LIST OF ATTACHMENTS

LIST OF FIGURES

#	Further Information Request	Response
1	Please provide a map identifying all individual seepages/wetlands located inside the MOA (Mine Operating Areas) and within the zone of influence. This map should include the seep/wetland boundary and identify the location of seeps/wetlands that may have already been removed from any location within the MOA.	An assessment of the effects of mine operations on the ecological values has been prepared by Boffa Miskell, March 2019. This report is attached as **Attachment 1** to this response. Section 4.2 of this report identifies the vegetation communities within the Mining Operations Area (**MOA**) that have, may have, or potentially will be, removed or disturbed by mining operations. Detailed descriptions of these vegetation communities are provided in Appendix 3 of the abovementioned Boffa Miskell (March 2019) report. **Figure 1** below presents the vegetation mapping as reported by Boffa Miskell. It also identifies the MOA.

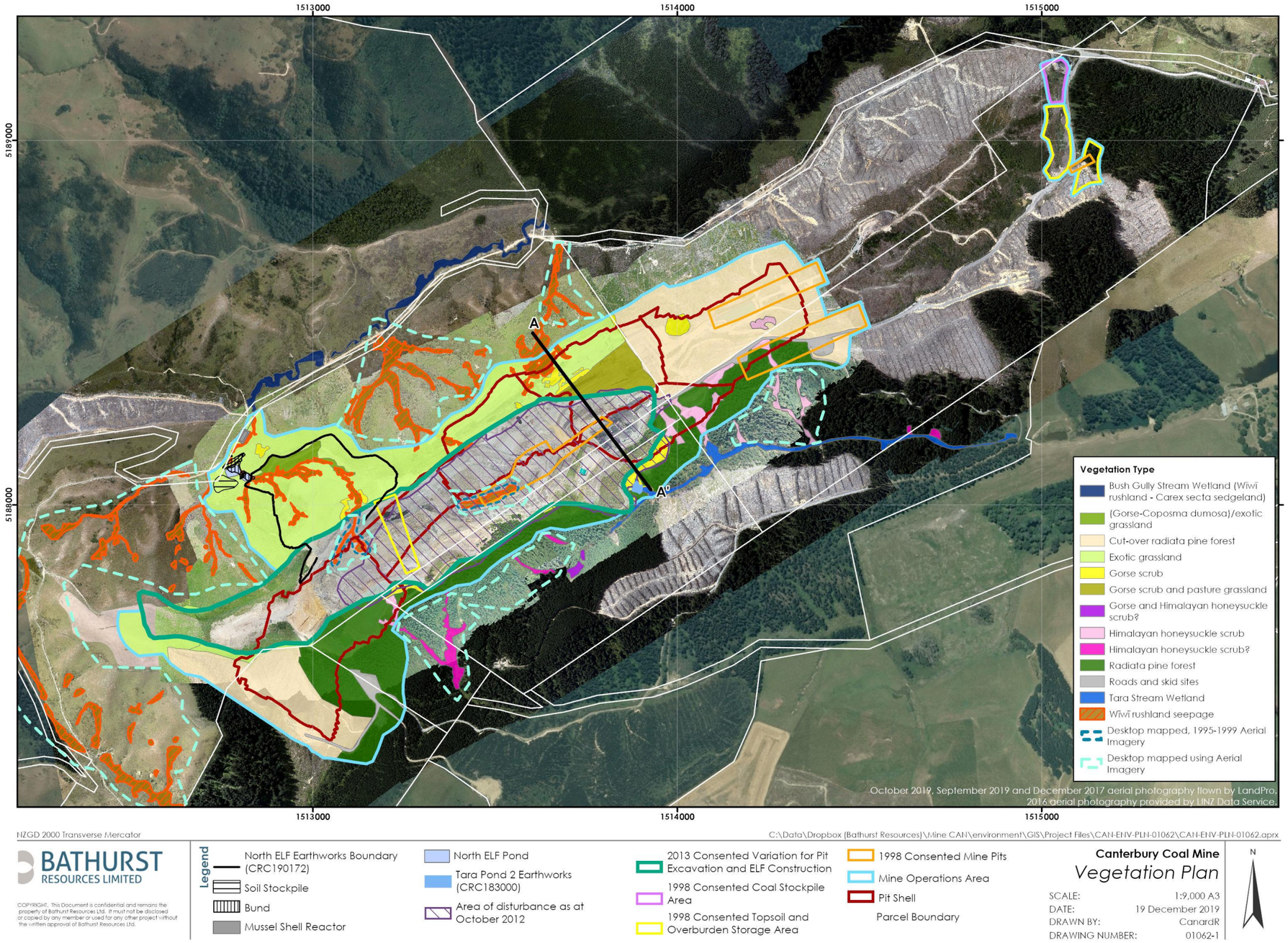


Figure 1: Vegetation Mapping, source Boffa Miskell Report (March 2019)

		Descriptions and photographs of two additional wetland vegetation communities that are outside the MOA, in the gullies within the farmland on the northern side of the mine are also provided in the Boffa Miskell report (**Appendices 3** and **4** respectively). A description of the Tara Stream wetland that is within the MOA that would be removed if the second Tara Stream pond is constructed is described in detail in Boffa Miskell Report dated November 2017 and attached to this response as **Attachment 2**. It is noted that the disturbance of this wetland is permitted by consent CRC183000. Wetland vegetation that would be affected by the North Engineered Landform (**ELF**) are described in the Boffa Miskell Report dated January 2017 and is attached as **Attachment 3** to this response. The disturbance of these areas is permitted by consent CRC173889. The Boffa Miskell Report (March 2019) identifies that there is a further 0.5 ha of this wīwī / exotic grass rushland in the heads of the gullies in the farmland on the hillslope on the north-west side of the mine. These areas could potentially be removed or disturbed by future mining operations within pit shells NO1, NO2 and NO3. Approximately 0.25 ha of this vegetation is within the pit shells where vegetation is likely to be removed by mining operations. Although not easily quantified, this vegetation community is common and widespread within grazed pasture, both in the local area, and in the Whitecliffs Ecological District and the level of ecological effect is assessed as being very low (a negligible magnitude impact on a low ecological value). In order to identify the location of seeps/wetlands that may have already been removed from any location within the MOA (particularly within the 2013 Consented Variation, **Figure 1**), a review of the historical aerial photographic imagery (1995-1999) that existed prior to 2013 was undertaken (see **Figure 1** – Desktop Mapped, 1995-1999 Aerial Imagery). A limitation to mapping seepages and wetlands using this methodology, particularly within those areas that have already been disturbed, is that the vegetation is no longer there and cannot be groundtruthed. Therefore, there is a reliance on detecting areas based on their colour and a complete absence of the ability to survey/groundtruth the assumed areas including knowledge of vegetation species to determine the vegetation community. This lacks scientific rigour and relies on assumption and speculation only, particularly when the photographic imagery is of a poor quality as are the 1995-1999 photographs. There is therefore no evidence available to BCL (apart from the assumptions drawn from the 1995-1999 aerial imagery) which suggests that other wetlands areas have been affected by historic mining at the site, or if such areas were affected whether such areas comprised wetlands as defined in the Canterbury Land and Water Regional Plan (**CLWRP**). It is also considered that if any such wetlands were in fact present within the active or historic mine areas then the disturbance or removal of such areas associated with the mining activities were undertaken in accordance with the appropriate (or necessary) authorisations at that time.
2	Using the map and information in response to question 10, an assessment of the potential ecological effects on seeps/wetlands and a description of any measures to avoid, remedy, mitigate or offset adverse effects.	The Boffa Miskell report (refer **Attachment 1**) provides an assessment of the surveyed wetland habitat identified in **Figure 1** above. The assessment shows that the vegetation communities and habitats within the MOA that could potentially be removed or disturbed are largely exotic grassland, cut-over (or harvested) plantation pine forestry and radiata pine forest. There are smaller areas of exotic gorse and Himalayan honeysuckle scrub, wīwī / exotic grass rushland and indigenous wetland vegetation. A full assessment of the effects of the removal of the Tara Stream wetland vegetation and habitat was undertaken as part of the consenting process for CRC183000. This included a mitigation proposal which is reflected in the conditions of that consent. The construction of the North ELF was within the Bush Gully tributary, which was also found to be a seepage and intermittent waterway, rather than a perennially flowing stream habitat (refer CRC173889). No fish were found to inhabit Bush Gully tributary. As with Tara Stream, while overall the ecological value of Bush Gully Stream is high, this is due to the presence of mudfish in the mid and lower reaches. The absence of this species in the headwater seepage suggests low ecological value in Bush Gully tributary, within the North ELF. As set out above, an area of wīwī / exotic grass rushland located on the north-west side of the mine could be affected by the mining operations. The ecological assessment (refer **Attachment 1**) does not consider the impact on this vegetation to be significant. This is on the basis that wiwi/exotic grass rushland is a common and widespread plant community throughout the local area and within the surrounding Ecological District. Within the MOA, the vegetation does not provide an important habitat for indigenous fauna, and as it is of limited extent it does not provide or contribute to an important ecological linkage or network. It does not provide a buffering function. Jens Rekker, Hydrogeologist from JH Rekker Consulting Limited, has also assessed these areas in terms of their impact and influence on hydrology in the area. This memo is attached as **Attachment 4**. He concludes that the area is likely to be sustained by shallow, even superficial groundwater movement downslope and confirms that once mining has been completed, and the final landform re-established, the pre-existing shallow, downslope seepage will return.

