GROUNDWATER SCIENCE CORP.

311 Glastonbury Drive,
Stratford, ON N5A 6B8
phone: (519) 746-6916
groundwaterscience.ca

October 22, 2025

Rob Stovel
Stovel and Associates Inc.
655 Orangeville Road
Fergus, Ontario
Canada
N1M 1T9

sent by email: stovel.associates@outlook.com

Dear Mr. Stovel:

RE: Proposed BelCal Inc. Development, 6640 7th Line, Belwood
Hydrogeological Assessment Review Comments

This letter provides a technical response to comments provided by Banks Groundwater Engineering Ltd. in their memo dated January 18, 2024 on behalf of the Township of Centre Wellington regarding the BelCal Inc. proposed development in Belwood.

The comments are summarized below *in italics*, followed by our response.

1.2 *Sub-section 3.7 Source Protection Considerations – it is acknowledged "there is no Wellhead Protection Area or Intake Protection Zone identified at the site or in the vicinity of the proposed development", and "the site is also not within any identified Wellhead Water Quantity Zone".*

It is also acknowledged "the site is mapped as part of a Significant Groundwater Recharge Area", which has implications with respect to maintaining pre-development rates of recharge following development. The most recent Source Protection Policies and guidelines should be referenced for this purpose.

As noted, the most recent Source Protection Policies should be referenced in the development of any LID measures to be used (to be determined in consultation with the Township) as part of the stormwater management plan for the site in order to maintain groundwater recharge.

1.3 *The report summarizes a review of water well record information (Sub-section 3.6), the results of a water well survey (Sub-section 4.3), and the results of on-site test well drilling (Sub-section 4.4). The information presented supports the conclusion that the main water supply source in this area is the bedrock aquifer. It is therefore understood the expected water supply source for each of the proposed 107 lots within this development will be the bedrock aquifer. Each lot is proposed to be serviced by an individual private water supply well. The test well drilling program was completed in accordance with the Province's Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment, August 1996. Based on a development area of 38.6 ha, a minimum of five water supply test wells were successfully constructed and tested for well yield and water quality. The analysis of each respective pumping test presented confirmed the wells are capable of providing a sufficient quantity of water for domestic*

> *purposes. However, there is a lack of discussion regarding the sustainability of domestic well yields for the proposed 107 lots.*

We note that a revised development plan has been prepared based on other comments received as part of the application process. The current plan proposes a total of 88 residences on 89 lots.

Based on known aquifer characteristics individual domestic wells at each of the proposed residential lots are expected to have sufficient yield for domestic purposes. Aquifer sustainability was briefly discussed in Section 8.3, referencing the long-term proven aquifer capacity at the 200+ domestic wells within the existing adjacent settlement.

In addition, we note that the same regional aquifer system supplies communities in the area (for example Elora/Fergus) and taking at those communities has been shown to be sustainable at much higher pumping rates and volumes.

In order to provide additional site-specific information regarding the sustainability of domestic yields within the bedrock aquifer we provide a 20-year drawdown projection based on the theoretical approach that taking over the entire development is sustained by combinations of the existing 5 test wells. We note that this scenario is not proposed, however it is utilized as an analysis approach to provide the requested sustainability assessment *of domestic yields for the proposed … lots*. For the purposes of this assessment a total of 107 lots is assumed (conservative approach consistent with original application), as noted above the total number of lots has been reduced therefore projected water taking effects would also be reduced.

Assuming a maximum of 107 residences with a daily demand of 1,000 Litres (per septic loading assessment), this equates to 107,000 L/d, or 74.3 L/min on average over 24 hours. We note that test wells TW2 and TW5, with tested rates of 45.4 and 34.1 L/min, would exceed the average daily demand within the development if they were both pumped continuously.

Drawdowns at TW2 and TW5 were relatively low, therefore a second projection is made using the remaining wells on a combined basis. Test wells TW1, TW3 and TW4, with tested rates of 22.7, 22.7 and 18.9 L/min would approach the combined daily demand within the development.

Projection plots are attached for reference.

The 20-year drawdown projections are often compared to “available drawdown” to assess sustainable yield. We are aware of guidelines in use by the MECP that also require comparisons of the 20-year drawdown projection to the top of aquifer (e.g. Government of Alberta, March 2011, *Alberta Environment Guide to Groundwater Authorization*). Therefore, we have calculated the available drawdown using the top of the bedrock aquifer at the site, and compared the projected drawdown to the available drawdown as the measure of sustainability of domestic yields at the site.

As shown on the plots, a very conservative assessment approach of assessing maximum daily pumping on a continual basis over 20 years with taking spread over only a few wells within the development is not projected to lower the water levels at the wells to the top of the bedrock aquifer at the site. Given that actual taking will be intermittent and distributed over the entire development area, and, site groundwater recharge will be maintained (through LID measures and other recharge processes at the site) we conclude that the combined taking would be sustainable within the bedrock aquifer. Similar to the existing developed community nearby.

