UNIVERSAL PARAGON CORPORATION
150 Executive Park Blvd., Suite 4000
San Francisco, CA 94134

December 8, 2016

Cliff Lentz, Mayor and Members of the City Council
City of Brisbane
50 Park Place
Brisbane, CA 94005

Honorable Mayor Lentz and Members of the City Council:

Re: Brisbane Baylands Hearing November 17, 2016

The purpose of this letter is to provide information to the Council on the following three topics raised at the hearing on November 17, 2016: the landfill closure process, liquefaction, and pile foundations and pile driving. For each topic, we provide general background information; summarized comments and questions raised at the November 17, 2016 hearing, and provide responses prepared with input from our team of experts.

In addition, due to the detailed nature of the questions raised and the need for accurate and timely responses to ensure an efficient review process, we request that the City consider permitting us to respond directly to questions presented by the Councilmembers at the continued hearing scheduled for December 15, 2017 as well as future hearings. We will have experts present at the meetings for this purpose.

We have included the following attachments for your reference:

1. Proposed Cap and Closure Plan (2002)
2. Cap and Closure Concept for Central Drainage Channel (2002)
3. RIFS to RAP Process Diagram
4. Plan View with Interpreted Pile Information, Sierra Point
5. Schematic with Conductor Casing
6. Cross Section - Brisbane Landfill

1. Landfill Closure Process

General Background Information

The following information is from the California Department of Resources Recycling and Recovery (CalRecycle) website: http://www.calrecycle.ca.gov/.

California requires that rigorous environmental standards must be met for closing landfills. Under current Title 27, California Code of Regulations, (27 CCR), section 21090, all closed landfills are required to have installed a landfill cap or cover. The landfill cover is intended to maintain a protective seal to keep moisture and rain from penetrating the landfill waste and prevent exposure of the public and the environment to the disposed waste.

The cover must be of a thickness to prevent moisture intrusion into the waste, prevent failure of the cover by erosion and structural or integrity failure, and prevent the cover from being breached by digging or other activities by wildlife or humans. The cover is intended to protect public health and safety and the environment.

Current Title 27 regulations require a "prescriptive" cover design, one that is established by regulation and intended for use in closure of all landfills. The prescriptive cover, as outlined in Title 27, section 21090 a (1-3) is comprised of an engineered final cover, consisting of a 2-foot or more compacted soil foundation layer, over which is placed 1 foot or more of re-compacted clay to prevent water infiltration, and one foot or more of soil for the planting of vegetation.

Summary of comments and questions raised at the November 15, 2017 Hearing

A. How is the cap engineered for the future land use?
B. How does the Baylands landfill differ from the engineered landfill at Sierra Point?
C. How is debris from the piling process handled, particularly if it is toxic?
D. How are debris and toxins kept from the bay, since the landfill is unlined?
E. How are toxins in the landfill dealt with?
F. How is monitoring handled?

UPC Responses

Items A-B: Prior to, or concurrently with, landfill development, a final cover system will be installed over the landfill. The final cover system is installed to minimize leachate generation, gas venting, and to keep waste constituents within the landfill. (Note: the existing several feet of soil over the landfill waste can be used as an alternative final cover system.) According to engineering analyses, once the final cover system is installed over the Brisbane Landfill, the leachate generation rate will decrease by approximately 80 to 90%.

As currently proposed, the final cover system will consist of the Title 27 prescriptive cover, which includes a 2-foot thick foundation layer, a 1-foot thick low permeability (clay) layer (aka “CCL”), and a 1-foot thick erosion control layer (**Figure 1).** For some areas (such as the Visitacion Creek banks), it is proposed to replace the 1-foot thick clay layer with a flexible membrane liner (FML) or a geosynthetic clay liner (GCL) **(Figure 2).**

Other alternative low permeability final cover layers include asphalt and concrete.

The waste is currently covered with approximately 2 to 40 feet of soil; those on-site soils, excavated to pre-determined elevations, will be used to construct the final cover system.

Damage to the cover system after an earthquake is identified through field observation during the post-earthquake inspection and then repaired as needed. Requirements for inspection and repair of the final cover system after closure will be included in the "Closure WDRs" which will be prepared and issued by the CRWQCB.

Landfill closure and development will be overseen by the San Mateo County Environmental Health Department and CRWQCB to ensure that all regulatory requirements are implemented. See **Figure 3** for a general overview of the process for the Remedial Action Plan. Contrary to what was presented to the City Council, the Sierra Point Landfill (SPL) is not an engineered landfill (i.e., it does not have a bottom containment (liner) system). Despite being unlined, the SPL has performed very well and has been successfully developed over the last 30 years. Considering that both landfills (i.e., SPL and the Brisbane Landfill) are similarly constructed (i.e., both landfills are unlined) and waste was placed directly into SF Bay at both landfills, development of the Brisbane Landfill is expected to be as successful as development at the SPL.
Items C - E: the Brisbane Landfill has been regulated by the California Regional Water Quality Control Board – San Francisco Bay Region (CRWQCB) through the Waste Discharge Requirements (WDRs) most recently revised and adopted in 2001. The WDRs require an implementation of a semi-annual discharge monitoring program (DMP) at the Landfill to assess the presence of daylighted debris, chemicals in leachate, groundwater and surface water. The Brisbane Landfill performs very well (i.e., there is no daylighted refuse, no debris is discharged from the landfill, and the leachate, groundwater and surface water quality meet discharge requirements).