Given this it is considered that although there will be the loss of wetland vegetation within the MOA, this is not considered to be a significant adverse effect as these species are common and widespread in the local area, do not provide habitat for significant indigenous fauna and will likely return upon rehabilitation of the area. It is also considered that the mitigation, rehabilitation and offsetting measures that will be implemented will be sufficient to provide for the small loss of of wīwī / exotic grass rushland vegetation within the MOA.

Outside of the MOA, gullies amongst the farmland on the north-west side of the mine support seepage wetland vegetation in places, and are predominately comprised of a mosaic of wīwī rushland, Carex geminata-Sinclair's sedge sedgeland and introduced grassland (Boffa Miskell Report, January 2017, Appendix 3). Within one of these gullies is a distinctive raised spring, with a spongy substrate and a low stature turf, dominated by the introduced jointed rush and moss, which supports a higher diversity of indigenous wetland plant species. These seepages and wetlands are of moderate ecological value. As a result of ecological field studies, the MOA was reduced in size to avoid the inclusion of many of these seepage wetland areas, including the aforementioned distinctive raised spring. **Figure 1** presents the final MOA in respect of the seepage wetland described above. **Figure 1** also presents the location of the cross sections presented in **Figures 2** and **3** which are explained further herein.

Figure 2 below, presents a cross section of the proposed workings in relation to the seepage wetland and original landform (prior to mining). The pit shells will avoid direct impacts (i.e. vegetation removal) to these communities. However, there is the potential for temporarily reducing the area of surface water runoff that may potentially report to the wetland caused by the excavation of overburden and coal within the pit shells. This will only occur for a short time frame while the pits are developed, noting that the wetland is fundamentally groundwater dependent. Following backfilling and recontouring/rehabilitation of the final landform, the surface water reporting to the seepage wetland will be reinstated as presented in **Figure 3**.

It is understood that the geology underlying the mine means that these seepages are sourced from water pushed to the surface by hydrostatic pressure from within the bedded Broken River Coal measure formation. Mining operations are not expected to alter the hydrology of these seepages, therefore their groundwater dependence will remain unaffected and intact. Based on onsite observations of current mining activities, sedimentation impacts are also very unlikely because the face of the pit is excavated to create a steep scarp facing into the mine pit, which means any mine affected water flows into the pit and the mine water management system. Ancillary activities outside the pit shells, such as track or fence formation could also result in erosion and sedimentation that could impact these seepage and wetland communities. However, the impact of this is likely to be localised, and temporary (until they are re-vegetated).

The RFI also refers to “potential seeps/wetland areas also evident in south-east gullies adjoining Tara Stream” located outside of the MOA. These south-east gullies are difficult to access and have not been comprehensively surveyed, but have been inspected from above, and from the Tara Stream Wetland [as part of consenting process associated with CRC183000]. Those gullies appeared to be dominated by Himalayan honeysuckle scrub with some gorse and are considered unlikely to be wetlands in accordance with the definition set out in the CLWRP.

Overall, the magnitude of the effect on these seepage and wetland communities outside the pit shells is considered to be low.

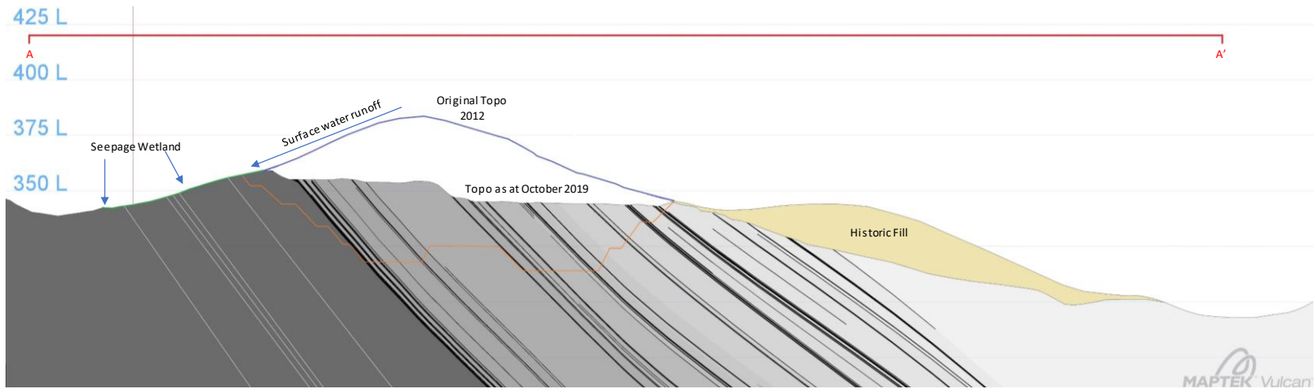


Figure 2 Cross section A-A' showing current topography and location of seepage wetlands and 'raised spring'. Ground water system supplying these seepage wetlands is not expected to be affected.

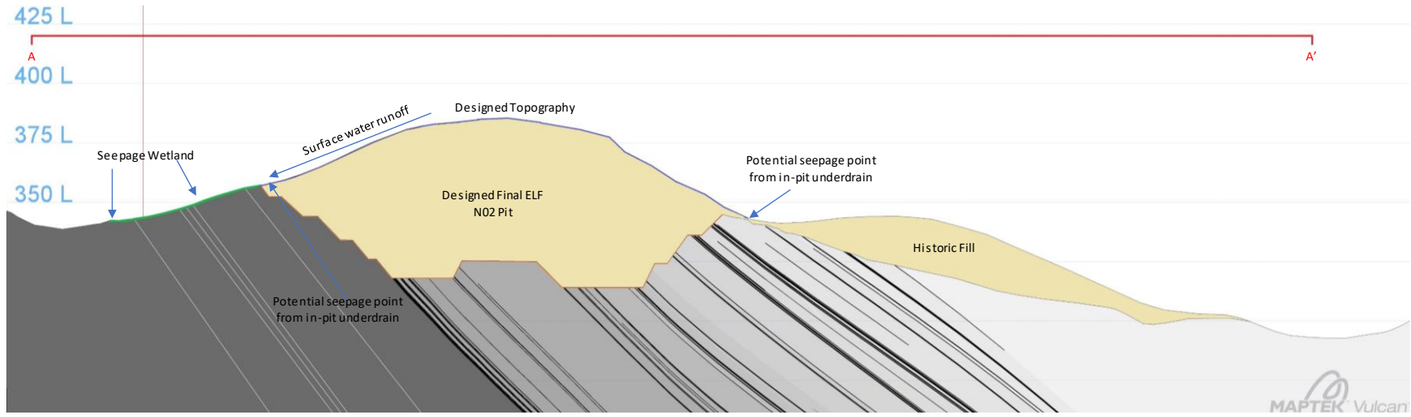


Figure 3 Cross-section A-A' - Designed backfill ELF of N02 pit showing the location of the seepage wetland and 'raised spring'.

2a	Rule 5.162 – Wetlands	The direct effects on a wetland that will be associated with the Tara Stream Pond 2 and those that have occurred with the construction of the North ELF have been considered under Consents CRC183000 and CRC173889. Historic disturbance or the reduction in seepages and wetlands that may have existed within the active mine footprint cannot be easily determined and no additional consents are necessary in this regard. As set out above, an area of wīwī / exotic grass rushland located on the north-west side of the mine could be affected by the mining operations. Despite there not being explicit reference in the application to the wetland, rules identified by ECan in its request it is considered that the scope and content of the applications (including this response) sufficiently cover the activities that will affect these wetland areas. The applications (e.g. the form 9) seek to provide for earthworks as well as the diversion and taking of water from within the MOA and there is sufficient scope within these to provide for the permits necessary to disturb a wetland (i.e earthworks, diversion and taking of water). Therefore no "new" consent is considered necessary, rather an additional assessment has been provided above.
3	Confirmation whether CCR disposal has occurred beyond the area identified on Figure 2 and if it will be part of the wider site rehabilitation.	CCR has been disposed of outside of the areas marked on Figure 2 as shown within the RFI dated 18th October 2019. We do not agree with ECan's analysis of the consented baseline and we have discussed this further in our covering letter and its attachment. In summary however our view is that CCR (and lime products and mussel shells) can be disposed of in the area shown attached to CRC 170540. It is acknowledged that the MOA extends into two additional land parcels which are not shown on the plan attached to CRC170540. These additional land parcels are shown in **Figure 4** below. As such it is considered appropriate to include an additional consent application to discharge contaminants to land. This is attached as **Attachment 5.** It is noted that this application cross references to material that is contained within the applications that are currently before ECan and should be read in conjunction with these (refer CRC201368).

