

21 February 2022

Victor Bendevski
Borg Manufacturing
2 Wella Way
Somersby NSW 2250

Via email: bendevskiv@borgs.com.au

Dear Victor,

**Re: Review of Groundwater Access associated with the Spring Fed Dam Reclamation,
Borg Panels Timber Processing Facility, Oberon NSW.**

1 Introduction

Geosyntec Consultants Pty Ltd (Geosyntec) was engaged by Borg Manufacturing (Borg) to provide preliminary hydrogeological advice regarding the influence on the local groundwater resource of a proposed reclamation plan for a spring fed dam (SFD) located at Borg's processing facility in Oberon, NSW (the Borg site). The western portion of the SFD (approximately 30% of its original area) was reclaimed in 2020 as part of Modification 1 of the Borg facility, and Borg now proposes to reclaim the remaining area to facilitate an expansion of the facility operations. The SFD reclamation proposal comprises backfilling of the dam with permeable granular material to facilitate ongoing access to the shallow groundwater resource via the backfilled dam, using a modified water supply work.

This advice was prepared in response to the following groundwater-related comments in a letter from the Department of Planning and Environment (DPE) and the Natural Resources Access Regulator (NRAR) related to the proposed reclamation plan (ref. OUT21/16593, dated 17 January 2022):

Recommendation – Prior to Determination

Confirm the additional activities and works that are to take water due to the project and complete an impact assessment on the environment and water users. Where the works are an aquifer interference activity the impact assessment will need to meet the requirements of the NSW Aquifer Interference Policy.

Recommendation – Post Approval

The proponent must ensure sufficient water entitlement is held in a Water Access Licence/s (WAL) to account for the maximum predicted take for each water source prior to take occurring unless an exemption under the Water Management (General) Regulation 2018 applies.

Explanation

The specifics of how the proponent will retain access to groundwater from the spring fed dam have not been provided including how this relates to a water supply work and how groundwater flows are to be extracted or maintained through the site. Further detail is requested on the works proposed to extract and maintain pathways for groundwater at the spring fed dam and any new bores proposed at the site.

An impact assessment on the environment and water users will be required, or justification as to why it's not necessary for additional works or activities. This is to understand how the works relate to a water supply work and to enable relevant exemptions under the Water Management Act 2000 to apply.

This advice was prepared to clarify the SFD reclamation proposal in the context of the local groundwater resource, including a comparison of the proposed method of future groundwater access to the current extraction method from the SFD as a basis for justification as to why an impact assessment is not considered to be necessary.

2 Environmental Setting

2.1 Climate, Topography and Hydrology

The Borg facility is located within an industrial precinct north of Oberon within the South Western Slopes region of NSW. The regional climate is warm temperate, with seasonal variations of wet winters and low summer rainfall. The average rainfall (from BoM Oberon Albion Street weather station ID 63063) is 835.7 mm.

The local topography slopes gently to the east, towards Kings Stockyard Creek located approximately 600 m east of the site. The creek follows a south easterly alignment and joins Fish River just over 3 km to the southeast. Stormwater from the site is collected in a surface drainage system and directed to sedimentation ponds that discharge to an ephemeral watercourse that discharges to the creek.

2.2 Geology and Hydrogeology

The local geology consists of late Ordovician aged Rockley Volcanics of the Cabonne Group, which are volcanoclastic sandstones of deep marine origin consisting of primarily feldspar or lithic rich arenite sandstones.

A borehole log from a groundwater bore (GW023226) close to the Borg site (west of Lowes Mount Road) indicates clay from the ground surface to approximately 12 m below ground level (mbgl), with "sandstone water supply" from 12 to 40 mbgl and shale beneath. It is suspected that the local groundwater flow system is through the underlying sandstone

Groundwater in the local shallow aquifer is likely to be recharged by direct infiltration of rainfall into and through the clay soils into the underlying volcanic sandstones. Perched groundwater may also be present in the surficial clay weathering profile, it is generally accepted that shallow groundwater at this site generally flows east, a portion of which may discharge to Kings Stockyard Creek and Fish River.

