Summary Title: Groundwater Pumping Ordinance Revision

Title: Adoption of an Ordinance Amending Chapter 16.28 of Title 16 of the Palo Alto Municipal Code to Revise the Requirements for Dewatering During Construction of Below Ground Structures

From: City Manager

Lead Department: Public Works

Recommendation
Staff recommends that Council adopt an Ordinance amending Chapter 16.28 of Title 16 of the Municipal Code to revise the requirements for Dewatering During Construction of Below Ground Structures.

Executive Summary
Staff is recommending revisions to the Groundwater Dewatering Ordinance adopted on March 7, 2017 (SR #7633). Council directed staff to return to Council after a construction season and further collection of information. Based on that information, staff is recommending changes that help clarify and augment the existing ordinance requirements, while leaving the basic structure of the 2017 requirements in place. This structure allows project applicants that anticipate encountering groundwater in construction projects that include underground structures to either 1) install groundwater exclusionary techniques, such as cut-off (secant) walls, to minimize the amount of water pumped; or to use 2) controlled groundwater pumping techniques, while predicting groundwater pumping drawdown. The proposed Ordinance amendments identify new requirements for both types of techniques, which focus on improving the prediction of the amount of pumped groundwater, decreasing impacts to surrounding structures and infrastructure, addressing traffic impacts during the construction period and minimizing impacts to the area’s groundwater quantity and quality as well as the quality of downstream water bodies. In addition, the
proposed amendments to the Ordinance identify and clarify requirements in order to standardize a performance-based, regulatory and enforcement process that the City can continue to improve over time.

Background
Council approved temporary groundwater construction pumping requirements in February 2016 for the 2016 construction season (SR #6478). These requirements were incorporated into the planning and building permit process on a pilot basis for the 2016 construction season. Staff evaluated the results of the 2016 construction season and returned to Council with a proposed ordinance (SR #7633), which was adopted on March 7, 2017.

The key changes made at that time were with respect to the Dewatering Hydrogeological Study (previously referred to as a “Geotechnical Study”), which had been put in place the previous year to determine groundwater drawdown levels and any associated impacts. Specifically, the March 2017 changes to the study were:

1. Required verification of the anticipated drawdown curve with a pump test, using actual wells. Cone Penetrometer Tests (CPT) were encouraged to verify soils data. The actual pumping rates, following a two-week start-up period, were limited to the rates used in the verification. Furthermore, the maximum amount of water pumped over the 10-week period, (excluding the two-week start-up period) was limited to that calculated during verification.

2. To support the work in (a) above, required measurement of the groundwater level at a farthest feasible point on the subject site from the underground structure.

3. If drawdown results were greater than anticipated by the Hydrogeological Study (previously known as Geotechnical Study) at the end of the two-week start-up period or thereafter, a revised study had to be submitted.

4. The applicant had to survey and mark land elevations on structures on adjacent parcels (assuming permission is obtained) prior to any pumping.
5. The Hydrogeological Study and verification was not required if the storm drain pumping was continuously limited to 30 gallons per minute (gpm) following the two-week start-up period. This could be accomplished through installation of groundwater exclusionary techniques (known as cut-off walls or secant walls) or similar construction techniques. Similarly, the 10-week pumping period could be extended if the 30 gpm flow rate was continuously achieved.

On March 7, 2017, Council directed staff to return to Council following the 2017 construction season after considering four following modifications for the 2018 construction season:

1. Determine whether existing wells from other sites/purposes can be used to satisfy the groundwater monitoring requirements; utilize such existing wells, if practical.

2. Limit the groundwater level drawdown at the closest off-site adjacent structure to 3’ (feet).

3. Determine whether existing wells can be used to satisfy the requirement in the verification step of the Hydrogeological Study (previously Geotechnical Study); if not, install a new monitoring well.

4. Potentially, require the use of groundwater cut-off walls, or other construction methods, which will limit the pumping (following a two-week start-up period) to 30 gallons per minute (gpm).

On March 7, 2017 Council also modified the applicability of all the groundwater pumping requirements to apply to any site not having a Building Permit prior to the effective date of the 2017 Ordinance (May 1, 2017).

Discussion
Staff considered a number of groundwater dewatering pumping program changes in formulating this Staff Report. They fall into the two categories summarized below.

1. The first category is those changes that Council directed Staff to consider on March 7, 2017:
a. **Determine whether existing wells from other sites/purposes can be used to satisfy the groundwater monitoring requirements; utilize such existing wells if practical, if not install a new monitoring well.**

Staff does not recommend making this a requirement since the City does not have control over existing wells. Applicants may propose to use existing wells if they choose to do so.

b. **Limit the groundwater level drawdown at the closest off-site adjacent structure to 3’ (feet).**

While it may be desirable to establish a performance standard of this nature, staff has not been able to determine whether 3 feet is achievable or needed. It was hoped that drawdown data would have been produced by new applicants in the 2017 construction season; however, current construction projects were either grandfathered in with the old requirements or new projects decided to use the groundwater exclusionary techniques ("cut-off wall technology"). Therefore, no sites elected to prepare the Hydrogeological Study in 2017 construction season. If and when actual data becomes available in the future, staff will evaluate the Hydrogeological Study and determine if the data provides the information needed or if other performance standards should be required in the future.

c. **Potentially require the use of groundwater cut-off walls, or other construction methods, which will limit the pumping (following a two-week start-up period) to 30 gallons per minute (gpm).**

Staff recommends retaining the current situation where the groundwater exclusionary technique (cut-off wall) is an option, but not a requirement. There are several reasons for this recommendation. First, staff was unable to find any other government entities that have this as a requirement. Therefore, there may be potential environmental and other unexplored concerns with the City requiring specific construction practices in all cases. Secondly, best practices described in engineering texts on this topic do not recommend installation of cut-off walls in all cases. Rather, the texts provide examples when cut-off walls can and cannot be used. Thirdly, there
may be unintended consequences from the installation of cut-off walls. Some Palo Alto residents have raised the concern that a proliferation of cut-off walls may retard the flow of groundwater in such a way that localized groundwater may rise or even come to the surface. Further study should be undertaken before a substantial shift to limit the allowable techniques.