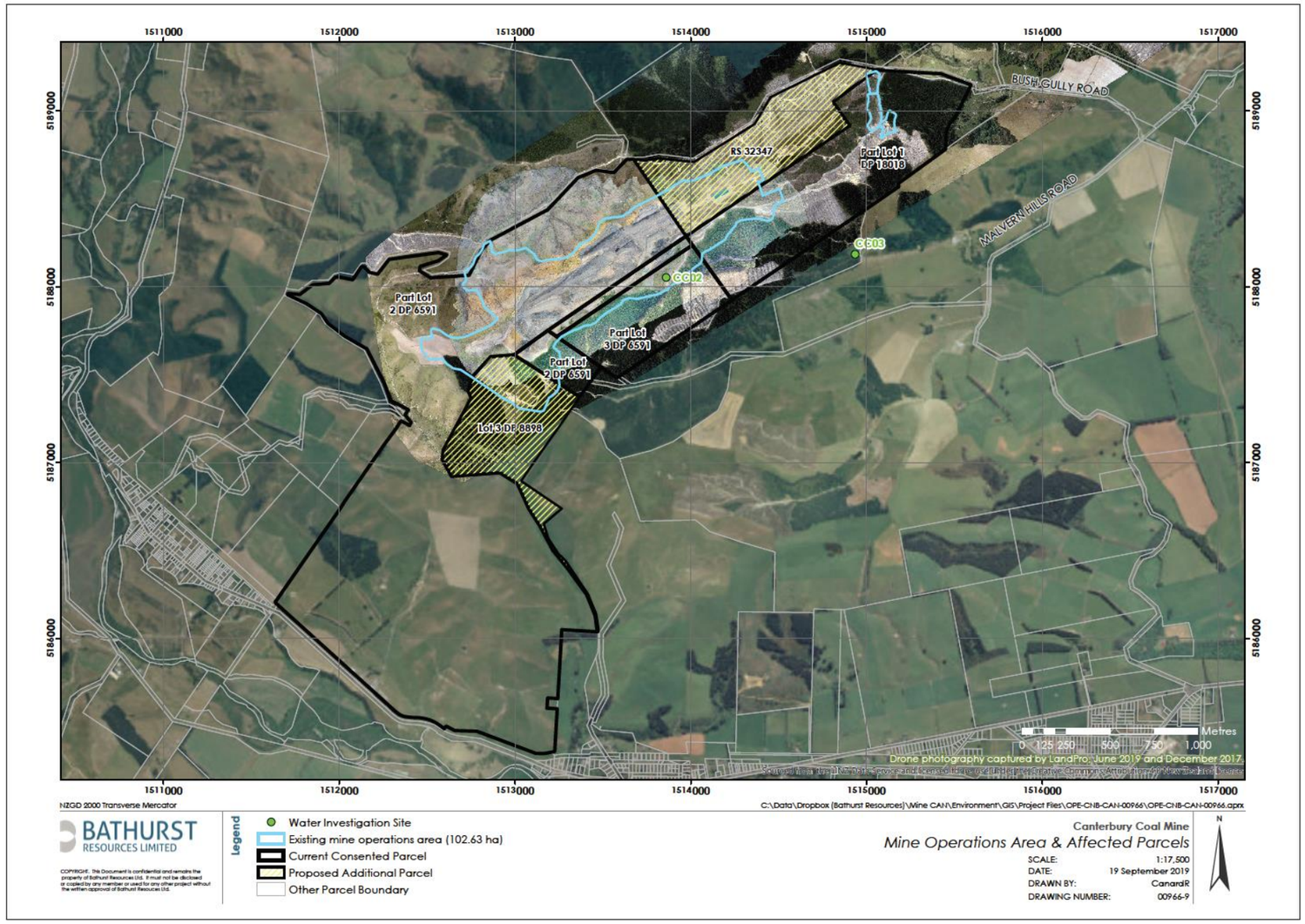


Figure 4 Additional Land Parcels to authorise the discharge of coal ash, lime and mussel shells to land within the MOA

4	If necessary, a new resource consent application seeking to authorise the disposal of CCR to land.	Refer to **Attachment 5**.

5	Please clarify that if ex-pit ELFs are required for some reason, that they will be a temporary landform and the material will subsequently be relocated to an in-pit ELF.	The current application does not seek or relate to any ex-pit overburden disposal areas (referred to as ex-pit Engineered Landforms or ex-pit ELFs). For example, the North ELF and the effects of the earthworks and associated water management for these were considered through its own separate consenting processes (CRC173823, CRC173889 and CRC175281). There are specific geotechnical and engineering matters that would need to be considered as part of the development and formation of an ex-pit ELF. No consents are being applied for as part of the suite of applications currently before Environment Canterbury for any ex-pit ELF.
6	Please provide a copy of the document 'Tip, Dams and Voids Principal Hazard Management Plan (CAN-TEC-PHMP-003) as referred to in the geotechnical update report.	Refer to **Attachment 6** to this response. This plan principally relates to worker health and safety whilst working within the pit and around other hazards.
7	Please provide a single maximum slope angle of the draft mine closure criteria and final mine closure criteria specify different maximum slope. The geotechnical report also cites different stable slope angles for ELF fills.	RFI question 7 relates to two different slope angle "types". The first part of the question relates to the slope angle associated with mine closure and the second part of the question relates to pit excavation angles. Both slope angle "types" are addressed herein. The earthworks application incorrectly stated that 21° slope was equivalent to a 1 in 5. This is in fact a 11.3° slope and is a general requirement of the access arrangement with landowners where allowance is also made to return a landform back to the landowner that resembles the original landscape as closely as practicable, particularly in areas with naturally steeper slopes prior to mining. Final landform design criteria set a maximum slope angle for engineered landforms constructed as backfill into completed mine pits to ensure global stability goals are met. This design criteria takes precedent over any original (pre-mining) slope angle. Final landform designs are reviewed against original topography to ensure access arrangement mine closure criteria are met. For clarity, **Figure 5** provides an excerpt from the global earthworks consent application. ***3.3.2 Mine Closure Criteria*** It is an objective of the design concepts for the final landform of CCM that mine closure criteria are meet, and includes a number of matters related to slope, and the relinquishment of land. Land shall not exceed a 21-degree slope (equivalent to 1 in 5) unless the original contour of the relevant part of the land was steeper. All topsoil shall be spread as evenly as possible, and compacted as far as practical. The soil fertility shall be no less than the soil fertility prior to Mining and/or Mining Operations and a cover crop suitable for growing rehabilitated trees or pasture similar to the species of those removed by BCL should be sown or established, including the control of gorse and noxious weeds. All fences, including earthworks and other improvements shall be reinstated to the same condition as they were in prior to Commencement or as agreed with relevant land owners. The relinquishment of land back to the landowner should be done so in a timely manner when the rehabilitation objectives have been achieved and agreed to as per relevant access arrangement agreements. *Figure 5 From global earthworks consent application*

The Geotechnical report provides ELF and Stockpile Design Parameters as set out in section 6.4. of that report. The Design Parameters provides two slope angles, one for single bench batter slopes of maximum 10m in height of 27° (represented by the blue solid line in **Figure 6**), the other provides a limit to a continuous slope or multi-bench slope of 21° (shown by the red dashed line in **Figure 6**). **Figure 6** has been prepared only to provide diagrammatic representation of the two different slope types. **Figure 7** presents an excerpt from the global earthworks consent application which sets out the single bench and multi-bench design angles.

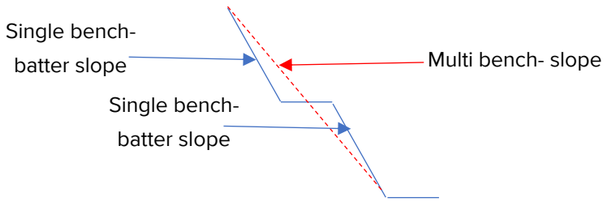


Figure 6 Representation of Single Bench Batter slopes and Multi-bench slope (diagrammatic only)

6.4 ELF and Stockpile Design Parameters

The proposed slope design parameters for the free draining ELF areas are outlined in Table 29 below. The overall maximum slope angle of 21° for final landform constructed from mixed overburden waste materials has been observed from areas below the current site office as summarised in Table 20. To date these slopes have been observed to perform in a satisfactory manner. It is assumed that this material has been placed in successive compacted lifts, no more than 1 m thick and has been rolled by careful sequencing of loaded trucks to achieve adequate compaction (Bell 2007). Surface water control had also been implemented to mitigate ponding of surface water and saturation of waste materials.

Table 29: Recommended maximum slope angles for ELF constructed from BRCM overburden and inter-burden waste.

Design Sector	Configuration	Bench Height (m)	Bench Width (m)	Batter Slope Angle
Mixed overburden and inter-burden waste rock	Benched	10	5	27° (2H : 1V grade)
	Continuous Slope	-	-	21° (2.5H : 1V grade)
Note: Applies to "Not Serious" consequence of failure design acceptance criteria as presented in Table 27 where fill remains free draining (dry).				

Figure 7 From global earthworks consent application

8	Please describe the stormwater runoff controls for runoff from internal access roads/haul roads.	As explained in the Environmental Management Plan (**EMP**) all runoff generated from areas disturbed by mining activities including the internal access roads is directed to appropriate collection and treatment facilities for sediment removal prior to discharge, where practicable. Erosion and sediment control practices are also applied site wide to minimise sediment generation and the volume of sediment that reaches the sedimentation ponds.

