

# GMA Certification Group

BUILDING SURVEYORS

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*Leaders in Building Certification Services*

**PLANNING DIVISION**

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Our Ref: 20185223

Date: 26 June 2019

Chief Executive Officer  
Douglas Shire Council  
PO Box 723  
Mossman QLD 4873

Via Email: [enquiries@douglas.qld.gov.au](mailto:enquiries@douglas.qld.gov.au)

Dear Sir,

**RE: RESPONSE TO INFORMATION REQUEST - APPLICATION FOR OPERATIONAL WORKS (EARTH DAM) ON LAND LOCATED AT 22 MOUNTAIN VIEW DRIVE, SHANNONVALE (LOT4 SP134229) COUNCIL REF: OP2971/2019**

Reference is made to Councils Information Request pursuant to section 12.2 of the Development Assessment Rules, dated 1 February 2019, in respect of the abovementioned application.

Specifically, the following information was requested to complete the assessment of the application:

- Failure Impact Assessment;
- Dam design details;
- Details of construction material;
- Details of the construction methodology;
- Certified design drawings;
- Stability Analysis;
- Lawful point of discharge;
- RPEQ certified sediment and erosion control plan.

As Council should be aware, s45 (3) of *the Planning Act 2016* states that:

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(3) A code assessment is an assessment that must be carried out only—

- (a) against the assessment benchmarks in a categorising instrument for the development; and
- (b) having regard to any matters prescribed by regulation for this paragraph.

There are no other matters identified in the regulation that the application is required to be assessed against. The result of this section of the act is that Council can only consider the matters set out in the relevant Planning Scheme Code in determining the application and cannot consider any other matter. On that basis, in responding to this information request only information that is related to the assessment benchmarks has been provided as information provided that is not relevant to an assessment benchmark cannot be considered by Council in the determination of the application.

In accordance with section 13.2 of the Development Assessment Rules please find attached the following:

- An engineering report prepared by JT Smith and Associates Pty Ltd, dated 21 June 2019, that addresses:
  - Dam characteristics;
  - Hydrology/Hydraulics; and,
  - Stability of the Dam.

In giving this response we also advise that we wish Council to proceed with the assessment of this application under section 13.3 of the Development Assessment Rules, effectively ending the applicant-response period.

Council would also be aware that, pursuant to section 60 (2) (d) of the *Planning Act 2016*, Council are obligated to approve the application where conditions can be attached to any approval to secure compliance with an assessment benchmark. In this instance it is considered that there is no conflict with the Assessment Benchmarks; however, if a conflict is identified it is considered that compliance can be achieved by imposing development conditions.

We look forward to receiving your advice in respect of the proposal as soon as possible; should you have any queries regarding this matter please do not hesitate to contact the undersigned on 0438 755 374 or by email Patrick.c@gmacert.com.au

Kind Regards,

**Patrick Clifton**  
**PLANNING MANAGER**  
**GMA CERTIFICATION GROUP**

**J T Smith and Associates Pty Ltd**  
**PO Box 1027**  
**MALANDA, Q 4885**

**Telephone 0418725585**  
**timsmithco@bigpond.com**  
**Contact: Tim Smith**

21 June, 2019

**AP and BR Eldridge, Mountain View Road, Shannonvale**  
**Analysis of Existing Dam on Lot 4 SP134229**

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**Inspection**

I advise that I inspected the dam on the 12 April, 2019 before preparing this report to assist AP and BR Eldridge respond to a Show Cause Notice issued by Douglas Shire Council on the 30 November, 2018. The notice related to AP and BR Eldridge carrying out assessable development (Operational Works) without a permit.

It appeared that the dam, its spillway and outfall were within Lot 4, with that outfall to the natural overland path in the direction of the corner of Ponzo Road and Thomson Low Drive.

**Characteristics of the dam (refer GMA Certification Group Planning Statement)**

Feature	Measurements
Crest Height	2.6 metres
Thickness of crest	2.4 metres
Height of spillway	1.5 metres
Width of Spillway	10 metres
Base Width	15 metres
Length of wall	100 metres
Distance of backup at full supply level (FSL)	80 metres



Photo of dam looking from east to west (towards Thomson Low Drive)

Based on this information, the storage volume at FSL or spillway level is about 7.4 megalitres. Therefore, with these characteristics, as GMA concluded, the dam is not a Referable Dam under the Water Act 2000.

## Hydrology/Hydraulics

Assuming the 50ha catchment experiences the Probable Maximum Precipitation (PMP) rainfall event and using the Bureau of Meteorology's Generalised Short-Duration Method to determine the PMP for a 20 minute time of concentration extreme rainfall event at this location, this gave a PMP of 287mm in 20 minutes.

Using this rainfall intensity and assuming 90% runoff gives a Probable Maximum Flood of 8.6 m<sup>3</sup>/sec at the dam site. Assuming no attenuation of that flow through the dam and the small storage above it, the depth of discharge through the 10m wide spillway is 0.44m.

With the depth of the spillway being 1.1m, the dam will not overtop with a PMF event. With the PMF, the dam still has 0.66m freeboard. The PMP is about three times the 1% AEP flood event in the catchment (1 in 100 year ARI event).



Spillway

## Stability of the Dam

The dam has been constructed with hillslope material that appears to have shrinkage and plasticity limits that would have enabled it to be compacted to at least 98% RDD.