On the positive side, the first residential cut-off wall was installed and completed in Palo Alto in 2017 and successfully reduced groundwater pumping at that site. Less than 200,000 gallons was pumped from the ground, with all of it percolated into the back yard and no discharge to the storm drain system. A typical large groundwater pumping site produces about 100 times that amount, 20,000,000 gallons in total. As a result, staff will convey to other applicants that this cut-off wall achieved very good results. In the immediate future, staff expects many applicants will choose a groundwater exclusionary technique, such as the cut-off wall installation. It has many advantages to the applicant, as a Hydrogeological Study is not required. The Hydrogeological Study takes time and money, must be verified with testing, and the outcome is uncertain. Finally, controlled groundwater pumping techniques are limited to 12 weeks at residential sites, whereas groundwater exclusionary techniques are not limited to this time period.

2. Revisions to the Groundwater Dewatering Ordinance adopted on March 7, 2017 (Revising Section 16.28 of the P.A.M.C.)

Staff recommends adoption of revisions to the Groundwater Dewatering Ordinance adopted by Council on March 7, 2017. Attachment A provides the new Ordinance language, while Attachment B (Comparison of Current Provisions and Proposed Changes: Groundwater Dewatering Ordinance) provides an easy-to-scan table with the current provisions and recommended changes. The following primary aspects to the proposed revisions are listed below:

a. Key language previously approved by Council in ‘Guidelines for Dewatering During Basement or Below Ground Garage Construction - May 2017’ (Attachment C) is being incorporated into the Ordinance for completeness,
which include the hydrogeological study, groundwater exclusion techniques and monitoring wells.

b. **Groundwater exclusionary techniques** (e.g., cut-off/secant wall):

When exclusionary techniques are used, the following must be submitted: 1) dewatering plan, including groundwater monitoring well location and monitoring plan; and a 2) traffic control plan, including a schedule for an attendant to be present during installation of exclusionary technique.

c. For sites where **controlled groundwater pumping will be conducted**, the following shall be required:

i. In addition to the previous required submittals of a hydrogeological study, groundwater use plan and dewatering plan, a pre-construction building survey and report on structures on adjacent parcels prepared by a qualified professional and meeting the standards established by the City Engineer shall be required. This survey/report shall include a photographic and narrative report on the interior and external condition of each structure and surveyed and marked elevations of adjacent parcels; the likelihood that the proposed dewatering would cause effects on off-site private or public structures or infrastructure, and the health or viability of vegetation or trees; and avoidance measures to be implemented that will minimize the type and severity of those effects.

ii. **Irrigation of sites as directed by the City**: To increase the incentive for efficient construction management, and to reduce the amount of groundwater pumping, sites pumping and discharging to the storm drain system for more than 8 weeks (including the two-week start-up period) must truck water to irrigation sites for 5 days (8 hours/day) per week. This is an increase from once per week during the entire dewatering period.

iii. Applicants must continuously work (on a daily basis) on the below ground structure while groundwater discharge to the storm drain
system is occurring. Periods of pumping and discharge, while no work is occurring, is not allowed.

d. Discharge to the City’s storm drain system (preferred) or sanitary sewer system is limited to April 1 through October 31, unless: 1) the discharge is limited to 10 gallons per minute (gpm) over a 24-hr period; or 2) applicant demonstrates that a 10-yr storm event can be accommodated by the receiving storm drain system and creek (or water body) to the satisfaction of the City Engineer. City Engineer may provide exemption to allow discharge beyond October 31; however, it shall be subject to immediate cessation orders under certain circumstances.

e. Construction of below ground structures in contaminated plume areas: Currently, discharge to the storm drain or sanitary sewer system must be coordinated and approved through Environmental Services Division’s Watershed Protection Group (in addition to other City Departments). A new requirement for submittal of a monitoring plan for particular toxic pollutants may be applied. Because of various complexities, specific requirements will be determined on a case-by-case basis.

**Resource Impact**
The City’s review, monitoring, and approvals associated with program implementation of the existing and new measures require approximately $100,000 in contract services per year. This cost is being funded by an increased, per-site municipal fee approved by Council earlier in 2017.

**Environmental Review**
The recommended program enhancements for the 2018 construction season are minor modifications to an existing regulatory program designed to be protective of the environment. These modifications are not subject to the California Environmental Quality Act (CEQA) as there is no possibility the modifications may have a significant effect on the environment (CEQA Guideline Section15061(b)(3)).