Groundwater discharge will also occur during abstraction from water supply bores. A search of the National Groundwater Database (BOM) indicated that there is a water supply bore at the Borg site (GW800701) drilled to 75 mbgl. Several additional water supply bores are located north of King Stockyard Creek at distances greater than 1 km of the SFD. No irrigation, stock and domestic, dewatering or exploration bores were identified within 1 km of the dam.

A review of the Groundwater Dependent Ecosystem (GDE) Atlas¹ indicated the following in the vicinity of the Borg facility:

- The closest aquatic GDE was identified as Kings Stockyard Creek to the east of the site, which is classified as a “moderate potential GDE”. The designation likely means that the creek is considered to receive a portion of its flow from groundwater baseflow.
- There are no terrestrial GDEs identified within the Borg site boundaries, a high-potential GDE (likelihood 5) is identified 1.1 km to the east of the SFD across the Kings Stockyard Creek and is identified as a “Oak forest and woodland wetland.”

3 Water Access License and Water Supply Works Approval

The site is situated within the jurisdiction of the *Water Sharing Plan for NSW Murray Darling Basin Fractured Rock Groundwater Sources* (WaterNSW 2020).

Borg holds the following licence and approval for accessing groundwater at the site:

- A Water Access License (WAL 28951) that allows for the extraction of 28 ML/annum of water from the Lachlan Fold Belt MDB Groundwater source.
- A water supply works approval for the “excavation of groundwater” (Approval number 80WA715797), which applies to extraction of groundwater from the SFD.

The WAL for 28 ML/yr applies to the whole property and will therefore remain valid for the future access of groundwater from the rehabilitated SFD. Borg should consult with Water NSW to confirm whether their proposal will require a revision to the nominated water supply works approval to reflect the method for accessing groundwater from the rehabilitated SFD.

4 Hydrogeological Setting of the Spring Fed Dam

The SFD was created as a result of an excavation for a source of clean fill during development of the site in the late 1990s. Borg indicated that the dam was excavated to an approximate depth of 9 mbgl. The source of water in the SFD is primarily groundwater inflow from the surrounding shallow aquifer, with a component of precipitation that falls directly on the dam. Borg indicated that the SFD continuously overflows via a spillway on the eastern end of the dam, even when the licensed allocation is extracted. Stormwater runoff from the site is captured in a separate stormwater drainage system at the site and is prevented from entering the SFD by a perimeter bund around the dam. In 2020, approximately 30% of the dam footprint was reclaimed as part of site development works approved under Modification 1 (MOD1). Borg indicated that the same yield was maintained in the remaining portion of the SFD, and that the dam continues to overflow as it did prior to the partial reclamation.

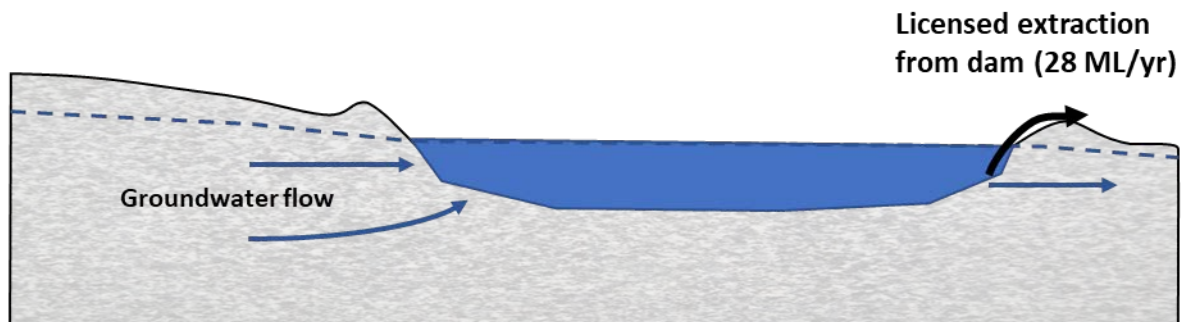
Based on the approximate depth of the dam, comparison to the lithological logs for nearby bores and the rate of groundwater ingress to the dam (discussed below), it is assumed that the dam excavation is likely to have penetrated the surficial clay profile and intersected the water table aquifer associated with the underlying volcanic sandstone formation. Despite the dam’s nomenclature, Borg was unsure if an actual spring or surface expression of groundwater existed in the location of the SFD prior to its excavation. Borg has estimated groundwater inflow to the SFD to be in the order of 100 m³/day (email correspondence, 2022), based on the maintenance of the water level in the dam when pumped at the corresponding rate. Borg indicated that a similar rate of groundwater ingress to the dam was maintained following the reclamation of the western portion of the SFD.