2. Liquefaction

General Background Information

The following information is from the Geology and Earth Science News and Information *website: http://geology.com/usgs/liquefaction/ and the US Geological Survey:* http://geomaps.wr.usgs.gov/sfgeo/liquefaction/aboutliq.html*.*

Liquefaction occurs when vibrations or water pressure within a mass of soil cause the soil particles to lose contact with one another. Thus, the soil behaves like a liquid, has an inability to support weight and can flow down very gentle slopes. This condition is usually temporary and is most often caused by earthquake vibrations affecting water-saturated fill or unconsolidated soil. Liquefaction occurs when three conditions are met: loose, granular sediment or fill; saturation by groundwater, and strong shaking, usually from an earthquake. All parts of the San Francisco Bay region have the potential to be shaken hard enough for susceptible sediment to liquefy.

Typical effects of liquefaction include:

- Loss of bearing strength, in which the ground can liquefy and lose its ability to support structures.
- Lateral spreading, in which the ground can slide down very gentle slopes or toward stream banks riding on a buried liquefied layer.
- Sand boils, in which sand-laden water can be ejected from a buried liquefied layer and erupt at the surface to form sand volcanoes and the surrounding ground often fractures and settles.
- Flow failures, in which earth moves down steep slope with large displacement and much internal disruption of material.
- Ground oscillation, in which the surface layer, riding on a buried liquefied layer, is thrown back and forth by the shaking and can be severely deformed.
- Flotation, in which light structures that are buried in the ground (like pipelines, sewers and nearly empty fuel tanks) can float to the surface when they are surrounded by liquefied soil.

Summary of comments and questions raised at the November 15, 2017 Hearing

A. What is the liquefaction risk for the landfill portion of the site in the event of a major earthquake?

UPC Response

Item A**:** Potentially liquefiable layers of dense sand exist at depths between about 40 to 120 feet or deeper below the Brisbane Landfill. Potential effects studied for the landfill are lateral spreading, sand boils, and settlement. Unlike the areas around San Francisco Bay that experienced liquefaction during the 1989 Loma Prieta earthquake, these layers at the Brisbane Landfill are deep and dense; therefore, the potential for significant damage to structures due to any of these three conditions is very low.

- Because the landfill does not have steep slopes, lateral spreading is not expected to occur during an earthquake. To further mitigate the potential for lateral spreading, slopes can be flattened.

- Because the sand layers beneath the site are too deep, sand boils coming to the surface of the landfill are not anticipated.

- Because the sand layers are both deep and dense, ground settlement due to liquefaction is expected to be less than a few inches. Structures will be designed to withstand settlement of this magnitude.

Fine tuning of the liquefaction evaluation and its consequences will be conducted for each building when development plans are finalized and any mitigation measures, as required, will be implemented.

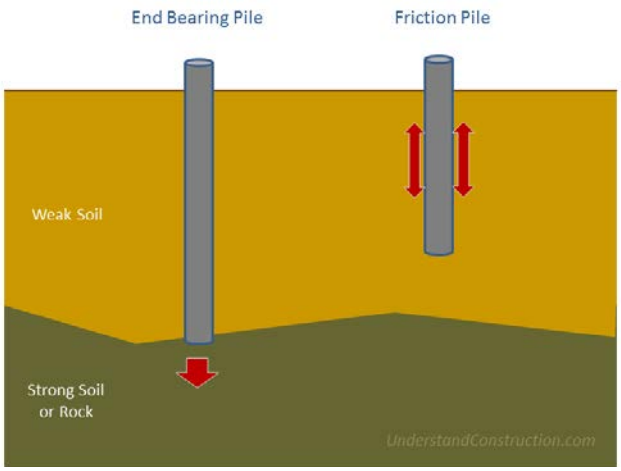
3. Pile Foundations and Pile Driving

General Background Information

Pile foundations are typically used to support heavy buildings in areas where shallow soil strength is not suitable to support the structures. The following information is from a website that provides general concepts about construction methods and the construction industry:http://www.understandconstruction.com/pile-foundations.html

Piles are long cylinder-shaped, square-shaped, or H-shaped prism of a strong material such as concrete, wood, or steel that are pushed or driven into the ground to act as a steady support for structures to be built on top of it. Pile foundations are typically used in the following situations: (i) when there is a layer of weak soil at the surface and the layer cannot support the weight of the buildings, so loads of the building bypass the weak layer and are transferred to the layer of stronger soil or rock below the weak layer; or (ii) when a building has very heavy and concentrated loads, such as a high-rise structure, bridge or water tank and the loads are transferred to the layer of stronger materials such as dense soils or rock.

