EMS0099

Spring Fed Dam Reclamation Plan

Borg Panels

124 Lowes Mount Road, Oberon NSW

Borg Panels Pty Ltd

28 May 2019

This document should be read in conjunction with EMS0060 Construction Environment Management Plan, EMS0006 Surface Water Management Plan and EMS0008 Erosion & Sediment Control Plan.

Revision History

Rev No.	Revision Date	Author / Position	Comments	Details	Authorised	
					Name / Position	Signature
0	29/03/2019	Jacqui Blomberg Environment Manager		Draft	Victor Bendevski Environmental and Regulatory Compliance	
0.1	28/05/2019	Jacqui Blomberg Environment Manager	Following DILW/NRAR review	Draft	Victor Bendevski Environmental and Regulatory Compliance	
1	28/05/2019	Jacqui Blomberg Environment Manager	For issue		Victor Bendevski Environmental and Regulatory Compliance	

.

Table of Contents

Appendices

1 INTRODUCTION

1.1 Background

Borg Panels operates a Medium Density Fibreboard (MDF) manufacturing facility in Oberon, NSW. This facility produces a range of Customwood MDF products including:

- Standard MDF;
- Moisture Resistant MDF;
- E0 (Low Formaldehyde Emitting) MDF;
- Ultraprime MDF Mouldings;
- Decorative Laminated MDF and Particle Board; and
- Treated paper for the lamination of MDF and Particle Board.

On 29 May 2017 Development Consent SSD 7016 was granted by the Minister for Planning to construct a particleboard manufacturing facility, modify the existing MDF manufacturing facility and undertake general site works at the existing Borg Panels site located on 124 Lowes Mount Road, Oberon.

On 20 November 2018 modification of Development Consent SSD 7016 MOD 1 was approved by the Director, Industry Assessments as a delegate of the Minister for Planning under section 4.55(1A) of the *Environmental Planning and Assessment Act 1979*. This modification included a proposal to extend the footprint of the warehouse at the north west portion of the site, which will encroach on the spring fed dam located at the north of the site. This extension will require reclamation of a portion of the man made dam to provide suitable structural footing for the new building, driveway and to allow sufficient space for the changes to the surface water management system. **Figure 1** shows the existing spring dam location.

1.2 Purpose and Objectives

The purpose of this Plan is to:

- Address the relevant conditions of Development Consent SSD 7016 including modifications and to manage the reclamation of a portion of the spring fed dam at the Borg Panels facility.

The objectives of the Plan are to:

- Identify potential impacts to the water resulting from construction activities, specifically the reclamation works;
- Implement appropriate mitigation and management measures as required, ensuring they meet relevant legislative requirements;
- Address comments concerning the reclamation works received in response to the approved Section 1A modification for an increase building footprint; and
- Define a protocol for reporting environmental incidents.

1.3 Structure of this Plan

This Spring Fed Dam Reclamation Plan (the Plan) has been developed to manage potential impacts to the dam during reclamation works and to satisfy the requirements as set out in Conditions C1 and C9 of Development Consent SSD 7016 and Condition B33A of MOD 1.

This is a sub plan to EMS0060 Construction Environmental Management Plan (CEMP) and includes information on the following:

- Section 2 – Legislative and Regulatory Compliance
- Section 3 – Overview
- Section 4 – Environmental Impact Assessment
- Section 5 – Mitigation & Management Measures
- Section 6 – Fill Design
- Section 7 – Inspections & Reporting
- Section 8 – Plan Review

1.4 Consultation

The Final Draft of this Plan was sent to DILW for review and consultation. The Final Plan will be submitted to the Secretary of the Department of Planning and Environment (DP&E) for approval. Correspondence regarding consultation is included in **Appendix A**.

1.5 Responsibilities

Name	Title	Responsibility
David Read	Construction Manager (CM)	• Instruct employees/contractors on how to comply with environmental procedures including this Plan and requirements relevant to their respective work activities • Ensure SS is aware of and complies with the environmental obligations as detailed in this Plan • Tracking and compliance against the Conditions of Consent for the scope of works detailed in this Plan • Evaluate effectiveness of environmental controls associated with the works detailed in this Plan • Implement and support remedial measures as recommended by the EO • Engage with EO, EM and environmental consultants where required to provide support in implementing this Plan • Investigate any environmental incidents or complaints with EO and EM where required, and ensure corrective action is implemented
Levi Yates	Site Supervisor (SS)	• Manage employees / contractors and construction activities on a daily basis to ensure the appropriate environmental controls are implemented and maintained • Undertake daily site inspections of environmental controls • Implement actions identified as a result of site inspections or reported environmental issues • Report any environmental management concerns or incidents immediately to the Construction Manager
Ian Makins	Environment Officer (EO)	• Train employees/contractors on how to comply with environmental procedures including this Plan

		• Undertake regular site inspections, documented at least monthly to ensure environmental issues are identified and managed and controls are adequate • General environmental compliance observations and recommend actions where necessary • Investigate any environmental incidents or complaints with CM and EM where required, and ensure corrective action is implemented
Jacqueline Blomberg	Environmental Manager (EM)	• Assist EO in training employees/contractors to ensure compliance with environmental procedures including this Plan • Investigate serious incidents, complaints or non-conformances and ensure necessary corrective action is implemented • Assist CM with tracking and compliance against the Conditions of Consent for the scope of works detailed in this Plan • Provide and other necessary support to EO and CM • Conduct review as per section 8 of this Plan

2 Legislative, Regulatory & Licence Compliance

2.1 Relevant Legislation

Key environmental legislation for the Existing Development includes:

- *Protection of the Environment Operations Act 1997*; *and*
- *Environmental Planning and Assessment Act 1979.*

Other relevant legislative framework associated with the spring dam reclamation works is the *Water Management Act 2000.* The NSW Aquifer Interference Policy is the governing policy for the licensing and assessment of aquifer interference activities under this Act and therefore is considered for this activity.

2.2 Conditions of Consent

The existing development operations are subject to the conditions contained in Development Consent SSD 7016 dated 29 May 2017 and SSD 7016 MOD 1 approved 20 November 2018.

The specific requirement for a Spring Dam Reclamation Management Plan (the Plan) can be found in Schedule 2, Condition B33A:

> **Spring Dam Reclamation Management Plan**
> *The Applicant must prepare a Spring Fed Dam Reclamation Management Plan for the Project. The plan must form part of the CEMP as required by Condition C1 and be prepared in accordance with Condition C9 and must:*
> - *Be prepared in consultation with DILW;*
> - *Be submitted to the Secretary for approval prior to commencement of the spring fed dam reclamation works;*
> - *Include details of the reclamation materials and reclamation methodology for the spring fed dam reclamation works;*
> - *Detail the management measures to mitigate water quality impacts during the spring fed dam reclamation works; and*
> - *Incorporate the recommendations outlined in Appendix A of Borg Construction Pty Ltd's Letter to Department of Industry, dated 2 August 2018 as described in Modification Assessments.*

2.3 Water Access Supply Licence

The existing development has approval from Department of Primary Industries (DPI) for water supply works under approval 80WA715797 allocating 28 units per financial year to be extracted from the aquifer (spring dam). The Statement of Approval issued under the *Water Management Act 2000* must be referred to during the reclamation works to ensure the conditions of approval are met, including nil exceedance of extraction limits.

If it is determined during design (or similar investigations) that the current water allocation is not sufficient, an application to DPI will be submitted requesting a temporary increase to the approved allocation units for the duration of the reclamation works.

3 OVERVIEW

3.1 Site Environment

The site is currently developed for the purposes of a manufacturing facility for Medium Density Fibreboard (MDF) and particleboard. This includes:

- A number of large scale industrial buildings which contain various processes involved with the manufacture of MDF and MDF products
- Concrete hard stand areas between the buildings
- A two-story administration/amenities building with associated staff car parking
- Various necessary items of infrastructure including venting, dust collection and wood particle conveyors Other facilities/buildings associated with the use of the land (including maintenance areas, security entry/exit gates and weigh bridges
- Fencing, landscaping, surface water drainage and other site facilities

The expansion works that have been undertaken allowed for the construction of a dedicated particleboard manufacturing line, whilst providing additional infrastructure including within existing buildings, to value add existing products.