Attachment A: Proposed Ordinance Revisions
Attachment B: Comparison of Current and Proposed Revisions to the March 7, 2017 Ordinance
Attachment C: Guidelines for Dewatering During Basement or Below Ground Garage Construction May 2017

Attachments:

- Attachment A: Red-lined Ordinance Amending Chapter 16.28 Groundwater Dewatering 20Nov17
- Attachment B: Comparison of Current Provisions and Proposed Changes: Groundwater Dewatering Ordinance
- Attachment C: Guidelines for Dewatering During Basement or Below Ground Garage Construction May 2017
Ordinance No. ____

Ordinance of the Council of the City of Palo Alto Amending Sections 16.28.030 (Definitions), 16.28.060 (Permit required), 16.28.070 (General exemptions), and 16.28.155 (Additional requirements for temporary construction-related dewatering), and adding Section 16.28.156 (Requirements for temporary construction-related groundwater dewatering in groundwater plumes) to Chapter 16.28 (Grading and Erosion and Sediment Control) of Title 16 (Building Regulations) of the Palo Alto Municipal Code to Revise the Requirements for Dewatering During Construction of Below Ground Structures

Recitals


B. After one construction season following the adoption of the ordinance, the City Council desires to clarify and enhance the requirements for testing, monitoring and protective measures to allow temporary construction-related groundwater pumping to continue, to continue gathering information, and address concerns about dewatering and its impacts.

The Council of the City of Palo Alto does ORDAIN as follows:

SECTION 1. Section 16.28.030 (Definitions) of Chapter 16.28 (Grading and Erosion and Sediment Control) of Title 16 (Building Regulations) is hereby amended to read as follows:

16.28.030 Definitions.

When used in this chapter, the following words shall have the meanings ascribed to them in this section.

. . .

(e) "Best management practices" or “BMPs” means a technique or series of techniques which, when used in an erosion control plan, is proven to be effective in controlling construction-related runoff and erosion, and sedimentation. . .

(s) "Grading” means any land disturbance or land fill, or combination thereof, any civil engineering or landscape construction work that involves establishing a level base, or one with a specified slope, for foundations, surface drainage or other construction work.

(t) “Groundwater” means water that is found underground in the cracks and spaces in soil, sand and rock formations called aquifers.
(u) “Groundwater exclusionary techniques” means methods that use cut-off walls and other barriers to minimize or exclude groundwater from the excavation.

(v) “Groundwater plume” means a volume of contaminated (polluted) groundwater in an aquifer that extends downward and outward from a specific source (usually a site where pollutants have been released to the ground and entered groundwater).

(w) “Groundwater plume area” means a groundwater plume with a specific buffer of five hundred feet from the outer-boundary of the mapped groundwater plume, or a lesser distance from the outer-boundary as determined by the City Engineer and established in the regulations adopted under Section 16.28.155(i) of this Chapter.

(tx) “Interim erosion and sediment control and storm water pollution prevention plan” or “interim plan” (“interim plan”) means a set of best management practices or equivalent measures designed to control surface runoff and erosion and to retain sediment on a particular site during the period in which pre-construction and construction-related land disturbances, fills, and soil storage occur, and before final improvements are completed.

(vy) “Key” means a designed compacted fill placed in a trench excavated in earth material beneath the toe of a proposed fill slope.

(vz) "Land disturbance" or "land-disturbing activities" means any moving or removing by manual or mechanical means of the soil mantle or top six inches (6") of soil, whichever is shallower, including but not limited to excavations.

(waa) “Land fill” means any human activity depositing soil or other earth materials.

(xbb) "Manual of standards" means a compilation of technical standards and design specifications published by the Association of Bay Area Governments.

(ycc) "Permittee" means the applicant in whose name a valid permit is duly issued pursuant to this chapter and his/her agents, employees, and others acting under his/her direction.

(ddd) "Sediment" means earth material deposited by water or wind.

(aee) "Site" means any lot or parcel of land, or contiguous combination under the same ownership where grading is performed or permitted.

(bbff) "Slope" means an inclined ground surface, the inclination of which is expressed as a ratio of horizontal distance to vertical distance.
"Soil" means naturally occurring superficial deposits overlying bedrock.

"Soils engineer" means a professional civil engineer experienced and knowledgeable in the practice of soils engineering and licensed by the state of California for practice in that field.

"Soils engineering" means the application of the principles of soils mechanics in the investigation, evaluation, and design of civil works involving the use of earth materials and the inspection and/or testing of the construction thereof.

“Temporary construction-related groundwater dewatering” means temporary pumping of groundwater to facilitate construction of underground below ground structures such as basements and garages. Discharge may occur to either the sanitary sewer or storm drain system, depending on project type.

“Wet season” means the period from October 1 to April 15.

SECTION 2. Section 16.28.060 (Permit required) of Chapter 16.28 (Grading and Erosion and Sediment Control) of Title 16 (Building Regulations) is hereby amended as follows:

16.28.060 Permit required.

No person may shall grade, fill, excavate, store, or dispose of soil and earth materials, or perform any other land-disturbing or land-filling activity, or engage in temporary construction-related dewatering, without first obtaining a permit as set forth in this chapter, except when the activity is performed in accordance with one or more of the general or specific exemptions set forth in Sections 16.28.070 and 16.28.080. Exemption from the requirement to obtain a permit does not provide relief from the requirement to conduct all grading activities in conformance with the general grading requirements contained in Sections 16.28.270 through 16.28.340 of this chapter.

