



Nagindar Singh

Our ref: DOC21/942110-1

Your ref: SSD 12469087

Senior Environmental Assessment Officer

Energy Resource Assessment

Nagindar.Singh@planning.nsw.gov.au

Dear Ms Singh

Gunlake Quarry Continuation Project (SSD 12469087) – Advice on EIS

The Biodiversity and Conservation Division (BCD) received a request for advice on the Biodiversity Development Assessment Report (BDAR) for the Gunlake Quarry Continuation Project (herein the Continuation Project) through the Major Projects Portal on 7 October 2021. I advise the following:

The Environmental Impact Statement (EIS) states that the project will result in the following:

- An extraction depth of 546 mAHD and a maximum of 750 daily truck movements
- Groundwater drawdown of 2 m is predicted to extend 1.3 km from the edge of the pit and > 2 m over the life of the Quarry
- Overall impacts to Groundwater Dependent Ecosystems (GDEs) are assessed as low

We are of the view that the BDAR has several limitations. These are described in detail in **Attachment 1**, but in summary:

- Full assessment under Chapter 4 and 5 of the Biodiversity Assessment Method (herein BAM 2020) has not been undertaken because the BDAR claims that the Continuation Project '*will not result in direct surface impacts*'. However, the prescribed impacts are not excluded from Stage 1 assessment.
- Plot data has not been entered into the Biodiversity Assessment Method Calculator (BAMC).
- The prescribed impact assessment concludes that the risk to the communities considered to be GDEs (PCT 1256 and PCT 1330) from ground water drawdown is low. However, there is inadequate scientific evidence to support this statement.
- Road widening has not been included in the BDAR
- There will be a large number of trucks in and out of the site posing a strike threat to threatened woodland birds known to occur in the area however the BDAR does not include a prescribed impact assessment.
- An adaptive management plan for uncertain impacts has not been provided.
 - An adaptive management plan would provide Vegetation Integrity (VI) scores for each GDE that could be used as baseline to validate the BDAR's conclusions that groundwater drawdown presents a low risk to these communities
 - If monitoring demonstrated that the integrity of the vegetation declines the Applicant should be required to offset by calculating partial loss in VI score in the BAMC and retiring credits in accordance with section 8.6 of the BAM 2020



- A Serious and Irreversible Impact assessment (SAII) has not been undertaken for the 14 SAI entities that have been assumed present in the prescribed impact area
- Area 1 appears to coincide with Area A identified in the original approval as an area for water irrigation. This area was slightly modified under Modification 2. BCD has no record of this area being offset in the original approval as the area was to be irrigated and the overstorey vegetation was to be retained. However, it appears from aerial photo imagery the area has now been cleared. This appears to be a breach of previous conditions.
- Spatial data has not been provided, including for Area 1. The Groundwater Assessment underpinning the conclusions of the BDAR also lacks rigour. Recommendations for how the Groundwater Assessment can be improved are provided in **Attachment 2**.

We recommend a meeting between BCD, the Planning and Assessment Group and the Applicant to discuss how these uncertain impacts can be addressed in a revised BDAR and Groundwater Assessment.

We note that this project has not been referred to the Commonwealth Department of Agriculture Water and Environment (DAWE) as a Controlled Action.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Michael Saxon'.

29/10/2021

MICHAEL SAXON
Director South East
Biodiversity and Conservation Division

Enclosure:

Attachment 1 - Additional information required in the Biodiversity Development Assessment Report (BDAR)
Attachment 2 - Groundwater Assessment review

Attachment 1 – Additional information required in the BDAR

Stage 1 BAM assessment

The BDAR states that the Continuation Project will not result in direct surface impacts and therefore no credit calculations have been undertaken.

The *Biodiversity Assessment Method 2020 Operational Manual* – Stage 1 (herein BAM Stage 1 Op. Manual) states that prescribed impacts can be both direct and indirect. The BAM Stage 1 Op. Manual also states that that prescribed impacts identified in Clause 6.1 of the *Biodiversity Conservation Regulation 2017* (herein BC Regulation) are not excluded from Stage 1 assessment. Biodiversity values excluded from BAM are outlined in section 1.5 of BAM 2020.

Several key components of the Stage 1 assessment are missing from the BDAR. These are outlined in further detail below.