There are two types of pile foundations: (i) end bearing piles, in which the bottom end of the pile rests on a layer of especially strong soil or rock; and (ii) friction piles, in which the entire surface of the pile transfers the forces to the surrounding soil. In a friction pile, the amount of load the pile can support is directly proportional to its length. See the diagram to the right.



Types of Pile Foundations
(Source: http://www.understandconstruction.com/pile-foundations.html)

Concrete piles are precast, that is, made at ground level in a casting yard, and then driven into the ground by hammering. Steel H-piles are made in a steel mill and are also driven into the ground. An advantage of steel H-piles is time savings during construction because the pile casting process is eliminated.

Summary of comments and questions raised at the November 15, 2017 Hearing

A. How will the piling process for the Baylands differ from Millennium Tower, in which the piles do not actually meet the bedrock?
B. Are piles driven in before the cap or after? If after, will the process create pathways for contaminants?
C. How many piling holes will there be?

UPC Responses

Item A: Based on the geotechnical borings performed at the landfill to date, the northern portion of the landfill is underlain by a relatively thick, continuous layer of dense sand whereas the remainder of the landfill is underlain primarily by clayey deposits, in turn underlain by bedrock. Based on the subsurface conditions encountered, two pile conditions were evaluated: (i) piles embedded primarily in dense sand, and (ii) piles embedded

primarily in clay with their tips supported on bedrock. Thus, pile foundations will be constructed to competent materials such as dense sand or bedrock depending on the pile location. A third condition, piles embedded in the stiffer clay deposits underlying the area, would be evaluated.

The major differences between the Brisbane Landfill and the Millennium Tower are that the Millennium Tower is a heavy, 58-story condominium skyscraper constructed of reinforced concrete, whereas the proposed buildings at the Brisbane Landfill will be similar to those constructed at the successful development at the Sierra Point Landfill, where buildings range between 3 and 12 stories (see **Figure 4).** Shorter buildings impose significantly lower loads on the subsurface than taller buildings such as the 58-story Millennium Tower.

We also understand that the foundation of the Millennium Tower is a concrete mat constructed on friction piles that develop their capacity in the shallower soils at the site. The Brisbane Landfill buildings will be founded on the deeper, denser sands or bedrock, similar to the buildings at Sierra Point Landfill.

The depth of the piles at the Brisbane Landfill will depend on the specific site conditions encountered at each building location when final design is completed. Pile indicator programs will be performed, during which piles are driven using the proposed construction equipment to test the pile and the pile driving setup. The pile indicator program can also include a full-scale pile load test. The information derived in a pile indicator program is used by the designers to fine tune the final pile design. We understand that at the Sierra Point Landfill, the pile indicator programs performed for the different buildings yielded invaluable information to finalize the foundation design for each structure.

We note that construction of the existing Sierra Point buildings began in the early 1980s and was completed for all structures in the early 2000s and that these buildings have not experienced the settlement issues experienced by the Millennium Tower.

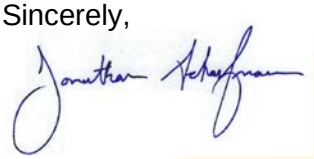
Item B: Piles through old landfills can be driven before construction of the final cover or after the final cover has been constructed. Predrilling at each pile location may be used by the pile driving contractor so that obstructions in the existing soil and waste can be identified before driving each pile. Each pre-drilled hole will have a smaller diameter than the pile dimension; in this way, the driven pile will have intimate contact with the ground. Predrilling can also be performed using a conductor casing where the casing is driven into the top 5 feet (approximately) of soil below the waste fill. After the casing has been driven, the materials inside the casing are drilled out and contained. The pile is then inserted into the casing and driven into the underlying deposits. The casing can then be pulled out or left in place. If left in place, the annulus between the pile and the casing is backfilled with bentonite grout as an additional precaution. See **Figure 5 and 6** for an illustration, including a cross section of the Brisbane Landfill.

The disturbed area at the surface around the driven piles can be sealed using materials such as low permeability soil, grout, or flowable fill. Thus, potential pathways for contaminants are mitigated.

Item C: The number of piles depends on the column load. The column load depends on the height of the building and the distance between the columns. Regardless, as described in Item B above, the disturbed area around the surface of the driven pile would be sealed and potential pathways for contaminants would be mitigated.

Please do not hesitate to contact me if you have further questions or would like to discuss these issues in more detail. We look forward to continuing the discussion on remediation of the Brisbane Baylands site at the next City Council hearing on December 15, 2016.