SECTION 3. New Section 16.28.065 (Minimization of impacts required) is hereby added to Chapter 16.28 (Grading and Erosion and Sediment Control) of Title 16 (Building Regulations) as follows:

16.28.065 Minimization of impacts required.

All land-disturbing, land-filling, soil storage, and grading activities, and all temporary construction-related groundwater dewatering, shall be undertaken in a manner designed to minimize surface runoff and erosion, and impacts to downstream waterbodies, and to safeguard life, limb, property, and the public welfare.
SECTION 4. Section 16.28.070 (General exemptions) of Chapter 16.28 (Grading and Erosion and Sediment Control) of Title 16 (Building Regulations) is hereby amended as follows:

16.28.070 General exemptions.

All land-disturbing or land-filling activities or soil storage, and all temporary construction-related dewatering, shall be undertaken in a manner designed to minimize surface runoff, erosion, and sedimentation and to safeguard life, limb, property, and the public welfare. A person performing such land-disturbing, land-filling, soil storage, and grading activities in conformance with Section 16.28.065, except where performing temporary construction-related dewatering, need not apply for a permit pursuant to this chapter, if all the following criteria are met:

(a) The site upon which land area is to be disturbed or filled is less than 10,000 square feet or less, except where temporary construction-related dewatering will be required.

(b) Natural and finished slopes are flatter than 10:1.

(c) Volume of soil or earth materials stored is 100 cubic yards or less.

(d) Rainwater runoff is diverted, either to a nearby pervious area (e.g., landscaped area) during or and after construction, from an area smaller than 5,000 square feet.

(e) An impervious surface, if any, of less than 5,000 square feet is created.

(f) No drainageway is blocked or has its storm water carrying capacities or characteristics modified.

(g) The activity does not take place within 100 feet by horizontal measurement from the top of the bank of a watercourse, the mean high watermark (line of vegetation) of a body of water or the boundary of the wetlands associated with a watercourse or water body, whichever distance is greater.

SECTION 5. Section 16.28.155 (Additional requirements for temporary construction-related dewatering) of Chapter 16.28 (Grading and Erosion and Sediment Control) of Title 16 (Building Regulations) is hereby amended to read as follows:

16.28.155 Additional requirements for temporary construction-related dewatering.

(a) In addition to applicable requirements in this Chapter 16.28, where temporary construction-related dewatering will be required, applicants also shall:

(1) Submit a dewatering geotechnical study conforming to regulations issued by the City Engineer, adhere to its findings, and make modifications as directed by the City Engineer.
(2) Install and maintain at least one fill station meeting standards established by the City Engineer.

(3) With the consent of neighboring property owners, water trees and other vegetation on adjacent properties.

(4) Verify the anticipated drawdown curve in the dewatering geotechnical study with a pump test performed on monitoring wells installed on the project site, as specified by the City Engineer.

(5) Prior to pumping, survey and mark elevations on structures on adjacent parcels.

(6) Submit periodic measurements and reports as required by the City Engineer.

(7) Continuously comply with all permit conditions, performance measures, regulations and requirements established by the City Engineer. Promptly implement corrective actions identified by the City to address any compliance issues.

(b) Prior to pouring a basement slab, groundwater may be pumped no deeper than three feet below the depth of the slab, measured at the center. After the slab is poured, groundwater may be pumped no deeper than one foot below the center.

(c) Dewatering may not be conducted before April 1 or after October 31. Pumping permits for single family residential basements are limited to ten weeks, with an additional two week start-up period. At the end of the start-up period, the applicant must demonstrate compliance with all performance and water quality standards established by the City Engineer. The City Engineer may adopt a regulation specifying time limitations for commercial property pumping.

(d) The City Engineer is authorized to establish and from time to time revise regulations to implement this section and advance the goals of minimizing temporary construction-related dewatering and reducing its impacts.

(e) Where pumping is continuously limited to no more than thirty gallons per minute, the City Engineer is authorized to waive requirements for a geotechnical study, verification procedures and pump time limitations.

(a) Compliance with Regulations. Where temporary construction-related groundwater dewatering will be required, applicants shall conduct dewatering in full compliance with the provisions of this Chapter, including this Section, the regulations established by the City Engineer, and all permit conditions. Applicants shall promptly implement corrective actions identified and required by the City Engineer, including, but not limited to, directives requiring immediate cessation of discharge.

(b) Types of Dewatering. Temporary construction-related groundwater dewatering may be conducted using 1) groundwater exclusionary techniques (e.g., secant wall), or 2) controlled groundwater pumping.
(c) Groundwater Exclusionary Technique Submittal Requirements. When groundwater exclusionary techniques will be required or utilized, applicants shall submit to the City Engineer a street work permit application, and a dewatering plan and traffic control plan in a form approved by the City Engineer.

(d) Groundwater Exclusionary Technique Operational Requirements. Temporary construction-related groundwater dewatering through groundwater exclusionary techniques shall be conducted in compliance with the following:

(i) The rate of discharge of groundwater shall be limited to thirty (30) gallons per minute or less.

(ii) Groundwater discharge shall be percolated onto the same property where pumping is occurring rather than discharged into the storm drain system, if feasible.

(iii) The approved dewatering plan and traffic control plan for the project, approved by the City Engineer, shall be followed during dewatering activities. The traffic control plan shall include, among other provisions, an appropriate schedule for an attendant to be present on the street during the period of the installation of groundwater exclusionary technique.