¹ <http://www.bom.gov.au/water/groundwater/gde/map.shtml>

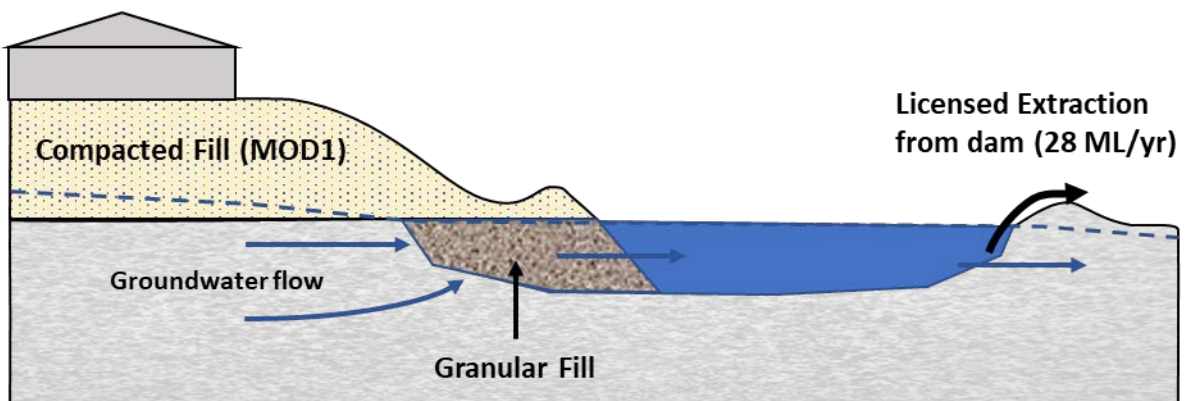
Borg indicated that they generally pump between 40 and 76 m³/day of water from the SFD from a pumping station located at the south-eastern end of the dam and directs the water to their onsite treatment plant prior to use in their processes. Borg further indicated that if the dam is not pumped, it will continue to fill and overflow through a spillway at the eastern end of the dam.

Edge Geotechnical (22 June 2021) estimated an annual volume of evaporative loss from the SFD of approximately 5 ML per year, based on the surface area of the dam and local evaporation data. Considering the average annual rainfall of 835.7 mm and an SFD surface area of 8500 m², direct precipitation input to the dam is estimated to be on the order of 7 ML per year. Hence, the SFD is likely to receive a net input of 2 ML/yr of rainfall in excess of evaporation.

Borg indicated that the dam consistently overflows when it is not being pumped. The overflow is directed from a spillway on the eastern end of the dam to a small storage pond east of the dam which is then diverted to a newly constructed (2020) stormwater collection dam located 140 m southeast of the SFD, which was constructed as part of the MOD1 approved works. Prior to construction of this stormwater dam, overflow from the SFD was released from the small storage pond and directed down a drainage channel towards the creek.



