

Lyttelton Port of Christchurch Coal Stockyard expansion project: response to Further Information Request - Stormwater Treatment Matters

This report has been prepared for the benefit of Lyttelton Port Company. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

*This disclaimer shall apply notwithstanding that the report may be made available to {*name of local authority* and} and other persons for an application for permission or approval or to fulfil a legal requirement.*

Rev. No.	Date	Description	Prepared By	Reviewed By	Approved By
0	May 2010	Draft for Client	C Mellish	P Heveldt	J Porter
1	July 2010	Final	C Mellish	P Heveldt	J Porter

1 Purpose

Lyttelton Port Company has applied for a suite of resource consents to expand the coal stockyard and the quarrying at Gollans Bay.

The Canterbury Regional Council has requested further information under Section 92 of the Resource Management Act, 1991.

The purpose of this report is to provide answers to those questions relating to the treatment of stormwater runoff from the coal stockyard as well as an answer to a question on the water supply to the coal yard for dust control. These are questions 19, 54, 58, 61 to 68 of the further information request, dated 10 March 2010. The report answers the questions in the order contained in the Request.

LPC is currently upgrading its coal stockyard water treatment plant for its existing operations through the installation of a water treatment process including a mechanical lamella clarifier. If the reclamation proceeds for coal stockyard purposes a further lamella unit would be installed. A Discharge Permit would be required because of a change in the outfall location.

2 Coal stockyard water supply and stormwater discharges

2.1 Item 19

Please provide information about the source of the water that is to be used for dust suppression, and a comment on the availability and amount of water required to adequately suppress coal dust discharges.

The Heathcote wellhead supplies potable water to the Lyttelton harbour basin. The water currently used by the Port Company for dust suppression is potable water.

The current availability is generally adequate to meet the demand for dust suppression on the stockyard. Christchurch City Council (CCC) are however currently reviewing the supply and planning to upgrade the pipe line through the tunnel feeding into the township. LPC are also producing in 2010/11 a review of present and future water requirements for the port and this work will help to inform the CCC water upgrade planning.

CCC have a total catchment management approach for the planning of potable supply in the Lyttelton Harbour network, and are reviewing the future demand for potable water.

In addition, depending on the timing of reclamation construction in relation to any CCC upgrade work, LPC is proposing to construct a water reservoir(s) above the coal stockyard to ensure that an adequate supply is available for dust suppression over the expanded coal stockyard area. Reservoir storage will be required if the instantaneous demands of the coal stockpile water system cannot be met by available flows from the CCC water supply.

2.2 Item 54

Water is applied to the coal stockpiles for dust suppression. Please confirm (a) the source, rate and volume of water applied to the coal stockpiles that enters the stormwater system, and (b) what proportion of the total stormwater volume is dust suppression water.

Item (a) The current source, rate and volume of water applied to the coal stockpiles is

- potable Lyttelton supply
- the sprinklers design flow rate is 18L/s
- daily volume varies on climatic demand, irrigated at a rate of 65 m³/h

Item (b) There is no relationship between the proportion of dust suppression water to the total stormwater in the treatment system as the sprinklers would not be used during a wet weather event. The flow to the dirty water pump stations, generated by the dust suppression system is low during dry periods.

For these reasons, the control strategy for the handling of stormwater is divided into two modes of operation, as described below:

- during dry weather, the stockpile runoff generated from the dust suppression system, or alternatively generated from short duration rain events, will be stored and fed back onto the stockpile. The water will be distributed using the existing water tanker. Under this operating mode, there may be some flow to the lamella plant but no run-off will be discharged into Te Awaparahi Bay harbour outfall
- during wet weather, the stockpile runoff generated is largely from a rain event and not the dust suppression system. Under these conditions, the flow will be treated by the lamella stormwater treatment system and discharged into the harbour outfall.

2.3 Item 58

There is conflicting information in the application about the proposed level of stormwater treatment (in Appendices 10 and 14). Please confirm whether it is proposed to treat stormwater such that it meets the relevant water quality standards in the RCEP, or to maintain the existing level of treatment.