We also note that the Road Safety Assessment Report recommends widening along the Primary Transport Route. The BDAR does not address this road widening. The BDAR needs to be amended to address any potential impacts on biodiversity.

Stage 1 BAM assessment – Chapter 4

The BDAR states that no field surveys are required for the Continuation Project because of the extensive field surveys previously undertaken across the Gunlake Quarry in 2008, 2014, 2016 and 2018.

Vegetation data from previous assessments can be included in the BDAR so long as it was collected -

- from within the subject land (section 4.2.1 of BAM 2020), which should be defined as all areas subject to *any amount* of groundwater drawdown
- in accordance with Chapter 4 of BAM 2020
- within the previous five years (Section 3.4 BAM Stage 1 Op. Manual)

Time limitations are imposed to ensure data in the BDAR reflects the current biodiversity values on the subject land including site condition, structural attributes and species presence. Where previous survey does not meet the required number of plots in Table 3 of BAM 2020 for any of the vegetation zones in the subject land, additional plots must be undertaken in those zones. Only the surveys undertaken in 2018 would therefore still be valid. There are no plots undertaken in any of the areas which may be impacted by the ground water draw down. BCD not that most of the plot data referred to occurs to the north of the predicted draw down area. Only 5 plots occur in the south and all these plots have been cleared as a result of the extension project. Additional plots need to be surveyed in vegetation within the predicted draw down area.

All plot data need to be included in the BDAR and entered into the Biodiversity Assessment Method Calculator (BAMC) to provide a baseline vegetation integrity (VI) score and credit output. This includes all the standard requirements of assessment under Chapter 4 of the BAM such as native vegetation cover and patch size. The VI scores generated can be used as baseline values in the development of an adaptive management plan that addresses uncertain biodiversity impacts arising from groundwater drawdown (s 8.5 BAM 2020).

In relation to PCT1256, the BDAR states ‘*While the site is located above 400 m ASL, appears to consist of a “generally boggy flat area near the headwaters of a stream” and has a complete absence of trees, the area of PCT 1256 mapped within the prescribed impact area does not appear to support areas of Sphagnum moss and is more likely to consist of mesic vegetation including sedges and rushes.*’ Sphagnum moss presence is highly variable in Montane Peatland Swamps and its absence does not necessarily preclude the PCT from being representative of the Endangered Ecological Community. BAM plot data is required to determine if PCT 1256 meets the criteria for Montane Peatland Swamps.

Stage 1 BAM assessment – Chapter 5

The BDAR states that assessment of threatened species is not required because -

- there will not be any direct impacts to native vegetation or habitat for threatened species, and
- extensive field surveys have previously been undertaken across Gunlake Quarry in 2008, 2014, 2016 and 2018.

As explained above, prescribed impacts can also be direct impacts, and the Stage 1 assessment requirements in BAM 2020 applies to prescribed impacts.

Field surveys - including targeted species surveys for candidate species credit species - can be included in the BDAR so long as it was collected -

- from within the subject land (section 4.2.1 of BAM 2020), which should be defined as all areas subject to *any amount* of groundwater drawdown
- in accordance with Chapter 5 of BAM 2020, relevant survey guidelines and information in the Threatened Biodiversity Data Collection (TBDC)
- within the previous five years (Section 3.4 BAM Stage 1 Op. Manual).

The list of predicted threatened species should be generated by applying the method in section 5.2.1 of BAM 2020, which can be done by entering BAM plot data into the BAMC. The alternative method proposed in section 5.1.1 of the BDAR is not appropriate because species credit species cannot be reliably predicted by vegetation surrogates or landscape features.

We encourage Accredited Assessors to engage with BCD’s Accountable Officers where there is uncertainty about the application of Steps Three, Four and Five in the assessment of habitat suitability for threatened species in the subject land (section 5.2 BAM 2020).

Prescribed impact assessment – Ground water drawdown

The BDAR states groundwater drawdown from the Continuation Project will impact only small portions of PCT 1256 (2.38 ha) and PCT 1330 (54.53 ha) at a local scale. However, scientific evidence for this conclusion is not provided.