SFD prior to MOD1 reclamation



SFD 30% reclamation with granular fill (MOD1)

5 Proposed Reclamation Setting

The objective of the reclamation works is to create a new, flat and uniform surface topography to make beneficial use of the industrially zoned land to the east of the newly built warehouse. Reclamation of the western part (30%) of the SFD was successfully completed in 2020. Borg has indicated that the dam is still overflowing with partial reclamation and extraction for site use. Reclamation of the remaining portion of the SFD will restore the dam to its pre-excavated condition.

Borg does not propose to dewater the dam during reclamation. They indicated that the remaining area of the dam will be filled in a similar manner to the western portion. Their reclamation plan states:

Boulders will be placed in the base of the dam to provide a stable layer for compaction. The fill material in the dam void will be crushed coarse cobbles or ballast comprising gravel, concrete and ceramic tile. The aggregate will be placed from the base of the dam to the water level within the dam. The aggregate will be placed on the edge of the dam and pushed into the dam filling approximately half of the dam. Voids between the cobbles will enable movement of water and ensure the permeability and that groundwater inflow is maintained into the remaining area of the dam.

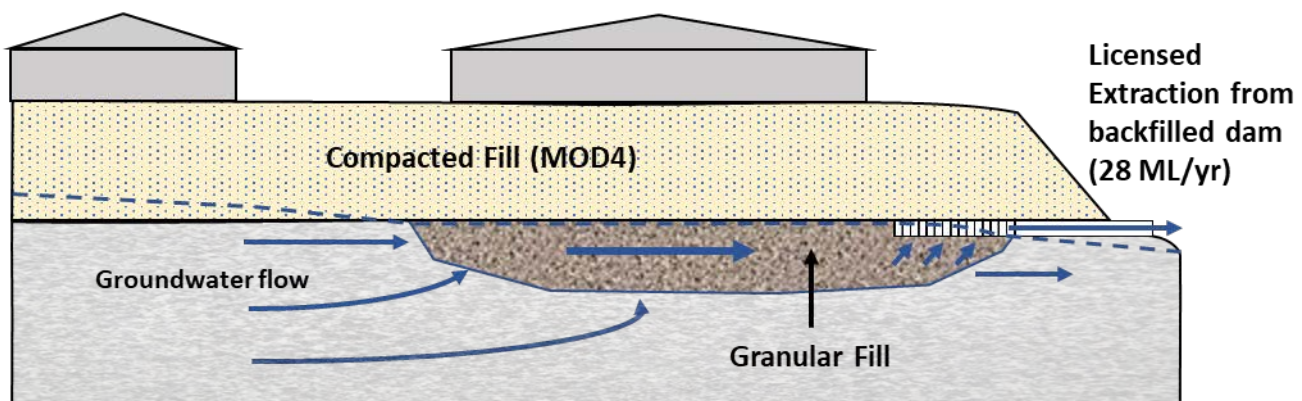
At the water level, a layer of geotextile matting will be placed above the cobbles. Subsequent [overlying] layers will consist of a sandy clay fill material with gravel and will contain two layers of geogrid geotextile and geotextile matting, which will bridge the aggregate above the dam.

The final fill level will be approximately 6 meters above the dam water level and the geotextile. The upper 300mm of fill will comprise DGB 20mm gravel stabilised with 5% cement. The final wearing surface layer is steel reinforced concrete and the thickness shall be governed by the expected loads.

Borg have confirmed that geofabric will be placed over the dam backfill material to prevent ingress of the finer overlying fill material into the coarse dam backfill material. Through reclamation of the dam and placement of reinforced concrete/hardstand at the surface, both the evaporation losses and precipitation inputs to the dam will be minimised.

The infilled dam will serve as a groundwater collection and storage system. The greater permeability of the backfill material relative to the surrounding formation will facilitate the continued ingress of groundwater. Borg has indicated that the proposed design will include a buried overflow collection pipe, at the height of the water table (current SWL height of the dam) that will act as a groundwater drain. Gravity flow will direct water to a pit and pipe system installed at a constructed embankment to the east.