Sincerely,



Jonathan Scharfman
General Manager and Director of Development

cc: Clay Holstine, City Manager
John Swiecki, Community Development Director

Attachments:

1. Proposed Cap and Closure Plan (2002)
2. Cap and Closure Concept for Central Drainage Channel (2002)
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FIGURE 1

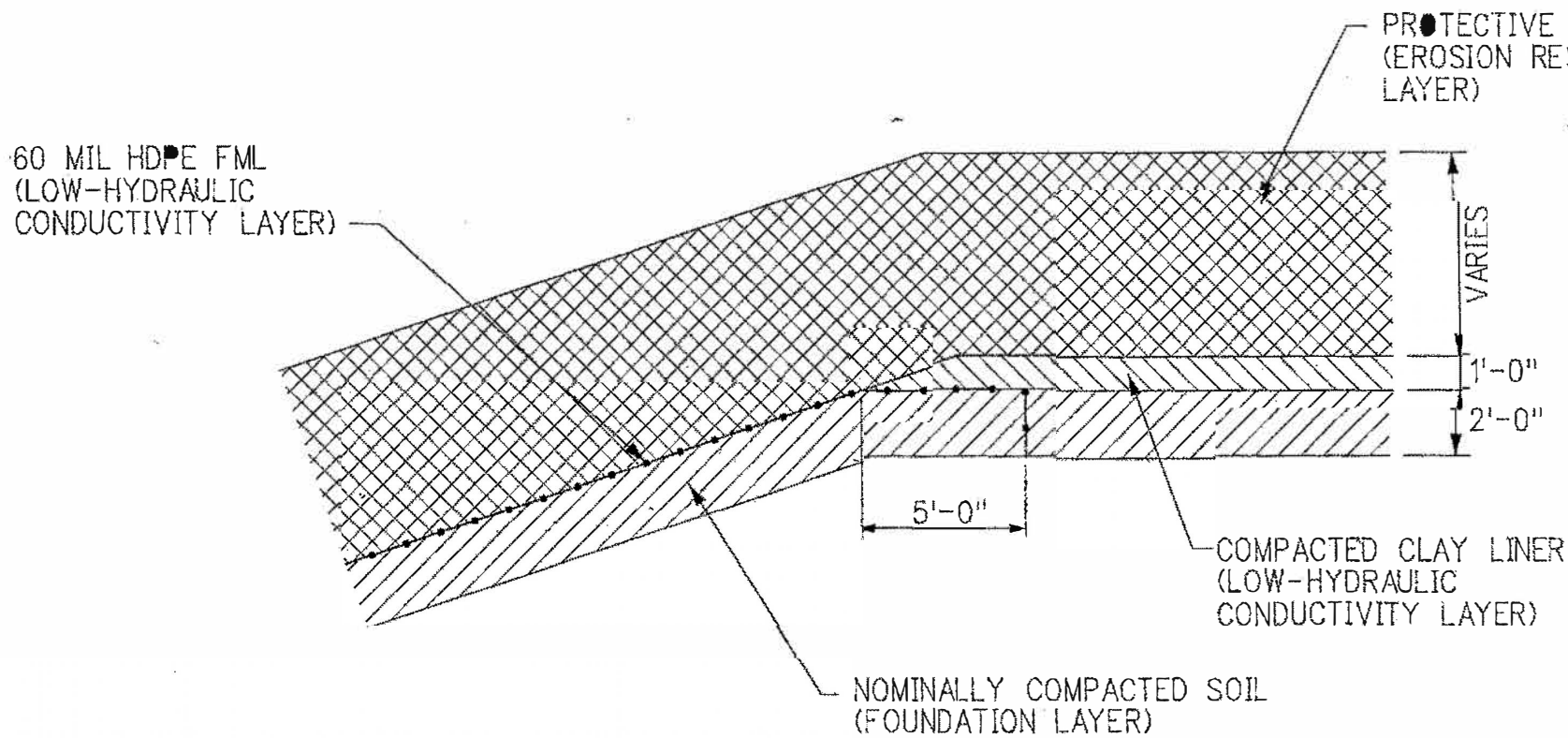
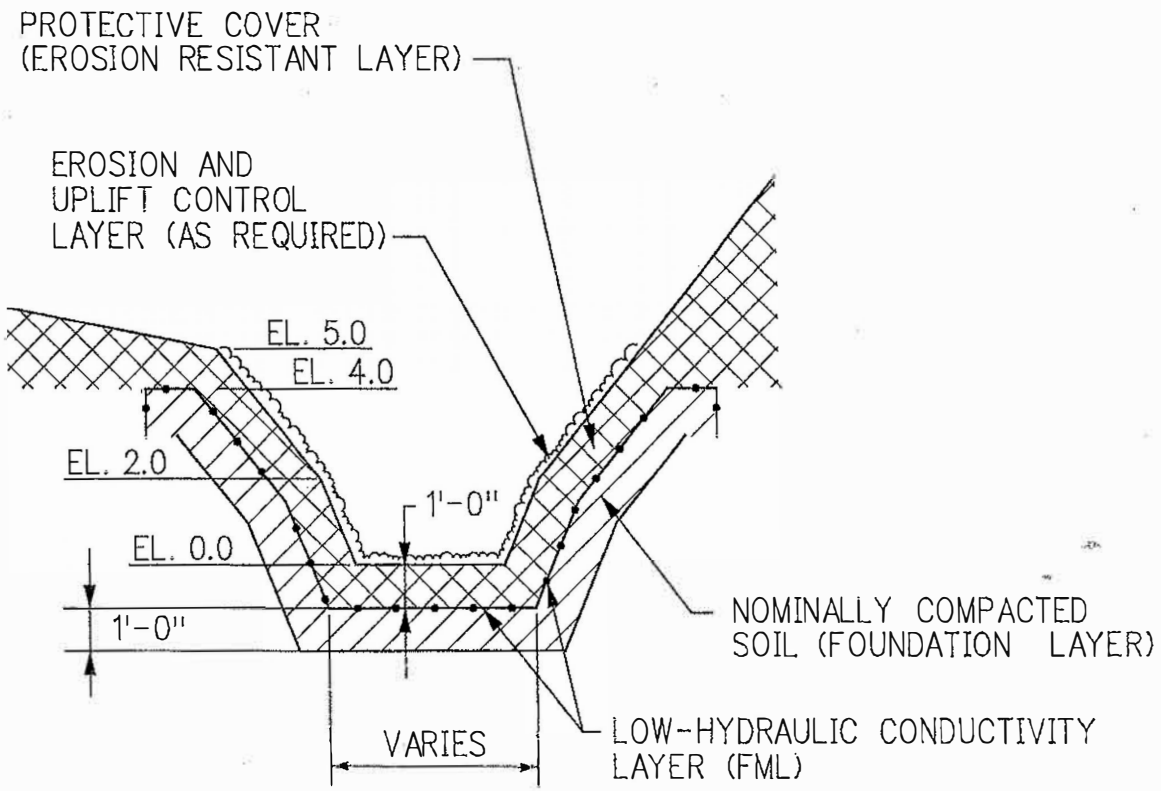


