

1 May 2023

Mr Stephen O'Donoghue  
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Department of Planning & Environment  
Locked Bag 5022  
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Via: Planning Portal

Dear Stephen

**Re: Albion Park Quarry – Stage 7 (SSD-10369) RFI - 22 December 2022**

I refer to the Department's Request for Information RFI3 dated 22 December 2022 in relation to a range of matters related to the above proposed development. The following provides a response to the matters raised. The additional information requested is highlighted in *italics* with the response in a normal font. An updated *Amendment Report* has been prepared and has been submitted separately.

## **VISUAL IMPACT ASSESSMENT**

### **Mitigation of Visual Impacts**

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#### Request for information

*The department requires further assessment of the potential visual impact of the proposed extension. The assessment should include alternative mitigation measures to reduce the visual impact of the proposed extension.*

#### Discussion

*Based on the information submitted, the department considers the risk of the proposed rehabilitation failing to reduce the visual impact of the proposed extension to be high. The contributing factors to this conclusion are:*

- *Limited examples of successful rehabilitation on a highwall with a similar grade. Several examples reviewed by the department included bench designs of 5 – 10 metres to accommodate maintenance access and provide sufficient soil and water to support vegetation.*
- *Rehabilitation of highwalls has not been undertaken in a location with similar visual sensitivity and magnitude.*
- *The visual montages presented are not consistent with the likely appearance of vegetation on the highwall benches.*
- *The highwall would form part of the final landform in perpetuity. Any mitigation measures supporting the reduction of any visual impact must also be able to perform in perpetuity.*

## Response

Cleary Bros has amended the Project to incorporate the following additional mitigation measures. Each of these amendments are described in greater detail in the *Amendment Report*.

- Reduction in the area of Stage 7e to move the eastern boundary westwards, thereby providing an additional approximately 20m of visual barrier.
- Increase in the width of the visible benches on the western and northern terminal highwalls from 3m wide to 10m wide. This would result in additional area for rehabilitation and maintenance operations and to establish soil and water resources to support vegetation growth in perpetuity.
- Establishment of two additional tree screens on natural ground to the east of the Stage 7 Extraction Area which are expected to exceed 10m in height prior to the commencement of Stage 7e.

Appendices 4 and 5 of the Amendment Report provide a *Visual Character Assessment* and updated *Visual Impact Assessment* for the Amended Project and Section 6.2 of the *Amendment Report* provides a summary of those assessments. In summary, the above amendments would result in the following reduced Project-related visual impacts.

- A reduction in the height of the western and northern terminal highwalls visible after Stage 7e from the east and southeast of the Amended Project Area as follows.
  - Stage 7 western terminal highwall – from approximately 38m to approximately 21m.
  - Stage 7 northern terminal highwall – from approximately 42m to approximately 16m.
  - Stages 1 to 6 western backfilled and rehabilitated face – from approximately 65m to approximately 16m.
- An increased probability of success of the proposed revegetation of the visible benches on the western and northern terminal highwalls associated with an increase in width from 3m to 10m wide. Annexure 1 of the *Visual Impact Assessment*, presented as Appendix 5 of the *Amendment Report* presents a range of examples of successful rehabilitation on quarry benches greater than 8m wide in the Illawarra and elsewhere.
- The proposed 10m high tree screens would provide additional visual screening of the final Extraction Area prior to the commencement of Stage 7e. It is noted that existing vegetation to the east of the amended Extraction Area is commonly at least 10m high and Cleary Bros anticipates that achieving the nominated height for the tree screens would be achievable.

In addition, given the examples of natural rehabilitation of quarry faces with no or limited ongoing maintenance presented in Annexure 1 of the *Visual Impact Assessment*, Cleary Bros anticipates that once established, the revegetated benches would be self-sustaining in the long-term. If maintenance were required, the 10m wide benches and, where required, inter bench ramps, would permit such activities.

Finally, the updated *Visual Impact Assessment* includes photomontages of the amended final Extraction Area, including views of both unvegetated and vegetated terminal faces, providing a worst case and anticipated likely rehabilitation outcome.

## **Visual Landscape Character Assessment**

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### Request for information

The department requires further visual impact and visual landscape character assessment that includes:

- *sensitivity of each landscape zone as a combination of the scenic quality of each landscape zone and how sensitive the landscape zone is to change. The sensitivity analysis should be based on:*
  - *scenic quality based on the presence/absence of scenic, cultural, or aesthetic values associated with community perceptions of low, moderate, or high scenic quality*
  - *the importance of viewpoints and the value that the community or visitors may place on landscapes viewed from public use areas and infrastructure as well as private viewpoints such as dwellings.*
  - *the types of views and number of viewers for each landscape zone, including consideration of recreational activities and local transportation*
  - *analysis of the sense of place held by those who live or visit the respective landscape zones supported by consultation materials.*
- *magnitude of the proposed extension, including the physical scale, how distant it is, and the contrast it presents to the existing viewshed.*

### Further guidance

*In addition to the 2020 Transport for NSW Guideline for landscape character and visual impact assessment, further guidance is available in the Department of Planning and Environment Technical Supplement – Landscape and Visual Impact Assessment Large-Scale Solar Energy Guideline (August 2022).*

### **Response**

Appendix 4 of the *Amendment Report* presents a *Landscape Character Assessment* prepared by Moir Landscape Architecture (Moir, 2023) to address the above requirements. The assessment was prepared with reference to the following documents.

- *Guideline for Landscape Character and Visual Impact Assessment (Transport for NSW, 2020).*
- *Technical Supplement - Landscape and Visual Impact Assessment Large-Scale Solar Energy Guidelines (DPE, 2022).*

In addition, an updated *Visual Impact Assessment*, informed by Moir (2023), is presented as Appendix 5 of the *Amendment Report*. That assessment provides additional assessment of the anticipated visual impacts of the Amended Project.

## HISTORIC HERITAGE

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### Request for information

*The department requires a revised historic heritage assessment which:*

- *is prepared in line with the NSW Heritage Manual*
- *all heritage items within and near the site, including built heritage, works, relics, gardens, landscapes, views, trees, or places of non-Aboriginal heritage significance,*
- *detailed mapping of Historic heritage items,*
- *an assessment of the items and site(s) heritage significance,*
- *an assessment of the heritage impacts of the proposed extension on the heritage significance of the sites, including the curtilage of each item, the landscape setting, and connectivity between the heritage items, and*
- *detailed mitigation measures for predicted impacts on heritage values.*

### Discussion

*The RtS does not adequately address several historic heritage issues outlined by Shellharbour City Council and the department. To adequately assess the potential impact of the proposed extension on the heritage values of the surrounding heritage items and the cultural landscape, an assessment of their heritage significance and curtilage is required.*

*The assessment of the heritage impacts of the proposed extension on heritage values should include:*

- *visual impacts of the proposed extension on views to, from, and between surrounding heritage items*
- *altered historical arrangements and access*
- *impacts on landscape and vistas*
- *impacts on the use of the surrounding land for dairying, including the management of flyrock risk and any mitigation measures that would limit land use during blasting*
- *blasting/ground vibration impacts on building fabric*
- *noise treatments to historic buildings*
- *the assessment should include these heritage items:*
  - *the Hill Farm Complex – 195 Dunsters Lane, Croom (including World War II observation post boxes)*
  - *Kurrawong Trees, Dry Stone Walls, and Silo – 126 James Road, Croom*
  - *St Ives and fig trees – 2 James Road, Croom*
  - *Rosemont Complex Trees and Setting – 35 James Road, Croom*
  - *Bravella Site Fig Trees – 144 James Road, Croom*
  - *Kyawana – 265 Dunsters Lane, Croom*
  - *Memorial, Norfolk Island pine trees – James Road, Croom*

- *lists held by the National Trust should also be reviewed and considered in the assessment*
- *additional assessment of the Belmont Homestead and fig trees to consider the impacts on heritage significance in connection with other homesteads in the landscape, visual impacts, landscape and vistas, and altered historical arrangements and access.*
- *an assessment of the cumulative impact of the proposed extension on historic heritage values.*

*The department notes that the Shellharbour Heritage Inventory for The Hill Farm Complex includes a recommendation to nominate the listing for the State Heritage Register. The assessment of heritage significance should consider whether The Hill Farm Complex meets the criteria for state heritage significance.*

#### Mitigation measures

*The department notes the historic heritage assessment should identify impacts and, if required, outline mitigation measures to reduce the predicted impact.*

*Negotiated agreements cannot be used as a mitigation measure for impacts to heritage items.*

#### **Response**

Cleary Bros commissioned Biosis Pty Limited to complete a *Historic Landscape and Heritage View Impact Analysis* to address the matters identified above. The resulting report, referred to hereafter as Biosis (2023) is presented as Appendix 6 of the *Amendment Report*. Section 6.3 of the Amendment Report provides a summary of Biosis (2023). The following presents a response to each of the matters above based on Biosis (2023). For ease of reference, the matters identified above have been reproduced as italics text, with responses to each in normal text.

*The department requires a revised historic heritage assessment which:*

- *is prepared in line with the NSW Heritage Manual*  
Section 1.4 of Biosis (2023) identifies that that report was prepared in accordance with the guidelines of the NSW Heritage Manual and the Burra Charter, and its practice note on cultural landscapes.
- *all heritage items within and near the site, including built heritage, works, relics, gardens, landscapes, views, trees, or places of non-Aboriginal heritage significance,*  
Section 3 of Biosis (2023) identifies all listed heritage items in the vicinity of the Amended Project Area.
- *detailed mapping of Historic heritage items,*  
Figures 8 to 13 and 17 to 24 of Biosis (2023) present the location of the identified historic heritage sites.
- *an assessment of the items and site(s) heritage significance,*  
Section 3.3 of Biosis (2023) presents a description of heritage-related significance of each of the identified items.
- *an assessment of the heritage impacts of the proposed extension on the heritage significance of the sites, including the curtilage of each item, the landscape setting, and connectivity between the heritage items, and*  
Section 8 of Biosis (2023) presents an assessment of heritage-related impacts on the identified items.



- *detailed mitigation measures for predicted impacts on heritage values.*

Section 8 of Biosis (2023) presents a range of recommendations in relation to management of historic heritage values.

*The assessment of the heritage impacts of the proposed extension on heritage values should include:*

- *visual impacts of the proposed extension on views to, from, and between surrounding heritage items*

Section 5 of Biosis (2023) addresses historical and current views of the cultural landscape and individual places in that landscape. The assessment relied upon the definition of heritage view catchments within the *Shellharbour Development Control Plan*. The Plan identifies the concept of Primary View Catchments within which new development should be avoided.

Biosis (2023) undertook an assessment of the visual aspect of each of the identified historic heritage items and, in particular, which items had views of which other items. In summary, “Belmont” is within the viewshed of “The Hill” Farm Complex, “Rosemont” and “Kyawana” only. Biosis (2023) determined that the Amended Project would remove the Primary View Catchment of “Belmont” from Dunsters Lane”. In addition, Biosis (2023) note that the context of “Kyawana” has been significantly altered and there is no apparent view catchment from that site.

- *altered historical arrangements and access*

Section 4 of Biosis (2023) describes the historic access arrangements and potential changes to those arrangements. In particular, access between the identified heritage items would have been via James Road and Dunsters Lane. Informal paths and tracks may have also existed between individual sites, with these increasing and decreasing in importance with time as landownership changed.

The Project would not impact on identified historical accesses between the remaining heritage sites.

- *impacts on landscape and vistas*

Heritage-related impacts to landscapes and vistas have been assessed in Section 5 of Biosis (2023). In summary, the Amended Project Area is within the viewshed of “The Hill” Farm Complex, “Rosemont” and “Kyawana” only. While removal of “Belmont” and establishment of the proposed Extraction Area would alter the visual landscape, the historic heritage aspects of the changed landscape and vistas would be limited.

The *Visual Character Assessment* (Moir, 2023) and the *Visual Impact Assessment* (RWC, 2023) present additional assessment of the visual setting and impacts associated with the Amended Project. Those reports are presented as Appendices 4 and 5 of the Amendment Report and are summarised in Section 6.2 of that report.

- *impacts on the use of the surrounding land for dairying, including the management of flyrock risk and any mitigation measures that would limit land use during blasting*

The use of surrounding land has changed with time, with dairying becoming less common as a result of surrounding suburbanisation, development of transport corridors, market forces and changed landownership. Cleary Bros have undertaken quarrying activities immediately adjacent to dairying and other agricultural operations since the 1960’s. In

addition, quarrying and mining operations are commonly undertaken in close proximity to agricultural operations. As a result, Cleary Bros does not anticipate that the Amended Project would result in particular impacts on the use of the surrounding land for dairying.