1.4 Procedure D-5-5 indicates "To ensure that the recommendations of the report are properly implemented, the consultant's report may include a recommendation for supervision of well construction by a qualified consultant at the time the well is being constructed by the (licensed) well contractor." Consideration should be given to include such a recommendation, and perhaps to include testing of well yield and water quality.

Agreed, recommendations are included below.

1.5 Sub-section 5.4 Bedrock (Water Supply) Aquifer Water Quality indicates the water sample from one of the test wells (TW3) had a level of total arsenic above the drinking water quality criteria limit. The report suggests a filtration system may required for this well. However, there is exists the potential that many more wells within this 107-lot development could have similar water quality. The report also includes a recommendation that "this test well could also be deepened to intercept lower water producing zones in order to mitigate arsenic." This is considered to be a preferred approach, as it may provide further guidance on well construction design for all wells on this site.

We agree that drilling test well TW3 deeper, to observed water bearing zones between approximately 50 to 60 m below ground surface, would be the preferred approach. Therefore, in order to address the overall concerns regarding well construction and testing, we now recommend the following:

- That prior to use for domestic supply, well TW3 (MECP Tag# A335262) be: deepened to 60 m below ground surface; redeveloped using air or by pumping; and, resampled for arsenic. The sample results should be reviewed by a qualified consultant (P.Geo or P.Eng) in comparison to applicable Ontario drinking water quality regulations and guidelines and appropriate recommendations made to the well owner regarding water consumption and/or treatment.

- New domestic wells drilled at the site shall be completed by a licenced water well contractor according to all applicable regulations under the supervision of a qualified consultant (P.Geo or P.Eng.). New wells shall be constructed in bedrock to a depth of at least 60 m below ground surface.

- Each new well shall be tested for well yield by a licenced water well contractor according to all applicable regulations.

- Prior to use as a domestic supply the water quality at each new well shall be sampled by a qualified consultant (P.Geo or P.Eng), and the sample results reviewed by the consultant for the well owner.

  The water quality sample shall be tested for a suite of water quality parameters that includes or is similar to (e.g. ALS Laboratories, Potability Package):

  General Chemistry: Conductivity, Langelier index (@ 4°C), alkalinity bicarbonate (as HCO3), alkalinity carbonate (as CO3), alkalinity hydroxide (as OH), alkalinity total (as CaCO3), colour, apparent hardness (as CaCO3), dissolved hardness (as CaCO3) from total Ca/Mg, pH, solids total dissolved [TDS], solids total dissolved [TDS] calculated, turbidity, Langelier index (@ 20°C), pH saturation (@ 4°C), pH saturation (@ 20°C).

  Ion Balance: anion sum, cation sum (total), ion balance (cations/anions), ion balance (APHA).

Anions and Nutrients: ammonia total (as N), bromide, chloride, fluoride, nitrate (as N), nitrate + nitrite (as N), nitrite (as N), phosphate ortho- dissolved (as P), sulfate (as SO4).

Microbiological Tests: coliforms Escherichia coli [E. coli], coliforms total, coliforms total background.

Metals: sodium adsorption ratio [SAR].

Total (unfiltered) Metals: aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, cesium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, molybdenum, nickel, phosphorus, potassium, rubidium, selenium, silicon (as SiO2), silicon, silver, sodium, strontium, sulfur, tellurium, thallium, thorium, tin, titanium, tungsten, uranium, vanadium, zinc, zirconium.

1.6 *Sub-section 5.1 Water Table Conditions summarizes the high and low water table elevations across the site. Important recommendations are included "Given that off-site infiltration and shallow flow onto the site likely contributes to seasonal water table levels, on a precautionary basis the high water table as defined in Figure 7 should be used to plan the subdivision design. For water balance assessments and any proposed LID design, recharge conditions at the till layer should be the primary consideration." These recommendations are not repeated in Section 9.0 of the report, but are considered important in terms of stormwater management and maintaining pre-development rates of recharge. It is acknowledged that the Functional Servicing and Stormwater Management Report notes that "the form of LID BMP and location will be reviewed further at the draft planning stage, using the input from the geotechnical and hydrogeological studies. The seasonally high depth of groundwater below surface in particular will impact the form and feasibility of infiltration measures." It is therefore anticipated that subsequent combined submissions of proposed engineering and site plan details will be coordinated with the on-going hydrogeological characterization of this site. Following review of such documents and drawings, further comments related to hydrogeological considerations can be made.*

Acknowledged. Additional reviews of subdivision design and stormwater management planning are expected as part of the approval process.