With a 2.4m crest and base width of 15m, the batter slopes are about 1 (vertical) on 2.4 (horizontal). Given the fact that the dam has a quite low embankment – a crest height of 2.6m and width of base of 15m and head of water in storage of only 1.5m and 1.94m under PMF conditions against it, the cross-section is considered adequate for seepage control.

Also under extreme PMP and PMF event conditions, the dam is not overtopped and still has some 0.66 m freeboard.

So failure of the dam is unlikely to occur by overtopping and breaching. Attachment 1 includes checks on breach failure with reference to the State Government's Guidelines for Failure Impact Assessment of Water Dams (2002).

The only other failure mechanism can be piping. At the inspection in April 2019, I looked at the alignment, downstream face, the inside of the embankment above water level, the grassed area below the dam and the spillway cutting. I saw no signs of misalignment, seepage, wet spots or erosion. I consider that under this low head and given the adequately constructed cross-section of the dam, piping is unlikely. However, I informed AP and BR Eldridge to always check for any sign of seepage, especially after the wet seasons.

At the time of inspection, the 2019 Monsoon rainfall event had just occurred and there was no sign of areas of concern. The grass cover had controlled surface rutting from rainfall.

## Conclusions

The dam is considered to be well constructed.

The spillway is capable of passing overflow from a PMF event.

With the 1% AEP flood event, the dam is not overtopped.

Theoretical breach failure analysis was carried out in accordance with the Department of Natural Resources, Mines and Energy guidelines. While the low embankment and the relatively small storage were somewhat outside the parameters those guidelines normally address, it was considered that the analysis confirmed that any failure would not significantly worsen the impacts downstream from a similar flood event across Ponzo Road and Thomson Low Drive.



J T Smith

RPEQ No 2668

## Failure Assessment

(reference Guidelines for Failure Impact Assessment of Water Dams, 2002)

The dam has a relatively long embankment to store a small amount of water. Assuming a typical homogenous earth fill embankment, the breach discharge  $Q^{\text{Breach}}$  is calculated by

$$Q_{\text{Breach}} = 2.5 F V^{0.76} H^{0.1} \text{ m}^3/\text{sec}$$

where,

F = a factor to account for the simplified nature of the assessment = 1.3

V = total volume of water that can be released = say 7.4 megalitres

H = maximum depth of water in storage = 1.5m + 0.44m or 1.94m

Therefore  $Q^{\text{Breach}} = 15.9 \text{ m}^3/\text{sec}$ , with up to  $8.6 \text{ m}^3/\text{sec}$  of that flow still going through the spillway. The spillway can not block.

The Guidelines specify breach parameters in Section 4.7.5(6) as follows. The guidelines recommend that unless special circumstances prevail, such as a very high embankment storing a relatively small volume of water, it should be checked that the breach size will be within the following range of parameters.

$$1.06 < B/b < 1.74$$

$$0.84 < B/d < 10.93$$

Side slopes in the range  $10^0$  to  $50^0$  off vertical

In this case we have a relatively long low embankment and a small storage volume of water, so B/b and B/d for this dam also fall outside the parameters. Therefore, assume a dam failure occurs with the PMF storage level and that the whole dam fails at the upper limit of those parameters (worst result/conservative)

$$B/b \text{ say } 1.74 = 100/b \text{ or } b = 57\text{m}$$

$$B/d \text{ say } 10.93 = 100/d = 9\text{m}$$

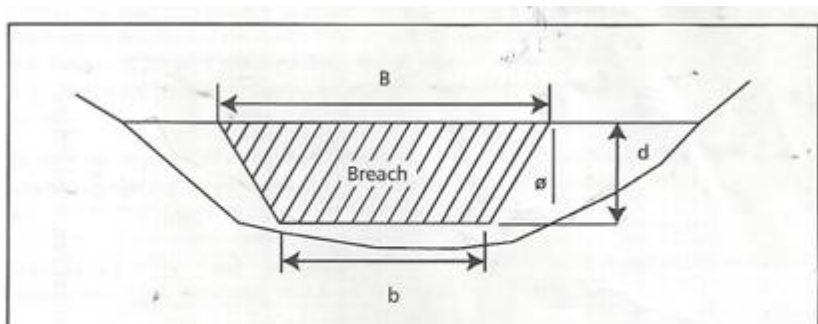


Figure 5 - Notation for breach parameters

Obviously the dam is outside the parameters in the Guidelines. There cannot be 9 metres of water behind the dam. However, as a guide, the Breach Development Time (BDT) was calculated based on the volume of material removed as the dam fails ( $V_m$ ) (Guidelines Fig 6.)  $V_m$  from the characteristics of the dam =  $2,262 \text{ m}^3$ . Therefore BDT came out as 37 minutes

Even if we assume a BDT of half that, say 20 minutes (and it will probably be at least in that order given the low head of water), as the breach develops the breach flow will peak at  $15.9\text{m}^3/\text{sec}$  over what will eventually be the 57m breach after 20 minutes or  $0.27\text{ m}^3/\text{metre}$  length of breached embankment. As the breach develops, the level of the water in storage falls, so will the flow through the spillway until the flow downstream approaches the  $Q^{\text{Breach}}$  and the spillway ceases to flow.

So the peak flow below the dam under PMF conditions is conservatively  $Q^{\text{Breach}}$  or  $0.27\text{m}^3/\text{metre}$  over the 57m of the breached dam developed above. That will have less impact over Ponzo Road and Thomson Low Drive than the PMF flow from the spillway, because of it's distribution across the corner of the embankment.

These comments ignore these minor the mitigation effect of the Eldridge dams.

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