In relation to managing fly rock risks, Cleary Bros have negotiated an agreement with the owners of “Figtree Hill” which includes processes to manage fly rock risks in a manner that would not significantly impact on their dairying operations.

- *blasting/ground vibration impacts on building fabric*

This matter is addressed below and in **Attachment A**.

- *noise treatments to historic buildings*

No noise treatments are proposed to any historic buildings.

- *the assessment should include these heritage items:*

- *the Hill Farm Complex – 195 Dunsters Lane, Croom (including World War II observation post boxes)*
- *Kurrawong Trees, Dry Stone Walls, and Silo – 126 James Road, Croom*
- *St Ives and fig trees – 2 James Road, Croom*
- *Rosemont Complex Trees and Setting – 35 James Road, Croom*
- *Bravella Site Fig Trees – 144 James Road, Croom*
- *Kyawana – 265 Dunsters Lane, Croom*
- *Memorial, Norfolk Island pine trees – James Road, Croom*

Each of the identified items have been assessed by Biosis (2023).

- *lists held by the National Trust should also be reviewed and considered in the assessment*

Section 3.2 of Biosis (2023) identifies that the only item listed on the National Trust Register is “The Hill” Homestead within “The Hill” Farm Complex.

- *additional assessment of the Belmont Homestead and fig trees to consider the impacts on heritage significance in connection with other homesteads in the landscape, visual impacts, landscape and vistas, and altered historical arrangements and access.*

Sections 3, 4, 5, 6 and 8 of Biosis (2023) address anticipated impacts of removal of the “Belmont” homestead in connection with other homesteads in the landscape, visual impacts, landscape and vistas, and altered historical arrangements and access. The results of these assessments are briefly described above.

- *an assessment of the cumulative impact of the proposed extension on historic heritage values.*

Section 8.4 of Biosis (2023) presents a cumulative impact assessment of the Amended Project. That assessment notes that the Amended Project would increase cumulative quarry-related impacts. However, those impacts were determined to be moderate in the full context of the surrounding landscape as the Amended Project Area is largely hidden from significant views and does not represent an added intrusion in those views such as power transmission lines or road projects. Biosis (2023) concluded that the Amended Project would have a lesser impact on the heritage landscape than the residential and transport developments that have previously been approved.

*The department notes that the Shellharbour Heritage Inventory for The Hill Farm Complex includes a recommendation to nominate the listing for the State Heritage Register. The assessment of heritage significance should consider whether The Hill Farm Complex meets the criteria for state heritage significance.*

Section 1.8 of Biosis (2023) identifies that there is no recommendation in the *Shellharbour Heritage Inventory* that “The Hill” Farm Complex be nominated for listing on the State Heritage Register. Rather, the listing assesses the heritage values of the Complex against the NSW Criteria for State heritage significance and mentions local and regional significance only. The recommended management is to ‘retain current listings.’ No recommendation is made to nominate the Complex on the State Heritage Register. Biosis (2023) state that despite enquiries with Council and others, a recommendation to nominate the item on the State Heritage Register has not been identified elsewhere.

Finally, the “The Hill” Farm Complex has been the subject of multiple assessments since it was listed on the register of the National Trust in 1977 and those assessments have resulted in the item being listed as having local significance only under the *Shellharbour Local Environmental Plan 2013* and regional significance under the now repealed *Illawarra Regional Environmental Plan No 1 (1986 EPI 11)*.

#### Mitigation measures

*The department notes the historic heritage assessment should identify impacts and, if required, outline mitigation measures to reduce the predicted impact.*

Section 9.2 and Appendix 1 of Biosis (2023) provides a range of recommendations and commitments respectively to mitigate anticipated heritage-related impacts.

*Negotiated agreements cannot be used as a mitigation measure for impacts to heritage items.*

Negotiated agreements are not proposed to be used to mitigate heritage-related impacts.

## **BLASTING**

### **Flyrock Management**

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#### Request for information

*The department requires an assessment of unexpected flyrock, and any associated impacts. The assessment must detail risk management protocols and whether neighbours would be required to vacate areas of their properties.*

#### Discussion

*Documents associated with the current approval LEC No. 10639 of 2005 identify the need for the property owners on the northern boundary of Stages 1 to 6 to vacate the area of people or cattle during a blast to mitigate the risk of unexpected flyrock.*

*The assessment documentation provided to the department does consider the risks associated with unexpected flyrock.*



## Response

The Applicant engaged SLR to prepare an assessment of blast-related matters raised by the Department, including unexpected flyrock. That assessment, referred to hereafter as SLR (2023a) is presented as **Attachment A**.

The blasting contractor for the quarry has stated that historically blasted rock generally falls within a blast envelope as follows. These distances are considered generally consistent with the industry best practice.

- 50m in front of the blast face.
- 20m on either side of the face.
- 10m behind the face.

For blasting undertaken within the Amended Project Area, the following management practices to manage flyrock are and would continue to be undertaken.

- Continue to notify the occupants of all properties adjoining the Stage 7 Extraction Area who request to be notified on the morning of each blast.
- Continue to survey the first row of blastholes to ensure identification of areas of less than optimum burden so that, if required, inert material instead of explosives can be placed at this location in the blasthole.
- Continue to use a minimum of 3m of aggregate as the stemming material as it locks in at the collar upon initiation of the blast to minimise material being ejected from the blasthole (“rifling”).
- Continue to adjust MIC when blasting close to external property boundaries in line with the near-field site laws to prevent vibration and air overpressure impacts on stock. This will also reduce the likelihood of flyrock when blasting close to external property boundaries.

Based on the above, SLR (2023a) state that ejection of flyrock beyond the usual blast envelope is not expected to occur.

Additionally, Cleary Bros have negotiated an agreement with the owners of “Figtree Hill” to cover a range of blasting-related impacts, including ensuring that people are aware of and vacate the blasting exclusion area, nominally 250m from the blast. Cattle are not required to be removed from the exclusion zone, with the near-field site laws utilised to minimise blasting risks to livestock.

Cleary Bros are also negotiating with all neighbours within 250m of the Amended Project Area to reach a similar agreement.

## **Additional Blast Monitoring Points**

### *Required Information:*

*The department requires a revised blast monitoring program that incorporates monitoring at receivers R5 and R6.*

### Discussion

*The RtS report predicts ground vibration between 3.8mm/s and 5mm/s during Stages 7a and 7b at receivers R5 and R6. The department does not consider the monitoring location at receivers R1 and R2 to be suitable for monitoring ground vibration at R5 and R6.*

### **Response**

The Applicant would establish two additional blast monitoring locations on its own land between the Extraction Area and receivers R5 and R6. Establishing these monitors on its own land would limit the frequency that the Applicant's personnel would be required to access private property surrounding these residences.

A mobile blast monitor would be located at the closer of the two monitoring sites for each blast. Blast criteria for the nominated sites would be established in the *Blast Management Plan* using the site blast laws to ensure that the nominated blast criteria are complied with at both R5 and R6.

## **NOISE**

### **Meteorological station data**

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#### Requested Information:

*The department requires an outline of the current meteorological monitoring undertaken on site and a comparison of the on-site meteorological data and the data from the Bureau of Meteorology Albion Park station data for the purpose of the noise assessment.*

#### Discussion

*Schedule 4, Condition 18 of No.10639 of 2005 requires Cleary Bros to ensure a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline.*

*The department notes the NIA does not use onsite meteorological data.*

### **Response**

The Applicant engaged SLR to prepare an assessment of noise-related matters raised by the Department, including an analysis of meteorological data used. That assessment, referred to hereafter as SLR (2023b) is presented as **Attachment B**.

Cleary Bros operate an on-site weather station in accordance with the conditions of Environmental Protection Licence (EPL 299) and Schedule 4, Condition 18 of Development Consent No.10639 of 2005. The weather station is currently located 35m northeast of the "Belmont" House, 75m east of the current extraction area and was installed in 2005 with refurbishment/upgrades in 2012, 2016 and 2023. SLR (2023b) state that the on-site weather station is influenced by topographic effects due to the complex terrain including funnelling and shielding of winds by surrounding hills, valleys, and nearby obstacles.

The noise and blasting assessment presented as Part 2 of the *Specialist Consultant Studies Compendium* that accompanied the EIS (SLR, 2022) used data from the nearby Shellharbour Airport BoM Station (No. 068241). SLR (2022) determined at the time that the Shellharbour Airport BoM Station was more representative of wind conditions in the region surrounding the Amended Project Area than the onsite weather station.

SLR (2023b) undertook a comparison of wind data between 2016 and 2020 for both the on-site meteorological station and the Shellharbour Airport BoM Station and determined that the use of the wind data from either station would not change the approach adopted in SLR (2022), the noise modelling results or assessment findings.

### **Short-term activities**

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#### Requested Information:

*The department requires revised noise modelling which incorporates the short-term activities as operational activities and provides predictions for all surrounding receivers. The revised noise modelling should include worst-case scenarios for each stage of the proposed extension.*

#### Discussion

*The noise impact assessment (NIA) provides separate models for operational and short-term activity scenarios. The department considers that short-term activities constitute operational activities occurring at or near the surface. Worst-case models for the NIA must include all operational activities.*

### **Response**

SLR (2023b) notes that the assessment of short-term activities presented in Sections 7.4.1.2 and 7.4.2.1 of SLR (2022) and Section 6.3.7 of the EIS were inclusive of typical extraction activities at the site. As an example, Stage 7b short term activity noise predictions include noise contributions from the concurrent Stage 7a extraction operation. As a result, the results depicting short term activities for the Project were representative of the cumulative noise impact of the Project, i.e., not separate short term activity scenarios. In light of this, SLR (2023b) determined that revised noise modelling was not required.

### **Reasonable and feasible mitigation measures**

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#### Requested Information:

*The department requires a revised NIA that considers all reasonable and feasible mitigation measures to reduce potential noise impacts at receiver R5.*

#### Discussion

*The RtS advice from the NSW Environment Protection Authority recommended a noise limit of 42dB(A)<sub>L<sub>Aeq</sub>(15minute)</sub> for receiver R5. Should the project be approved, the department would apply a noise limit of 40dB(A)<sub>L<sub>Aeq</sub>(15minute)</sub> for receiver R5, given the proximity of the receiver to other receivers with a recommended noise limit of 40dB(A)<sub>L<sub>Aeq</sub>(15minute)</sub>. The NIA must evaluate all reasonable and feasible mitigation measures to reduce the potential noise impacts at R5.*

### **Response**

Intrusive noise limits for the Project were developed based on the existing noise levels using the framework provided under the NSW Noise Policy for Industry (NPfI). Table 9 of SLR (2022) identifies that the Rating Background Level (RBL) at R5 during the daytime is 45dB(A), giving an intrusiveness limit of 50dB(A). The 15-min Amenity Noise Level in accordance with the NPfI is 48dB(A). As a result, in the case of R5 the NPfI nominated 15-minute Project Noise Trigger Levels (PNTL) is 48dB(A) (the lower of the intrusiveness and amenity criteria). The worst case predicted noise levels at R5 is 42dB(A) or 6dB(A) less than the NPfI derived PNTL, and 3 dB(A) below the RBL.

In light of the above, the Applicant contends that the Amended Project will result in noise emissions at R5 that are substantially less than the identified noise criteria, and an assessment of all reasonable and feasible mitigation measures is not required. Notwithstanding this, SLR (2023b) notes that section 7.3.2 and 7.3.3 of SLR (2022) details the noise mitigation measures which will be implemented for the Project, including source controls and path controls, along with noise management measures. The Amended Project has therefore included all reasonable and feasible noise source and propagation path mitigation measures through the design of the project and noise suppression of key equipment.

Finally, SLR (2023b) recommend that the Department carefully consider the NPfI and the advice from the NSW EPA on this matter, noting that the EPA have applied the NPfI minimum daytime criteria of 40 dBA where predicted noise levels are less than the minimum criteria level, and the predicted noise level where this is less than the NPfI derived limit. In each case, these criteria are well below the identified background noise levels and PNTL. This approach is in accordance with the NPfI and is consistent with the approach typically applied by EPA when setting noise limits within EPLs.

### **Noise Monitoring Program**

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#### Requested Information:

*The department requires a revised noise monitoring program that satisfies the requirements in the NSW EPA Noise Policy for Industry.*

#### Discussion

*The noise policy for industry requires noise monitoring within 30 metres of a receiver.*

#### **Response**

The Applicant anticipates that any consent issued for the Project would include a *Noise Management Plan* prepared in accordance with the requirements of the NPfI. That Plan would be prepared in consultation with the Environment Protection Authority and would identify that noise monitoring would, subject to landholder consent, be undertaken within 30m of a receiver.