The further proposed extension of the warehouse at the north west of the site will encroach on the spring fed dam. Part of the dam area will require reclamation to provide suitable structural footing for the new building and driveway, and allow sufficient space for the changes to the surface water management system.

3.2 Identification of Issues

Additional works as approved under as per SSD 7016 MOD 1, namely extension of the northern warehouse facility, will affect the spring fed dam.

Potential issues associated with the reclamation works include pollution of waterways if dam dewatering is required, or use of unsuitable fill material, which may result in localised groundwater mounding which may have a negative effect on water quality.

Advice on the reclamation works provided by Edge Geotechnical *Borg Panels Timber Processing Facility Modification 1 (SSD 7016 MOD 1) Comments on Reclamation of Spring Fed Dam* (**Appendix B**) concluded that groundwater flow paths could be maintained whilst achieving the required fill compaction/stability for the warehouse extension. Edge Geotechnical recommended further investigation be undertaken into reclamation materials and the preparation of a reclamation methodology.

Acting on the recommendations of Edge, reclamation of the spring dam has been assessed by Sustainability Workshop *'Proposed S96 Mod for an increase building footprint at Oberon – surface water quality and quantity considerations'* (**Appendix C**) which concludes that the activity should not impact on long-term viability of the groundwater source if the advice provided by Sustainability Workshop is followed. Impacts and mitigation measures are further discussed in sections 4 and 5 of this Plan.

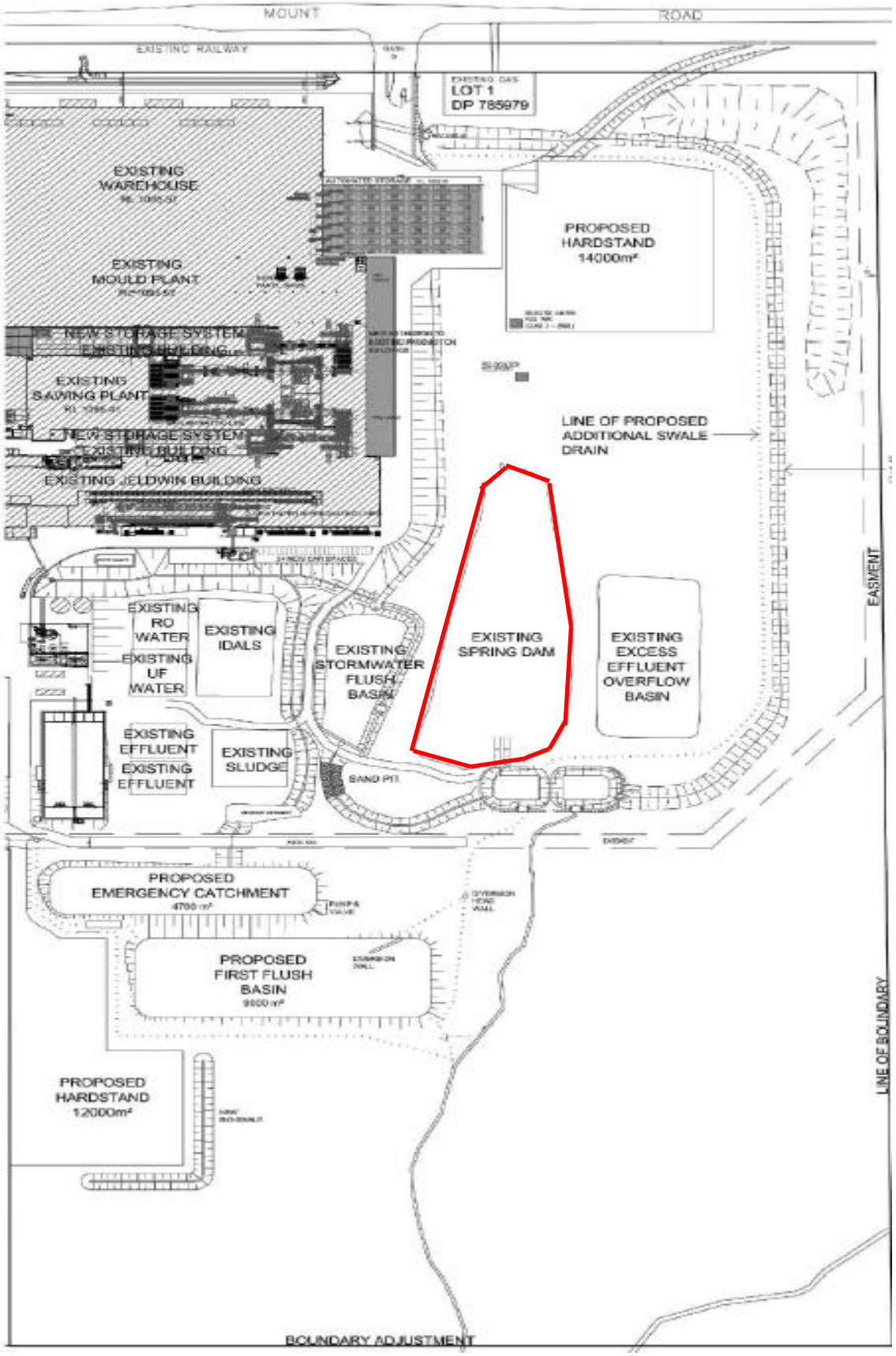

Figure 1 Existing spring dam location

4 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Existing Environment

The spring dam is a groundwater dependent dam that does not store surface waters. This dam was created by previous owners of the facility when they had extracted clean fill for construction purposes. This location has a shallow groundwater table and as a result, a permanent waterbody was inadvertently created. The dam has no notable upstream catchment and is simply a hole in the ground, filled with groundwater.

The permeability of the fill placed in the dam will need to be maintained during construction and operation of the facility to prevent sealing of the spring and influencing the groundwater table.

4.2 Potential Impacts

Potential impacts from the activity could occur during both construction and operation of the facility.

4.2.1 Construction

During construction, impacts on water quality causing pollution to Kings Stockyard Creek has been identified as a key risk if dewatering of the dam to reduce the water level were to occur. This water may be more turbid than normal given the construction activities and hence, affect water quality.

Envirowest Consulting has provided a construction design plan (see **Appendix D**) which satisfies the requirements recommended by Edge Geotechnical and The Sustainability Workshop. This plan is outlined below in Section 6 Fill Design & Methodology.

Use of unsuitable fill material has also been identified. If use of a fill material that has a lower permeability that currently exists localised groundwater mounding may result. Groundwater mounding occurs where infiltrating water intersects a groundwater table and the rate of water entering the subsurface is greater than the rate at which water is conveyed away from the infiltration system. Mounding may result in groundwater impacts on site or on adjacent land, and has the potential to damage building structures, as it is an unsuitable construction material.

4.2.2 Operation

Provided that a porous fill material is chosen to reclaim the dam i.e. allows groundwater to flow through it at a rate equal to or greater than the site clays and is also low in dispersible materials (less than 10% dispersibility), it is unlikely that there will be any short term or long-term groundwater implications. Further, a reduction in evaporation from the surface of the dam may be realised as the surface area will be reduced.

5 MITIGATION & MANAGEMENT MEASURES

Provided the advice contained within Sustainability Workshop *'Proposed S96 Mod for an increase building footprint at Oberon – surface water quality and quantity considerations'* and fill design provided by Envirowest Consulting, the proposed reclamation works will not impact on long term viability of the groundwater source whilst providing a suitable foundation for the building works to proceed. The below mitigation and management measures are applicable for both construction and operation phases of the facility. Measures are as follows:

- Implement the Spring Fed Dam Reclamation Management Plan (this Plan) for the site
- Implement erosion and sediment control measures over the development site whilst construction works are underway as part of CEMP
- Fill imported to site to be suitably certified
- Engage a geotechnical engineer to review subsurface conditions during construction stages and to confirm that subsurface conditions are consistent with design assumptions (see section 6. Fill Design), and provide advice on fill placement methodology
- Ensure flow path for emerging groundwater is maintained
- Daily monitoring to ensure no discharge of dam water off site, pump into the existing stormwater flush basin to be used as site process water
- Follow the fill design (including reclamation materials) provided by Envirowest Consulting and outlined in this Plan in Section 6. Fill Design & Methodology
- Undertake daily site inspection to maintain and ensure ERSED controls are working effectively
- Undertake (at least monthly) environmental inspections using checklist to record site condition, monitor environmental performance of the construction works, and capture required actions to address identified adverse environmental impacts

Provided that a 'closed site' approach is adopted during construction to ensure no dam water leaves the site, the risk of causing pollution under the POEO Act will be minimised.