(iv) Discharge of groundwater to the City storm drain or sanitary sewer systems shall only occur from April 1 through October 31. The City may grant an exemption and allow discharge from November 1 through March 31, upon application, if:

(a) The discharge is limited to an average of ten (10) gallons per minute over a 24 hour period and other conditions warrant allowance of discharge; or

(b) It is demonstrated that a 10 year storm event can be accommodated by the receiving storm drain system and water system to the satisfaction of the City Engineer.

(c) Any such exemption granted under subsections (a) or (b) above shall be subject to immediate cessation orders from the City. A cessation order may be issued for reasons including, but not limited to: capacity issues in the storm drain or sanitary sewer systems; the discharge is causing or contributing to surcharging in the storm drain or sanitary sewer systems; the storm drain or sanitary sewer systems fail; excess flow entering the Palo Alto Regional Water Quality Control Plant; emergency or routine maintenance of City infrastructure; and protection of the environment, public health, safety and welfare. The applicant shall immediately comply with any cessation order issued.
(v) The applicant shall install a groundwater monitoring well, and during the construction period of the underground structure, submit periodic groundwater level and other measurements and reports as required by the City Engineer. During pumping, the groundwater monitoring water level shall be measured at a monitoring well located at a farthest feasible point on the subject site from the underground structure. This monitoring shall be conducted daily for the first two weeks, then weekly thereafter.

(vi) Designs and plans submitted to the City Engineer for approval shall incorporate all of the requirements hereinabove.

(e) When Controlled Groundwater Pumping Required. If the rate of groundwater discharge is greater than thirty (30) gallons per minute, the requirements of subsections (f) and (g) below shall be followed.

(f) Controlled Groundwater Pumping Submittal Requirements. When controlled groundwater pumping will be required, applicants shall submit the following to the City Engineer:

(i) The applicant shall prepare and submit a street work permit application, a dewatering plan and a groundwater use plan, all in a form approved by the City Engineer. The groundwater use plan shall show how the groundwater will be used to the maximum extent practicable and incorporate the operational requirements of subsection (h) below.

(ii) The applicant shall submit a dewatering hydrogeological study conforming to the regulations issued by the City Engineer, adhere to the study’s findings, and make modifications as directed by the City Engineer. Avoidance measures identified in the study shall be employed to the maximum extent practicable to minimize the flow rate and duration of the pumping, even when off-site effects are not specifically identified. The dewatering hydrogeological study shall be stamped by a California licensed hydrogeologist or equivalent and submitted to the City.

(iii) The applicant shall submit a pre-construction building condition survey and report on structures on adjacent parcels prepared by a qualified professional and meeting the standards established by the City Engineer. The survey shall include a photographic and narrative report on the interior and external condition of each structure and surveyed and marked elevations of adjacent parcels, with particular attention to the condition of concrete foundations, structural connections, brickwork, plasterwork and other architectural finishes that are susceptible to cracking. The report shall assess the likelihood that the proposed dewatering would cause effects (including but not limited to settlement
or movement) on off-site private or public structures or infrastructure, including the right-of-way, easements, and utilities within public utility easements, and the health or viability of vegetation or trees. To the extent that report concludes that off-site effects are reasonably likely to occur, the applicant shall identify avoidance measures to be implemented that will minimize the type and severity of those effects, and shall develop a monitoring plan to assess any actual effects on vegetation, trees, structures and infrastructure.

(g) Controlled Groundwater Pumping Operational Requirements. Temporary construction-related groundwater dewatering through controlled groundwater pumping shall be conducted in compliance with the following:

(i) Dewatering shall only occur April 1 through October 31, if discharge to the storm drain or sanitary sewer system is required. The City may grant an exemption and allow discharge from November 1 through March 31, upon application, if it is demonstrated that a 10 year storm event can be accommodated by the receiving storm drain system and water system to the satisfaction of the City Engineer. Any such exemption shall be subject to immediate cessation orders from the City, which shall be complied with immediately upon issuance.

(ii) Groundwater pumping for underground residential structures shall be limited to ten weeks, with an additional two week start-up period. At the end of the start-up period, the applicant must demonstrate compliance with all performance and water quality standards established by the City Engineer.

(iii) The applicant shall verify the anticipated drawdown curve in the dewatering hydrogeological study with a pump test performed on monitoring wells installed on the project site, as specified by the City Engineer. Following the two-week start-up period, the dewatering, pumping rates and maximum amount of water pumped on a daily basis shall be limited to the values calculated in verification study.

(iv) Fill station(s) shall be designed to provide the minimum delivery flowrates and incorporate instructional and public safety signage in accordance with the regulations issued by the City Engineer.

(v) The applicant shall deliver pumped groundwater to any nearby parks and schools as requested by the City.

(vi) The applicant shall truck water one full day (8 hours) per week from the project site to irrigation sites as directed by the City during the first six weeks of dewatering activities (not including the two-week start-up
period). The applicant shall truck water five days per week (8 hours per day) during the remainder of the dewatering period.

(vii) The applicant shall allow adjacent properties to use hoses connected to the fill station(s). If used, applicant must set up hoses with bridges along sidewalks. Hoses shall be placed in a manner that is safe to the public and does not cause damage to neighboring or City property, and shall not cross the street. The City Engineer may modify these requirements as circumstances require.

(viii) Prior to the commencement of dewatering activities, the applicant shall notify occupants of neighboring properties of the temporary construction and availability of water.

(ix) The applicant shall use the pumped groundwater on-site for dust suppression and other construction needs.