### **AIR QUALITY**

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#### Requested Information:

*The department requires a revised air quality monitoring program that incorporates a tapered element oscillating microbalance (TEOM) monitor and dust management procedures that utilise real-time air quality monitoring.*

*The department considers the proposed air quality monitoring network to be inadequate. The results from dust deposition and high-volume air samplers (HVAS) do not provide real-time air quality monitoring. Information included in the assessment documentation also demonstrates difficulty implementing a HVAS at the site.*

#### **Response**

Cleary Bros has utilised a number of monitoring methodologies to assess the impact of the site on local air quality, consistent with the currently approved *Air Quality Management Plan*. These methods include the following (see Figure 6.2.1 of the Stage 7 EIS):

- Depositional dust monitoring at four sites with sample recovery of greater than 98% over a 10-year period.

- A PM<sub>10</sub> High Volume Air Sampler (HVAS) recording on a 1 in 6-day basis with sample recovery of greater than 99% over a 10-year period. There has been no difficulty in implementing the HVAS on site as demonstrated by the excellent sample recovery.
- Continuous (real-time) monitoring of PM<sub>10</sub> using light scattering photometers incorporating in-built low volume air samplers. These monitors are co-located with the HVAS monitor. The low volume air samplers are not an EPA Approved Method, however, conform to AS3580.9.9. The photometer component operates using the principles described in AS3580.12.1, however this standard prohibits the reporting of particulate matter concentrations derived from measurements of light scatter. AS3580.12.1 was adopted as EPA Approved Method (AS-16) in the December 2021 update to the Approved Methods.

The light-scattering photometers were installed as a trial to determine whether they could provide a suitable substitute for the existing HVAS. The results of that trial indicate that there have been numerous instances where data from the two techniques are not quantitatively equivalent. The light-scattering photometers nevertheless provide an ability for the site to respond in real time to reduced visibility most likely caused by elevated dust.

Cleary Bros would prepare an amended *Air Quality Management Plan*, that would:

- relocate the existing HVAS to a location close to R1 ('The Cottage'), the closest residence to Project Area; and
- establish one or more real-time air quality monitors, including one at the same location as the HVAS.

The real-time air quality monitoring methodology would be determined in consultation with the Environment Protection Authority during preparation of the *Air Quality Management Plan*.

## **REHABILITATION STRATEGY**

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### *Requested Information:*

*The department requires a revised rehabilitation strategy prepared in line with the objectives of the Strategic Framework for Mine Closure, including:*

- *consultation with relevant stakeholders to develop the proposed final landform*
- *an outline of a consultation strategy that:*
  - *will enable stakeholders to have their interests considered during the mine closure process*
  - *incorporates consultation in the detailed closure planning process developed as part of the rehabilitation management plan*
  - *includes regular involvement of stakeholders throughout the implementation of the detailed closure plan and during the development of the final closure plan at least five years before closure*
  - *includes a strategy for how to proactively participate in and contribute to strategic planning processes undertaken by government agencies*



- *closure objectives that use a risk-based approach to planning, including risks for site access, stability, pollution, and community.*
- *preliminary completion criteria linked to objectives developed in line with the Strategic Framework for Mine Closure.*
- *alternatives for closure and justification for the chosen final landform as the most suitable option. The justification should address land capability and site access issues for agricultural land use and the proposed biodiversity values of the nature conservation land use.*
- *revised conceptual landform design that does not rely on structures that require maintenance in perpetuity.*
- *final landform water balance and proposed mitigation measures for groundwater and surface water inflows in dry and wet years.*
- *detailed outline of the rehabilitation activities proposed beyond the 30-year project duration.*

### Discussion

*The objectives of the Strategic Framework for Mine Closure to be addressed by the response are:*

- *to enable all stakeholders to have their interests considered during the mine closure process*
- *to ensure the process of closure occurs in an orderly, cost-effective, and timely manner*
- *to ensure the cost of closure is adequately represented in company accounts and that the community is not left with a liability*
- *to ensure there is clear accountability, and adequate resources, for the implementation of the closure plan*
- *to establish a set of indicators that will demonstrate the successful completion of the closure process*
- *to reach a point where the company has met the agreed completion criteria to the satisfaction of the Responsible Authority.*

### **Response**

This matter has been addressed in Section 3.8 and Section 3.12 of Appendix 1 of the *Amendment Report*.

### **Final landform water management**

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*The proposed pipeline is not consistent with the rehabilitation objectives that the department typically applies in consent conditions that require a stable landform for the following reasons:*

- *the pipeline is not likely to remain free draining in perpetuity.*
- *the pipeline at Ardlethan Tin Mine exchanges water between pits and does not discharge to a natural environment*
- *environmental management established at Ardlethan does not represent current best practice mine closure planning*
- *the pipeline may impact the riparian environment.*

## Response

The Applicant does not agree with the Department's assessment that the proposed pipeline from the final void to Watercourse 3 would be inconsistent with the rehabilitation objectives for the Project. In particular, the Applicant notes that drilling and lining of inclined pipeline for the purposes of draining water is a routine activity undertaken for a wide range of purposes in civil construction, including transfer of stormwater and wastewater.

The Applicant consulted two horizontal directional drilling companies, namely UEA (<https://www.uea.com.au/>) and BRP Industries (<https://brpindustries.com.au/>). Each company undertakes horizontal directional drilling for a range of clients and have confirmed that directional drilling an approximately 240m hole at a range of diameters through latite and sandstone is well within the capability of each of the companies. Completed projects have included the following.

- Installation of a 1,410m horizontal pipeline under the Shoalhaven River for transfer of recycled wastewater. The drillhole was lined with a long life 400mm diameter PN 32 HDPE pipe.
- Installation of a 2.92km recycled water pipeline from Mayfield West to Kooragang Island, including three lined horizontal directional drillholes of 460m, 470m and 610m, including one under the Hunter River.
- Installation of a 290m 100mm diameter HDPE sewer pipeline for Sydney Water through the Bumbo latite for the Cedar Grove subdivision in Kiama, NSW, approximately 8km south of the Project. The pipeline was constructed by UEA under supervision from Cleary Bros Construction Division.
- Installation of a 930mm stormwater pipe for Bathurst City Council with varying levels of fall.

In addition, the Applicant engaged SEEC to prepare a conceptual design for the proposed pipeline. The resulting letter report is presented as **Attachment C**. In summary, the conceptual design would include the following (see Section 3.12.7.2 of Appendix 1 of the *Amendment Report*).

- A cased and inclined pipeline 450mm in diameter with an inclination of 4%.
- A protected inlet that would prevent both coarse sediment and floating material such as leaves, sticks and branches from entering and potentially blocking the pipe.
- A pipeline casing that would ensure the structural integrity of the pipeline in the long term.
- An engineered outlet within Cleary Bros-owned land that would prevent erosion or scouring of Watercourse 3. The pipe outlet would be positioned to direct flow at an angle of 45° to 60° degrees to the main channel of Watercourse 3 and would be set back from the bank of the watercourse. Scour protection would be installed at the outlet and within Watercourse 3 as required.

Section 6.5 of the *Amendment Report* presents an assessment of the anticipated impacts to Watercourse 3 of the proposed pipeline.

## TRANSPORT OF VENM

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### Requested Information:

*An assessment of the potential impacts of importing 1.5 million tonnes of VENM for rehabilitation purposes.*

### Discussion

*Under DAM0136/2020, Cleary Bros has the approval to import and reprocess 100,000 tonnes of VENM annually in Pit 2 to manufacture construction aggregates and road base products. The allowances under DAM0136/2020 are not consistent with the importation of VENM to rehabilitate the proposed Stage 7 extension.*

### **Response**

The Applicant notes that Section 3.1.3 of the EIS identifies that DAM0136/2020 permits importation of VENM to Pit 2 for reprocessing and that that activity would continue independent of the Project as proposed.

In addition to the above, Development Consent No. 10639 of 2005 (DA10639) under *Schedule 3 Condition 2(b)* states:

*“The Applicant must carry out the development generally in accordance with:*

*(b) The EIS titled Proposed Quarry Extension Albion Park, dated October 2003, and prepared by Perram & Partners;”*

Paragraph 3 of Section 3.6.2 of the 2003 EIS states the following.

*“Clean fill (virgin excavated natural material – VENM) would be brought to the site [Stages 1 to 6] from future excavation projects in Cleary Bros’ trucks for the purpose of raising the floor of the quarry to agreed final levels.”*

As a result, the Applicant confirms that importation of VENM for the purposes of rehabilitation of Stages 1 to 6 is an approved activity.

DA10639 does not limit the annual quantity of VENM that may be imported to Stages 1 to 6. In recognition of the fact that uncapped transportation rates are not consistent with current community expectations, Section 3.12.3 of the Stage 7 EIS proposes the importation of VENM and ENM to a maximum of 100,000tpa for rehabilitation activities. The environmental impacts of this activity, in particular noise and air quality, have been assessed in Section 6 of the Stage 7 EIS.

## BIODIVERSITY

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### Requested Information:

*The department requests a revised BDAR if any changes to the project design or footprint result in altered impacts to biodiversity compared to the impacts detailed in the revised BDAR submitted with the Rts report.*

### **Response**

An Amended BDAR has been prepared and is presented as Appendix 7 of the *Amendment Report*. Section 6.4 of the *Amendment Report* presents a summary of the Amended BDAR.

## **SOCIAL IMPACT ASSESSMENT**

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### Requested Information:

*The department requests a revised social impact assessment (SIA) that considers any revised conclusions of technical studies prepared for noise, blasting, heritage, and visual amenity.*

### **Response**

An *Amended Social Impact Assessment* has been prepared and is presented as Appendix 9 of the *Amendment Report*. Section 6.7 of the *Amendment Report* presents a summary of the *Amended Social Impact Assessment*.

## **SIA Consultation**

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### Requested Information:

*The department requests disaggregated results from consultation undertaken for the SIA. The results should demonstrate the outcome of the consultation program for each stakeholder group and how this information supported the SIA conclusions.*

### Discussion

*The consultation information should demonstrate the current experience of the existing operation for each stakeholder group identified in the SIA. The department does not consider the record of formal complaints as a suitable data source without further analysis from detailed consultation.*

*The consultation results should contribute to the visual landscape character assessment, and the description of the sense of place for each landscape character zone.*

### **Response**

Disaggregated results from consultation undertaken for the Social Impact Assessment, as well as that undertaken since exhibition of the EIS have been provided separately to the Department.

## **ECONOMIC ASSESSMENT**

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### Requested Information:

*A revised economic assessment which considers any changes to predicted impacts and proposed mitigation measures.*

### **Response**

A review of the *Economic Assessment* has been undertaken in light of the changes which form the Amended Project and is presented as Appendix 9 of the *Amendment Report*. Section 6.6 of the *Amendment Report* presents a summary of this review.

## RESOURCE ASSESSMENT

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### Requested Information:

*A copy of the resource assessment referenced in the Amendment Report – Lee (2020). This report can be submitted to the department as commercial in confidence.*

### **Response**

In discussions subsequent to issue of RFI 3, the Department of Planning and Environment have advised that a copy of the resources assessment is no longer required.

I trust that this provides you with the information that you require at this stage. Please do not hesitate to contact myself or Mark Hammond of Cleary Bros should you required additional information.

Yours sincerely



Mitchell Bland  
Managing Director/Principal

Encls: Attachment A – Blasting Response (SLR, 2023a)  
Attachment B - Noise Response (SLR, 2023b)  
Attachment C – Discharge Pipeline Conceptual Design (SEEC, 2023)



# **Attachment A**

## **Blasting Response**

prepared by

**SLR Consulting Australia  
Pty Ltd**

(Total No. of pages including blank pages = 7)

13 March 2023

610.18905.00000-L01-v1.0-20230314.docx

Cleary Bros (Bombo) Pty Ltd  
39 Five Island Road  
PORT KEMBLA NSW 2505

**Attention: Mark Hammond**

Dear Mark

## Response to DPE's Request for Information Noise and Blasting Assessment Albion Park Quarry Extraction Area Stage 7 Extension

### 1 DEP's Request for Information

In relation to the potential impacts from blasting in Stage 7 of the proposed Albion Park Quarry Extension, the Department of Planning and Environment (DPE) have requested further information, extra to that contained in the Noise and Blasting Assessment (Report No 1004/02, September 2021, "NBA") for the proposal.