6 FILL DESIGN & METHODOLOGY

It is anticipated that approximately half of the spring dam will be filled to facilitate the warehouse extension works. **Figure 2** illustrates the area of the spring dam to be reclaimed, and **Figure 3** the extension and associated works details. During construction the permeability of the dam void will be maintained in the filling process. The expected depth of the dam is 6 meters. The fill for the reclamation works will comprise boulders, ballast, recovered aggregates, general fill and stabilised fill (**Table 1**). Geotextile, geogrid and geotube will assist the stabilisation process.

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. 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 the spring remains able to maintain flows into the remaining area of the dam. The blast/cobbles will have a 1:2 batter and may be stabilised with a permeable grout mat and a concrete filled geotube. The geotube will be anchored to the base of the dam with rock and will secure the edge batter of the filled area.

At the water level, a layer of geotextile matting will be placed above the cobbles. Subsequent 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. Advice may be sought from geotextile suppliers for the optimum product for the bank and pad area.

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. **Figure 4** provides a schematic of the filled dam area including fill layers and materials.

The level of stabilised layer will be verified for no deformation by proof rolling with a minimum 10t truck or similar prior to construction activities. Compaction testing may be undertaken at each lift above the water level to check for compaction density.

Table 1: Fill Layers in the Spring Dam

Layer	Description	Comments
Surface layer	Concrete	-
Base and subbase (300mm)	Stabilised DGB gravel	Compacted
General fill (5m)	Sandy clay with gravel with two layers of geogrid separated by 2m	Compacted
Water level	Geotextile	-
Dam void (5m)	Ballast/cobbles (>75mm dia)	Washed with no fines
Base of dam	Boulders (>200mm dia)	Base of dam in sediment