The intention of the collection system design is to facilitate access to groundwater at the same volume and rate as the current licensed extraction from the SFD. The pipe outlet will be positioned at the toe of the constructed embankment to the east of the infilled SFD, in the vicinity of the overflow pond and close to the current water extraction point at the pumping station. Groundwater that flows into the collection system will be directed to the onsite treatment plant and surplus overflow water will be directed into the stormwater drainage system. Groundwater in the backfilled dam that is not captured by the collection system will flow back into shallow aquifer to the east, as it currently does from the SFD.



SFD 100% reclamation with granular fill (MOD4)

6 Hydrogeological Comparison of Reclaimed SFD Design to Current SFD Groundwater Extraction

Borg currently holds a WAL to extract 28 ML/yr of groundwater from the SFD. They have indicated that the average rate of water extraction from the dam is sustained by inflow from the surrounding shallow aquifer. Hence, the SFD currently acts as a groundwater drain to the local shallow aquifer, with groundwater likely to enter the dam on the upgradient (western) end and excess water flowing back into the shallow aquifer on the eastern side. Locally, groundwater flow from the west is expected to bend inwards towards the dam within the radius of influence of the dam, as it would within the capture zone of an extraction well. The fact that the water level in the dam is reported to exhibit minimal variation in response to pumping suggests that the extraction rate is within the sustainable yield of the surrounding shallow aquifer.

Conceptually, backfilling of the SFD with coarse permeable material will result in the backfilled dam having a higher permeability than the surrounding formation and will therefore act as a preferential flow path for groundwater in the surrounding shallow aquifer. With groundwater being extracted from the backfilled dam at the same licensed rate as it is currently, the influence on the local groundwater flow system is expected to be nearly identical to the current extraction regime. Covering the dam with engineered fill will eliminate the evaporative losses from the dam and will also prevent (or greatly reduce) direct rainfall infiltration to the dam. Based on the estimated net rainfall in excess of evaporation to the dam of 2 ML/yr, the loss of this input to the system may result in a minor increase in the radius of influence of groundwater flow into the dam in response to extraction. However, this is anticipated to have no impact to the closest water supply works (which are located >2 km from the SFD) or the maintenance of baseflow to Kings Stockyard Creek.

Borg has indicated that the material used to backfill the SFD will not be contaminated or contain waste (similar to the material used to backfill the western 30% of the SFD during the approved MOD1 development). Accordingly, the backfill material is not expected to leach contaminants to groundwater in contact with the fill. It is recommended that proposed backfill material is subjected to rigorous quality control and testing to ensure it will not degrade the environmental values of the local groundwater resource.

With respect to the Aquifer Interference Policy, reclamation of the SFD will not interfere with the local groundwater flow system (as it will be more permeable than the surrounding aquifer), will not degrade the quality of the local groundwater resource, and licensed extraction from the reclaimed SFD (in accordance with the current WAL) will have an equivalent effect to the current extraction from the SFD. Reclamation of the SFD does not directly meet the definitions of a high-risk activity as listed in the NSW Aquifer Interference Policy. A cumulative pressure head decline is not anticipated.

In summary, the reclamation of the SFD will not impact groundwater flow or quality in the shallow aquifer, and future groundwater extraction from the reclaimed SFD will access the same licensed rate and volume, from the same location within the same aquifer as the current extraction from the SFD. Accordingly, the influence on the local groundwater resource is expected to be indistinguishable from the current licensed extraction from the SFD, and therefore a more detailed impact assessment is not considered to be warranted.

7 Limitations

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Geosyntec's assessment was limited strictly to identifying environmental conditions associated with the spring fed dam, as identified in the scope of work and does not include evaluation of any other issues.

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All conclusions regarding the site are the professional opinions of the Geosyntec personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, Geosyntec has not independently verified and assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Geosyntec, or developments resulting from situations outside the scope of this project.

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8 Closure

Should you have any queries or wish to discuss any points, please do not hesitate to contact the undersigned.

Yours sincerely,



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Geosyntec Consultants Pty Ltd



Sarah Silver
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