The DPE's comments/requests are as follows:

**a. An assessment of:**

- *Blasting/ground vibration impacts on building fabric*

**b. Flyrock Management**

**Required Information:** *The department requires an assessment of unexpected flyrock, and any associated impacts. The assessment must detail risk management protocols and whether neighbours would be required to vacate areas of their properties.*

**Discussion:** *Documents associated with the current approval LEC No. 10639 of 2005 identify the need for the property owners on the northern boundary of Stages 1 to 6 to vacate the area of people or cattle during a blast to mitigate the risk of unexpected flyrock. The assessment documentation provided to the department does consider the risks associated with unexpected flyrock.*

**c. Additional blast monitoring points**

**Required information:** *The department requires a revised blast monitoring program that incorporates monitoring at receivers R5 and R6.*

**Discussion:** *The RtS report predicts ground vibration between 3.8mm/s and 5mm/s during Stages 7a and 7b at receivers R5 and R6. The department does not consider the monitoring location at receivers R1 and R2 to be suitable for monitoring ground vibration at R5 and R6.*

## 2 Response

### a. Building Damage Vibration Criteria

Applicable building damage vibration criteria are presented in AS 2187: Part 2-2006, Appendix J. Table J4.5(B) of the standard is derived from British Standard 7385: Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2 - Guideline to damage levels from ground-borne vibration". AS 2187 recommends the frequency dependant guideline values given in BS 7385 as they "are applicable to Australian conditions".

This latter standard sets guideline values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels have been established to give a minimum risk of vibration induced damage, where "minimum risk" for a named effect is usually taken as equating to a 95% probability of no effect.

Sources of vibration which are considered in the standard include blasting (carried out during mineral extraction or construction excavation), demolition, piling, ground treatments (e.g. compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of even cosmetic damage to residential and industrial buildings are presented numerically in **Table 1** and graphically in **Figure 1**.

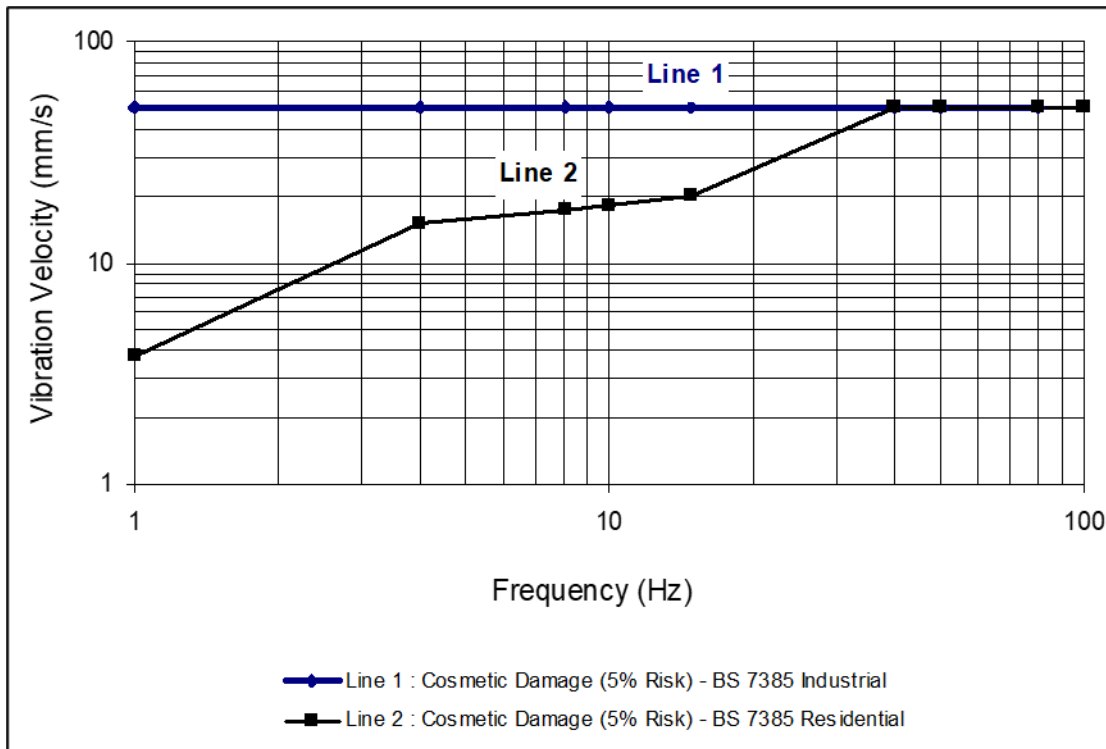
**Table 1 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage**

| Line | Type of Building  | Vibration PCPV in Frequency Range of Predominant Pulse <sup>1</sup> |   |
|------|---|---|---|
|      |   | 4 to 15Hz   | 15Hz and Above  |
| 1    | Reinforced or framed structures<br>Industrial and heavy commercial buildings              | 50 mm/s at 4 Hz and above   | -   |
| 2    | Unreinforced or light framed structures<br>Residential or light commercial type buildings | 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz                      | 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above |

Note 1: Vibration Peak Component Particle Velocity - PCPV (mm/s).

The standard states that the guide values in **Table 1** relate predominantly to transient vibration (as in blast vibration in quarrying) which does not give rise to resonant responses in structures, and to low-rise buildings.

**Figure 1 Graph of Transient Vibration Guide Values for Cosmetic Damage**



The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 1** and major damage to a building structure may occur at vibration magnitudes greater than four times the tabulated values.

It is noteworthy that additional to the guide values nominated in **Table 1**, the standard states that:

*“Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.”*

Also that:

*“A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.”*

Based on the foregoing discussion a conservative vibration (PCPV) damage assessment criterion of 12.5 mm/s would be applicable to all privately-owned residences in the vicinity of the subject quarry site. This criterion is accounted for in the proposed human comfort vibration limits of 5 mm/s for 95% of blasts with no blasts exceeding 10 mm/s which are widely adopted throughout the industry in order to minimise the impacts on the amenity of building occupants and the number of community complaints from blasting activities.

**Building Damage Airblast Criteria**

In relation to building damage airblast criteria, AS 2187: Part 2-2006, Appendix J, Table J5.4(B) recommends a maximum airblast level of 133 dBLinear Peak.

As stated in the ACARP Report C9040, “*Structure response to blast vibration*” (November 2002), the 133 dBL recommended airblast damage limit in AS 2187 has the approximate equivalent structural response to 10 mm/s in racking response terms from quarry blasts for lightly clad timber framed houses subject to vibration from quarry blasting.

Based largely on work carried out by the US Bureau of Mines, the US Office of Surface Mining has presented the following regulatory limits for airblast from blasting (depending on the low frequency limit of the measuring system):

| <u>Low Frequency Limit</u> | <u>Peak Airblast Level Limit</u> |
|----------------------------|----------------------------------|
| 2 Hz or lower              | 132 dBLinear                     |
| 6 Hz or lower              | 130 dBLinear                     |

These levels are generally consistent with the level of 133 dBLinear nominated in AS 2187.

The US criteria are structural damage limits based on the relationship between the level of airblast and the probability of window breakage and include a significant safety margin. It has been well documented that windows are the elements of residential buildings most at risk to damage from airblast from blasting.

While cracked plaster is the type of damage most frequently monitored in airblast complaints, research has shown that window panes fail before any other structural damage occurs (USBM, RI 8485-1980 “*Structure Response and Damage Produced by Airblast from Surface Mining*”). The probabilities of damage to windows exposed to a single airblast event are as shown in **Table 2**.

**Table 2 Probability of Window Damage from Airblast**

| Airblast dB Linear | Level kPa | Probability of Damage | Effects and Comments         |
|--------------------|-----------|-----------------------|------------------------------|
| 140                | 0.2       | 0.01%                 | “No damage” - windows rattle |
| 150                | 0.6       | 0.5%                  | Very occasional failure      |
| 160                | 2.0       | 20%                   | Substantial failures         |
| 180                | 20.0      | 95%                   | Almost all fail              |

In conclusion, reference to the NBA and **Table 1**, “*Blast Emissions Predictions based on Current Site Laws*” indicates that the predicted levels of ground vibration and airblast through the life of the subject Stage 7 Extension of the quarry will be lower than the respective criteria applicable to building damage to the nearby structures.

Further, compliance with these criteria will be ensured via the nominated blast emissions monitoring programme.

**b. Flyrock Impacts and Management**

As stated in the NBA, there are generally two main areas within the blast from which flyrock has the potential to be produced. These are at the blasthole collar (where the stemming length has not been optimised and the explosive column is too close to the upper surface of the rock mass creating crater effects - rifling) and at the face of the blast (where there could be less than optimum burden on a blasthole whereby the explosives gases are able to vent to atmosphere - blowouts, producing flyrock).



In relation to the impacts of unexpected flyrock, the Blasting Contractor for the quarry has indicated that historically blasted rock generally falls within an envelope with dimensions:

- 50 m in front of the blast face:
- 20 m on either side of the face: and
- 10 m behind the face

and that such dimensions are consistent with industry best practice.

Cleary Bros will contact those occupier(s) of all properties adjoining the Stage 7 extraction area who register to be contacted prior to blasting in accordance with the process described in Section 8.13 of the NBA.

For blasting undertaken within the Project Area, the front row blastholes will continue to be "Boretracked" in order to identify any areas of less than optimum burden in order that, if required, inert material (rather than explosives) can be placed at this location in the blasthole. Consequently, ejection of flyrock from the face of the blast is not expected to occur.

In terms of collar ejection, the nominal minimum stemming length of 3.0 m, and stemming material comprising aggregate typically 10-14 mm in size, will continue to be used as the stemming material (rather than drill cuttings or other materials), again in order to contain the explosives within each blasthole. Aggregate is used as stemming material as it "locks" at the collar of the blasthole upon initiation of the blast enabling the explosives gases to be used in fracturing and moving the rock instead of being ejected from the blasthole ("rifling"). Consequently, ejection of flyrock from the collar of the blastholes is not expected to occur.

The blast design procedures for blasting near the external property boundaries will be determined through reference to the then current near-field blast emissions site laws (refer to Sections 8.7 and 8.8 of the NBA). As stated, the site specific Stage 7 extension and near-field site laws (for ground vibration and airblast) will be regularly updated and used to design subsequent blasts. Consequently, the allowable MICs to comply with the nominated ground vibration and airblast safety limits at the external property boundaries will progressively reduce as blasting approaches closer to the boundary, thereby further reducing the likelihood of flyrock.

In line with previous commitments, prior to implementing any revisions to the site laws for the Project Area, Cleary Bros will consult with the representatives of the "Figtree Hill" property in relation to how the change(s) may affect blasting practices.

Further, Cleary Bros have a negotiated agreement with the owners of "Figtree Hill" to cover a range of amenity impacts associated with the Project, however for the purposes of the blasting assessment, the "Figtree Hill" property is not considered Project-related. Any reference in the NBA to non-project related properties in the context of blasting therefore includes the "Figtree Hill" residences.

Also, Cleary Bros are conducting negotiations with the neighbours to the south of the quarry in relation to the issue of blast emissions management to minimise the risk from potentially hazardous blast emissions including flyrock.

### c. Additional Blasting Monitoring Points

#### Blast Emission Monitors

As outlined in the NBA, blast monitoring instrumentation will be employed that meet the measuring equipment specification presented in Appendix J, Section J3.2.1 (for ground vibration) and Section J3.3.1 (for airblast) of AS 2187.2-2006: "*Explosives – Storage and Use. Part 2: Use of Explosives*". The instruments will be externally calibrated at regular intervals throughout the life of the project.

#### Permanent Monitor Installation

The Cottage blast monitor will continue to be permanently installed throughout quarry blasting operations, with a remote communication link.

As well, Cleary Bros will establish two mobile monitoring locations close to the Cleary Bros eastern property boundary, approximately in line from the blast to each of the closest Receivers R5 and R6. The mobile monitor would be located at the closer of the two mobile sites for each blast with the monitoring continuing until it can be demonstrated that blast emissions are unlikely to approach the nominated blast emissions criteria at Receivers R5 and R6 for the remainder of the project.

Blast emissions criteria at these eastern property boundary monitoring locations would be set based on the prediction of compliance with the nominated ground vibration and airblast criteria at Receivers R5 and R6 using the then current blast emissions site laws in order to ensure compliance at Receivers R5 and R6.

At the nominated blast emissions monitoring locations, a vibration velocity geophone will be coupled to the ground via a concrete plinth embedded in the consolidated ground surface with the associated microphone positioned in the free-field. These mobile monitoring systems would also be equipped with a remote communication link.

