APPENDIX C

WATER BALANCE

Sediment basin volume calculations

The required sediment basin volume was calculated in accordance with the procedures outlined in *Managing Urban Stormwater – Soils and Construction – Volume 1* (Landcom, March 2004) and *Volume 2E Mines and Quarries* (DECC, June 2008). These calculations adopted the following:

- A total catchment area of 16.79 ha;
- A design rainfall depth of 39.2 mm which is for a standard receiving environment and disturbance greater than 3 years (refer to Table 6.1 in DECC, 2008);
- A weighted runoff coefficient (C_v) of 0.43;
- Sediment storage zone based on four months soil loss calculated using the Universal Soil Loss Equation (USLE) and the following factors:
  - R = 1320
  - K = 0.05
  - L = 100 m
  - S = 2%
  - LS = 0.44
  - P= 1.3
  - C = 1
  - Density = 1.3 t/m^3
  -

The required sediment basin volume is:

- Settling zone 2,847 m^3
- Sediment storage 162 m^3
- Total 3,009 m^3 (approximately 3 ML)

DA10.2017.51.3 (approved 28/9/22) approved an increase of the site sediment basin from 3.2 ML to 5.2 ML.

This sediment basin therefore provides sufficient volume to meet the minimum design volume plus storage for water reuse.

Water balance model

Water demand on set is met through a combination of sources including the surface water and groundwater.

Water is used from the surface water system for dust suppression and processing. A diesel pump is located on the western edge of the sediment basin, and this is used to pump water to header tanks for use around the quarry.

The surface water supply is supplemented with groundwater extracted from a licensed bore. Boral holds a water access licence with an entitlement of 6 ML per year.

A site specific daily water balance model was used to assess the overall water cycle for the quarry operations and determine:

1. if adequate surface water and groundwater supplies are available to meet operational water demand;
2. the average number of spill events from the surface water management system. For a 90th percentile design basis, the average number of spill events should be 2 to 4 spill events per year (DECC, 2008).

The model uses 132 years of daily SILO (climate database) rainfall and evaporation data for the site (1 January 1889 to 31 December 2020). The SILO data interpolates rainfall and evaporation values from surrounding climate stations to provide a long term data set for the specific location (Data Drill for Latitude, Longitude: -31.30 150.75).

The water cycle is broken down into its various components and then the inflows and outflows are modelled for each section.

Dust suppression

Water for dust suppression is drawn from on-site tanks which are filled from the sediment basin and holding pond and distributed across working areas using a 12,000 litre water cart. The water balance model adopted the following for dust suppression water:

- No dust suppression undertaken on Saturday or Sunday (non-working days);
- No dust suppression if rainfall on current day is greater than 5 mm;
- Four (4) tanker loads applied each working day (subject to rainfall constraint) in warmer months (November, December, January, February and March); and
- Two (2) tanker loads applied each working day (subject to rainfall constraint) outside of the warmer months.

The dust suppression supply was topped up with bore water if there was no water available from the surface water management system.

Process water

Process water is used for dust suppression on screens and conveyors and to add moisture to the product for processing. The water balance model adopted the following for process water:

- 400,000 tpa;
- 5 days per week, 52 weeks per year
- 1.538 t per day; and
- Water added at 4% of product (i.e. for each tonne of material processed, 40 L of water is used).

Modelling assumed the process water supply was topped up with bore water if there was no water available from the surface water management system.

Water balance results

The water balance model was used to assess two operating scenarios:

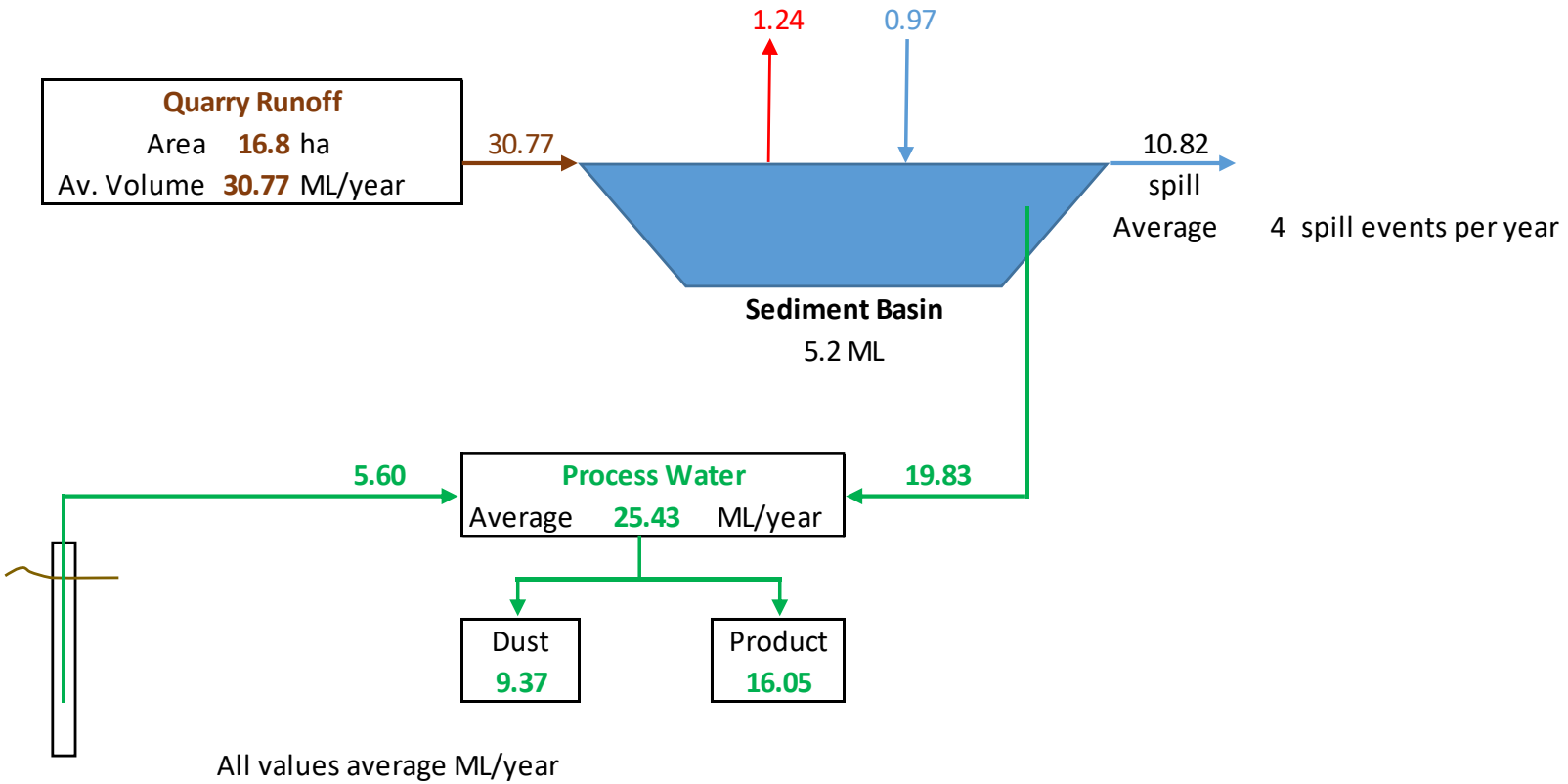
- Existing – annual production of 400,000 tpa with a 5.2 ML sediment basin; and
- Proposed – annual production of 400,000 tpa with a 5.2 ML sediment basin and 3 ML holding pond.

Existing operations

Results for the existing operations are summarised in Figure 7 and show:

- Average annual site runoff is approximately 31 ML/year;
- Around 19.8 ML/year is reused from the 5.2 ML sediment basin;
- An average of 5.6 ML/year is used form the bore;
- An average of 10.8 ML/year is discharged from the site; and
- There is an average of 4 spill events per year.