		As noted, every attempt is made to ensure that all site-impacted water is diverted to the two site treatment systems and discharge points. Some non-point source discharges around the perimeter of the mine may however occur. Any such discharges are considered to be consistent with the permitted activity rules within the Plan relating to stormwater and other minor discharges (refer Rule 5.95 and 5.99).
9	Please provide an assessment of the effects on surface water flows (7dMALF and mean flows) in the Waianiwaniwa catchment and Selwyn River catchment. This assessment should consider the natural and post-mining topography, runoff co-efficients and meteorological conditions of the site and the influence of the water treatment system and take of water for dust suppression.	An assessment of the potential hydrological impacts arising from the earthworks and surface water changes due to the diversions and landform changes has been prepared by Jens Rekker and is attached as **Attachment 4**. As the take for dust suppression purposes is from a water storage facility and not from a surface water river or lake, it is considered that this is a permitted activity pursuant to Rule 5.121. For this reason it is considered that no further assessment of the take from the storage facility is necessary. Notwithstanding this, it is noted that the storage facility captures water from diverted overflow pathways, site dewatering, as well as capturing rain water. A proportion of this water would be lost in plant uptake and evaporation prior to it reaching the downstream surface water systems in any case. The take for dust suppression purposes is therefore not considered to be significant in this context and will have little to no effect on downstream hydrology and water availability.
10	Please provide an assessment of potential effects of altering drainage patterns on any seepages or wetlands on the north-west slopes, the south-east gullies and Tara Stream and any subsequent changes in lows flows to receiving waterbodies. This assessment should identify any retrospective effects and future effects and also effects both inside and outside of the MOA.	BCL has agreed with the landowners of the site that once mining is complete the land will be rehabilitated as far as practicable to its former condition, or to an alternate condition that is agreed between the relevant parties involved. Objectives guide the rehabilitation of the site in that it shall be physically, geotechnically and geochemically safe. This is set out in the EMP. The land is being progressively recontoured and rehabilitated as mining progresses through the site. During operations, runoff from the ELFs will be directed toward the storage and treatment ponds, mimicking the natural direction of runoff from the areas. The storage and treatment ponds will remain in place following the completion of the mining at the site, and upon mine closure these will be remediated as a wetland habitat. The final contour of the landform will be such that there is no ponding or pooling of water, or accelerated runoff so as to prevent any significant erosion or sediment runoff from the final landform. Over time it is anticipated that the natural drainage channels and overflow pathways within the site would return to their natural state. This is further demonstrated in **Figures 8** and **9** below and also within the memo prepared by Jens Rekker (refer **Attachment 4**).

11	Please provide an assessment of the storage of water and the take of water for dust suppression on the allocation limits for the combined Selwyn-Waimakariri Allocation Zone and any subsequent effects on the Selwyn Te Waihora catchment	As discussed in response to question 9 above, the storage of water is a necessary part of the overall water management system for the site and comprises water captured from land drainage diversion, treatment of the dirty/mine influenced water captured, site dewatering as well as capturing rain water. There is minimal impact on downstream flows and water availability as a result of this activity (see also **Attachment 4**). This water is then stored for treatment prior to discharge and a proportion of the water is abstracted and used onsite for dust management during dry periods. Both the storage component and the taking of water from this water storage facility are assessed as permitted activities pursuant to Rules 5.154 and 5.121, and therefore no further assessment of these activities is considered necessary.
12	Please provide map identifying all surface water bodies and other surface water features such as artificial drains and ponds, wetlands, springs and seeps in accordance with the definitions in the CLWRP. The map should include where possible the water quality management unit where mapped on the CLWRP Planning Maps. Please also identify any water features that may have been removed and their previous location.	Maps depicting the location of artificial drains and ponds that form part of the surface water treatment system were shown in Figure 8 of the AEE attached to the application to take, divert and discharge water from two additional land parcels (refer CRC201368). **Figure 8** below shows the surface water bodies within vicinity of the mine. **Figure 1** above provides an overview of the existing wetland and seepage areas within the MOA and surrounds. The relevant water quality map (Map A-057) indicates that the surface water bodies surrounding the site are classified as “Hill-Fed Lower”. **Figure 8** below shows the sub-catchments and flow paths as at October 2012. The red, yellow and orange lines present the sub-catchment boundaries. **Figure 9** below shows the sub-catchments and flow paths after completion of the final landform. The red, yellow and orange lines present the sub-catchment boundaries.