I trust the foregoing information satisfies your requirements in addressing the DPE's comments.

Yours sincerely



DICK GODSON  
Technical Director

Checked/  
Authorised by: GT

# **Attachment B**

## Noise Response

prepared by

**SLR Consulting Australia Pty  
Ltd**

(Total No. of pages including blank pages = 6)

20 March 2023

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Cleary Bros (Bombo) Pty Ltd  
39 Five Island Road  
Port Kembla  
NSW 2505

**Attention: Mark Hammond**

Dear Mark

## **Albion Park Quarry Stage 7 DA - Request for further information - noise matters**

This letter provides responses to noise queries raised by the NSW Department of Planning regarding the Albion Park Quarry Stage 7 Extraction Area Noise and Blasting Assessment (NBIA) prepared by SLR Consulting.

### **1.1 Meteorological Station Data**

#### **Comment**

*The department requires an outline of the current meteorological monitoring undertaken on site and a comparison of the on-site meteorological data and the data from the Bureau of Meteorology Albion Park station data for the purpose of the noise assessment.*

#### **Response**

Cleary Bros operate a weather station on the Albion Park Quarry (APQ) site as per the requirements of the site environment protection licence (EPL # 299). The weather station is located at coordinates (GDA 94 MGA56) 300615, 6170490. Cleary Bros provided the following details on the weather station:

- Located 35m north east of the "Belmont" House, 75m east of the current extraction area.
- Station installed in 2005 with refurbishment/upgrades in 2012, 2016 and 2023.
- Equipment includes; 10m mast and Vaisala WXT536 series weather station.
- Data collected includes 10m wind speed, direction, sigma theta, humidity, temperature, air pressure, solar radiation, precipitation and 2m temperature with web server upload every 10 minutes.

Analysis of daytime wind conditions from the nearest Bureau of Meteorology (BoM) weather station at Shellharbour Airport approximately 2.5km north of the quarry site and the onsite weather station are presented in Table 1 and Table 2 respectively.

**Table 1 BoM weather station ID 068241 Shellharbour Airport 2016-2020 winds**

| Wind Direction | Percentage of Occurrence of Noise-Enhancing Winds (0.5-3m/s) (Winds Blowing From) |            |      |            |       |            |      |            |
|----------------|---|------------|------|------------|-------|------------|------|------------|
|                | North   | North East | East | South East | South | South West | West | North West |
| Summer         | 4.2   | 6.9        | 7.9  | 5.3        | 3.7   | 4.1        | 4    | 3.4        |
| Autumn         | 6.9   | 8.9        | 10.3 | 7.1        | 6.8   | 10.3       | 9.5  | 6.2        |
| Winter         | 5.8   | 7.9        | 8.1  | 5.5        | 6     | 11.7       | 12.1 | 6.9        |
| Spring         | 4.5   | 6.3        | 7    | 4.4        | 3.2   | 4.2        | 3.9  | 3.4        |

Note 1: Noise-enhancing winds (0.5-3m/s) were calculated per direction  $\pm 45$  degrees during the daytime period (7:00 am to 6:00 pm) for each season.

Note 2: Wind data was available for 97.5% of the 2016-2020 dataset.

**Table 2 APQ weather station 2016-2020 winds**

| Wind Direction | Percentage of Occurrence of Noise-Enhancing Winds (0.5-3m/s) (Winds Blowing From) |            |      |            |       |            |      |            |
|----------------|---|------------|------|------------|-------|------------|------|------------|
|                | North   | North East | East | South East | South | South West | West | North West |
| Summer         | 7.5   | 13.8       | 18.5 | 14.6       | 11.2  | 6.3        | 1.5  | 3.2        |
| Autumn         | 10.9  | 11.4       | 14.2 | 17.7       | 21.1  | 15.0       | 7.4  | 9.6        |
| Winter         | 9.7   | 8.8        | 9.0  | 11.7       | 21.5  | 19.5       | 12.6 | 12.0       |
| Spring         | 8.3   | 11.3       | 12.6 | 12.3       | 11.1  | 6.3        | 2.7  | 4.3        |

Note 1: Noise-enhancing winds (0.5-3m/s) were calculated per direction  $\pm 45$  degrees during the daytime period (7:00 am to 6:00 pm) for each season.

Note 2: Wind data was available for 99.4% of the 2016-2020 dataset.

The APQ site is located in complex terrain and the site weather station is influenced by topographic effects including funnelling and shielding of winds by surrounding hills, valleys and nearby obstacles. The NBIA assessment referenced publicly available data from the Shellharbour Airport, which is considered more representative of wind conditions surrounding the project area. Comparison of both datasets with Fact Sheet D of the NSW Environment Protection Authority (EPA) Noise Policy for Industry (NPfI) using the NSW EPA's Noise Enhancing wind analysis program (NEWA) does not change the findings discussed in section 2.3 of the NBIA, that is, noise enhancing winds do not occur for more 30% of the time from a specific direction.

Use of wind data from the Shellharbour Airport meteorological station or the APQ meteorological station would not change the approach adopted in the NBIA, the noise modelling results or assessment findings.

## 1.2 Short Term Activities

### Comment

*The department requires revised noise modelling which incorporates the short-term activities as operational activities and provides predictions for all surrounding receivers. The revised noise modelling should include worst-case scenarios for each stage of the proposed extension.*



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*The noise impact assessment (NIA) provides separate models for operational and short-term activity scenarios. The department considers that short-term activities constitute operational activities occurring at or near the surface. Worst-case models for the NIA must include all operational activities.*

## **Response**

Results for short term activity scenarios presented in Sections 7.4.1.2 and 7.4.2.1 of the NBIA are inclusive of typical extraction activities. That is, the results presented are not separate short term activity scenarios but are the cumulative noise levels from the short term activity combined with concurrent quarrying and processing activity. As an example, Stage 7a vegetation mulching and soil stripping would occur while quarrying and processing is undertaken in Stage 5/6 extraction. These Stage 5/6 typical operations were included in the prediction of noise levels from short term activities in Stage 7a. Similarly, Stage 7b short term activity noise predictions include Stage 7a typical extraction occurring concurrently. Similarly for Stage 7d/c short term activities. It should be noted that noise levels from short term activities are the highest predicted level for each sensitive receiver which is typically at the most exposed position across the Stage 7 extraction areas for a particular receiver. In light of the above, a revised NBIA is not required.

### **1.3 Reasonable and Feasible Mitigation Measures**

#### **Comment**

*The department requires a revised NIA that considers all reasonable and feasible mitigation measures to reduce potential noise impacts at receiver R5.*

*The RtS advice from the NSW Environment Protection Authority recommended a noise limit of 42dB(A)L<sub>Aeq</sub>(15minute) for receiver R5. Should the project be approved, the department would apply a noise limit of 40dB(A)L<sub>Aeq</sub>(15minute) for receiver R5, given the proximity of the receiver to other receivers with a recommended noise limit of 40dB(A)L<sub>Aeq</sub>(15minute). The NIA must evaluate all reasonable and feasible mitigation measures to reduce the potential noise impacts at R5.*

#### **Response**

Section 7.3.2 and Section 7.3.3 of the NBIA discusses in detail the noise mitigation measures including source controls and path controls which will be implemented for the project. Noise management measures are also discussed. The project includes all feasible and reasonable noise source and propagation path mitigation measures through project design and configuration and noise suppression of key equipment. Management measures such as restricting operational hours are also included.

Noise levels from short term activities are predicted up to 42 dB at R5 during Stages 7b, 7c and 7d presented in the NBIA (note the amended EIS includes an amended Stage 7e which comprises parts of the eastern extent of Stage 7c and 7d from the NBIA, with the eastern boundary of the Project now located further from R5 than that proposed in the NBIA). Due to topography (R5 is on a ridge line) this receiver has line of sight to these activities during Stage 7b, 7c and 7d. This occurs at R5 because of the position and elevation of this receiver relative to the 7b, 7c and 7d extraction areas. At other receivers in this area (R4 and R9) noise levels less than 40 dBA have been predicted as these receivers are shielded by intervening topography between the quarry and the dwellings.

Section 2.1 of the NBIA provides a description of the existing acoustic environment and quantifies measured background and ambient noise levels. Intrusive noise limits for the project (section 5.1) were developed based on the existing noise levels. Amenity noise limits were also established based on the recommended amenity levels for the existing land use relevant to the sensitive receiver. In the case of R5 this was the most stringent criteria level for rural residential as defined in the NSW NPfl. The predicted noise levels at R5 are 3 dB less than the rating background level (RBL) of 45 dBA at this location and 6 dB less than the Noise Policy for Industry derived Project Noise Trigger Levels (PNTL) for this receiver considering both the NPfl derived amenity and intrusive noise limits

SLR recommend that the department carefully consider the NPfl and the advice from the NSW EPA on this matter as the EPA have applied the NPfl minimum daytime criteria of 40 dBA where predicted noise levels are less than the minimum criteria level, and the predicted noise level where this is less than the NPfl derived limit. This approach is considered appropriate in this case and is typically applied by EPA when setting noise limits within EPLs as it provides a better outcome for community where noise levels are predicted below the NPfl PNTLs. SLR strongly encourages the Department to utilise the NPfl when setting noise limits for the Project rather than set arbitrary limits which are not aligned to the NPfl.

### **Noise Monitoring**

*The department requires a revised noise monitoring program that satisfies the requirements in the NSW EPA Noise Policy for Industry.*

*The noise policy for industry requires noise monitoring within 30 metres of a receiver.*

### **Response**

The *Albion Park Quarry Extension Noise and Blast Management Plans, "NBMP"* (SLR Consulting, 2017) also included reference to similar requirements from the previous approval and the EPL #299 noise limits. Wording from the Noise Policy for Industry regarding assessment locations as described in section 2.6 of the policy is reproduced below:

*"For a residence, the project noise trigger level and maximum noise levels are to be assessed at the reasonably most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most affected point within 30 metres of the residence, but not closer than 3 metres to a reflective surface and at a height of between 1.2–1.5 metres above ground level."*

It is recommended that this wording is maintained when the NBMP is updated for stage 7.

## 2 Closure

Please do not hesitate to contact the undersigned as required.

Yours sincerely



AARON MCKENZIE  
Technical Director

|                               |
|-------------------------------|
| Checked/<br>Authorised by: AW |
|-------------------------------|

# **Attachment C**

## **Discharge Pipeline Conceptual Design**

prepared by

**Strategic Environmental  
and Engineering Consulting**

(Total No. of pages including blank pages = 15)



STRATEGIC ENVIRONMENTAL  
AND ENGINEERING CONSULTING

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Mitchell Bland  
Principal / Managing Director  
RWCorkery & Co  
Via email: [Mitchell@rwcorkery.com](mailto:Mitchell@rwcorkery.com)

our reference: 19000260-L-01-20230320  
your reference:

20 March 2023

Dear Mitchell,

## FINAL VOID PIPE OUTLET FEASIBILITY REVIEW

---

### Background

SEEC has been commissioned by RW Corkery & Co to undertake a feasibility review of a proposed pipe outlet from the final void at the Albion Park Quarry Extension – Stage 7. The scope does not include the endorsement of any geotechnical, structural or civil engineering components of the design or construction, however it includes an assessment of what is feasible and highlights various items to be considered in the final design.

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It is anticipated at the end of the quarry life, that a final void will be formed. The void is expected to be at least 70-80m deep relative to an overflow location, therefore the void will trap rainfall/runoff. In order to prevent the void ponding water, it is proposed to undertake earthworks and fill a portion of the void to create a low spot centrally located in the western section of Stage 7e. A pipe will be bored with a slight downslope from the void to an adjacent creek (Watercourse 3) providing a free draining outlet. The Department of Planning and Environment is seeking additional details on the proposal to better understand how the pipeline will remain free draining in perpetuity and how it might impact the riparian environment.

The proposed route of the pipeline is provided in Figure 1.