The treated stormwater at the outfall is proposed to meet the standards set out in Table 2-1 below.

Table 2-1: Proposed water quality

Analytical Determinant	Proposed water quality
Turbidity	80 NTU
pH	4.5-9 pH units
Flow Rate	100 L/s

Provided these standards are met at the outfall then it is conservatively predicted by Cawthron that the treated stormwater will meet the visual clarity standard set out in Rule 7.1 B of the RCEP. It is noted this assessment is based on a dilution series study and the 80 NTU is conservative and would easily meet the clarity requirements (see pages 41 to 47 of the Cawthron Report).

2.4 Item 61

Please provide information on how the proposed treatment plant will be designed to manage contaminants other than coal fines (i.e., such as oils, fuels and greases from rail, heavy equipment and road areas and other contaminants associated with coal fines such as metals).

LPC currently uses the following management practices to manage contaminants:

- the access road around stockyard is maintained as a clean boundary with contamination from vehicles within the stockyard minimized
- any spillage of diesel in the fuelling area is managed by the operating procedures for the stockyard as follows: Pump station 3 is isolated, and the contaminated coal and any runoff is retrieved from the stockyard and removed from site
- A three stage interceptor is used also at the fuel area to trap oil and diesel spills. The interceptor pumps the separated flow to pump station 3. Pump station 3 is connected to the (lamella) stormwater treatment installation. The three stage interceptor is equipped with a shut off valve and can be closed if required.

The form of the trace metal content in any particular coal greatly influences the toxicity risk that it poses in receiving environments. Thus, the total metal content or even individual metals may not be present in bioavailable forms. In fact, various studies have concluded that the contaminant load in coal is relatively non-bioavailable. Furthermore, it is likely that, in the treatment plant, both the coal fines themselves and the PAC coagulant will adsorb and co-precipitate dissolved metals from other sources (heavy machinery, road runoff etc.), possibly to a significant extent.

The result will be that the concentrations of metals reaching the marine environment, regardless of source, will be negligible.

2.5 Item 62

Please provide information on how the proposed acid correction will be carried out and at what stage of the treatment process will it be carried out.

The influent pH water quality will be monitored and a chemical added to correct the pH to within the preferred dosing range for the coagulant, which will meet the range allowed for in the consent.

The influent pH will be monitored in the chemical mixing tank and the lamella clarifier effluent will also be monitored to maintain the pH within the consent limits.

2.6 Item 63

Please clarify what turbidity levels the treatment system is being designed to, and the rationale for these levels.

The treatment process for the reclamation will be designed to treat the stormwater to the proposed consent level requirements as set by the RCEP. The rationale for this choice is described in item 58 above.

2.7 Item 64

Please provide information about how coal fines will be managed and a comment on how this fits with best practice for treatment plant performance for managing coal fines.

The following methods are used to protect the treatment process from excessive fines loading and will also be used in the extended yard, namely:

- the stockyard is equipped with concrete aprons in front of the stormwater pump stations. These areas are shaped to collect coal fines from the stormwater in the stockyard and are cleared by front end loaders. This process provides a primary settling zone, where coal fines are removed from the stormwater gravitating into the pump station.
- the pump stations are designed with two compartments. The first compartment, a slurry sump, allows for the settling of coal fines, followed by an overflow weir feeding the dirty water pumps. The first sump

is equipped with a solids handling pump, which pumps the coal fines back into the stockyard. The second sump is equipped with a dirty water pump that pumps the stormwater forward to the treatment process. This process operates as a secondary separation zone.

The treatment system for the reclamation area will also include the following features:

- as per Figure 4.1: Process Flow Diagram of Proposed Treatment System in our report¹ (Pg 6) the secondary separation area will be upgraded to include the installation of a hydrocyclone, which separates fines to a level of 150 micron. The separated coal fines will be discharged into the slurry sump and pumped back into the stockyard. This additional process will ensure control over the size of coal fines that must be treated and avoids the need for personnel to handle the slurry
- the treatment process will receive the stormwater with the remainder of the coal fines. The coal fines will be utilised as a seed to improve the settling of the coagulated particles. This process is referred to as ballasted settling.
- the sludge generated in the clarifier will settle into hoppers. The proposed treatment process utilise pumps to remove the sludge from the hoppers and pump the sludge to the stockyard, where it will be distributed back into the stockpiles.