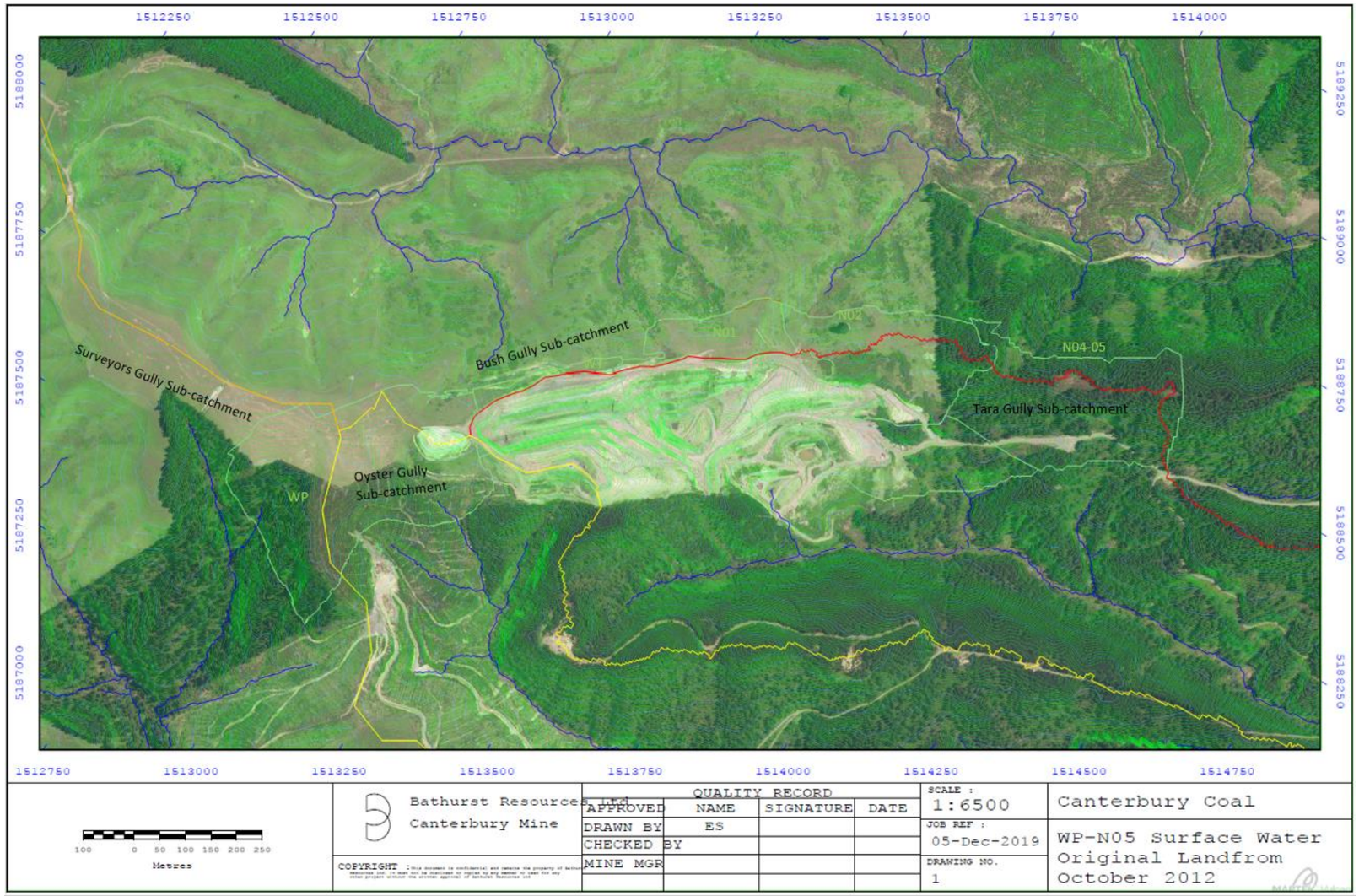


Figure 8 Landform and surface water at baseline

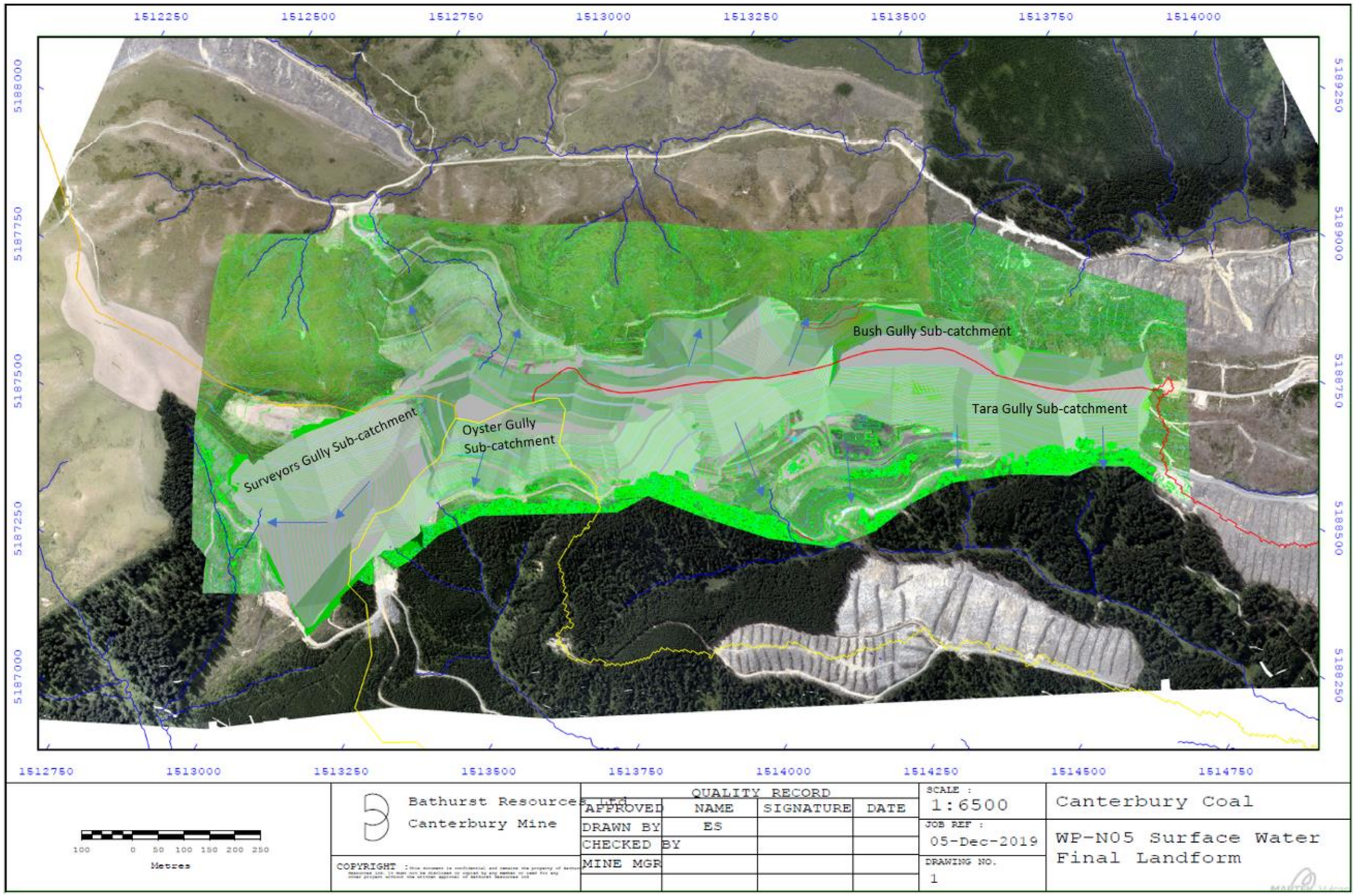


Figure 9 Landform and surface water at final landform

13	Based on the map, please describe if works have or will be undertaken in riparian margins and if consent is necessary under Rule 5.169.	Due to the elevated location of the site, there are no lakes or rivers affected by any works (with the exception of those consented as part of the Tara Pond #2 consents CRC183000), but there may be some seepage wetlands within 10m of the working areas of the site as discussed in response to questions 1 and 2 above. A separate application is however not considered necessary as the area is similarly within scope of the current applications that have been prepared and in particular the earthworks consent that is being sought, however it is acknowledged that an assessment in accordance with Rule 5.169 is necessary. This is provided below. As set out in response to question 2a above, while there is not anticipated to be any direct impacts to the wetlands, aside from those already identified and consented, there is potential for the excavation of overburden and coal within the pit shells to indirectly affect these water bodies. It is reiterated that sedimentation impacts are however very unlikely because the face of the pit is excavated to create a steep scarp facing into the mine pit. Sediment discharges and contaminants from the active mine areas are also directed through the water treatment ponds within the Tara Stream catchment and suspended sediment retention ponds in the Bush Gully Stream catchment. Run off from the mine site is directed through these sediment ponds and includes flocculent dosing, active and passive Acid Mine Drainage (**AMD**) treatment, with the capacity to retain water during rain events. This treatment is effective in maintaining the quality of any water bodies immediately surrounding the MOA as the majority of any direct runoff is prevented. Specific erosion and sediment controls that are currently being adopted throughout the mine site will also ensure the protection of surrounding wetland and seepage features. These controls are explained in the EMP attached as Appendix 11 to the application to discharge water and take, use and divert water and includes the installation and use of silt fences, silt socks, sedimentation ponds (refer above), and progressive rehabilitation requirements. Overall it is considered that these measures will ensure that wetlands surrounding the MOA are largely unaffected, and post closure there will be no long term effects anticipated as the land will be rehabilitated to encourage natural drainage patterns and functioning. Final landform catchment boundaries largely follow the original catchment boundary as shown in **Figures 8** and **9**.
14	Please provide further details regarding what the final drainage patterns will be, what the methodology is to determine those patterns (i.e as part of rehabilitation plan), any potential adverse effects arising from changing drainage patterns and any monitoring that may be required.	Final landforms will be contoured to match the surrounding landscape. The design of the final landform is carried out using appropriate software that allows for the scheduling of material to create the final landform. During construction of the landforms, contour drains are used to transfer surface water from the slopes and ensure any sediment is treated through the surface water treatment system. As the final landform slopes are stabilised and rehabilitated, and sediment runoff has returned to natural levels, the contour drains are systematically removed to allow water to shed to the natural environment as a laminar flow. It is not anticipated that any water quality monitoring is required for laminar flow from fully rehabilitated slopes. Construction of underdrains under engineered landforms does tend to result in relatively continuous seepage flows at their discharge points even through prolonged dry periods - e.g. CC02 underdrain would discharge continuously whereas pre-mining that sub catchment was likely to have been ephemeral like other undisturbed sub catchments. Even in-pit ELFs will have underdrains installed to ensure adequate drainage and interception of potential groundwater flows. These underdrains will channel flow to the low points in pit highwalls as the backfill ELFs are constructed which are generally at the heads of gullies. Potential adverse effects arising from the changed drainage patterns are considered to be negligible. Please also refer to the material provided by Jens Rekker attached as **Attachment 4**. Current monitoring with regard to onsite water management is further discussed in response to [email dated 22nd October 2019] question 4 below and ongoing monitoring and obligations are discussed in more detail in response to question 15 directly below.
15	As the site is leased and once rehabilitated will be returned to the landowner, what is the procedure for removing land from management by Bathurst once mining is complete? Specifically,	The site operates in accordance with an EMP (refer to Appendix 11 of the application to discharge water and take, use and divert water). At section 15 of the EMP, a detailed site rehabilitation plan is provided. Existing consents issued by both Environment Canterbury and the Selwyn District Council require implementation and adherence to the EMP and therefore require the rehabilitation of the site at closure in accordance with a Site Rehabilitation Plan. The plan is required to be implemented in accordance with the following key objectives: • The site is left in a manner which is physically safe. This includes removal of all hazards which could impact upon both people and animals, and any future use of the site. • The site is geotechnically stable.

will any changes to the consents be necessary and what checks will be undertaken to ensure all consent conditions have been adhered to.

- The site is geochemically safe – meaning the site will be left in a manner which is non-polluting, and which ensure that groundwater and surface water quality are not compromised and do not exceed background levels across a range of different parameters.
- Sustaining post mining land use – so as to ensure that a self-sustaining land use can be achieved post mining. This will require the establishment of appropriate vegetation, and the development of a final landform that can continue to be used for the intended post mining land use in the foreseeable future.

The plan also sets out details relating to the closure of the site, and access agreements with landowners. These legally require BCL to return the site to a state whereby it can be used for farming and/or commercial forestry purposes. Once closure has been achieved, the landowner may choose to remove some fences or establish access. These legal access arrangements further state that BCL must:

- Meet all obligations according to relevant resource consents;
- Reduce all slopes to, at most, a 12 degree slope, unless the location was originally steeper;
- Restore the land to a similar contour as original;
- Replace all topsoil to original thickness and compaction;
- Restore soil fertility;
- Reinstate fences;
- Sow and establish a cover crop and replace trees removed with a similar species;
- Control all gorse and noxious weeds.

As noted above, the implementation of the EMP and its inherent components including the site rehabilitation plan is required to be implemented onsite by consents already issued by both ECan and Selwyn District Council. Although BCL has no intention not to fulfil the requirements (of these or its future consents) with regard to rehabilitation, it is noted that in accordance with RC165238 [Selwyn District Council consent], BCL must maintain a bond in favour of the Council. In addition, BCL holds substantial bonds with the landowners. The purpose of these bonds is to provide the Council and the private landholders with unencumbered access to a source of funds sufficient to close and rehabilitate the mine site in the unlikely event that BCL fails to fulfil its closure and rehabilitation obligations. As site closure and site rehabilitation is primarily associated with the land use activity, it is considered that there is sufficient certainty within the current consents conditions and obligations (and will be carried forward into any future land use consents issued by the Selwyn District Council) that these outcomes will be achieved.

Rehabilitation Procedures:

General procedures for land rehabilitation are as follows:

- Overburden and associated materials that have been stripped and placed ensuring that correct procedures in relation to the overburden ELF and in-pit disposal are to be shaped, covered with non-acid generating (**NAG**) materials to a depth of 500mm, and topsoiled and re-grassed or prepared for new forestry plantations.
- Disturbed ground within the overburden landforms is to be limited in area to the extent that is realistically required for the next stripping campaign, and steps are to be taken to complete shaping and grassing as soon as is practicable to limit exposures of bare ground to storm runoff.
- Within worked-out areas of the coal pit all compacted materials are to be placed to an agreed height and shape, covered with NAG materials, and similarly grassed unless that part of the pit is to be used for temporary coal storage or other designated operational uses.