(x) Prior to pouring a basement slab, groundwater may be pumped no deeper than three feet below the depth of the slab, measured at the center. After the slab is poured, groundwater may be pumped no deeper than one foot below the center.

(xi) The applicant shall install a groundwater monitoring well prior to the commencement of dewatering, and during the construction period of the underground structure, submit periodic groundwater level and other measurements and reports as required by the City Engineer.

a. During pumping, the groundwater monitoring water level shall be measured at a monitoring well located at a farthest feasible point on the subject site from the underground structure. This monitoring shall be conducted daily for the first week, then weekly thereafter. At the end of the start-up period or thereafter, if drawdown results are greater than anticipated, the applicant shall submit a revised dewatering hydrogeological study and any revised conclusions on impacts of the groundwater drawdown.

b. Survey and mark land elevations on structures on adjacent parcels weekly, if allowed by the adjacent property owners. These locations should coincide with the pre-construction building condition survey. If permission is not granted, inform the City immediately.

(xii) While discharging to the storm drain system, construction work on the underground structure shall be continuous, occurring daily, and make progress towards completion of the underground structure without delay.
(h) City Engineer Authority to Issue Regulations. The City Engineer is authorized to establish and from time to time revise regulations to implement this Section and related provisions of this Chapter and to advance the goals of minimizing temporary construction-related dewatering and reducing its impacts.

SECTION 6. New Section 16.28.156 (Requirements for temporary construction-related groundwater dewatering in groundwater plumes) is hereby added to read as follows:

**16.28.156 Additional requirements for temporary construction-related groundwater dewatering in groundwater plume areas.**

For temporary construction-related groundwater dewatering in the groundwater plume area, the following additional requirements must be followed:

(a) The applicant shall contact the City’s Watershed Protection Group for guidance and requirements on sampling, treatment and disposal of temporary construction-related groundwater.

(b) The City Engineer may require monitoring and an associated plan for specific pollutants. The applicant shall adhere to any such requirements established by the City Engineer.

SECTION 7. Severability. If any provision, clause, sentence or paragraph of this ordinance, or the application to any person or circumstances, shall be held invalid, such invalidity shall not affect the other provisions of this Ordinance which can be given effect without the invalid provision or application and, to this end, the provisions of this Ordinance are hereby declared to be severable.

SECTION 8. CEQA. The City Council finds and determines that this Ordinance is not a project within the meaning of section 15378 of the California Environmental Quality Act (“CEQA”) because it has no potential for resulting in physical change in the environment, either directly or ultimately. In the event that this Ordinance is found to be a project under CEQA, it is subject to the CEQA exemption contained in CEQA Guidelines section 15061(b)(3) because it can be seen with certainty to have no possibility of a significant effect on the environment in that this Ordinance simply clarifies existing local regulations.
SECTION 9. Effective Date. This ordinance shall be effective on the thirty-first date after the date of its adoption.

INTRODUCED:

PASSED:

AYES:

NOES:

ABSTENTIONS:

ABSENT:

ATTEST:  

APPROVED:

_________________________________  ______________________________________
City Clerk  Mayor

APPROVED AS TO FORM:

_________________________________
City Manager

_________________________________
Assistant City Attorney  Director of Public Works/
City Engineer
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>March 2017 Ordinance</th>
<th>November 2017 Proposed Ordinance Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUNDWATER EXCLUSIONARY TECHNIQUE</td>
<td>Optional for all projects.</td>
<td>Optional for all projects.</td>
</tr>
<tr>
<td></td>
<td>No specific requirements presented for the installation or during subsequent construction.</td>
<td>Requires a traffic control plan with a schedule for an attendant during the installation. Requires a groundwater monitoring well located at the farthest feasible point.</td>
</tr>
<tr>
<td>PRE-CONSTRUCTION BUILDING CONDITION SURVEY OF NEIGHBORING STRUCTURES</td>
<td>Not included</td>
<td>Requires evaluation of existing condition of neighboring structures as well as evaluation of likelihood of dewatering impacts to the neighboring structures, trees, and vegetation.</td>
</tr>
<tr>
<td>FILL STATION</td>
<td>While not expressly described in ordinance, the City Guidelines required applicant's trucking of water one day per week during entire dewatering period.</td>
<td>The previous Guidelines are clarified in the Ordinance. In addition, trucking of water must increase to five days per week after six weeks of dewatering period (not including two-week start-up period).</td>
</tr>
<tr>
<td>LIMITS OF DISCHARGES TO DRY SEASON</td>
<td>Discharges to storm or sanitary drains only allowed April 1st through October 31st.</td>
<td>Provides a provision, case-by-case, to consider allowing discharge from November 1 to March 31st if (1) the discharge is limited to ≤ 10 gallons per minute or (2) the receiving storm drain line would have sufficient capacity for a 10-year storm. Discharges subject to cessation orders from the City.</td>
</tr>
<tr>
<td>LIMITS TO PUMPING DEPTH</td>
<td>Not included</td>
<td>Prior to pouring a basement slab, groundwater may be pumped no deeper than three feet below the depth of the slab, measured at the center. After the slab is poured, groundwater may be pumped no deeper than one foot below the center.</td>
</tr>
<tr>
<td>PRE-DEWATERING TECHNICAL STUDY</td>
<td>Required Geotechnical Study but the details were not expressly described in ordinance.</td>
<td>Renamed a Dewatering Hydrogeologic Study and incorporated details from the 2017 City Guidelines to clarify content of the study.</td>
</tr>
<tr>
<td>VERIFICATION OF DEWATERING STUDY</td>
<td>Required verification via pump test and project site monitoring wells.</td>
<td>Clarified that after the 2 week start-up, the pumping rates and volume pumped shall be limited by the values calculated in the study.</td>
</tr>
<tr>
<td>MEASUREMENTS DURING DEWATERING</td>
<td>Required periodic measurements as required by the City Engineer.</td>
<td>Clarified that measurements include periodic groundwater level monitoring and weekly surveys of adjacent buildings.</td>
</tr>
<tr>
<td>GROUNDWATER USE PLAN</td>
<td>Not expressly described in ordinance but was included in City Guidelines.</td>
<td>Ordinance clarifies the Use Plan requirements based on the 2017 guidelines and field observations during 2017 construction season.</td>
</tr>
<tr>
<td>DEWATERING PLAN AND STREET WORKS PERMIT</td>
<td>Not expressly described in ordinance.</td>
<td>Clarifies required submittals if there is a planned storm drain discharge.</td>
</tr>
<tr>
<td>EXCEPTIONAL WASTE DISCHARGE PERMIT APPLICATION</td>
<td>Not expressly described in ordinance.</td>
<td>Clarifies required submittals if there is a planned sewer discharge.</td>
</tr>
</tbody>
</table>
Guidelines for Dewatering During Basement Or Below Ground Garage Construction
May 2017