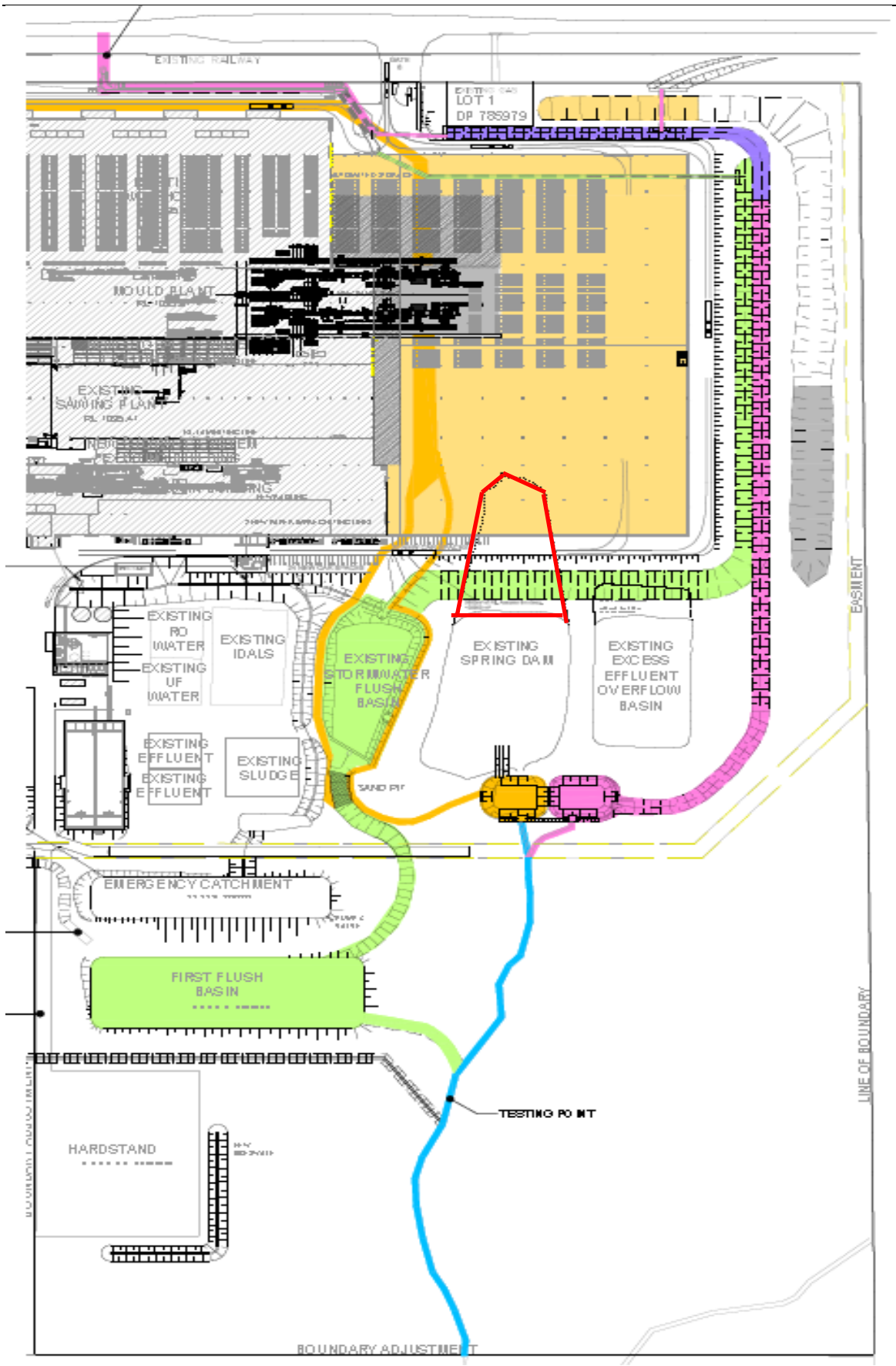

Figure 2 Spring dam reclamation area

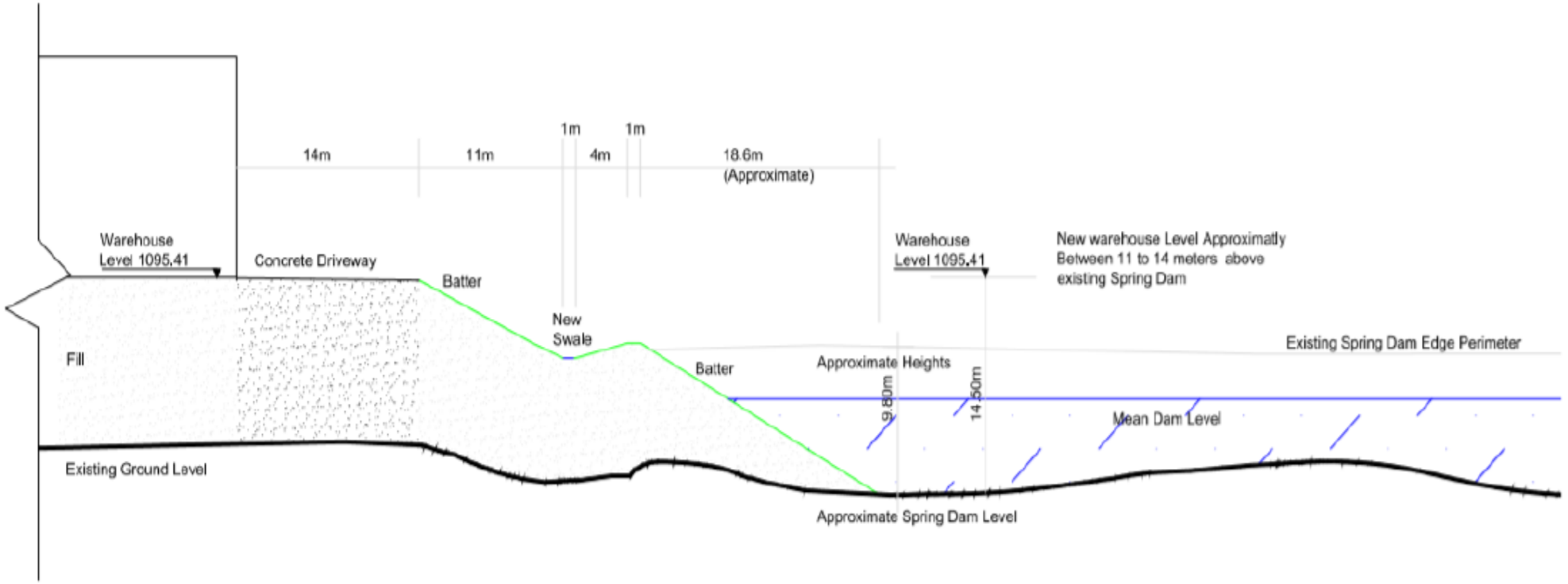

Figure 3 Construction plan for reclamation works

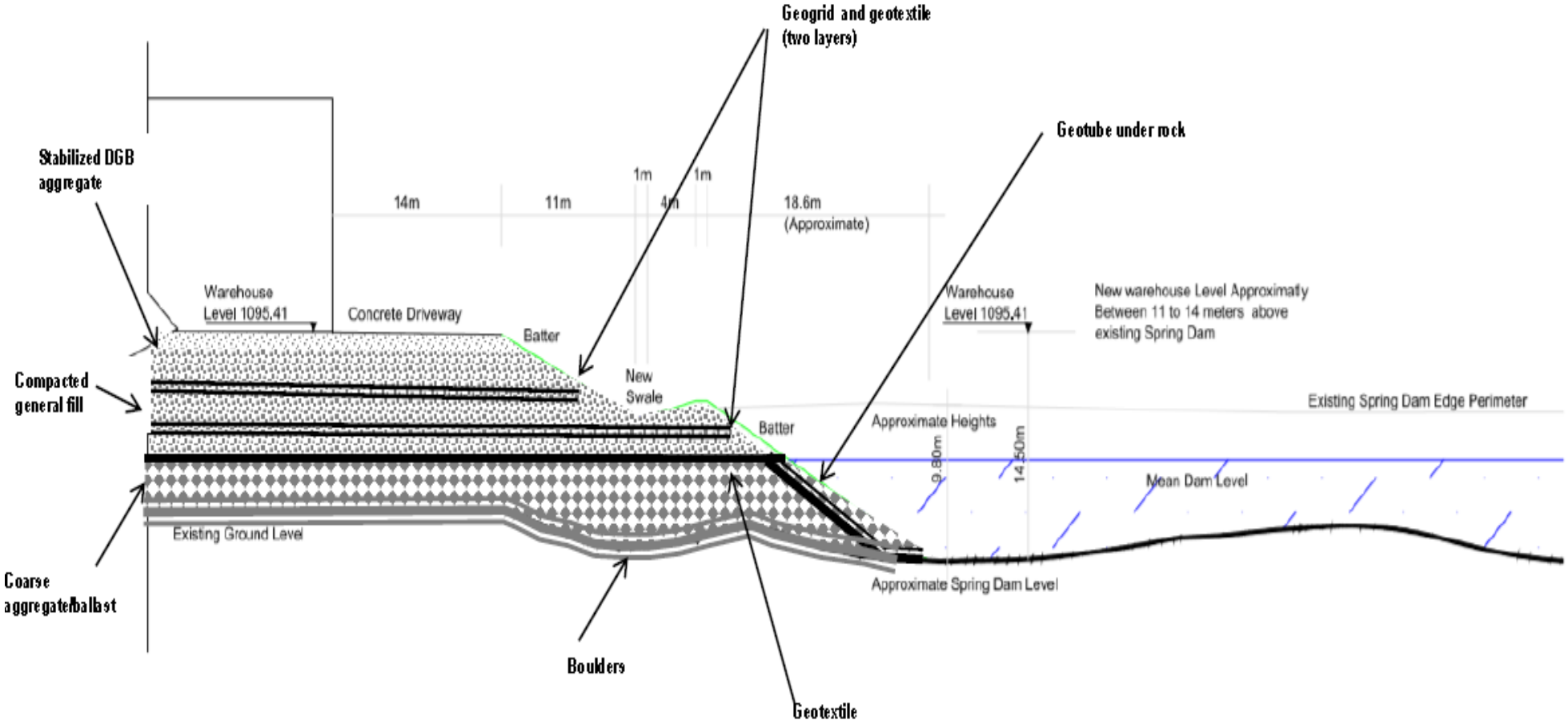

Figure 4 Schematic of filled dam area

7 INSPECTIONS & REPORTING

Borg Panels will manage all internal and external reporting requirements in accordance with EMS0060 Construction Environment Management Plan (CEMP). Any environmental concerns regarding the reclamation works will be immediately reported to the Construction Manager and/or the Environment Officer.

7.1 Inspections

Either the Environment Officer or Site Supervisor will perform daily inspections of the construction area. Any environmental issues identified such as ineffective erosion or sediment controls will be addressed immediately. A monthly site inspection will be conducted and recorded by the Environment Officer. Checklists will be used to report on activities for compliance with this Plan and to identify issues specific to the reclamation works that require attention.

Pre-rainfall and post-rainfall inspections will also be undertaken and recorded by the Environment Officer to ensure erosion and sediment control devices are adequate, working effectively and replaced if necessary.

All workers will be responsible for reporting identified environmental issues immediately to the Site Supervisor, and implementing the requirements of this Plan as they conduct their works.

7.2 Unlicensed discharge

In the event of an unlicensed discharge during the reclamation works, Borg Panels will notify the EPA immediately and undertake an investigation of the discharge event. In the unlikely event that a discharge poses a threat to health of surrounding property owners and occupiers, Borg Panels will implement the Pollution Incident Response Management Plan (PIRMP), which includes notification with those likely to be affected. A list containing surrounding property owner's and occupier's contact details is held by Borg Panels.

The notification procedure is to be initiated by the Environment Officer for Borg Panels. In the absence of the Environment Officer, the notification procedure is to be initiated by the person designated as fulfilling the responsibilities of the Environment Officer.

An investigation report on the unlicensed discharge will be prepared and provided to the EPA or other relevant agency, including the DP&E.

7.3 Annual Review

In accordance with Development Consent SSD 7016 an Annual Review report is prepared and submitted to the Secretary Department of Planning and Environment on an annual basis. The review will be prepared in accordance with Condition C11.

8 PLAN REVIEW

In accordance with Development Consent SSD 7016 Condition C10, this Plan will be reviewed and if necessary revised within 3 months of an:

- Approval of a modification;
- Submission of an incident report under Condition C13;
- Approval of an Annual Review under Condition C11; or
- Completion of an audit under Condition C15.

The Plan will also be updated as required to reflect any change to on-site management or monitoring programs referred to in this document, or any changes to Development Consent SSD 7016 or EPL 3035.

Revisions to the Plan will be submitted to the Secretary DP&E for approval.

Appendix A
Consultation Correspondence -DPI and DILW

Natural Resources Access Regulator

Contact Tim Baker
Phone 02 6841 7403
Fax 02 6884 0096
Email Tim.Baker@dpi.nsw.gov.au

Victor Bendevski
Borg Manufacturing
2 Wella Way
SOMERSBY NSW 2250

Email: bendevskiv@borgs.com.au

Our ref V18/869#5

15 May 2019

Dear Victor,

RE: Spring Dam Reclamation Plan

I refer to your email dated 10 April 2019 requesting comment by the Natural Resources Access Regulator (NRAR) on the draft Spring Dam Reclamation Plan (Plan). It is understood this consultation is in accordance with the requirements of Condition B33A of development consent SSD 7016 Mod 1. The plan has been reviewed and the following comments and recommendations are provided.

Comments

- The plan indicates the need to maintain the groundwater flow paths and has identified the risk of unsuitable fill causing groundwater mounding.
- Construction of the works have been identified to have the potential to impact water quality of Kings Stockyard Creek if dewatering is proposed.
- If the placed material is to intersect the water table or there is the potential for runoff from the material to enter the groundwater or surface water source, the material needs to not have the potential to leach contaminants that can degrade the quality of the water sources.
- Mitigating measures have been included in section 5 of the plan to address the previous points. These measures are supported.
- Where groundwater is to be intersected, a Water Access Licence (WAL) with sufficient entitlement in the relevant water source will need to be held to account for any take of water. Where additional entitlement is required, this needs to be obtained on the water market on a temporary or permanent basis as required, or via a Controlled Allocation Order process if applicable to the water source.