FIGURE 1

NOT TO SCALE

Figure 1

TYPICAL FML/CCL TIE-IN



NOT TO SCALE

Figure 2

CONCEPT CENTRAL DRAINAGE
CHANNEL MITIGATION

FIGURE 3

Baylands RIFS to Remedy Process

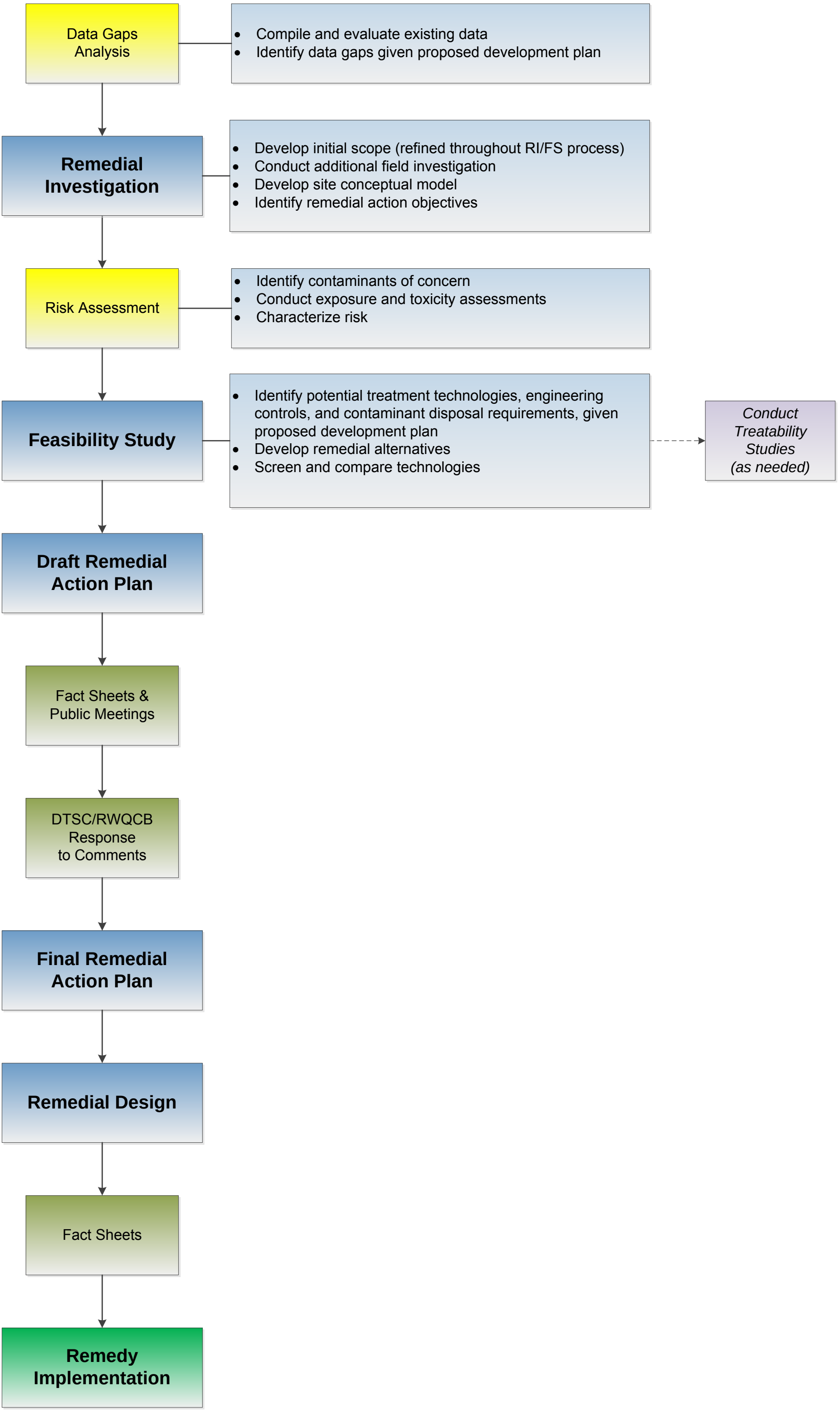
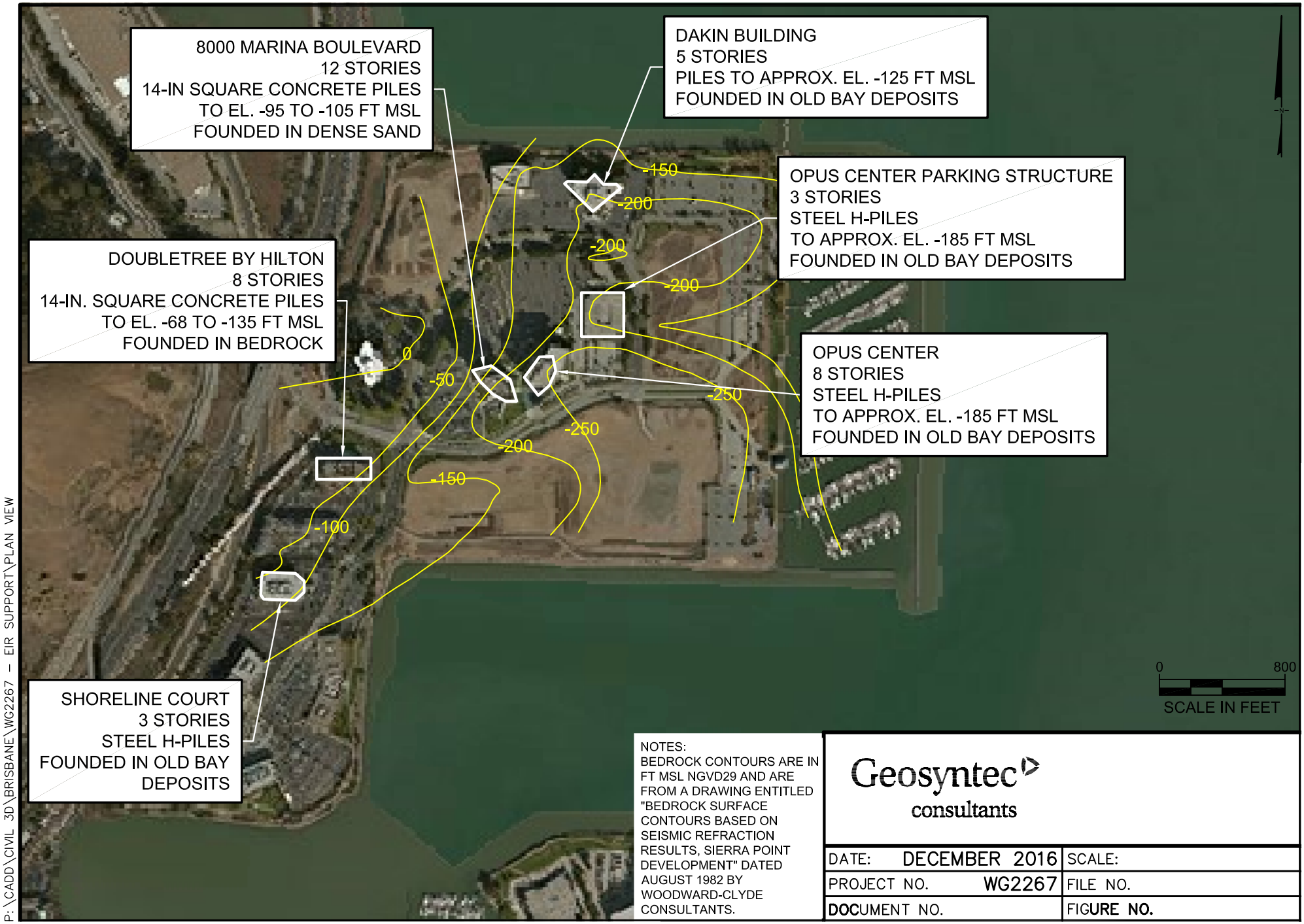


