dimensions

Sub catchment	Estimated Area (m ²)	ESC Type	Volume (m ³)	Length (m)	Width (m)	Depth (m)
3-1	16,880	SRP	506.4	31.8	10.6	1.5
3-2	18,000	SRP	540.0	31.8	10.6	1.6
3-3	9,375	SRP	281.3	24.6	8.2	1.4
3-4	9,000	SRP	270.0	24.1	8.0	1.4
3-5	11,550	SRP	346.5	26.4	8.8	1.5
3-6	11,800	SRP	354.0	26.6	8.9	1.5
3-7	10,500	SRP	315.0	26.0	8.7	1.4
3-8	8,750	SRP	262.5	24.6	8.2	1.3
3-7 & 3-8 combined	19,250	SRP	577.5	32.9	11.0	1.6
3-9	10,630	SRP	318.9	25.8	8.2	1.5
3-10	10,400	SRP	312.0	25.5	8.2	1.5
15	16500	SRP	495.0	31.5	10.5	1.5
15a	11050	SRP	331.5	26.7	8.9	1.4

Note: it is proposed Stage 3-7 and 3-8 use a common SRP sized accordingly, with a contour drain along the downslope margin of both stages serving as a dirty water diversion draining to the SRP

As stage development (overburden removal) activity is completed and operational activity (rock extraction) proceeds, drainage patterns will progressively become more centralised as landform is modified within the expanding pit area, and pit runoff will be directed to existing and additional treatment devices at the southern end of the site. As Stage #1 transitions into Stage #2 and #3, the central clean water diversion proposed for Stage #1 will eventually be utilised as a dirty water diversion for operational activities in Stage 1 sub-catchments 5 to 9, Stages 2-5 to 2-7 and Stage 3. The remainder of operational Stage 2 and pit areas to the east of the central diversion, along with Areas 11 and 12, will drain to the existing (south) sediment pond. Catchment areas for operational activity and proposed sediment retention pond dimensions are given in Table 3 below. Sub-catchment areas are estimated and are subject to confirmation pending final construction methodology.

Table 3. Operational Stage 1 to 3 Sub-Catchment Areas and SRP Dimensions

Pit Section	Sub catchments	Estimated Area (m ²)	Required Treatment Volume (m ³)	SRP	Length (m)	Width (m)	Depth (m)	Volume (m ³)
Western	1-5 to 9 2-5 to 7 3-1 to 10	169,105	5,073	Pond E	84.0	28.0	2.2	5,174
Eastern	1-1 to 4 2-1 to 4 10, 11, 12	134,870	4,046	South Pond	70.0	30.0	2.4	5040

Throughout quarry development and operation, McPherson Resources Ltd will undertake actions to ensure that the quarry is well managed to control the discharge of sediment to the Waipunga Stream, and will prepare a suitable Quarry Management Plan. This plan will set out the operational (day-to-day) functions of the quarry., and management of the quarry to minimise erosion and sedimentation effects. The following sections outline the specific issues to address in regard to on-site operations.

1.1. Stormwater Management

In accordance with TR09/02 (WRC, 2009) all drainage structures including perimeter clean water diversions will be designed to accommodate a 5% AEP rainfall event (20-year return period) – refer WSP-Opus report **McPherson Quarry Resource Consent Support – Hydraulics Assessment Report External Stormwater**.

Stormwater will generally be managed to minimise the amount of water coming in to contact with contaminants from the quarry operation. In accordance with this principal, stormwater will be collected in a network of drainage channels, which will divert ‘clean’ water away from working areas and direct ‘dirty’ water to suitable treatment devices.

As landform change progresses following overburden removal and initial rock extraction, and levels within sub-catchment areas reduce, sub-catchments and drainage lines will be reconfigured accordingly, with sediment trapping structures extended or added in response.

To the maximum degree practicable, wash and process water will be collected at the plant and recycled into two 20,000 litre settling tanks. This water will then be used for dust suppression, and any overflow from the tanks will be directed into the existing (north) sediment pond.

As part of the procedures for monitoring and control of the stormwater systems at the quarry, it will be the responsibility of the Quarry Manager that resource consent conditions are complied with at all times.

1.2. Sediment Retention Ponds

Temporary and long-term sediment retention ponds (SRP’s) and similar devices (decanting earth bunds) will be designed in accordance with TR09/02 (WRC, 2009), and will be connected with dirty water diversions,

generally placed along the downslope margins of sub-catchment stage areas. Treated water from these devices will discharge to stable, vegetated terrain, via a level spreader structure in some cases. In Stage 3, a single SRP is proposed for sub-stages 3-7 and 3-8. Depending on final construction methodology, a similar approach may be adopted for sub-stages 3.1 & 3.2, and 3-9 & 3-10.

Sediment retention ponds be inspected on a weekly basis, and following major rainfall events, to ensure ongoing functionality. SRP's will be cleaned out when the volume of accumulated sediment reaches 20% of the pond design volume. If the material removed is not of saleable quality, it must be disposed of to landfill, unless it is used for site rehabilitation.