Recommendations

- Implement the mitigating measures as proposed in Section 5 of the plan.
- Ensure fill material of sufficient permeability is used to maintain the groundwater flow paths and prevent groundwater mounding.
- Ensure the fill material does not have the potential to leach contaminants that can degrade the quality of the water sources.
- Ensure sufficient entitlement is held in a WAL to account for water take from the proposed activity prior to this take occurring.

Should you have any further queries in relation to this submission please do not hesitate to contact Tim Baker 02 6841 7403.

Yours sincerely

Tim Baker for
Vickie Chatfield
Manager Licensing and Approvals - West
Natural Resources Access Regulator

Appendix B
Edge Geotechnical *Borg Panels Timber Processing Facility Modification 1 (SSD 7016 MOD 1) Comments on Reclamation of Spring Fed Dam*

Edge Geotechnical

J18017-001 23rd July 2018

Borg Manufacturing Pty Ltd
2 Wella Way
SOMERSBY NSW 2250

By email: bendevskiv@borgs.com.au

Borg Panels Timber Processing Facility Modification 1(SSD 7016 MOD 1)
Comments on Reclamation of Spring Fed Dam

Introduction

At your request, Edge Geotechnical Pty Ltd (Edge) has reviewed Borg Manufacturing Pty Ltd (Borgs) proposal to reclaim part of the Spring Fed Dam as part of its Oberon warehouse extension project.

The spring fed dam lies to the north-east of the existing plant and the proposed expansion to the north requires reclamation of the western portion of the dam (30% of the dam).

This letter is provided to assist in your response to comments made by Department of Industry to the Department of Planning & Environment via a Response to Submissions, Document No: OUT18/8997 (dated 29th June 2018).

Impact of Reclamation on Groundwater Regime

The site is located within an area of elevated/perched and possibly deep artesian groundwater, with significant groundwater inflows observed through the shallow subsurface profile which comprises porous volcanic sandstone with breccia and conglomerate. During original expansion of the factory in 1996, the spring fed dam was excavated and significant groundwater inflow was encountered.

Proposed expansion of the Borg Oberon warehouse requires general fill placement, plus additional fill for reclamation of the western 30% of the spring fed dam, which is up to 9m deep. Given the anticipated significant volume of groundwater inflow, dewatering is not currently considered feasible and reclamation is proposed to be carried out whilst the dam contains water. Underwater reclamation is likely to be carried out using a granular or rock fill (or blend of both), which has high permeability and can be placed below water and compacted when the new surface level is above water. Underwater reclamation with granular or rock fill is considered routine work and its core objective will be to minimise impact on local groundwater flow paths.

It is widely accepted that crushed rock material can provide good strength whilst maintaining high permeability - which would enable reclamation of the spring fed dam with minimal impact on local groundwater flow paths. A suitable granular fill, or blend of granular fill with crushed rock, could also provide sufficiently high permeability reclamation fill with minimal impact on local groundwater flow paths.

The required composition and degree of compaction of the reclamation fill can be tailored to be compatible with the local groundwater regime, minimising impact on local groundwater flows paths whilst meeting the engineering requirements of proposed structures and hardstand areas. Footings for proposed structures can be founded below new reclamation fill, facilitating acceptance of a lower degree of compaction and maximising fill permeability. Hardstand

areas can be designed to accommodate additional settlement that will occur due to acceptance of a lower degree of compaction of the reclamation fill.

"The ability to achieve the maintenance of groundwater flow paths whilst achieving the required fill compaction/stability" can be clearly identified with testing of proposed fill sources, a reclamation methodology and plant design that is compatible with the degree of fill compaction.

Recommendations

Is it understood that after you have obtained planning approval for the proposed extension, further investigation into reclamation materials can be carried out and a reclamation methodology prepared, that meets the above objectives. We anticipate that such work would comprise, but may not be limited to, the following:

- Investigation into local sources of rock fill, including gathering information on material grading curves and collecting samples for laboratory testing where necessary.
- Investigation into local sources of granular fill (other than crushed rock), including gathering information on material grading curves, compaction/density curves and collection samples for laboratory testing where necessary.
- Laboratory testing of fill sources would include particle size distribution, compaction and permeability testing.
- Further investigation (desk top study and/or additional field testing) into in-situ field permeability of the aquifer(s) to provide clear comparison with physical properties of possible fill sources to demonstrate that groundwater flow objectives are satisfied.
- Documentation of a reclamation methodology and construction specification documents and to enable construction verification that main objective of maintaining groundwater flow is satisfied.

Edge is well positioned to assist you in the above detailed investigation. Our Principal Geotechnical Engineer has been involved in numerous reclamation projects in Australia and overseas. During her time with Golder Associates Pty Ltd, Karen played a pivotal role in successful tendering of the Sydney Port Botany reclamation project and was co-author of the paper "Experience In Geotechnical Design Of Overseas Port Facilities", published in GeoEng2000.

If you have any questions, please do not hesitate to contact Edge by email or telephone.

For and on behalf of

Edge Geotechnical Pty Ltd

Karen Allan BEng (Hons), CPEng MIEAust
Principal Geotechnical Engineer, Director

Appendix C
Sustainability Workshop *Proposed S96 Mod for an increase building footprint at Oberon – surface water quality and quantity considerations'*

14th May 2018

Head Office
4 Park Avenue
Blackheath, NSW, 2785
Australia
E: mark@sustainabilityworkshop.com
T +61 (2) 4787 8428
www.sustainabilityworkshop.com

Dear Victor,

RE: Proposed S96 Mod for an increase building footprint at Oberon – surface water quality and quantity considerations

We have assessed the proposed S96 modifications to the approved development plans at Borgs Oberon. This letter addresses the implications of the proposed modifications on water quality and quantity.

1.1. Proposal

The S96 proposal includes an expansion of the main production building footprint to the north of the existing building, i.e. toward Gate 6. There would be a trafficable hardstand located around the periphery of the building as shown on the plan.

Previously this area was largely assumed and modelled as a hardstand that was to be used for car parking and storage. This S96 modification sees much of this hardstand area change its landuse and become roof area.

The existing "clean water" swale, which conveys runoff from the paddock on the western side of Lowes Mount Road, and which skirts the northern end of the Borgs site will be modified to have a top width of 10m and a base width of 1m. This swale will be slightly relocated to the north.

Previously we had proposed a grassed swale to accept runoff from the CHH site on the western side of Lowes Mount Road and part of the Borgs site which drained directly to the "inner swale". This swale was known as the "dirty inner swale" as it would accept runoff from the industrial land and be

located adjacent to but inside of the clean water swale. The previous MUSIC water quality model included the inner swale, modelled as a grass swale, with a total swale length of 300m.

This swale remains a key part of the S96 modification proposal however the total length of swale available will be increased to approximately 470m.

The proposal would see some of the spring fed dam reclaimed with a rock and or earth platform and building over the top. Creation of additional impervious area associated with this activity has been accounted for in a revised MUSIC model.

The modification also includes reclaiming part of the spring fed dam. Assessment of this activity is also included below.

1.2. Method and Results

The proposed modification sees additional impervious area constructed. It sees a change in land use from existing pervious area and proposed hard stand to proposed roof and hardstand. On a first principles basis this should result in additional volumes of runoff (from a net increase in impervious area) combined with a fairly neutral impact on runoff quality (roofs are considerably cleaner than hardstands and so will see some improvement in water quality. Conversely, changing a pervious area to either roof or hardstand will see a decline in water quality leading to a fairly neutral position).

The proposed modification was modelled in MUSIC to more accurately determine the impact on water quality using the same method previously adopted. This involved changing the proposed land uses, running the 20 year MUSIC water quality model 10 times (i.e. simulating 200 years) and selecting the maximum water quality values obtained for TSS, TP and TN. Apart from the land use changes described above, two other changes to the model were undertaken. These were:

1) Increasing the volume of the storage pond to reflect a preferred pond volume of 11.1 ML. Previously this was modelled as 6 ML. A design for a pond achieving 11.1 ML has been undertaken and this design allows for the system to function hydraulically while remaining as high above the groundwater as feasible. The footprint of the dam has not changed, the depth will be increased to 1.2m to create the extra volume.
2) Previous MUSIC modelling, which was conservative, allowed for 300m of grassed swale. More detailed construction plans show that there will be 470m of swale. The MUSIC model was amended to reflect the increase in swale length.