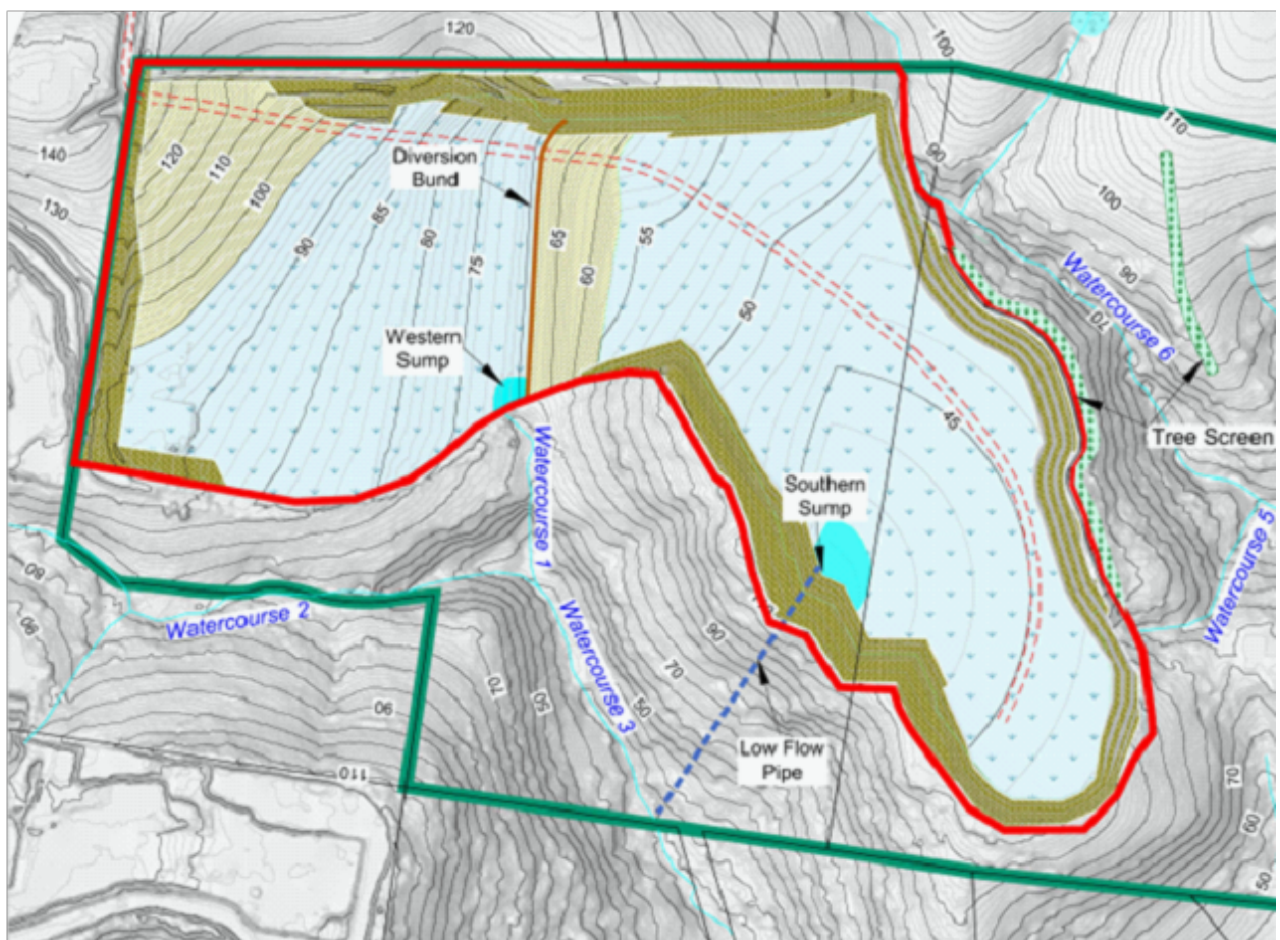


Figure 1: Indicative Final Landform with Outlet Pipe (Source: RWCorkery & Co)



## Outlet Pipe Construction

It is proposed to bore the pipeline using horizontal boring techniques based on the steep topography and material type – rock. The pipe would be around 250m in length with a longitudinal grade of around 4%.

The specific equipment to bore the cavity required would depend on the type of rock and the diameter and length of the hole required. For instance, directional drilling techniques could be used to drill a pilot hole in the rock, followed by enlarging the hole with reaming tools until it is wide enough to accommodate a larger pipe. The drilling rig would have to be powerful enough to overcome the hardness and density of the rock, and the process may take a significant amount of time.

There are numerous examples of projects undertaking horizontal drilling through rock including:

- Sydney Water – Blackheath Water Supply Upgrade – 375mm water main.
- Hunter Water – Chelmsford Drive Sewer Upgrade – 375mm sewer main.
- Sydney Water – Elizabeth Hills Water Supply Upgrade – 375mm water main.
- Sydney Water – Blacktown to Rouse Hill Trunk Mains – 450mm water main.

This method of pipeline construction is appropriate and regularly used and the following issues are to be considered in the design:

- Potential deviation from the planned trajectory resulting in a negative grade.
- Borehole collapse.
- Environmental impacts from drilling fluids and chemicals used in the drilling process.
- Equipment failure.

Ensuring that the borehole is as straight as possible, with a consistent slope or gradient that allows for proper drainage is perhaps the greatest risk for the project. There are several factors that can affect the slope or gradient of the borehole, including the type of soil or rock being drilled through, the equipment used, and the skill of the operators. It is possible for horizontal drilling to result in negative-grade sections where water may pond. This can occur if the borehole deviates from the planned trajectory or if the slope of the borehole is not consistent. However, negative-grade sections can often be identified during the drilling process, and measures can be taken to correct the slope or gradient of the borehole to ensure proper drainage. Regular monitoring and inspection during the drilling process can help identify any issues and allow for corrective action to be taken before negative-grade sections become a problem.

The other risks are relatively low as given that the rock formation is stable and unlikely to collapse. Operating procedures are expected to limit the potential for equipment failure and potential to be stuck within a partially completed borehole.

Environmental controls such as adequate storage and bunding of drilling fluids and chemicals is expected to limit the risk of a spill.

RW Corkery & Co has contacted a number of companies specialising in horizontal drilling and they have confirmed that the scope of works is feasible and not inconsistent with previous works completed for stormwater and sewer installations.

### Outlet Pipe Size

The discharge rate and time to empty any runoff collected in the void is primarily based on the adopted pipe size. The adopted pipe size will then influence the potential for blockage of the outlet and the outlet velocity of the pipe system at Watercourse 3. Initial discussions indicated a pipe size of 450mm diameter.

A check of pipeline capacity was undertaken for various pipe sizes assuming that the outlet pipe acted as a long culvert with a length of 250m at a gradient of 4% (inlet invert at RL 42m and outlet at RL32m). Water ponding was limited to 3m above the invert of the pipe as the system generally acts under inlet control and controls the discharge rate. A higher headwater will increase peak flow rates and velocities. The velocity is then influenced by the pipe gradient. Based on the adopted information above, the outlet velocity could be expected to reach 4.15m/s for a 450mm diameter pipe with a peak flowrate of 0.66m<sup>3</sup>/s. The flow velocity can be reduced by flattening the pipe grade. This then alters the hydraulics of the pipe system and it becomes outlet controlled (controlled by the tailwater and pipe friction). This requires a higher headwater or ponding depth to discharge the same or similar flow rate as the steeper inlet controlled pipe however the velocities have been reduced. A summary of the expected peak flow rates and outlet velocities that could be expected are provided in Table 1.

**Table 1: Expected flow rate and velocities for various pipe sizes**

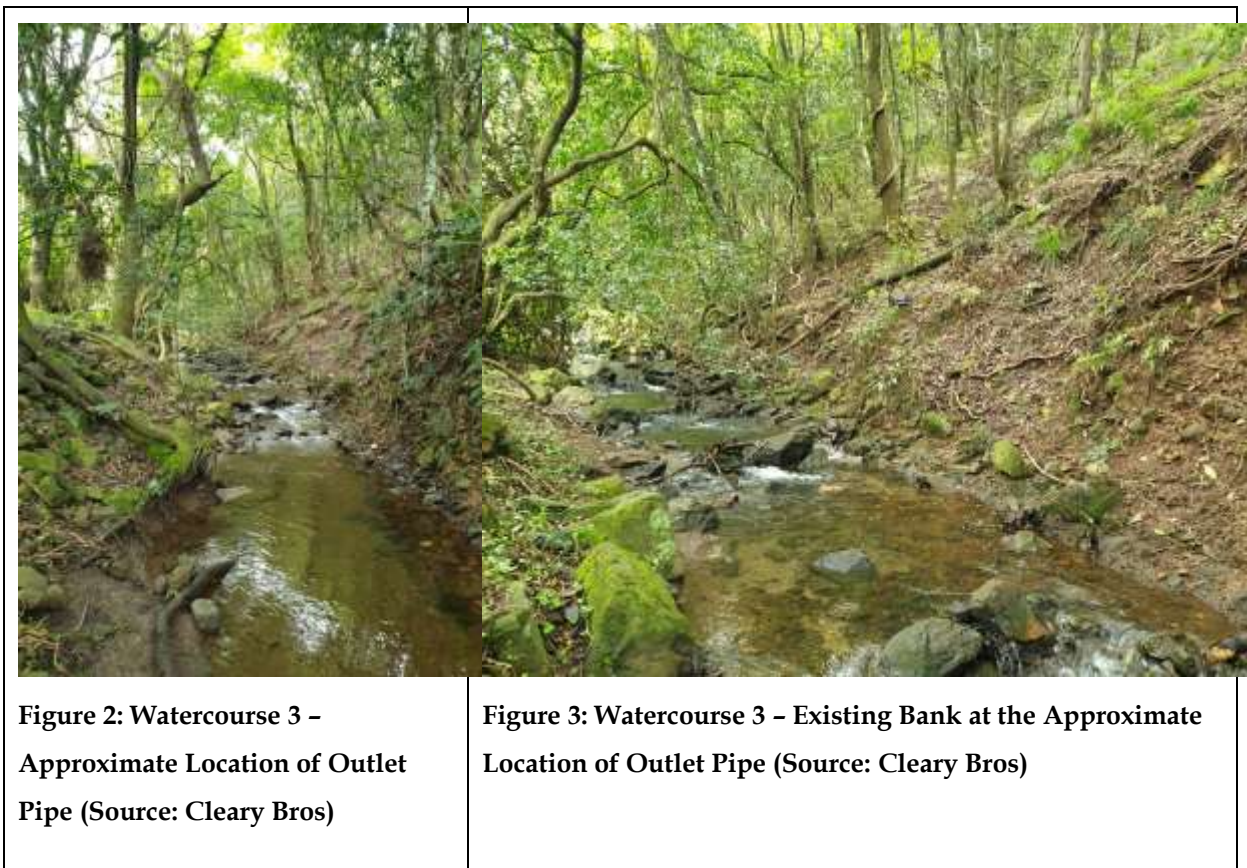
| Pipe Dia (mm) | Pipe at 4% Grade.<br>Headwater limited to 3m. |                       | Pipe at 2% Grade<br>Headwater limited to 5m. |                       |
|---------------|---|-----------------------|--|-----------------------|
|               | Flow (m <sup>3</sup> /s)                      | Outlet Velocity (m/s) | Flow (m <sup>3</sup> /s)                     | Outlet Velocity (m/s) |
| 300           | 0.23  | 3.25                  | 0.20   | 2.83                  |
| 450           | 0.66  | 4.15                  | 0.58   | 3.65                  |
| 600           | 1.25  | 5.30                  | 1.20   | 4.24                  |
| 750           | 1.9   | 6.06                  | 2.1  | 4.75                  |
| 900           | 2.7   | 7.13                  | 3.3  | 5.19                  |
| 1200          | 4.7   | 7.86                  | 6.4  | 5.66                  |

## Outlet Design

It is preferable to not locate pipe outfalls in waterways that have highly mobile or erodible banks. Based on the photos provided by Cleary Bros, the existing waterway at the discharge location is relatively straight (minimal bends) with steep sides, however the bed and lower bank has limited scour and has sections of rock armouring as shown in Figure 2.

Some limited bank scour can be seen in Figure 3 on the toe of the opposite bank to the proposed outlet pipe.

It is expected that additional rock may be needed at this location to limit further erosion and that it can be incorporated into the outfall design and blended to match the existing rock in the waterway. Alternative designs such as log barriers/walls may also be appropriate.



It is preferred to direct the outfall pipe at an angle of 45 to 60 degrees to the main channel flow (pointing downstream) as shown in Figure 4 to minimise turbulence with coincident flows in the waterway. The outlet headwall should be recessed into the bank to limit erosion of the opposite bank and channel expansion/migration. The Queensland Urban Drainage Manual (QUDM) recommends a minimum

desirable setback of at least 3 times the bank height or 10 times the equivalent pipe diameter. The maximum setback for this location would be based on 3 x the bank height. Assuming that the opposite bank has a height of approximately 2.0m, the pipe outlet should be set back approximately 6m from the toe of the opposite bank. This requirement may need to be adjusted based on the impact and practicalities of excavating a setback in the existing waterway. Additional bank protection on the opposite bank may be required if the minimum setback is not adopted. Schematics from Sydney Water (Rouse Hill Development Area) show a similar arrangement as provided in Figure 5 and Figure 6.