Flocculants and automated dosing sheds may be used to improve the effectiveness of sediment retention ponds. Batch dosing of flocculants to DEB's is not proposed.

1.3. Stockpile Areas

Stockpile areas used for quarry products prior to further processing or final dispatch will have drainage controls directing runoff to recycling storage, with overflow directed to settling ponds.

Top soil and overburden stockpile areas will be separated from watercourses with vegetated buffer zones of at least 10 m width, and will have runoff diversion drains around upslope margins as required. Within stockpile areas a chain of controls will be used, including temporary and permanent surface covers, benching of batters where slopes exceed 25°, surface roughening of batters during construction, silt fences for critical areas in proximity to water course buffers and active working (stockpile construction or cleanfill removal) areas, and 'dirty' water diversions draining to sediment retention ponds or other sediment traps.

1.4. Dust Control

Worked areas and stockpiles may require dust control during dry periods, including:

- Existing vegetation cover will be retained where ever possible, and works will be staged to limit areas of exposed soil.
- Vehicle movements will be limited to a stipulated access points with stabilised access pads, a Limit of Works area will be set, and a maximum vehicle speed of 25 kph will be enforced.
- A water truck or sprinkler irrigation will be used to maintain soil moisture on exposed areas.
- Temporary stockpiles in worked areas will be managed to limit height and use suitable surface stabilisation measures (straw mulch or geotextile covers).

1.5. Haul Routes

Haul route drainage will be directed to dirty water diversions and sediment traps through table drains, water cut-offs and culverts. Haul routes may be watered as required during dry periods to reduce potential dust discharge.

The site access road connecting to McPherson Road will also be monitored and managed as a potential source of sediment. The road will be swept as required to minimise any sediment build-up that could contribute to dust nuisance or sediment discharge to a minor tributary of Waipunga Stream which crosses the access road.

1.6. Overburden Management

Overburden stripping will be staged over the minimum area practicable to extract the required volume of material. During top soil and over burden removal, and initial rock extraction, dirty water runoff will be directed to local sediment retention ponds or decanting earth bunds in each staging sub-catchment area.

Any overburden material that is not of saleable quality will be formed into permanent fill and stabilised with groundcover and revegetation or landscape plantings. Permanent, stabilised surface drainage will also be installed at completion of fill landforms.

1.7. Rehabilitation of Worked Out Areas

McPherson Resources Ltd will prepare a comprehensive rehabilitation plan for the quarry. The rehabilitation programme will support maintaining the site in a condition so that erosion and contaminated runoff are minimised. The plan will include the following:

- Establishment of suitable final ground contours.
- Establishment of a suitable environment for vegetation growth
- Revegetation of the site with suitable vegetation cover

1.8. Riparian Protection Areas

Riparian protection areas use vegetation to provide a buffer between the quarry operations and the Waipunga Stream. This margin will provide a physical barrier and sediment trap for diffuse runoff and/or unforeseen discharges. Riparian margins must be regularly maintained to ensure effectiveness and livestock should be excluded.

Construction equipment will not be permitted to track through existing watercourses. If temporary waterway crossings are required, they will be sited and constructed in accordance with TR09/02 (WRC, 2009).

1.9. Maintenance Schedule

McPherson Resources Ltd will develop and implement a maintenance schedule for all sediment control/treatment structures, to ensure structures provide optimum performance at all times, and avoid or minimise any potential adverse environmental effects of the quarry operation.

Inspection and maintenance of control/treatment structures will be carried out by delegated staff with training and experience in erosion and sediment control, and with reference to relevant resource consent conditions. It will be the responsibility of the Quarry Foreperson to ensure that sediment trapping structures are maintained regularly, and actions are recorded on a *Quarry Monitoring Check Sheet*. The Quarry Foreperson to ensure that all drainage structures are maintained as specified, or otherwise twice monthly, including the clearing of silt traps, inlet and outlet structures.

Control/treatment structures will be inspected after significant rainfall events, or during prolonged rainfall, in addition to any regular scheduled inspections to ensure they are working adequately at all times.

1.10. Monitoring

The Quarry Manager will ensure that any sampling requirements set out in the resource consent are carried out to specification. As and when required, it will be the responsibility of the Quarry Manager to arrange sampling and testing of stormwater and wash water discharge. Such testing will be undertaken by an independent certified testing laboratory, who will submit their results to the Quarry Manager, and with a copy to Waikato Regional Council (WRC).

Should results indicate contaminant levels in excess of specifications, the Quarry Manager shall take the following action:

- Immediately notify nominated WRC staff
- Immediately take action to identify the cause and apply interim control measures
- Retest the stormwater discharge following the initial results, in accordance with agreed sampling procedure, to determine if an isolated incident
- If the results of the contaminants that failed the first time are still over the limits, then the Quarry Manager will investigate the reasons for the occurrence and develop a plan to control the cause.

1.11. Complaints

The Quarry Manager will record all complaints. The Quarry Manager will be responsible for acting on, rectifying the cause and reporting complaints. All complaints received in respect of the Quarry discharge shall be recorded on a *Complaints Register Form* for the collation into the complaints register, which will be maintained by the Office Administrator.