FIGURE 4



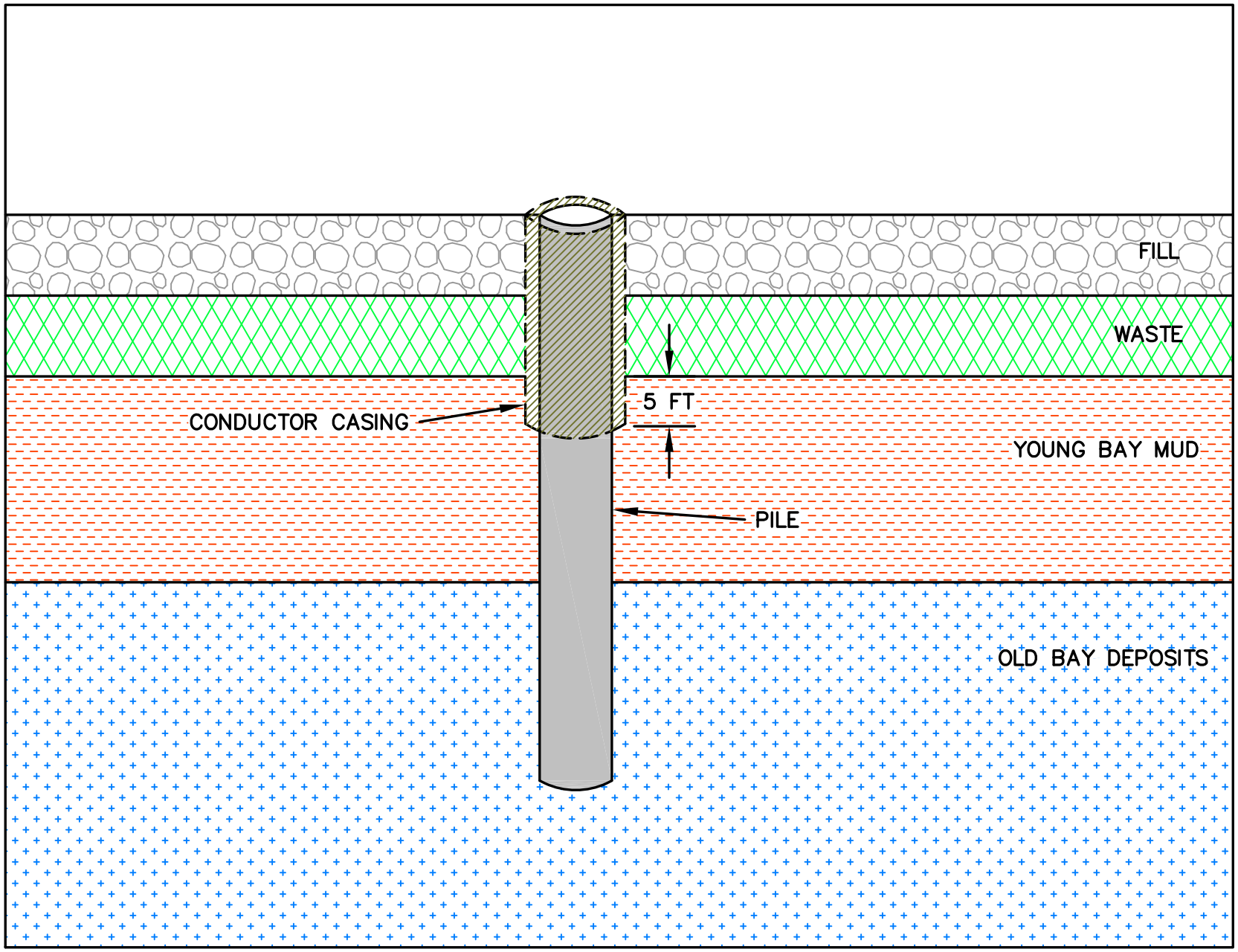
NOTES:
BEDROCK CONTOURS ARE IN FT MSL NGVD29 AND ARE FROM A DRAWING ENTITLED "BEDROCK SURFACE CONTOURS BASED ON SEISMIC REFRACTION RESULTS, SIERRA POINT DEVELOPMENT" DATED AUGUST 1982 BY WOODWARD-CLYDE CONSULTANTS.