Overview

On February 1, 2016, Palo Alto City Council strengthened requirements designed to minimize the pumping and discharge of groundwater from basement (or below ground garage) dewatering during construction. Pumping of groundwater after the completion of basement construction has not been permitted for over a decade. In recent years, concerns that construction dewatering may be wasting water, potentially damaging structures, trees and vegetation, and depleting or altering the flow of groundwater, have arisen. Therefore Palo Alto added new requirements.

Public Works only allows drawdown well dewatering of groundwater. Open pit dewatering of groundwater is disallowed. Open pit dewatering is allowed for rainwater that may accumulate at the bottom of an excavation, if water quality limits are met. Groundwater dewatering is only allowed from April 1 through October 31 due to inadequate capacity in the City's storm drain system. Open pit dewatering of rainwater is allowed throughout the year, but must meet water quality requirements.

After assessing the results of new dewatering regulations from the 2016 Construction Season, the City Council approved several enhancements to the dewatering policy that have been codified in Palo Alto Municipal Code and go into effect May 4, 2017. The 2017 enhancements include improving fill station performance, ensuring watering of adjacent neighboring vegetation, monitoring actual groundwater elevation changes, clarifying reporting, and enhancing the Hydrogeological Study, while adding an exemption to the Study if groundwater pumping can be limited to 30 gpm or less using techniques such as cut off wall design.

Residential sites are now only allowed to dewater for a 10-week time period with a 2-week startup period. At the end of the two-week startup period, compliance with all performance standards and water quality standards shall be demonstrated. In addition, groundwater can only be pumped up to a maximum of 3 feet below the basement slab center following the two week start up period. Once the slab is poured, the depth to the center of the slab shall be 1 foot.

A geotechnical report must be submitted for the site (separate from the Geotechnical Study described below), and must list the highest anticipated groundwater level. Public Works recommends a piezometer to be installed in the soil boring. The contractor must determine the depth to groundwater immediately prior to excavation by using the piezometer or by drilling an exploratory hole if the deepest excavation will be within 3 feet of the highest anticipated groundwater level. If groundwater is found to be within 2 feet of the deepest excavation, a drawdown well dewatering system or cutoff wall must be installed, or, alternatively, the contractor can excavate for the basement without a dewatering system in place and hope not to hit groundwater.

However, if groundwater is hit, the contractor must immediately stop all work and must meet all of the following requirements prior to resuming work.
Public Works may require water to be tested for contaminants prior to initial discharge and at intervals during dewatering. If testing is required, the contractor must retain an independent testing firm to test the discharge water for the contaminants Public Works specifies and submit the results to Public Works.

Below is a summary of the pre-existing requirements, with the recently adopted requirements included. The overall goal is to minimize the discharge of groundwater from basement construction dewatering. The requirements fall into four categories: 1) Fill stations are required so that others may fill water trucks or connect garden hoses for irrigation; 2) Use plans are required to demonstrate that the applicant/builder is arranging for use of as much of the pumped water as possible and minimizing storm drain discharge; 3) A Geotechnical Study is required to determine any potential effects and needed avoidance measures; and 4) Street Work/Dewatering permits are required (and are issued after requirements #1, #2 and #3 are completed).