1.7 *Sub-section 8.1 Water Balance Calculations – includes a water balance assessment of existing conditions, where the entire site is considered pervious. A pre-development average annual recharge rate is estimated to be 0.195 m/yr. A recommendation is included "It is expected that in order to mitigate any water balance within the proposed development area deficit clean (roof and open land) runoff will be directed to LID lot level and/or conveyance control measures. In addition end-of-pipe infiltration measures can also be considered." This recommendation is also not repeated in Section 9.0 of the report, but is considered important in terms of stormwater management and maintaining pre- development rates of recharge. It is noted that the Functional Servicing and Stormwater Management Report acknowledges this recommendation.*

Acknowledged. LID targets and measures are expected to be part of a complete stormwater management plan to be developed at the site, in coordination with the Township.

1.8 Sub-section 8.2 Nitrate Loading provides the basis for the recommendation that all lots be serviced by tertiary treatment septic systems (Level IV), designed to reduce the nitrate concentration in effluent by at least 50 percent. It is recommended the design, installation, and on-going maintenance of these systems, as well as reporting procedures, be completed in accordance with the requirements of the Township of Centre Wellington.

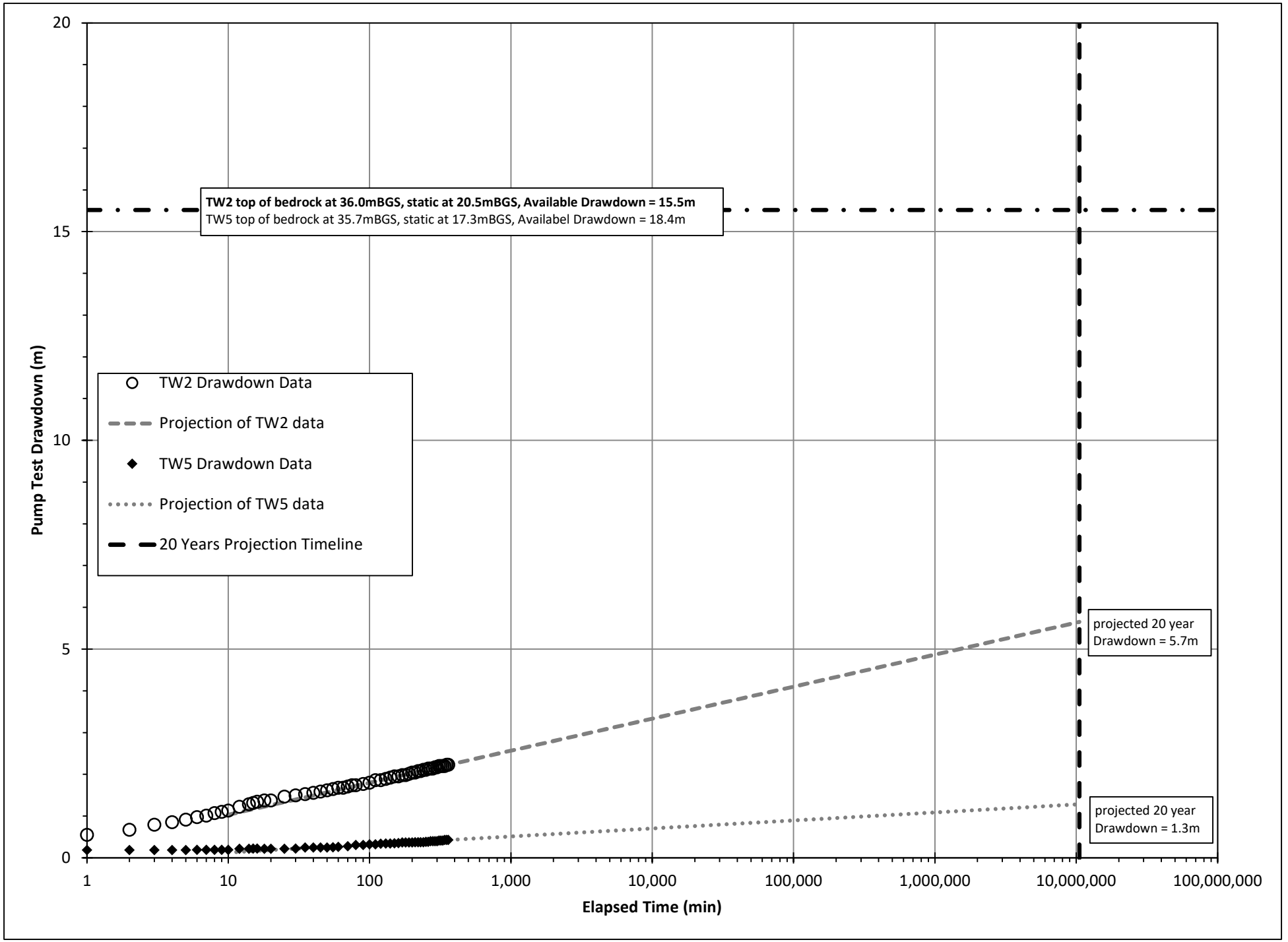
Acknowledged.