The BDAR has –

- relied mainly on desktop methods to determine the extent of groundwater dependency
- not fully applied the *Method of the identification of high probability groundwater dependent vegetation ecosystems* (herein the 2016 GDE Guidelines) or the *NSW Risk assessment guidelines for groundwater dependent ecosystems* (herein the 2012 GDE Guidelines), which, among other things, require field validation of GDEs.
- Did not include a rigorous Groundwater Assessment (see **Attachment 2**)

The assessment of whether PCTs are groundwater dependent ecosystems should be undertaken using revised vegetation mapping in accordance with chapter 4 of BAM 2020 and habitat suitability assessment in accordance with chapter 5 of BAM 2020. The assessor should apply the 2016 GDE Guidelines, which provide a method to identify high probability GDEs that are phreatophytes.

The BDAR should provide justification for –

- the criteria used in Table 6.2 to infer the extent of groundwater dependency of PCTs
- the omission of SAI species in Table 6.4 that have been assumed present
- setting the impact threshold for groundwater drawdown for PCT 1330 at >20 m
 - it cannot be assumed that the root zone of a species extends beyond the groundwater level because there are areas where the vegetation community occurs where the groundwater is >20 mbgl.
 - Generally, root systems would not grow deeper than necessary to access water, so a drawdown which does not exceed a groundwater level 20 mbgl could still result in impacts.

The rate of drawdown needs to be considered because a rapid drop in the water table can cause severe stress and partial or complete mortality in large trees due to an inability to grow their root systems rapidly enough to maintain adequate water supplies to their extensive canopies (Le Maitre et al, 1999). Drawdown beyond confining layers also need to be considered as they could prevent communities from regaining access to groundwater after drawdown.

The BDAR states that the predicted drawdown is not considered likely to affect the ability of PCT 1330 to access groundwater '*except during periods of stress.*' For communities such as this, detection of impacts may be difficult as the loss of species and changes in the vegetation community structure may have time lags of years to decades between the drawdown event before becoming evident (Le Maitre et al, 1999). This uncertainty in the nature and extent of the impact should be addressed by developing a robust adaptive management plan as described in section 8 of the GDE Guidelines and section 8.5 of BAM 2020.

Prescribed impact assessment - vehicle strike

The BDAR states that prescribed impact assessment has not been undertaken because '*the traffic impact assessment identified that this will be a small percentage increase of existing traffic levels.*'

However, the Continuation Project will result in an increase in the maximum daily number of inbound and outbound truck movements to 750 over the 24-hour period of quarry operations. This represents a 21% increase in traffic.

An increase in vehicle movements of this magnitude requires a prescribed impact assessment for vehicle strikes in accordance with section 8.3.6 of BAM 2020.

Adaptive management for uncertain biodiversity impacts

The BDAR does not detail an adaptive management plan to address uncertain impacts to GDEs potentially arising from groundwater drawdown.

The adaptive management plan for uncertain impacts needs to be detailed in the BDAR rather than in external documents (section 8.5 of BAM 2020). We recommend using the following documents as a guide to forming adaptive management plan -

- Section 8 of the 2012 GDE Guidelines
- *Addendum to NSW biodiversity Offsets Policy for Major Projects: upland swamps impacted by longwall mining subsidence as a*

At the very least, the adaptive management plan should –

- describe the structure, function and composition of GDEs and associated threatened species habitat that are at risk of impact from groundwater drawdown (section 8.5.4a BAM 2020)
- propose a groundwater monitoring program that monitors real groundwater data rather than modelled data and continues monitoring beyond 30-year operational life of the quarry (section 8.5.4b BAM 2020). This should be done through the installation of piezometers.
- include a vegetation monitoring program for GDEs that continues monitoring beyond the 30-year operational life of the quarry (section 8.5.4b BAM 2020). This should be done using the BAM.
- identify changes in VI score to GDEs which would be a trigger for implementing adaptive management actions (section 8.5.4c BAM 2020)
- describe adaptive management actions that will be implemented in the event of a trigger (section 8.5.4d BAM 2020)

In ecosystems that rely on groundwater during extreme climatic conditions, there may be a significant time lag between a disturbance event and impacts. Therefore, care should be taken to –

- monitor GDEs for a sufficient period of time
- monitor indicators that are not tolerant of disturbance

We recommend using biodiversity credits to offset the residual prescribed impacts by calculating partial loss in VI score in the BAMC and retiring credits (section 8.6 BAM 2020).

Serious and Irreversible Impact Assessment (SAIL)

The BDAR states that an SAIL assessment is not required because there are no direct impacts. SAIL assessment against the four principles in clause 6.7 of the BC Regulation applies to all impacts to SAIL entities, irrespective of whether they are direct, indirect, uncertain or prescribed.