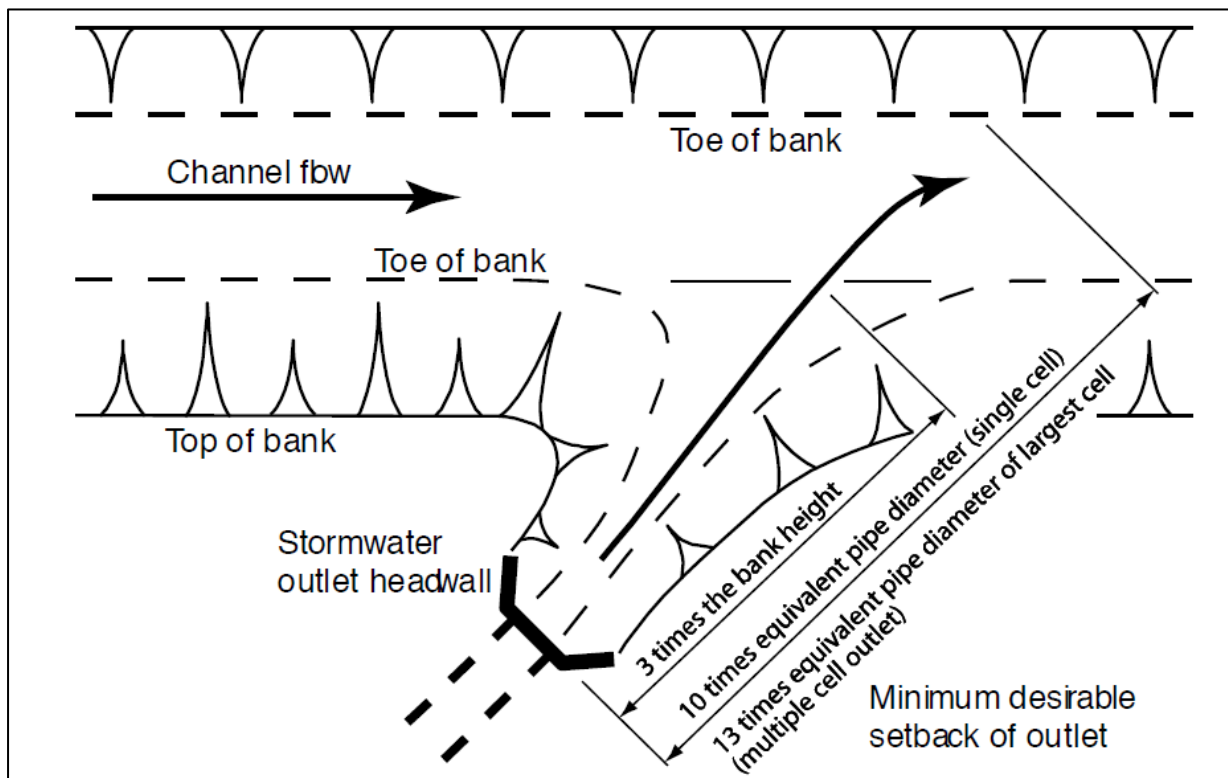


Figure 4: Minimum desirable outlet setback (QU DM, 2018)

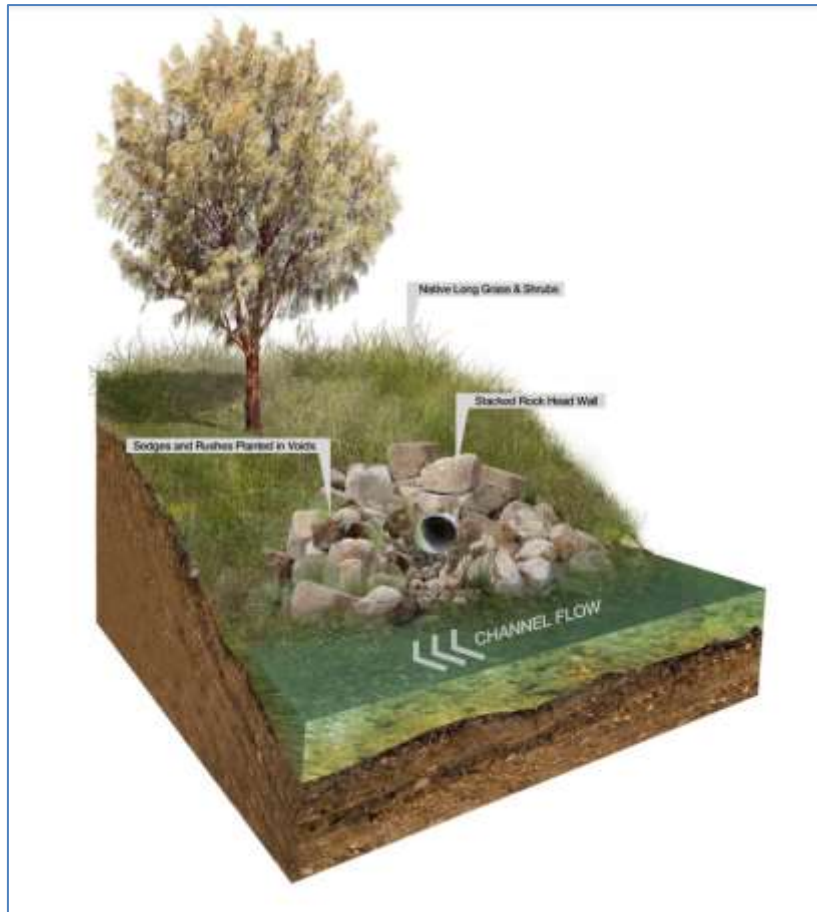


Figure 5: Headwall setback (Sydney Water, 2014)

<https://www.sydneywater.com.au/content/dam/sydneywater/documents/stormwater-connections-to-natural-waterways.pdf>



Figure 6: Headwall setback (Sydney Water, 2014)

<https://www.sydneywater.com.au/content/dam/sydneywater/documents/stormwater-connections-to-natural-waterways.pdf>



The invert of the pipe is preferred to be located just above the waterway invert to limit potential outlet blockages. The minimum elevation of the pipe invert is 0.3m and a maximum of 0.5m above the bed level to limit scour and undermining of the pipe outlet. The drop/chute between the pipe outlet and the bed of the waterway should be lined with rock.

Assuming a pipe size of 450mm and an outlet velocity of 4.15m/s, the discharge location will need to be protected. It is suggested that a flexible rock pad be adopted as the existing waterway appears to have natural rock armour in sections as shown in Figure 2 and Figure 3. The rock pad would need to extend from the pipe outlet across to the bed of the waterway. The rock may need to be extended across the waterway and up the opposite bank to a height equal to the pipe obvert if the minimum setback is not achievable. The rock is to have a d50 size of 300mm and extend for the length of the setback (expected to be around 6m). The rock pad is to be aligned with the discharge direction and existing waterway. The rock pad thickness will need to be twice the d50 (600mm) and expand from the width of the outlet apron at a ratio 5 (length) to 1 (width) as shown in Figure 7.

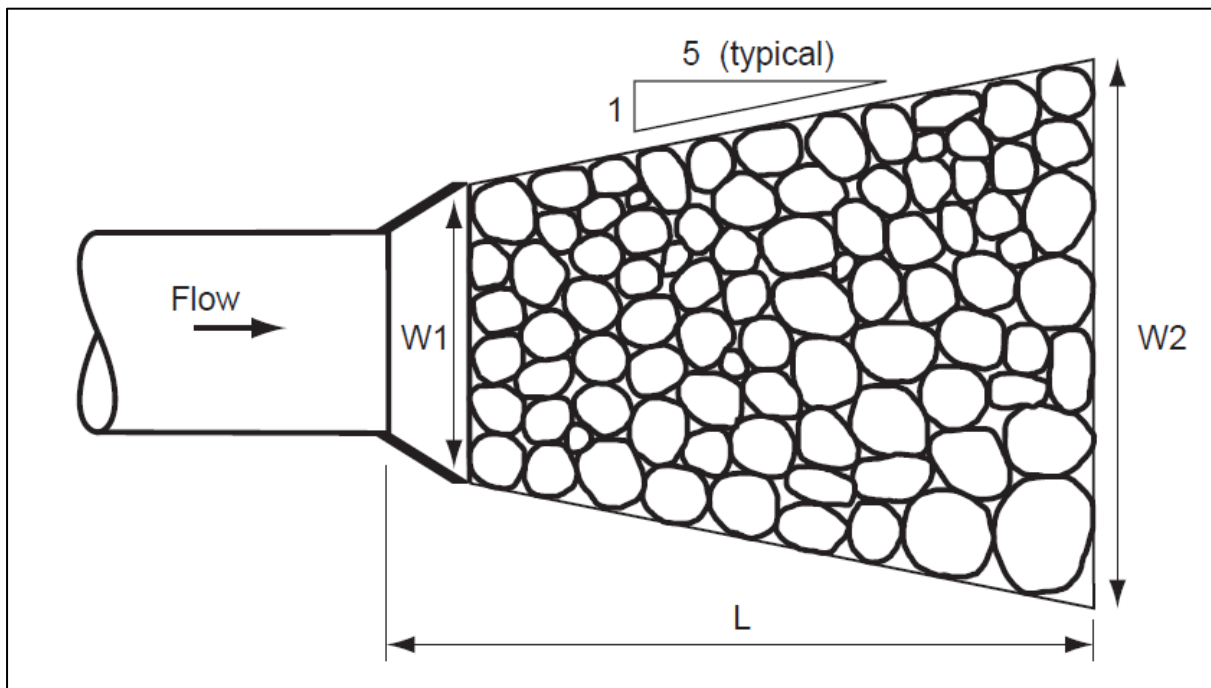


Figure 7: Rock pad layout (QUDM, 2018)



## Pipe Blockage

As the pipe will be the only free draining discharge mechanism for the final void, the risk of blockage needs to be considered. Factors influencing blockage include:

- Debris type and dimensions.
- Debris availability.
- Debris mobility.
- Debris transportability.
- Structure interaction.

(Australian Rainfall and Runoff, 2019)

Debris from the void will be influenced by the final state of the void and is expected to include vegetative debris (leaf litter, grass and sticks) and sediment. The void is expected to be stabilised with vegetative cover (grass, small shrubs and trees etc.) with little exposed soil. Sediment, grass and leaf litter are expected to be the primary debris types and potential cause of initial pipe blockage. Larger sticks, branches and logs may cause blockage as the trees mature.

The void will have relatively steep internal batters and a base gradient of around 5% indicating that debris could be readily mobilised and transported by heavy rainfall events towards the piped outlet.

Vegetative debris is likely to block the inlet of the pipe however sediment (especially fine sediment) is expected to be washed through the culvert based on the velocities listed above. As the pipe is to be horizontally bored, there is the potential for varying gradient along the pipe which may decrease flow velocity in some sections and allow sediment to drop out of suspension.

The outlet pipe size of 450mm diameter is relatively small and will be the only discharge location therefore given the expected debris potential protection measures must be included in the design.

Based on the debris types discussed above, blockage risk can be reduced by:

- Upstream coarse sediment trap/sediment basin.
- Sediment/debris deflector wall.
- Screen / cage.
- Screen - underflow/overflow weir.
- Additional pipe to provide some contingency and allow for maintenance on one pipe.

Potential layouts for protection measures are provided below.