All constructed landforms are to be designed so as to shed water from the grassed surfaces without causing erosion or sediment generation, and runoff is to be directed into existing natural gully systems or to prepared stormwater channels within the mine footprint as appropriate. It is expected that any completed overburden placement areas will be topsoiled and oversown within a maximum period of six months, and that advantage will be taken of growing periods such as spring to establish vegetation cover as quickly as possible. Any damage to oversown areas, or areas where grass cover has not readily established, are to be further assessed and re-planted if appropriate.

In Practice – ELF Construction and Rehabilitation:

ELF design and construction is based on a plan for final landform. Rehabilitation, where it is practicable to do so, is progressively completed to the designed final land contour. For example, the North ELF has been constructed as a final landform (refer CRC190172). The area is used to place waste rock from the active pits. The North ELF is being progressively

		rehabilitated as it is constructed and is almost complete. Once fully grassed, the North ELF will ultimately be returned to the landowner for agricultural or forestry purposes, although the consents will remain live and the sediment retention ponds will remain in place to capture and if necessary treat any leachate from the underdrain, until such time that these ponds are no longer considered necessary (and can be remediated) and the existing consents have been surrendered or have expired. The Green ELF is partially complete and grass cover is well established. The western edge of the Green ELF is on the boundary with a forestry block and the final drainage and planting plan is yet to be confirmed. Currently all runoff is directed to the Tara Gully where naturally it would drain to the forestry block. Some pine trees have been planted on the Green ELF by Matariki during August 2018 and in 2019. BCL adopt an adaptive management approach to ongoing water management and quality onsite. In this regard, BCL intend to continue to monitor the surface water quality downstream and respond accordingly to results (i.e. undertake further monitoring as required or implement additional mitigation actions if monitoring detects any potential issues etc). It is anticipated that such monitoring will continue until such time as the rehabilitation objectives and outcomes that are set out in the EMP (and other agreed documents with the respective landowners) have been achieved. The EMP contains various procedures, monitoring and inspections to be undertaken to confirm that activities are being undertaken in accordance with the relevant consent conditions. BCL also report water discharge compliance annually to ECan, the most recent of which was provided on 26th November 2019. In addition, field measurements are undertaken to ensure that compaction criteria are achieved during the construction of ELFs and surveys are undertaken to show ELF construction follows the construction management plan guidance with paddock stacking and low lift heights. Underdrains are also surveyed to record their correct positioning upon installation The strategy for removing land from management by BCL includes: • Initial consultation with the relevant landowner to confirm proposed final landform and land use requirements; • Following final landform construction, agreement is reached with the landowner regarding revegetation (ie. grasses) requirements which also forms part of land access arrangements; • Interim hand over of land to landowner to use whilst BCL continues monitoring of stability as well as site discharges from the rehabilitated/revegetated areas; • Final hand over of land management following confirmation of land stability and final agreement with the respective landowner. The most recent example of where this is occurring is associated with the North ELF. Construction of the North ELF is almost complete with grass hydroseeded over the final batters in September 2019. Since this time, BCL has continued to undertake the relevant inspections, monitoring and maintenance activities. More recently, the land owner is using the land for grazing low stock numbers as an interim trial period whilst BCL continues the monitoring for stability and performance. It is noted that the existing consents for the North ELF allows for this long term approach as they expire in around 2032. This provides more than sufficient time for BCL to monitor for stability and for the landowner to be comfortable that the land is in a steady state. Changes to consents may be required for final mine decommissioning (ie. requirement/removal of infrastructure, extension of time, changes to monitoring required, etc), however, the detail of these changes cannot be scoped out at this stage.
16a	The application discusses the final land cover following rehabilitation is likely to be production forestry or pasture. Due to the disposal of CCR at the site and the methods undertaken to manage AMD by encapsulating acid forming rock, are there any measures	Overburden materials including CCR materials that are placed within ELFs have been sampled and analysed as per conditions of CRC170540. These results show that the materials, once placed as per above EMP directives, meet the Class B landfill guidelines and do not pose a risk to future land use. The EMP and Ground and Strata Instability PHMP (**Attachment 7**) set out the measures that are or will be employed in the ongoing management and rehabilitation of the site – also refer to the above response. No further measures beyond those already set out in the relevant sections of the EMP and Ground and Strata Instability PHMP are deemed necessary to ensure risks of disturbance are minimised in the long term.

	proposed to ensure those risks of disturbance are minimised in the long-term?	
16b	Please provide an assessment of any risks future land use activities pose and any mitigation necessary (for example: land covenants restricting certain land uses).	As noted above the site closure and rehabilitation requirements will ensure that the land is returned to a state whereby it can be utilised for farming and/or forestry purposes. With regard to other potential future land use activities it is noted that the site is located in the Malvern Hills Rural Resource Area (**MH**) in accordance with the Selwyn District Plan. Given this zoning it is very unlikely that the site would be developed for purposes other than mining, forestry or farming purposes. The majority of other activities would likely trigger a consenting requirement under the relevant provisions of the District Plan. A change in land use (from production land) would also to likely trigger consideration of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
17	What is proposed to ensure the on-going operation and monitoring of treatment systems and the remediation of any issues once land is transferred back to the landowner?	As noted above the EMP will guide the site closure and rehabilitation requirements for the site. The conditions currently attached to the various consents ensure it will be carried out in accordance with this Plan. There are also legal agreements in place with landowners that will ensure prescribed outcomes are achieved.
Questions from Email 22 October 2019		
1	What were the sources of acid and high conductivity discharges 2006 – 2018?	It should be noted that BCL did not take ownership of the Canterbury mine until 2013. The consensus is that the main source of acidity load was the old North Dump/Shearers dump behind the ROM/office area. This was constructed prior to BCL taking full ownership and operation of the site and was completed using outdated methods using high tip heads and light weight articulated trucks. Compaction of the material was therefore thought to be very poor thus allowing oxygen and water ingress which led to significant amounts of oxidation of pyrite minerals thereby producing high acid loads. Additionally, the operator at the time had a poor understanding of acid producing potential and its control, of the overburden materials. Significant investment by BCL into overburden acid-base accounting characterisation has shown that the upper portions of the coal measure sequence is predominately potentially acid forming (**PAF**) rock. The previous operator at Canterbury coal only mined the upper portion of the coal measure sequence and therefore overburden material was predominately PAF. The combination of these two causal factors plus a lack of treatment in the form of acid neutralisation dosing (such as lime, or mussel shells) was the root cause of acid and conductivity discharges.
2	Have they been extinguished, or how have they been extinguished/managed (2018-2019 data)?	BCL has significantly improved acidity loads at the discharge point, first through identification of seeps emanating from the old dump with high acidity loads and treatment of these seeps through passive treatment (mussel shell reactors), and more recently by complete removal of the seeps by excavating and removal of the old waste dump and transporting and disposing of the material as per current overburden placement practices. The addition of Tara pumps to the surface water system enables the high conductivity (but pH neutral) underdrain water to be pumped back to surface water treatment system for dilution and treatment prior to discharge.

3 Please provide more analysis of climate conditions during and preceding sampling to assist in interpretation of discharge water quality patterns (particularly 2018-2019 if these are being used to demonstrate a new state?).

As per conditions of CRC170541, weather and rainfall is recorded for the day of and the day prior to the manual compliance samples being taken. Such results are provided to ECan as part of BCL's reporting obligations under its existing consents, the latest of which was provided to ECan on 26th November 2019.

Below (**Figure 10**) is a chart showing rainfall by month as recorded at the ECan Whitecliffs weather station:

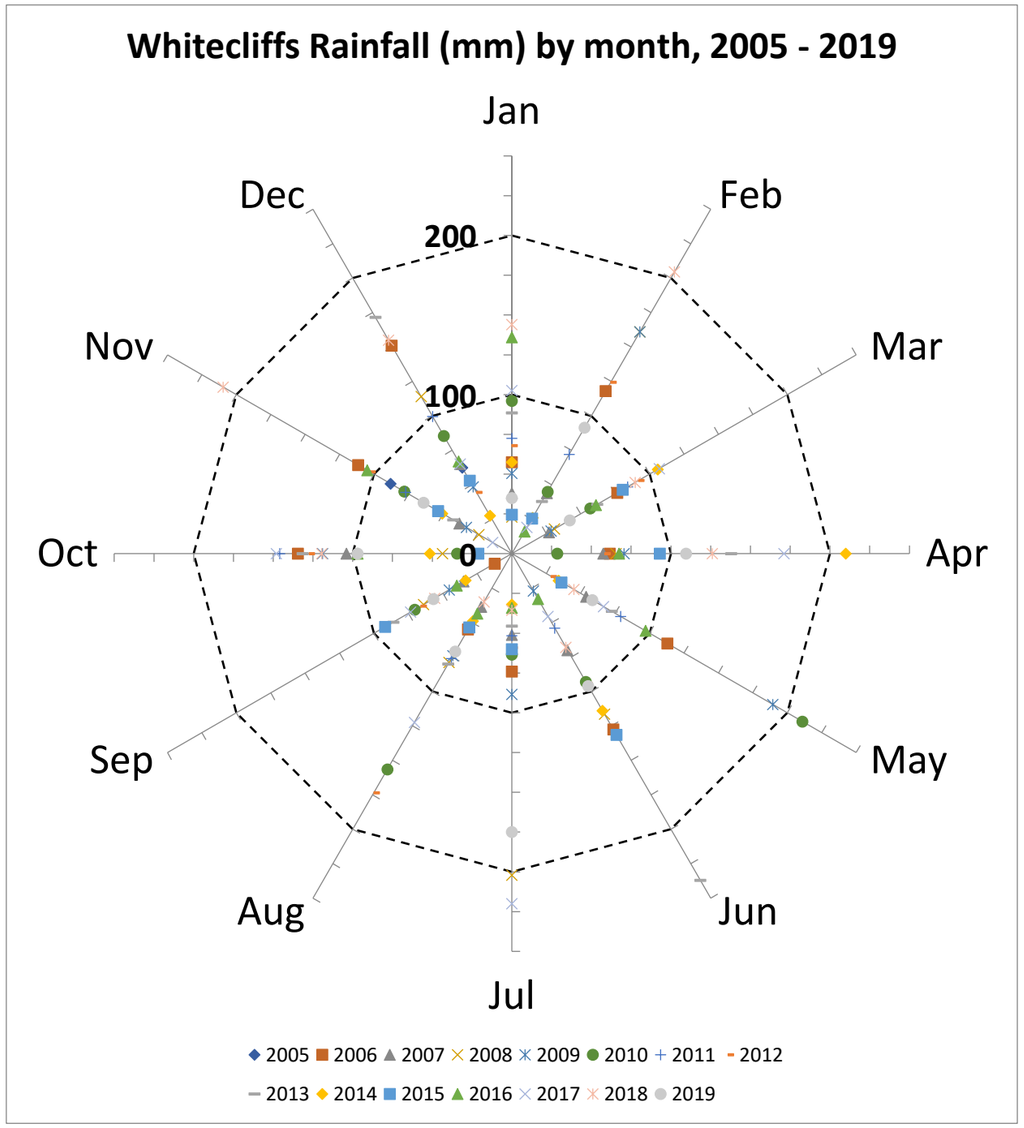


Figure 10: Rainfall by month as recorded at the ECan Whitecliffs weather station

4 What information is there to support the assessment that these classic AMD type discharge/contaminant sources can be controlled into the future at the mine-site?

The North ELF is an example of how backfill methodologies as set out in the EMP (short lift with traffic compaction) resulted in discharge of relatively low contaminant loads. The Acid Based Accounting block model also allows materials with a high risk of acidity generation (e.g. Old North Dump type materials) to be identified ahead of mining for more controlled disposal as per the AMD and construction management plans. It is noted that the EMP contains the mines AMD Management Strategy.

Discharge of mine affected water from North ELF to Bush Gully Stream is governed by resource consent CRC173823. The monitoring suite and resource consent compliance limits are summarised in Table 1 below.

Table 1: CC24 compliance limits downstream of North ELF

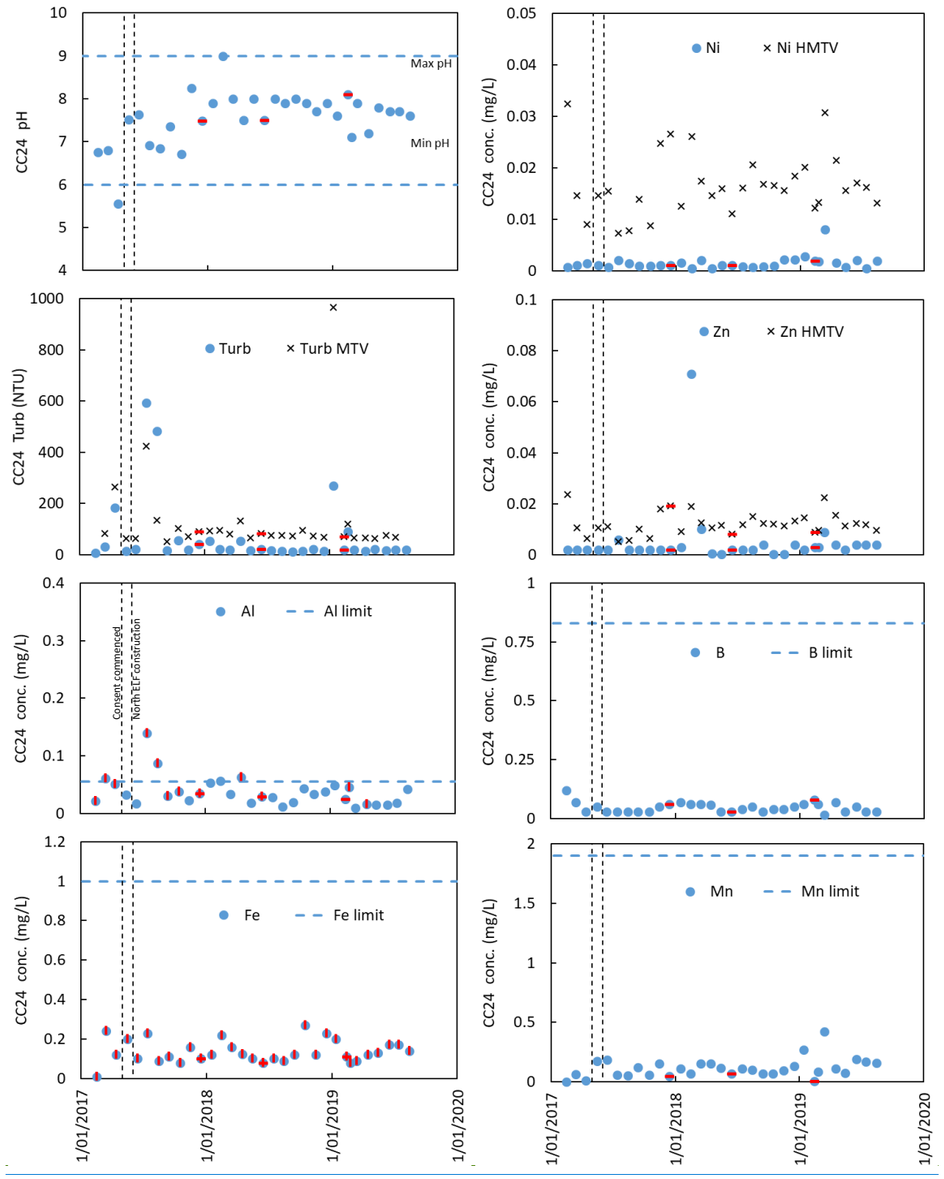
Contaminant	Unit	Frequency	Limit
pH*		Monthly	6-9
Turbidity	(NTU)	Monthly	<50 NTU increase from CC22
Electrical Conductivity		Monthly	
Boron**	(mg/L)	Monthly	0.83
Manganese	(mg/L)	Monthly	1.9
Nickel***	(mg/L)	Monthly	0.011
Zinc***	(mg/L)	Monthly	0.008
Iron	(mg/L)	Monthly (if pH is <4.5)	1
Aluminium	(mg/L)	Monthly (if pH is <5.5 or >7.5)	0.055
Total Suspended Solids	(mg/L)	Monthly	

* Unless modified in accordance with CRC173823 conditions 30-32; ** Unless modified in accordance with CRC173823 conditions 24-29; *** Where the compliance limit (ANZECC 95% TV) is modified by the hardness algorithm: $TV(H/30)^{0.85}$ (HMTV)

Mine water discharge from the North ELF is via a sediment pond with flow rate controlled by a floating decant and riser system. Discharge is therefore relatively continuous, however flow rates can:

- Increase significantly during rain events; or
- Decrease if the floating decants are raised or the water level falls below the 'dead storage' level in the pond.

Figure 11 shows CC24 monitoring data compared against compliance limits.



'No-discharge' data shown by (–); pH outside range of reporting shown by (|).

Figure 11: CC24 Compliance Record

Although there were some exceedances for turbidity at the CC24 compliance site shortly after North ELF construction commenced monitoring data show consistent CC24 compliance since mid/late 2017 (**Figure 11**).