If you have any questions regarding this technical response, please do not hesitate to contact me.

Sincerely,

Andrew Pentney, P.Geo.
Hydrogeologist
apentney@rogers.com

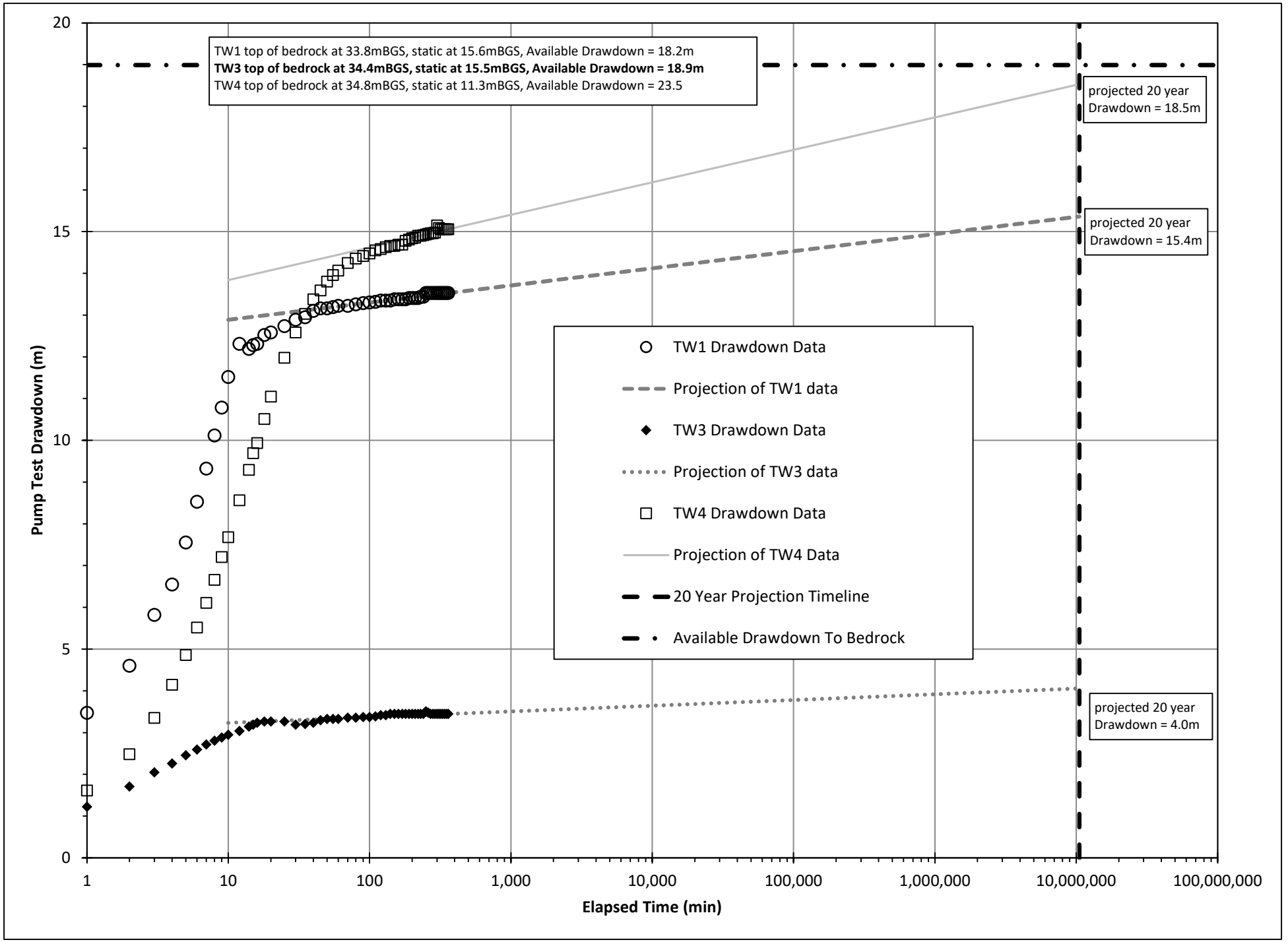
attached: TW2 and TW5 Pumping Projection
TW1, TW3 and TW4 Pumping Projection



BelCal Inc
Proposed Belwood Development

TW2 and TW5 Pumping Projection

Groundwater Science Corp
Hydrogeologic Assessment



BelCal Inc
Proposed Belwood Development

TW1, TW3 and TW4 Pumping Projection

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