The forms will record the following details of each complaint received either verbally or in written form:

- Date of complaint
- Date of event
- Name, address and contact details of the complainant (where provided)
- Details of complaint
- Action to resolve the issue/complaint
- Action to prevent further similar complaints
- Date of oral response, and/or written response

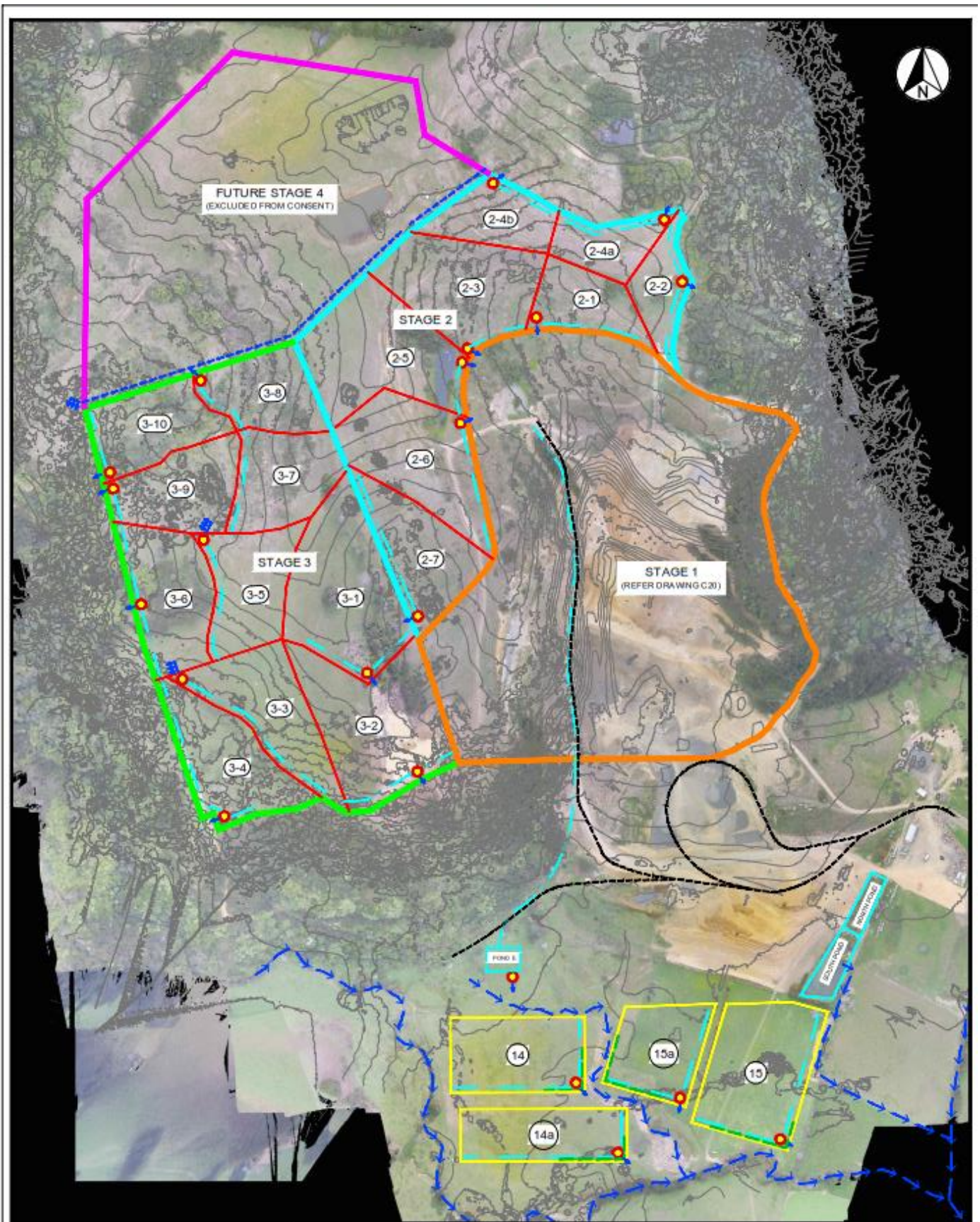
The Quarry Manager shall respond to complaints within the following timeframes following receipt:

8 hours – oral response

3 days – written response, which confirms details of the complaint and indicates what action has been taken or is proposed to be taken.

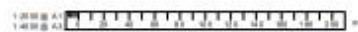
It will be made clear that if the complainant is not satisfied; he or she can contact the Nominated WRC staff member. Copies of complaint records, including all details shall be forwarded to WRC within 3 days. A summary of all complaints received shall be presented in an annual report to the Consents Manager, WRC.

2. APPENDIX 1



KEY

- SEDIMENT RETENTION POND
- SILT FENCE
- CLEAN WATER DIVERSION
- DIRTY WATER DIVERSION
- HAUL ROUTE
- SRP OUTLET
- WATER COURSE
- LEVEL SPREADER



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