		An adaptive AMD management/treatment plan was developed as part of the North ELF consenting process. The AMD risk was classified based on annual acidity load. The management description for each risk class ranged from no treatment with discharge within compliance to a medium scale active treatment dosing plant. Acidity loads from the North ELF have remained negligible with CC27 and CC20 remaining circum-neutral. As such, North ELF discharges to date have remained in the 'Very Low' risk class (as defined in the 2016 AMD management plan (BRL 2016) for negligible acid loads) with no treatment required (from a geochemical perspective) and discharge within compliance.
5	How is this proposed to be demonstrated – continuous logging of say conductivity and/or pH at CCO2 and/or CCO3?	Routine monitoring is gathering the data required to demonstrate that the contaminant loads discharged from site are being adequately controlled. Continuous logging of pH and Electrical Conductivity is currently captured at CC02-tele as per CRC170541. This continuous data, along with monthly compliance sampling currently provides an adequate level of monitoring of discharges into Tara gully from site activities. Further sampling at CC03 can be added to the monitoring suite if required, this site is one of many locations monitored monthly to provide background information on water quality.
6	Monitoring at the exit of Pond 2 in Tara Stream is largely an "end-of-pipe" type discharge point. This is an appropriate "discharge" monitoring type site for a large mine-site, but there should also be a monitoring site demonstrating the effects after such discharges have equilibrated/stabilised in the environment and therefore their effects on the natural environment. So there should be a monitoring site some distance downstream, but not as far as below the forestry. Can the application give some consideration of an appropriate site, and appropriate monitoring?	As set out in the EMP, an extensive water management system is in place at the site. In addition to the monitoring and compliance site CC02, monitoring is already undertaken at other sites as shown in **Figure 12** below:

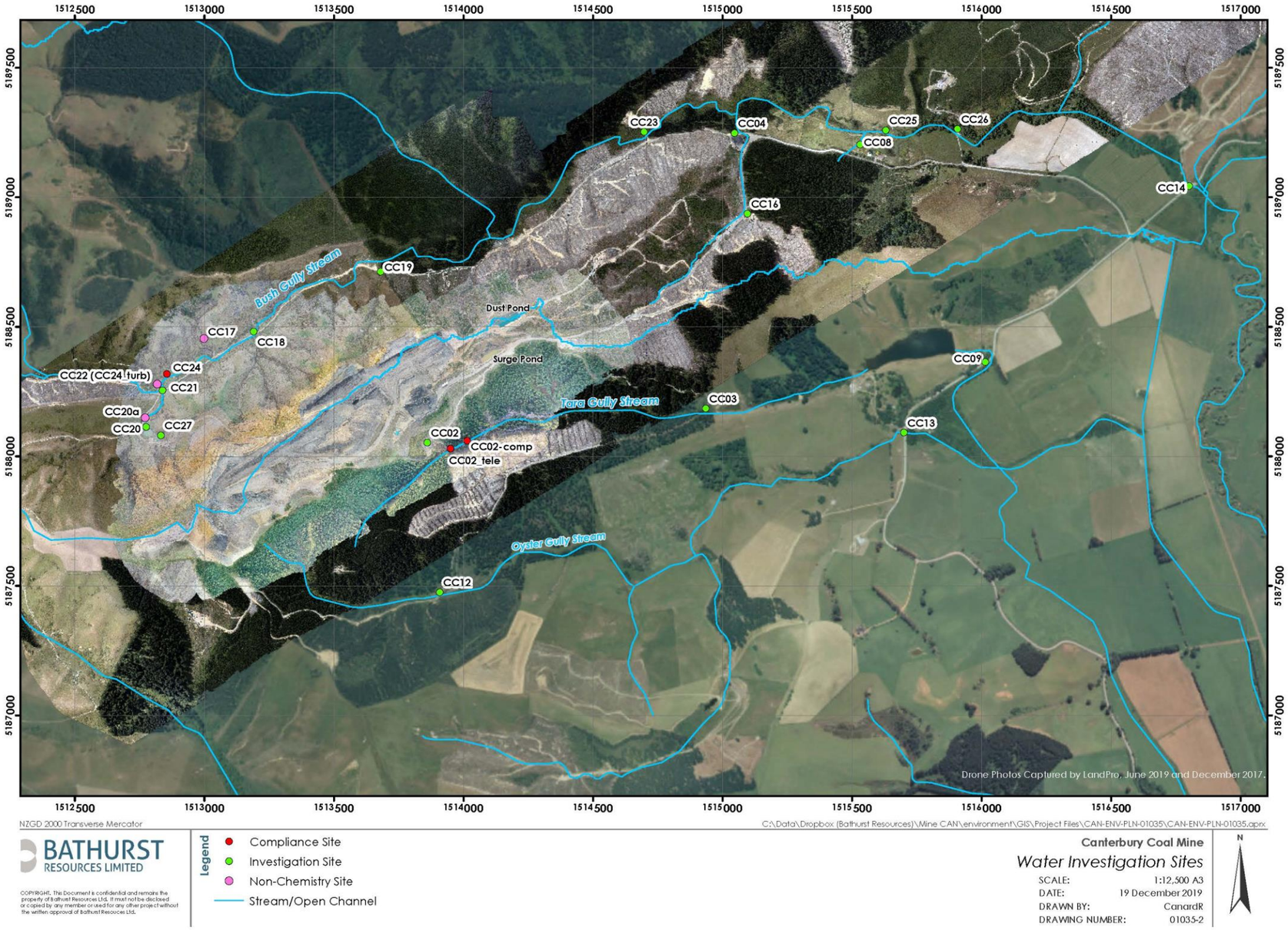


Figure 12: Water Quality Monitoring Sites

Due to BCL's inability to manage surface and ground water runoff from sources outside of its mining footprint (ie. offsite), any water quality results obtained from further downstream, below its discharge points, may provide misleading results if the runoff water quality from other land uses (ie. offsite) is to be attributed solely to BCL's activities. It is noted that monitoring of the discharge point, will measure the quality of "treated" water from the CCM. However, once the water is released from the mine's treatment system, BCL cannot be held responsible

		for extraneous runoff from land NOT controlled by BCL (ie. offsite land uses and runoff), particularly when natural background concentrations of some elements may be elevated, or land use practices result in high contaminant loads from land up stream of the suggested monitoring point. This land is not under the control of BCL. These "offsite" runoff contributions may have a negative impact on water quality within the catchment. If an additional monitoring site is to be added, then these issues need to be clearly provided for so that BCL does not become responsible for the actions of others. We would suggest that BCL monitor at CC03, being a site beyond the mixing zone and report these findings annually, along with a discussion on the longitudinal water chemistry in Tara Stream in the annual water monitoring report (see condition 24 CRC170541). This monitoring however should not be used to for enforcement action purposes.
7	Biochemical oxygen demand is poorly considered (for Tara Pond and Bush Gully Stream discharges) when the respective discharges will contain levels of coal fines. Coal fines are biodegradable [almost pure] unoxidized carbon so will have a significant BOD/COD. When the discharges are from ponds, or the receiving environments are sluggish or wetland type environments, has there been significant consideration of sediment anoxia and water anoxia in receiving environments? Particularl y when considering options for coal washing plants.	The level of coal fines in discharges from site are low for the following reasons: • The only runoff from site that has the potential to contain entrained coal fines is from the ROM area. This area is only approximately 1.5Ha and is therefore a small proportion of the site's disturbance footprint and therefore, surface run off potentially containing coal fines will be minimal when considering the total disturbance area. • Surface run off from the ROM area is captured in the Tara surface water system which also captures runoff from the mine site generally, excluding the North ELF. • The surface water treatment system works on the settling velocity of sediment particles suspended in the water. Generally, the larger the sediment particle size, the faster the settling time for the particle. • Coagulant, and then Flocculent are used to increase particle size of the suspended solids which in turn increases the settling velocity of particles which speeds up treatment. Coagulant and flocculent target the tiny clay particles which, without treatment, have difficulty settling out (primarily due to the polarity of water and the fact that the clay particles are electrically charged). • Coal fines particles are larger than the tiny clay particles which are difficult to treat. Coal fines are not electrically charged unlike these clay minerals so settling times for coal fines are reduced and treatment requirements are also reduced. • Water treatment analysis on runoff from the main drain (that also drains the ROM area) has determined that this water requires the least amount of flocculent treatment to achieve sufficient settling times. The analysis for this runoff shows treatment requirements are an order of magnitude lower than high clay content runoff from other areas of the mine. • The water treatment system has been designed to accommodate significant rainfall events and enable treatment of the fine sediment particles. Under these scenarios it is expected that coal fines would have settled out and only very fine clay minerals remain in suspension. Earlier reporting has identified that water processing in the Mussel Shell Reactor (**MSR**) lowers the dissolved oxygen in the treated water. Therefore, treating AMD via the MSR can remove the acidic effects but will release anoxic water. This oxygen depletion zone will be most pronounced immediately downstream of the MSRs onsite. Reaeration will increase oxygen content as the water flows downstream and dilution occurs. Monitoring onsite (see **Attachment 8**) at CC02tele confirms that this reaeration is occurring with latest Dissolved Oxygen (**DO**) readings at CC02 of 9.2 g 02/m^3. This result shows that DO is fairly close to being fully oxygenated. The BOD/COD results are below detection limits (see also **Attachment 8**). Given this, impacts on the fish species that are known to exist within the downstream affected reaches with regard to BOD/COD are not expected to be significant, however it would be appropriate to include monitoring of dissolved oxygen. If monitoring detects an issue, this could be adaptively managed via a reaeration structure such as the creation of a small water fall to increase turbulence and promote further reaeration.
8	From 6. Above, re-aeration efforts (weirs or discharge structures) are only part of the solution as they are necessary but only treating current levels of oxygen depletion, not the full	Aeration is provided in the mechanics of the water management system that is employed at the site. As noted above, it is considered appropriate to extend the current monitoring regime to include DO, COD, and BOD records. This monitoring would occur at sites CCO2 and CCO3 to understand how DO is trending downstream of the site. As noted above water quality monitoring at CCOO2tele undertaken in November 2019 show that DO at this site is reasonably high at currently 9.2 g 02/m^3.

	BOD that may generate downstream DO sag conditions. Please give more consideration of this.	
9	The potential effects of dust discharges arising from the disturbance of any areas of old mine workings. I understand there is a risk of encountering old workings in the Southern Extension area.	There is no increased risk regarding dust discharges associated with historic mine workings.