1. Fill Station Requirements

Fill Station requirements are explained in the attached “Fill Station Requirements” and are summarized in the check-list shown below:

Note: When the City determines that the site is too close to an area of ground water contamination, no fill station shall be provided.)

a) Locate the fill station box outside the fence to allow 24-hour per day access;
b) Provide 2 ¾” hydrant fitting hose connection with a 50-foot (minimum) hose. Applicant must demonstrate maximum 10-minute fill time for a ~2700 gallon water truck;
c) Provide at least two 100' hoses outside the fill station box, 10 gallons per minute (gpm) deliveries (simultaneously) during the two week start up period;
d) Design the tank system so that the storage tank is always at least one-half full;
e) GFI outlet inside or electrical connection outside the box;
f) “In-use” cover over switch/outlet in box;
g) Provide a “Water Filling Station” sign on the fill station box;
h) Provide a “Non-Potable Discharge” sign on the discharge point;
i) “No Hoses Crossing Street and Sidewalk” sign at hose bibs;
j) Supply log sheets, and a pen inside the box for truckers to show date and amount of filling;
k) Provide a fill station box combination lock (combination should be 2, 4, 6, 8);
l) Provide sufficient flow meters and data loggers to determine both the water used through the fill station and the total water pumped from the ground;
m) Protect against trip hazards with sidewalk bridges and appropriate signage as needed;
n) Once water is in the tank, call Watershed Protection (650-329-2430/2122) for water quality testing;
o) When Fill Station is ready, call Public Works Engineering Inspection (650-496-6929) for inspection and call 650-444-6173 for Electrical Safety Check;
p) Flow meters should start at zero, should be easily readable and in a safe location at the outlet of the settling tank;
q) Pump and hose bib are operational;
r) Applicant will be required to report on all measurements and requirements (reports due at the end of the two-week start-up period, then bi-weekly, and then a final report at the end of pumping).
2. **Use Plans**

A brief groundwater use plan must be prepared to show how the groundwater will be used to the maximum extent practical. It shall be submitted with the Street Work/Dewatering Permit Application, and shall contain the following minimum provisions:

a) Applicant distribution of City-provided door-hangers to advertise the availability of water; these are to be collected if still apparent after 24 hours.
b) Applicant watering of on-site and neighboring vegetation, to the extent desired by owners;
c) Applicant piping water to any nearby parks and schools as requested by City;
d) Applicant trucking water one full-day per week to irrigation sites as directed by the City;
e) Applicant using water on-site for dust suppression and other construction needs.

3. **Geotechnical Study / Determination of Effects and Associated Avoidance Measures**

Note: applicants are exempt from this requirement if groundwater pumping can be limited to 30 gpm or less using techniques such as cut off wall design.

Conduct a Geotechnical Study to determine the radius of influence (i.e. extent of cone of depression) from each dewatering well as a function of time, based on local soil and groundwater conditions. All wells and other dewatering sites within a 400-foot radius (roughly one City block) of the property that may interact with dewatering activity, using information available from the City, shall be included in the study. State or show the exact location of these dewatering sites. Prepare a map and cross sections of the cone(s) of depression.

The key change for 2017 is applicants are now required to verify the anticipated drawdown curve with a pump test using actual wells. Cone Penetrometer Tests (CPT) are also encouraged to verify soils data. The actual pumping rates, following the two week start-up period, shall be limited to the rates calculated in the verification. The maximum amount of water pumped over the 10-week period shall be limited to that calculated during verification. To support this work, measure the ground water level at a distance representative of the distance to the nearest structure on an adjacent parcel, or farthest feasible point on the subject site. This monitoring shall be daily for the first week, then weekly thereafter. At the end of the 2 week start-up period or thereafter, if drawdown results are greater than anticipated, submit a revised Geotechnical Study and any revised conclusions on impacts of the groundwater drawdown. Survey and mark land elevations on structures on adjacent parcels (obtain permission first) prior to any pumping and weekly thereafter.

State whether it is reasonably likely that the proposed dewatering will cause effects (including settlement or movement) on off-site private or public structures or infrastructure, including the right of way, easements, and utilities within public utility easements. State whether it is reasonably likely that the proposed dewatering will reduce the amount of water taken up by vegetation or trees to a level that will affect the health or viability of the vegetation or trees. Utilize a Certified Arborist Sub Consultant to verify any such effect on trees.

To the extent that the qualified professional states that off-site effects are reasonably likely to occur, identify avoidance measures to be implemented that will minimize the type and severity of those effects. Avoidance measures are also to be employed to the maximum extent practical to minimize the flow rate and duration of the pumping, even when off-site effects are not specifically identified. Avoidance measures may include, for example: optimizing well count, well depth, well location, pumping rate, and/or duration of pumping; supplemental irrigation of trees or vegetation, soil amendment, or other
plant protection methods recommended by a certified arborist; alternative dewatering or construction methods. Develop a monitoring plan to assess any actual effects on vegetation, trees, structures and infrastructure. The Geotechnical Study and description and extent of the cone of depression must be stamped by a California licensed Geotechnical Engineer and submitted to the City, and will be made available for public review. A Geotechnical Study Worksheet is attached.

4. **Grading Permit/Street Work/Dewatering Permit Application**

Dewatering will now be reviewed as part of the Grading Permit. The Grading Permit for a project will not be issued until all required submittals related to dewatering have been submitted, reviewed and approved by Public Works. Once all required submittals have been reviewed and approved by Public Works, a Dewatering Permit and Street Work Permit must be obtained before any discharge from the site occurs. Dewatering discharge to the storm drain system cannot occur between October 31 and April 1 to ensure that the full capacity of the storm drain system is available for storm flows. If the applicant can demonstrate that they can maintain 30 gpm flows, the attached Street Work/Dewatering Permit Application Checklist becomes the operative worksheet (as opposed to the Geotechnical Study worksheet).

A Residential Street Work/Dewatering Permit will be issued for a maximum period of 10 weeks to ensure that minimization of pumping duration occurs. Administrative penalties shall accrue following the permit expiration date, if pumping and/or discharge continues.

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J. Michael Sartor, P.E.  
Public Works Director  

5/2/17  
Date