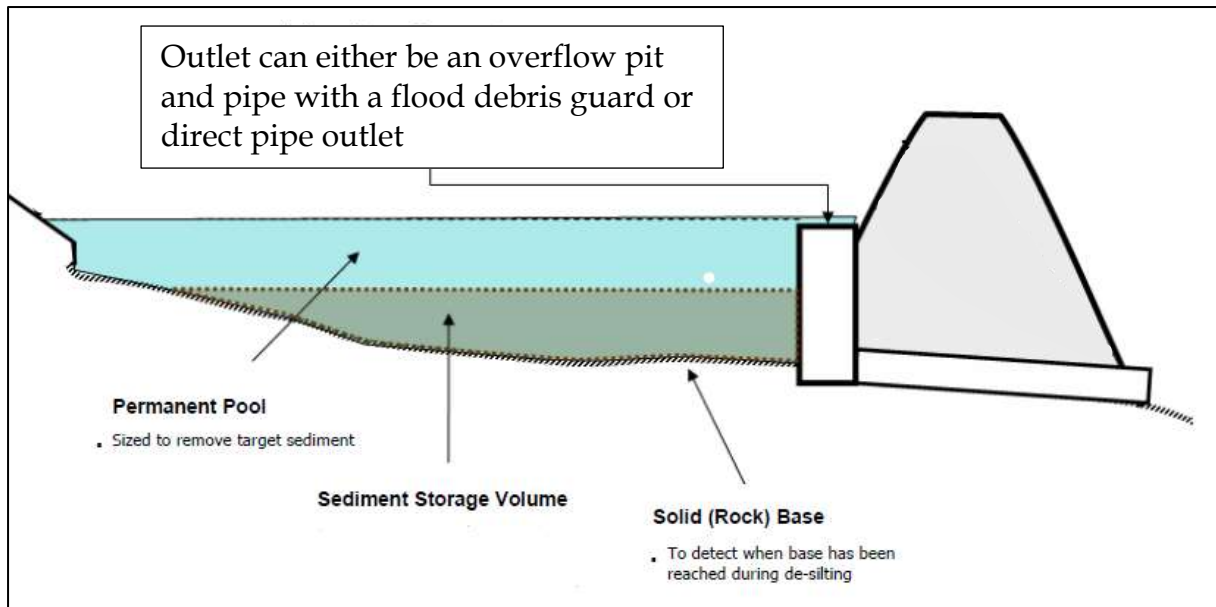


Figure 8: Sediment Basin Arrangement (Amended from WSUD Technical Design Guidelines for the Coastal Dry Tropics)



Figure 9: Example of an overflow / underflow weir at a basin outlet

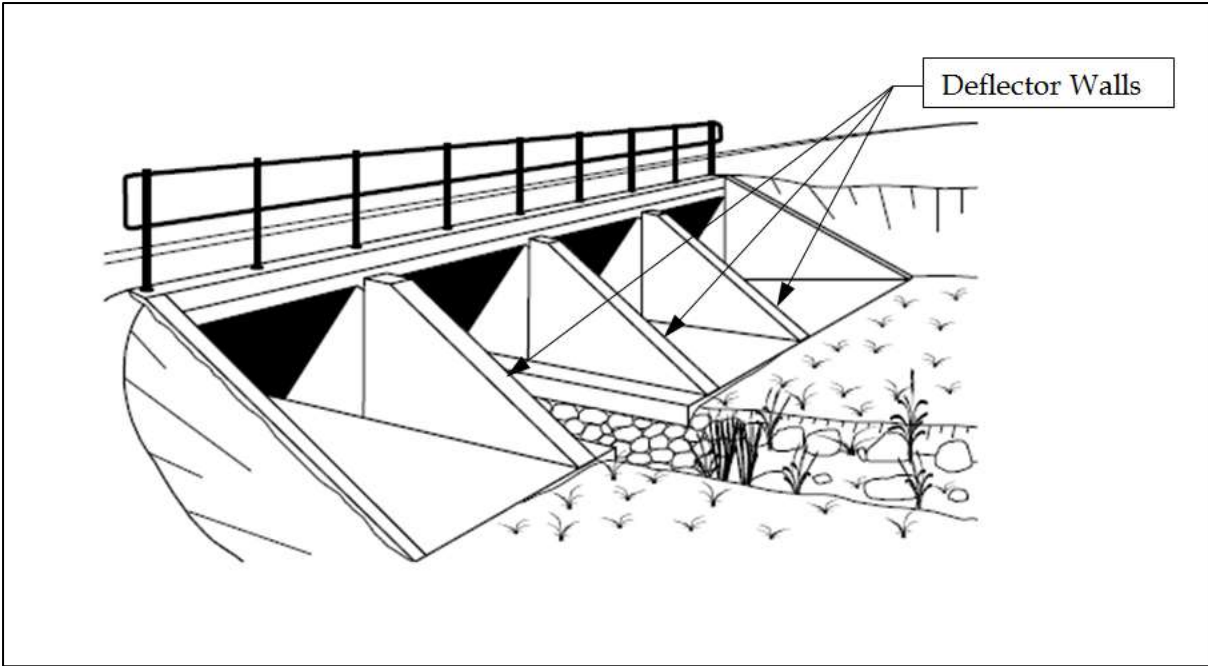


Figure 10: Culvert deflector walls (Source: QUDM)

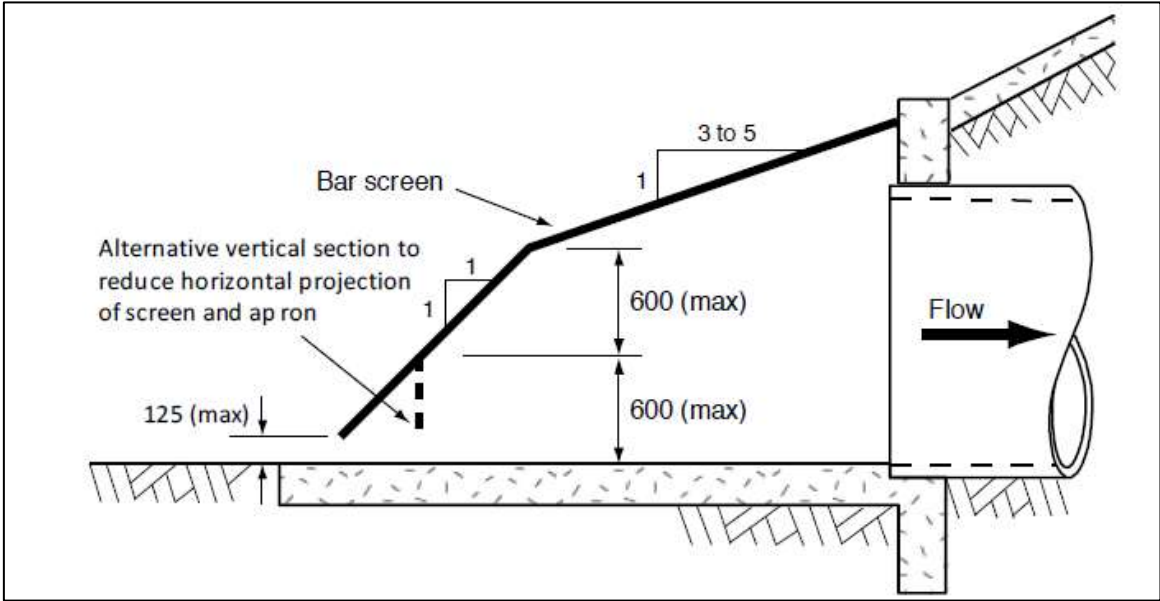


Figure 11: Section of hinged bar screen (Source: QUDM)

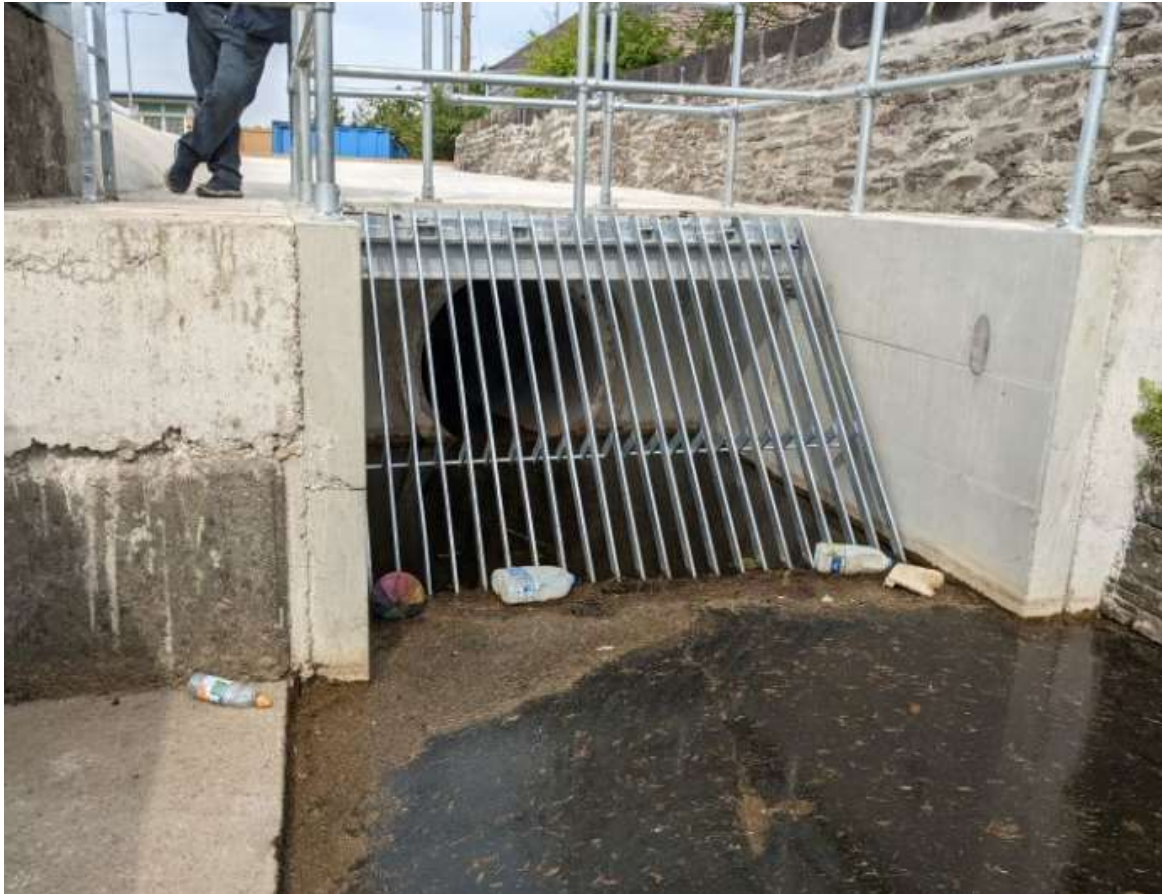


Figure 12: Hinged bar screen (Source: Althon Limited)

## Maintenance

Maintenance will be required to limit blockage of the system. This will include:

- Regular inspections including additional inspections before and after major rainfall events.
- Review of potential debris sources within the catchment/void.
- Removal or stabilisation of potential debris i.e. drag fallen logs away from potential flow paths.
- Stabilisation of exposed soils.
- Removal of collected sediment in traps, basins etc.
- Removal of collected debris at the outlet structures.
- Repair any erosion or scour at the inlet and outlet.
- Replacement of any rocks that may have moved in Watercourse 3.

## Residual Risks

Despite the consideration and adoption of debris blockage mechanisms, residual risks will occur and would include but are not limited to those in the table below.

**Table 2: Expected residual risks**

| Risk   | Potential Outcome  |
|--|--|
| Vegetative debris blocks outlet pipe               | Water will continue to pond in the void. As the void is its own catchment and evaporation is generally expected to be greater than rainfall indicating that water level should fluctuate and experience periods of no inundation.<br><br>The pipe outlet will be hidden during periods of water outflow making clearing of debris during an event extremely dangerous if not impossible. |
| Sediment blocks the pipe                           | Same outcome as vegetative debris blocking the outlet pipe   |
| High velocities scour outlet                       | Bank scour, bank instability, loss of vegetation, movement/loss of rock armour, damage to pipe outlet  |
| Safety of the general public and maintenance staff | Injury or loss of life.  |

It is recommended that a geotechnical and structural review be completed prior to final design to confirm:

- Material properties to be excavated to confirm horizontal boring process.
- Casing requirements of the envelope and required strength of pipe material.
- Water holding capacity of the void.

The void will act similarly to a detention basin and as such should include safety measures to reduce the risk to the general public and maintenance staff. Ideally the general public should be discouraged from being within the void however embankments near areas that are ponded regularly should be 1 in 6 or flatter to allow easy egress up a wet surface. The following additional safety measures have been included in the design to improve safety.

- Discourage general public from entering the void (e.g. fences, thick vegetation etc.).
- Warning signs indicating that the void is subject to flooding after heavy rain.
- Inclusion of rails and bollards around the outlet to limit access.
- Regular vegetation or anchor points with rope to allow people to gain assistance or safe footing and pull themselves out of ponded water.

- Angled oversized screens that allow egress and water flow even when partially blocked.

If you would like to discuss any aspect of the above, please feel free to contact me on 0407 261 515 or [bjohnson@seec.com.au](mailto:bjohnson@seec.com.au)

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'Bill Johnson', with a stylized flourish at the end.

Bill Johnson  
Director, SEEC