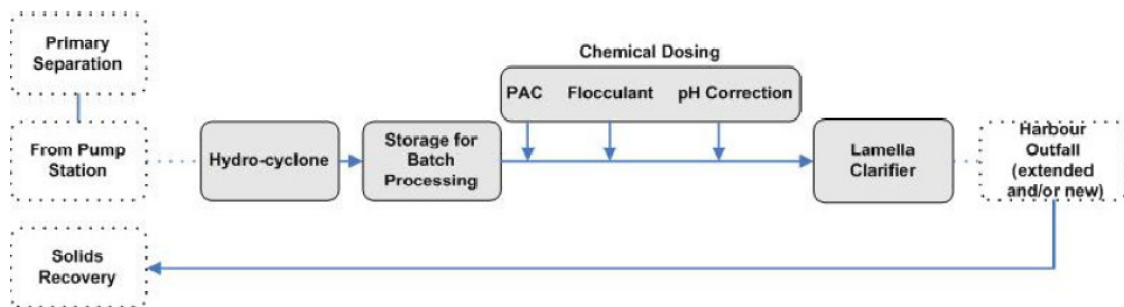


Figure 4.1: Proposed process flow diagram

2.8 Item 65

Please assess the likely variability of the coal types stockpiled and hence the likely variability in stormwater quality, and details of how this will be managed.

LPC handles a wide range of coal types (hard coking, semi-soft and thermal) from underground and open cast mines on the West Coast operated by Solid Energy and other miners including Pike River and Francis Mining). The coal comes from a number of different mines (Stockton, Spring Creek, Roa, and Pike River etc) with various types being on site in different combinations at different times. Around eleven different “product” types will be assembled in stockpiles at the port in any one year with a range of moisture content and particle size distributions.

LPC have built up experience of the variability of these coals and are confident of being able to cope with the variability in the future. The combined characteristics of the stormwater run-off from the different stockpiles does not vary significantly over short periods, however seasonal variations will be monitored and controlled in the proposed treatment system.

The stormwater treatment system will be designed to be robust enough to manage the likely range of influent loadings and pH. The plant will be designed with automated real time systems to control the pH and turbidity of the treated flows.

¹ MWH Report: LPC Stormwater Treatment Upgrades Technical Paper.doc, November 2009

2.9 Item 66

Please describe how sludge will be managed and where will it be disposed. If sludge from the treatment plant is dewatered please provide details of how the filtrate will be managed.

Item 64 above describes in detail how the coal particulate is handled. The sludge from the clarifier hoppers is expected to have dry solids of 0.5%, which will be pumped to a front end loader on a batch basis when required for distribution back onto the coal stockpiles.

The sludge is not dewatered and will be spread on the stockyard. The sludge will form part of the coal export chain and is a very small fraction of the mass handled.

2.10 Item 68

Please provide further information to demonstrate that the Polyaluminium chloride (PACl) in the discharge will be stable initially in the in the discharge plume, and in the long term within a marine environment. Given the composition of PACl, instability above pH 8 would be expected. Based on the response please assess the potential effects of discharging stormwater containing flocculent into the coastal marine area.

In Appendix 14, Cawthron Report No 1509, June 2009 (page 47) discussed the implications of chemical treatment additives and their impacts on the marine environment and elaborated on the rapid assimilation of any remaining aluminium in the effluent in their response dated 23 April 2010.

As noted by Cawthron, the fate of aluminium in the marine environment is typically that of rapid attenuation by a variety of physical and chemical processes. The enhanced reactivity of aluminium in seawater is one key factor resulting in rapid removal by particulate matter and humic substances.

Coagulant dosing in the stormwater treatment system is designed to provide effective removal of suspended particulate to the greatest practicable extent, while avoiding overdosing of the coagulant which would be both wasteful and costly.