1.2.1. MUSIC Water Quality Results

Predicted maximum concentration values for TSS, TP and TN from MUSIC are shown in Table 1 below.

Parameter	Previous Approved Model Results	S96 Mod Proposed Results	EPL limit (mg/L)
Total Suspended Solids (mg/L)	44.1	42	50
Total Phosphorus (mg/L)	0.227	0.229	0.3
Total Nitrogen (mg/L)	9.515	8.92	10

Table 1 Predicted maximum concentration values for TSS, TN and TP

Table 1 shows that the worst case TSS discharge concentration will improve slightly from approved values as will TN while TP will slightly increase but remain below the EPL.

Results for the predicted yield of stormwater from the proposed pond and the volumes of runoff are shown below in Table 2.

Parameter	Previous Approved Model Results (ML/a)	S96 Mod Proposed Results (ML/a)	% change
Volume of runoff from the site	287.5	286.5	0.35%
Stormwater yield from the proposed water quality pond	118.9	126	6%

Table 2 Changes in the volume of runoff and yield – Sec96 mod versus approved

The runoff volume row in Table 2 shows that the proposed additional impervious area will be mitigated by increasing the length of swale from 300m to 470m and increasing the volume of the proposed treatment and reuse pond by 2ML. That is, there is practically no change in site runoff volume.

It is concluded that the proposed increase in impervious area will have no detrimental impact on water quality leaving the site or on volumes of runoff, i.e. runoff regime. The increase in pond volume will see an additional 7 ML of runoff treated and harvested and leave an equivalent volume of water in the town water supply.

1.3. Spring Fed Dam Reclamation

The Spring Fed Dam is a groundwater dependent dam that does not impound surface waters. It is understood that the Spring Fed Dam was created many years ago by previous owners of the site when they had extracted clean fill for construction on the site from this area. This location has a shallow groundwater table and as a result a permanent waterbody was inadvertently created. It is understood that the excavation was abandoned when water started to seep into the pit at a rate

faster than could be economically pumped out. The dam has no notable upstream catchment and is simply a whole in the ground which is filled with groundwater.

This S96 proposal would see a maximum of 30% of the dam reclaimed. Impacts form this proposed activity could occur during both construction or operation.

During Operation: Provided that a porous fill material is chosen to reclaim the dam i.e. allows groundwater to flow through it at a rate equal to or greater than the site clays and is also low in dispersible materials (i.e. less than 10% dispersibility) it is unlikely that there will be any long-term groundwater implications.

If anything, it is concluded that there will be a reduction in evaporation from the surface as the surface area of the dam is reduced. Use of a dispersible clay material would not only be detrimental for water quality it would also be an unsuitable construction material and must be avoided for both of these reasons.

Use of a fill material which had a lower permeability may result in localised groundwater mounding. Because the Spring Fed Dam is located in the low point in the terrain mounding may result in groundwater impacts on the site or adjacent to the site. To avoid having to determine such impacts it is noted that fill material will need to have a permeability greater than or equal to site clays in the area surrounding the Spring Fed Dam.

During Construction: Construction phase impacts to water quality are more likely to occur than long term risks to water quality or water levels. Dewatering of the dam (if it were feasible) is one key risk and the risk here is of causing water pollution.

Construction phase impacts could be mitigated as follows:

- Temporarily reduce the water level of the dam by pumping using the existing water access licence. The purpose of water level reduction is to ensure that spring flows do not leave the site during any period of construction when the dam water quality may be more turbid than normal.
- Engage a geotechnical engineer and investigate both a source of suitable fill material and fill placement method and place the fill material into the dam. This statement assumes that it would not be economically viable to dewater the dam prior to placement of fill.
- It is noted that dewatering by lowering the water table may have substantial local groundwater impacts on surrounding groundwater users. Alternately, isolating the area to be filled in a cofferdam and dewatering the cofferdam would be a resource intensive exercise and may not be economically viable either.
- Do not discharge the pumped dam water off the site into King's Stockyard Creek unless it is free of sediment. Preferentially use it for on-going operations on the site, i.e. as raw process water by pumping into the existing stormwater quality pond. If this is not an option, then

disperse this water across the land downstream of the dam ensuring that it does not runoff into the creek.

- If necessary, apply a flocculant such as Chitosan to the water to settle any silt prior to allowing the groundwater in the spring fed dam to return to a level at which it could flow off the site.
- Provided that a "closed site" approach was adopted whereby for the duration of construction, no dam water left the site then the risk of causing "pollution" under the POEO Act will be minimised. Critical to achieving this outcome is the need to source suitable, non-dispersive material and finding a suitable method of placement for that fill.

Provided the advice contained herein is followed the proposed reclamation should not impact on long term viability of the groundwater source. The reclamation works are unlikely to affect the yield or viability of this valued groundwater source. The proposal does not see any additional extraction of groundwater and so should not affect your existing water access licence.

Yours sincerely,

Mark Liebman, CPEng, MIEAust, MIPWEA.

Director, Principle Engineer

Appendix D
Envirowest Consulting –*Partial filling of Spring Dam, 124 Lowes mount road, Oberon NSW*.

Envirowest Consulting *Pty Ltd* ABN 18 103 955 246
• 9 Cameron Place, PO Box 8158, Orange NSW 2800 • Tel (02) 6361 4954 •
• 72 Corporation Avenue, Bathurst, NSW 2795 • Tel (02) 6334 3312 •
• Email admin@envirowest.net.au • Web www.envirowest.net.au •

Environmental
Geotechnical
Asbestos
Services

6 February 2019

David Read
Borg Manufacturing
2 Wella Way
Somersby NSW 2250

Our ref: L10570g1

David,

Partial filling of Spring Dam 124 Lowes Mount Road, Oberon NSW

1. Introduction

The spring fed dam on the Borg Panels Timber Manufacturing Facility site requires partial filling to enable construction of a Timber manufacturing facility. The permeability of the dam water area needs to be maintained by the construction of a porous bed to prevent sealing of the spring and allow into the part of the dam no to be filled. The filled section of the dam will contain a warehouse and concrete driveway. Approximately 10 metres of fill needs to be placed in the dam to make the level suitable for the new facilities. The fil needs to have sufficient bearing capacity to support the new building and pavement.

A construction plan is required to enable the allow flow of water through the fill in the dam void under the platform for the new facilities.

2. Scope

Prepare a construction design plan for filling of the dam and placement of fill to the new surface level.

3. Location

The site is the Borg Panels Timber Manufacturing Facility development site above Spring Dam at 124 Lowes Mount Road, Oberon at the Borg Manufacturing Facility (Figure 1).

4. Description of development

A new building and pavement will be constructed above Spring Dam.

5. Fill design

Approximately half of the Spring dam will be filled (Figure 2 and 3). The permeability of the dam void will be maintained in the filling process. The fill will comprise boulders, ballast, general fill and stabilised fill (Table 1). Geotextile, geogrid and geotube will assist the stabilisation process.

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 (Figure 4). The aggregate will be placed from the base of the dam to the water level. The aggregate will be placed on the edge of the dam and pushed in to the dam filling approximately half of the dam. The expected depth of the dam is 6m. The aggregate will not contain fines. Voids between the cobbles will enable movement of water and ensure the permeability is maintained and spring remains active to maintain flows into the remaining part of the dam

The slope of the tile batter should be 1 vertical to 3 horizontal.

The blast/cobbles batter will be stabilised with a permeable grout mat which is a filled concrete filled geotube. The geotube will be anchored to the base of the dam with rock and will secure the edge batter of the filled area. The geotube will be further stabilised by pumping of concrete into the tubes.

At the water level a layer of geotextile matting will be placed above the cobbles. Subsequent layers will consist of a sandy clay fill material with gravel. The fill will contain two layers of geogrid geotextile and geotextile matting which will bridge the aggregate above the dam. Advice should be provided from geotextile suppliers for the optimum product for the bank and pad area.