We also note that fourteen SAI entities are assumed present. Where presence is assumed, the assessor needs to provide a species polygon that delineates areas of suitable habitat (section 5.2.5 BAM 2020).

Spatial data

The Applicant must provide digital shape files of all spatial data used in the BDAR, such as the –

- 'Area 1'
- Subject land
- Primary Transport Route
- Development site
- Development footprint
- Development site and footprint for the Extension Project
- Vegetation mapping
- BAM plot locations
- Survey locations for candidate species credit species
- Species detections
- Species polygons
- Extent of Occurrence and Area of Occupancy for SAI entities
- Groundwater \ drawdown depths

Area 1 appears to be consistent with Area A in the original project approval for Gunlake Quarry granted in September 2008. Please confirm if Area 1 is the same location as Area A.

The aerial imagery on the figures are not the most recent and should be updated.

Attachment 2 – Groundwater Assessment review

The BDAR states that the impacts to GDEs from groundwater drawdown resulting from the Continuation Project are not predicted to increase because the drawdown is less than the predicted drawdown for the approved Extension Project.

We note the following issues with the Groundwater Assessment for the Continuation Project and recommend how it can be improved -

- The current groundwater monitoring program at Gunlake Quarry is considered to be poor due to the small number of bores monitored. It only uses four groundwater monitoring bores (GM6, GM13, GM24, GM36) in calibrating the groundwater model, two of which are no longer functional. The functioning bores are positioned in the middle of the quarry, which means there is no groundwater monitoring at the boundary of the Continuation Project or in the area where the greatest drawdown is expected to occur. Agreement between the model and measured data is also poor and it appears the model may use monthly or longer time steps. The model requires significant improvement if it is to provide useful information on the potential impacts from the development. We would prefer the use of real groundwater monitoring rather than reliance on a poorly calibrated and unvalidated model.
 - The Groundwater Assessment should utilise landholder bores near the boundary of the Continuation Project as well as bores at the nearby Holcim Lynwood Quarry.
- There is a substantial difference in modelled groundwater heights before the quarry when compared to the groundwater assessment undertaken for the Holcim Lynwood Quarry. Holcim Lynwood Quarry predicted groundwater at a maximum height of ~655m AHD, whereas the Continuation Project predicts groundwater at a maximum height of ~685m AHD.
 - Discrepancies between the models needs to be reconciled to demonstrate that the Continuation Project's Groundwater Assessment is scientifically rigorous and fit for purpose.
- Holcim Lynwood Quarry Groundwater Assessment also identifies a geological dyke and a number of faults nearby which do not appear in the Continuation Project's Groundwater Assessment, despite both models covering much of the same area.
 - This geological dyke should be incorporated into the Continuation Project's Groundwater Assessment or justification should be provided as to why it was omitted.
 - The Continuation Project's Groundwater Assessment should be revised to account for cumulative local impacts.
- Following completion of the quarry operation of the Continuation Project, the final void is proposed to be left as is, with a 53ha footprint and a depth of approximately 100m. This will likely continue to draw water from surrounding aquifers in perpetuity (ie act as a permanent groundwater 'sink').



- The Applicant needs to clarify if they intend to obtain a new licence from unallocated water in the Groundwater Water Sharing Plan under the *Water Management Act 2000* that would enable continued extraction of 68 ML year inflow at the end of the quarry's life.

The Applicant also needs to further clarify why drawdown is not predicted to occur north of the quarry.

References

NSW Department of Planning Industry and Environment (2020) *Biodiversity Assessment Method 2020*, Department of Planning Industry and Environment, Environment Energy and Science, Parramatta.

NSW Department of Planning Industry and Environment (2020) *Biodiversity Assessment Method 2020 Operational Manual – Stage 1*, Environment Energy and Science, Parramatta.

NSW Department of Primary Industries, Water (2016) *Method of the identification of high probability groundwater dependent vegetation ecosystems*.

Serov P (2012) *NSW Risk assessment guidelines for groundwater dependent ecosystems, Volume 1 – the Conceptual Framework*

Le Maitre DC, Scott DF, Colvin C (1999) *Palaeovalley Groundwater Resources in Arid and Semi-arid Australia: a literature review*, Geoscience Australia, Canberra