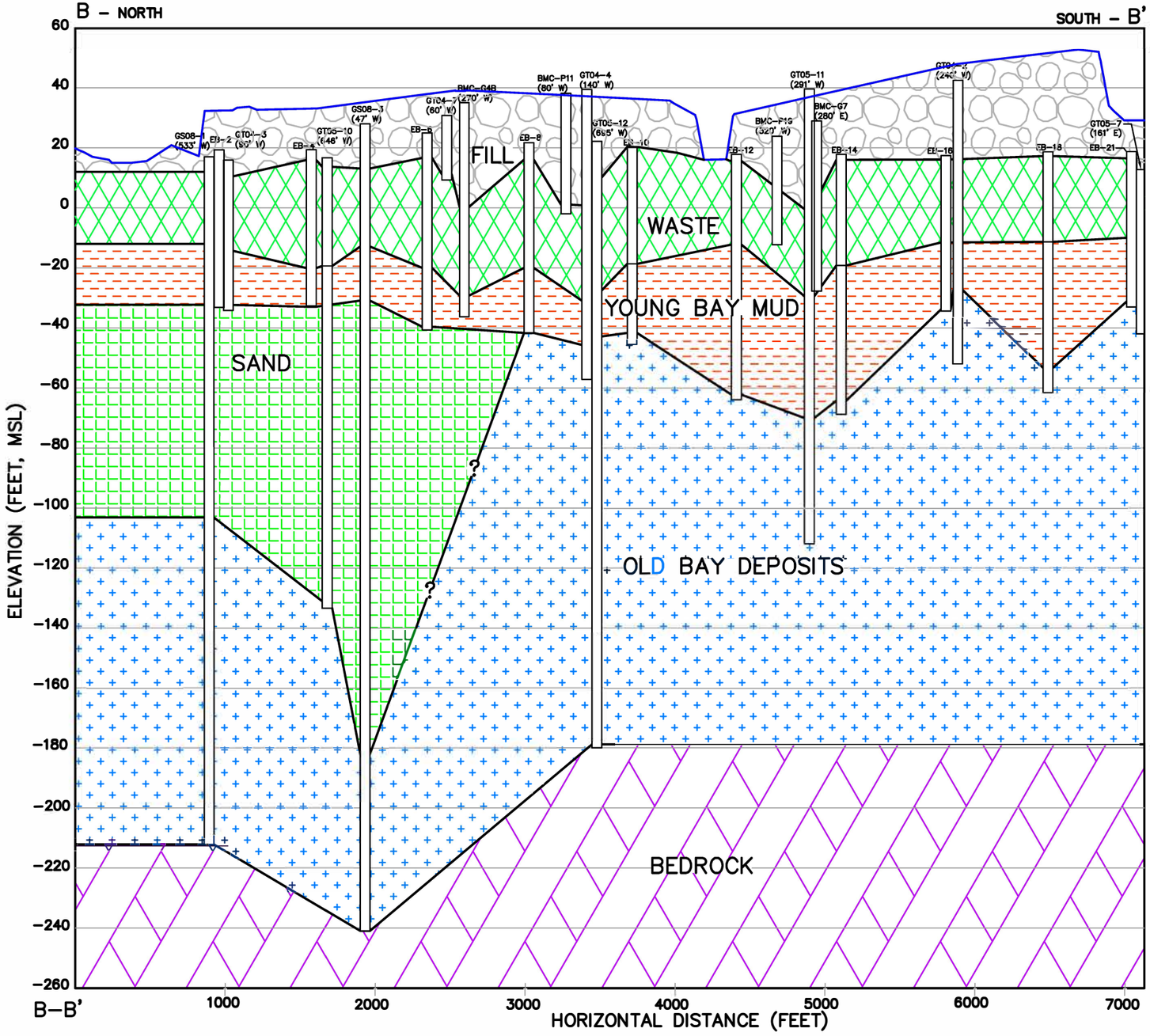
Geosyntec consultants

DATE: DECEMBER 2016	SCALE:
PROJECT NO. WG2267	FILE NO.
DOCUMENT NO.	FIGURE NO.

P:\CADD\CIVIL 3D\BRISBANE\WG2267 – EIR SUPPORT\PLAN VIEW

FIGURE 5


FILL
WASTE
5 FT
CONDUCTOR CASING
YOUNG BAY MUD
PILE
OLD BAY DEPOSITS



- EXISTING AND PROPOSED FILL
- WASTE
- YOUNG BAY MUD
- SAND
- OLD BAY DEPOSITS (also includes clayey SANDS AND CLAYS)
- BEDROCK
- PROPOSED GRADES

BORING ID	DRILLED BY:	YEAR OF DRILLING:
GS08–1:	GEOSYNTEC	(2008)
GT05–1:	GEOSYNTEC	(2005)
GT04–1:	GEOSYNTEC	(2004)
BMC G–1:	BURNS AND MCDONNELL	(2000)
B–01:	KLEINFELDER	(1989)
EB–01:	LOWNEY ASSOCIATES	(1977)

0 400 800
SCALE IN FEET

Geosyntec consultants

BOREHOLE CROSS – SECTION B–B'
BRISBANE LANDFILL
BRISBANE, CALIFORNIA

FIGURE NO.	
PROJECT NO.	WG2267
DATE:	DECEMBER 2016

P:\CADD\CIVIL 3D\BRISBANE\WG2267 – EIR Support\Cross–sections_EIR SUPPORT.dwg 12–08–16 10:39:41 AM MViswanath