The final fill level will be approximately 10 m 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 steel reinforced concrete and the thickness determined by the expected loads.

The level of stabilised layer will verified for no deformation by proof rolling with a 10t truck or similar prior to construction activities. Compaction testing should be undertaken at each lift above the water level to check for compaction density.

Table 1. Fill layers in the dam

Layer	Description	Comments
Surface layer	Concrete	-
Base and subbase (300mm)	Stabilised DGB gravel	Compacted
General fill (5m)	Sandy clay with gravel with two layers of geogrid seperated by 2m	Compacted
Water level	Geotextile	-
Dam void (5m)	Ballast/ cobbles (>75mm dia)	Washed with no fines
Base of dam	Boulders (>200mm dia)	Base of dam in sediment

6. Bearing capacity

The shear strength of the fill material is expected to be 100kPa from a depth of 2m above the former water level. The end bearing capacity of the fill will be 150kPa to a depth of 2m above the former water level and skin friction of 15 kPa.

The building will be designed to bridge the dam area. Foundations for the building will be screw piers inserted at the edge of the dam. The screw piers will not compromise the geotextile layers.

7. Dam edge

The surface water from the southern edge of the development area will be diverted from the dam by a surface drain (Figure 4). The dam will be recharged only from the subsurface spring.

Regards,

Greg Madafiglio
Engineering geologist

Attachments

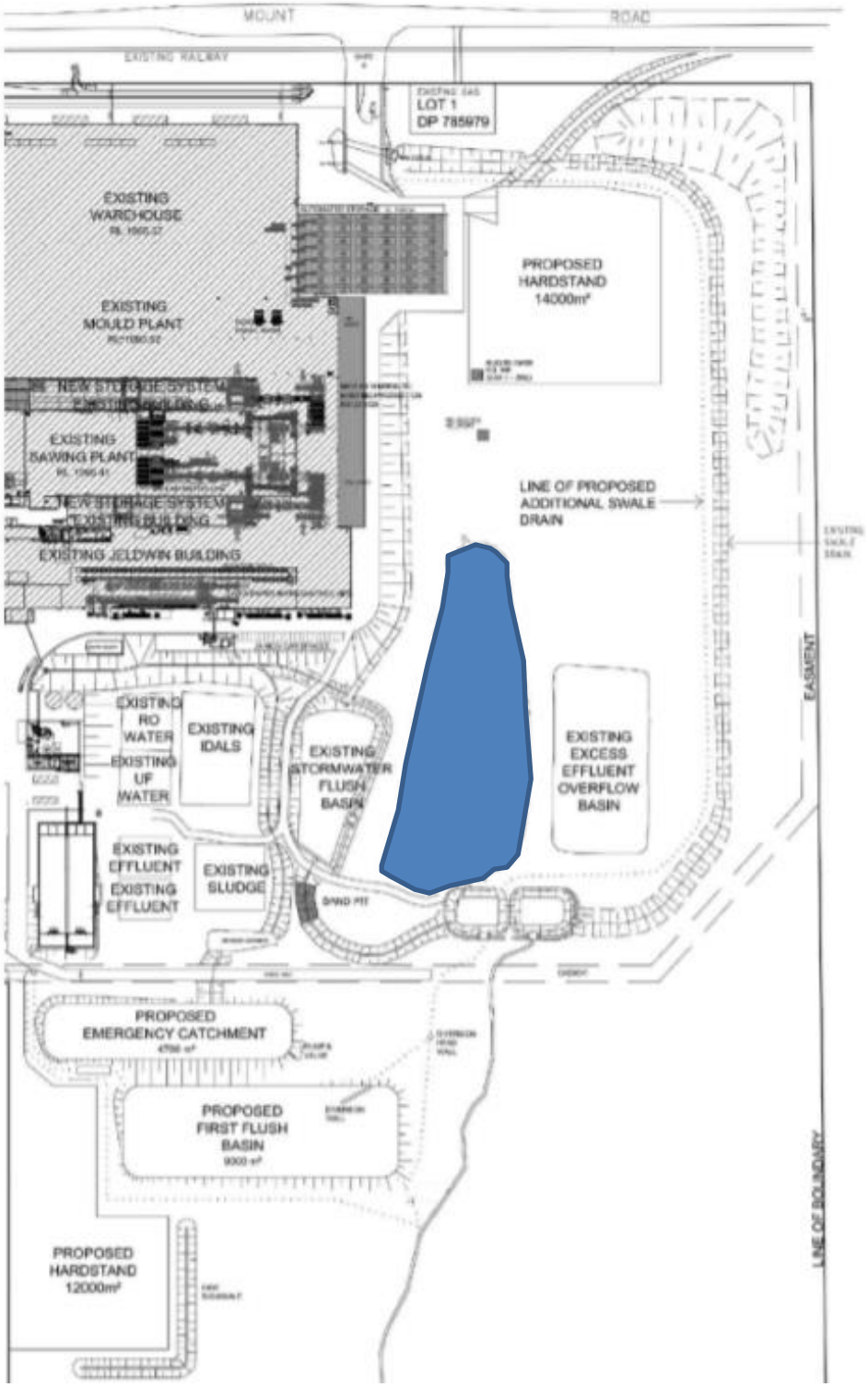

Figure 1. Existing Spring Dam location		
Panels manufacturing Facility, 124 Lowes Mount Road, Oberon NSW		
	Envirowest Consulting Pty Ltd	
Job: L10570g1	Drawn by: GM	Date: 6/2/2019