Figure 7 – Existing operations water balance results



Proposed operations

Results for the proposed operations including the enlarged sediment basin are summarised **Figure 8** and show:

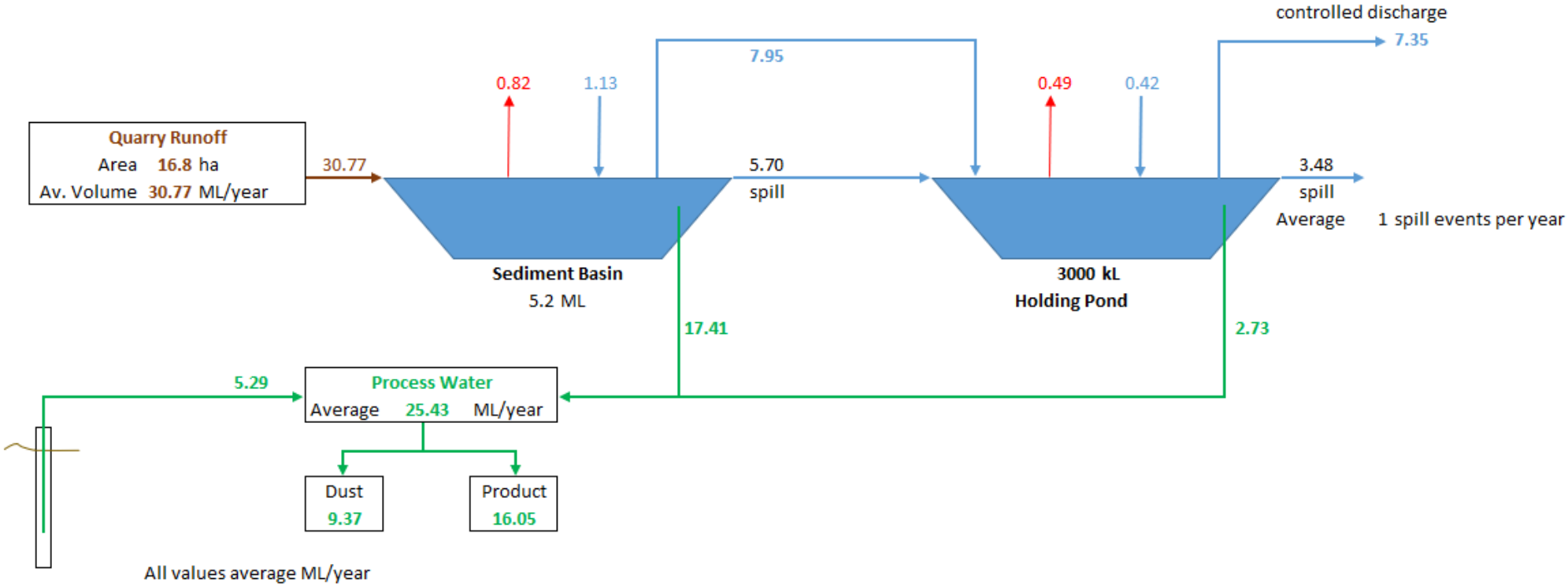
- Average annual site runoff remains at approximately 31 ML/year as there is no change to the quarry catchment area;
- Around 20.1 ML/year is reused from the sediment basin and holding pond;
- An average of 5.3 ML/year is used form the bore;
- An average of 10.8 ML/year is discharged from the site; and
- There is an average of 1 spill event per year.

These results demonstrate the addition of the proposed holding pond into the surface water management system:

- Increases the volume of surface water reuse at the quarry. This reduces the reliance on the groundwater system;
- Maintains the average volume of water discharged from the site; and
- Reduces the average number of spill events from the surface water management system from 4 per year to once per year.

Controlled releases would be made from the holding pond when operational water demand is low to ensure adequate capacity remains in the system to manage rainfall events. Controlled releases would only be made if the water quality meets the 100 percentile concentration limits specified in EPL 5846.

Figure 8 – Proposed operations water balance results



Premise