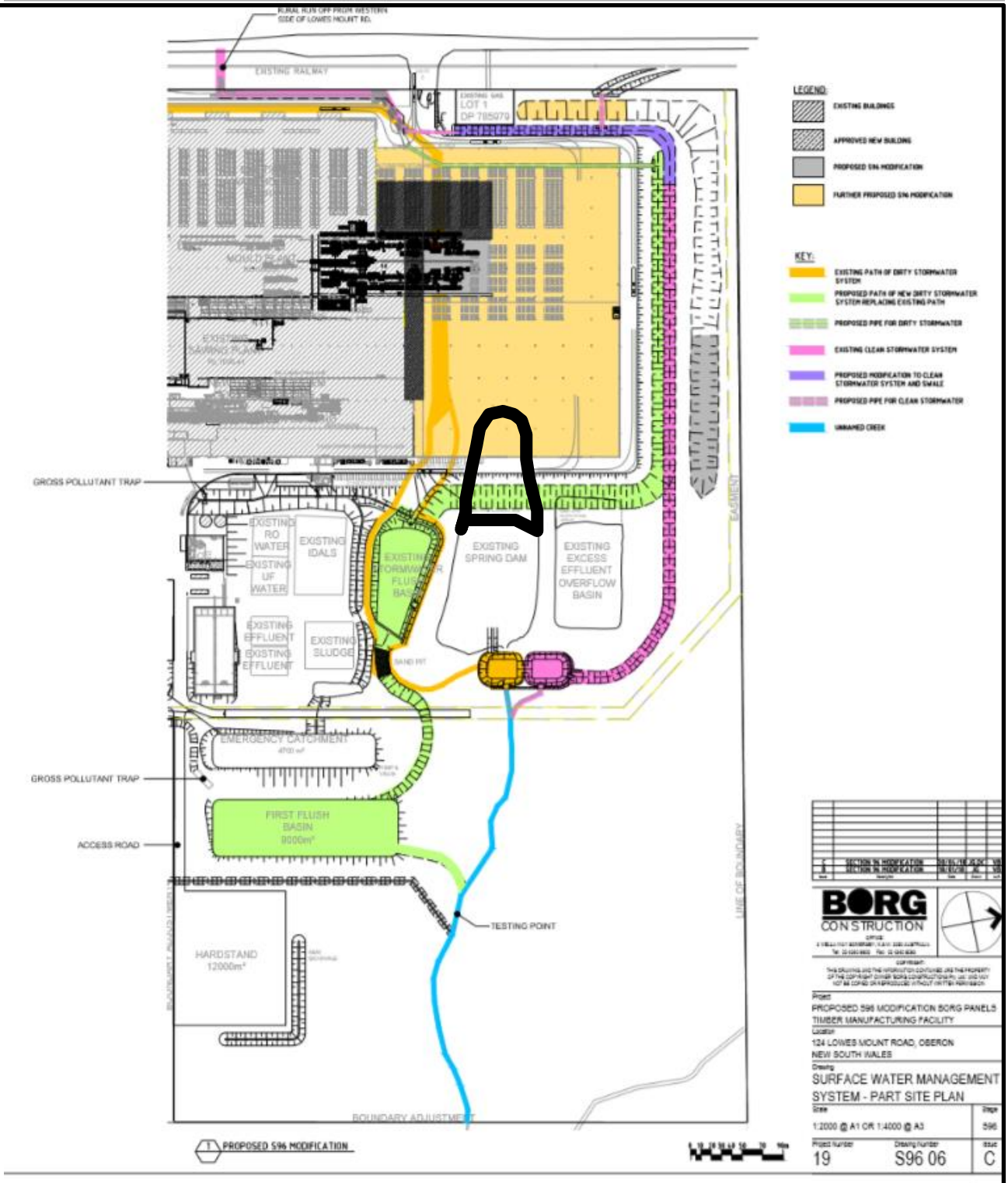

Figure 2. New development and area to be filled		
Panels manufacturing Facility, 124 Lowes Mount Road, Oberon NSW		
	Envirowest Consulting Pty Ltd	
Job: L10570g1	Drawn by: GM	Date: 6/2/2019

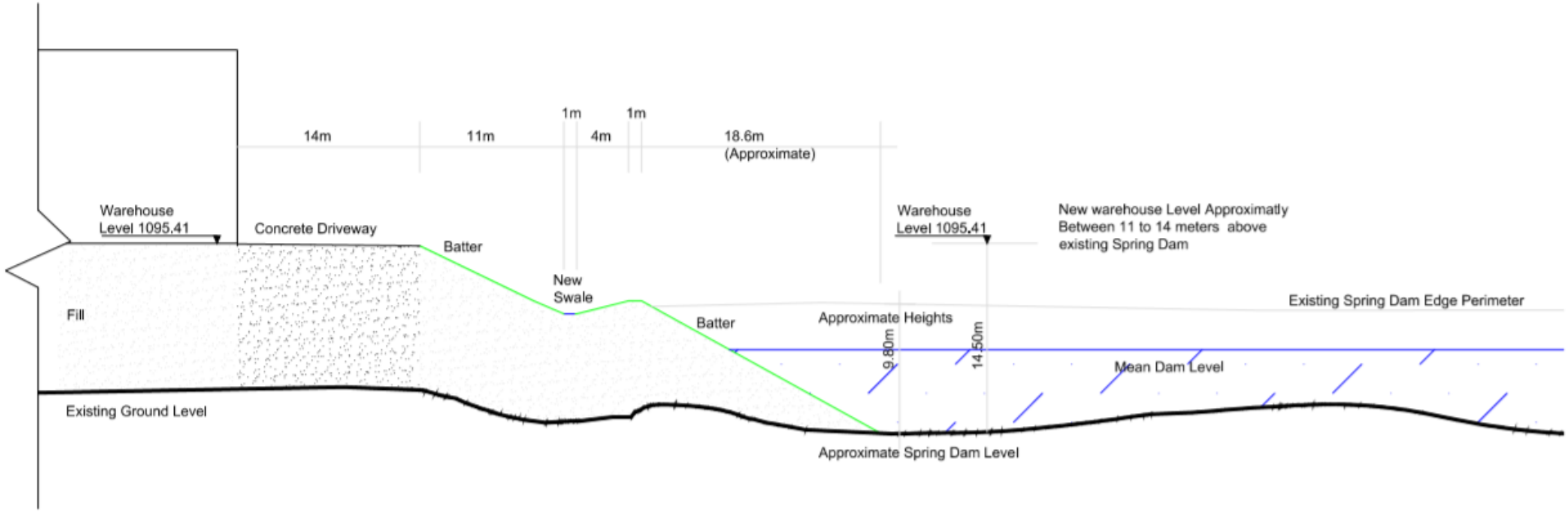

Figure 3. New development and area if dam to be filled		
Panels manufacturing Facility, 124 Lowes Mount Road, Oberon NSW		
	Envirowest Consulting Pty Ltd	
Job: L10570g1	Drawn by: GM	Date: 6/2/2019

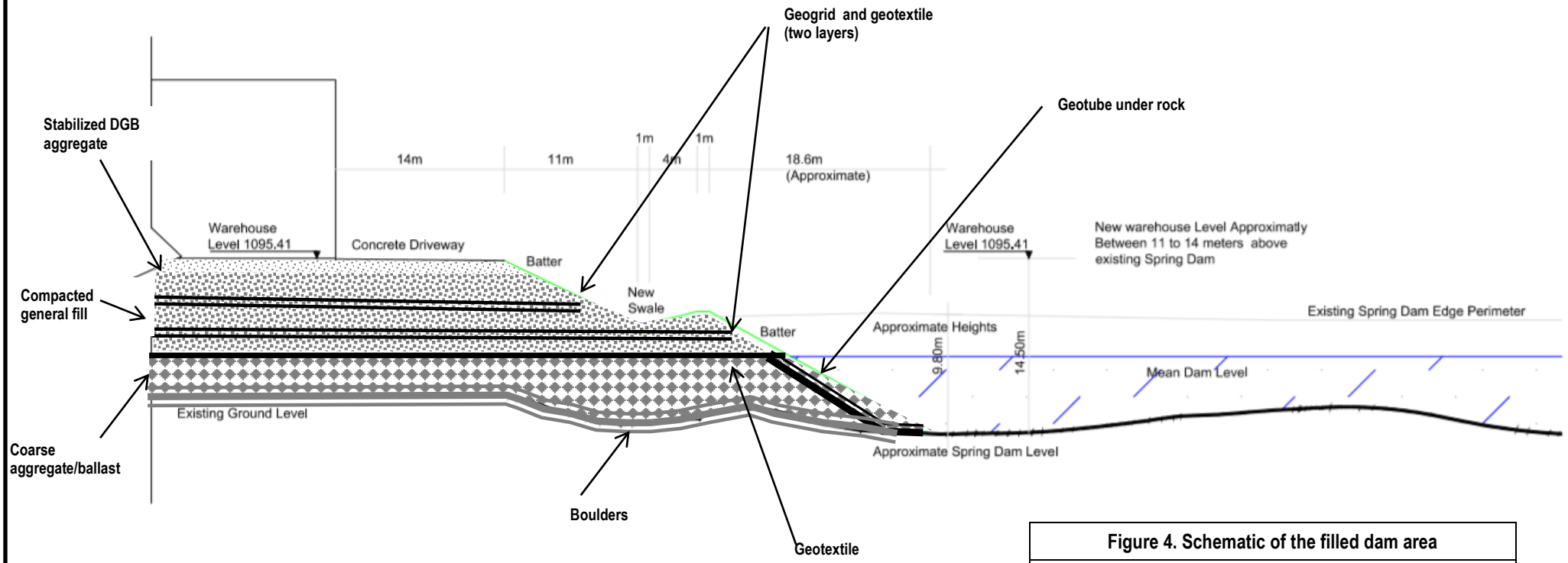

Figure 4. Schematic of the filled dam area		
Panels manufacturing Facility, 124 Lowes Mount Road, Oberon NSW		
	Envirowest Consulting Pty Ltd	
Job: L10570g1	Drawn by: GM	Date: 6/2/2019

Appendix 1. Limitations of the investigation

Ground conditions can vary over relatively short distances and it may be necessary to carry out additional investigations for specific excavation and building sites. Once specific proposals are known a geotechnical review should be undertaken and if necessary additional investigations commissioned to provide the level of information required for assessing design parameters. A geotechnical engineer should be engaged to review subsurface condition during construction stages to confirm that subsurface conditions are consistent with design assumptions.

This report has been prepared for the use of the client to achieve the objectives given the client requirements and cost constraints. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the investigation and its likely impact on the proposed buildings Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that Envirowest Consulting Pty Ltd are not responsible for these limitations.

This report including data contained and its findings and conclusions remain the intellectual property of Envirowest Consulting Pty Ltd. This report should not be used by persons or for purposes other than stated and not reproduced without permission.