24 March 2014

TECHNICAL MEMORANDUM

To: Eileen Fanelli, Presidio Trust

From: John DeWitt, Erler & Kalinowski, Inc. ("EKI")
Steve Tarantino, EKI
John Montgomery-Brown, EKI

Subject: Potential Temporary Remedial Actions to Minimize Exposure, Lendrum Court, Presidio of San Francisco, California (EKI B00025.07)

In a 9 January 2014 letter to the Presidio Trust ("Trust"), the Department of Toxic Substances Control ("DTSC") stated that surface soils at Lendrum Court present a potential human health risk to residents and requested that the Trust submit a Technical Memorandum proposing actions to minimize exposure while a final remedial action is developed. Erler & Kalinowski, Inc. ("EKI") prepared this Technical Memorandum to summarize potential temporary remedial actions the Trust could implement to minimize the exposure of Lendrum Court residents to impacted surface soils at Lendrum Court, evaluate these potential temporary actions, and present a recommended approach to limiting exposure.

Background and Purpose

Lendrum Court ("Site") is located in the North Fort Scott neighborhood of the Presidio of San Francisco. Figure 1 shows Lendrum Court and associated Site buildings.

A draft copy of the *Lendrum Court Investigation Summary Report and Screening Risk Evaluation, Presidio of San Francisco,* was submitted to the DTSC for review in December 2013. The report identified three soil units: overburden soil, debris fill, and underlying soils. Soil analytical data presented in the report document lead and polycyclic aromatic hydrocarbons ("PAHs") at concentrations in excess of human health screening levels in the debris fill. In addition, 12 of 17 overburden soil samples contained lead concentrations in excess of the residential lead screening level of 80 mg/kg. Based on these soil sample results, the calculated exposure point concentration for lead in overburden soil is 615 mg/kg.

In its 9 January 2014 letter to the Trust (DTSC, 2014a), the DTSC determined that surface soils at Lendrum Court present a potential human health risk to residents. DTSC requested that the Trust submit a technical memorandum proposing an action to minimize exposure while a final remedial action is developed. These actions would likely be in place for an estimated 12 to 18 months, depending on the time required to complete remedial investigations, prepare a remedial action plan, and initiate remedial construction. This

Technical Memorandum identifies potential technologies and recommends actions to limit the exposure of Lendrum Court residents to overburden soils.

In a separate letter, also dated 9 January 2014 (DTSC, 2014b), DTSC provided comments on the draft summary report. These comments were addressed and a final report was submitted to DTSC in February 2014 (EKI, 2014). DTSC approved the final *Lendrum Court Investigation Summary Report and Screening Risk Evaluation, Presidio of San Francisco* on 7 March 2014 (DTSC, 2014c).

Technical Approach and Design Criteria

In addition to the sample analytical results reported in the final investigation summary report, the Trust had previously conducted lead-based paint in soil sampling and analysis for the buildings in Lendrum Court. These additional lead data results were reviewed to delineate areas where lead in soil is present above human health screening levels and where temporary actions would be appropriately implemented.

Based on the available data, surface soils with lead sample results exceeding risk-based screening levels are limited to the landscape areas around Buildings 1257 through 1259 and Buildings 1278 and 1279. Lead analytical results for soil samples around Buildings 1280 and 1282 are below the lead residential soil screening level of 80 mg/kg; therefore no potential for excess risk has been identified at these two buildings and temporary actions are not considered necessary.

Based on site inspections and discussions with Lendrum Court residents, the areas of impacted soil can be divided into three general Site-use categories:

- landscape areas;
- high-traffic areas around the residences; and
- informal gathering areas primarily used by Lendrum Court residents.

The landscape areas at Lendrum Court are primarily located in areas of relatively steep topography around Buildings 1257 and 1258, behind Buildings 1259, 1278, and 1279, and the large open area between the street and Buildings 1257 and 1258. The high-traffic areas are primarily located within 10 to 20 feet of the building entrances and exits and in corridors used for pedestrian access between the buildings. The informal gathering areas are primarily located near the front entrances of the buildings. These three general use areas are shown on Figure 1.

The primary exposure pathway for human exposure to lead in overburden soil is direct contact. The existing concrete sidewalks and paved street and parking areas currently serve as a barrier to underlying overburden soils. For exposed overburden soils, direct contact can be reduced by covering exposed soils to create a barrier or by restricting access to uncovered soils. Both of these approaches (covering and restricting access) are considered in the identification of technologies to limit exposure to residents.

Several potentially applicable technologies for limiting exposure to overburden soils are presented in Table 1. Brief descriptions of these technologies are presented below.

- Fencing: Fencing can be used to restrict access to landscape areas. There are many types of fencing available. Post and cable fencing is an aesthetically-appealing alternative to chain-link fencing and has been widely used at the Presidio to indicate areas off-limits to park users and tenants. Post and cable fencing could be effectively used in a residential neighborhood like Lendrum Court where the tenants are informed and aware of the purpose of the fencing. Post and cable fencing will not affect views or wildlife access.
- Sod and Artificial Turf: Sod (grass) and artificial turf materials could be used to cover soils. While both materials are similar in function and appearance, artificial turf is an engineered material that has greater initial costs to install but requires less maintenance than sod. Proper installation of artificial turf requires greater engineering to ensure it is stable and to address surface water runoff, as well as excavation for a stable subbase. To be effective as a barrier, both materials would require additional measures to prevent gopher activity.
- Wood Chips over Erosion Control Matting: Wood chips (mulch) are a readily available material that could be installed on an erosion control matting as a soil cover. Wood chips are widely used within the Presidio in landscaped and natural areas. They are generally an aesthetically acceptable ground covering. As erosion control matting is generally not as durable in high-traffic areas as other materials, this technology is most applicable for landscape areas and low to moderate pedestrian traffic areas.
- Aggregate rock and Sand-set Pavers over Geotextile: Sand-set paving stones and aggregate rock (i.e., gravel-like) materials placed on top of a geotextile material could be used to cover overburden soils. These materials are primarily suited to high-traffic areas of relatively flat topography. Technologies such as geocells, in combination with aggregate rock, could be used in relatively steep landscape areas. A geocell is a cellular confinement system that is widely used for erosion control and soil stabilization on sloped terrain. A typical geocell system is composed of strips of high-density polyethylene material that are expanded to form a honeycomb-like structure. The geocell system is then anchored to the desired surface and filled with sand, soil, rock, or concrete.
- Boardwalk: Wooden or synthetic wood walkways could be used in high-traffic areas.
- Permeable Rubber Surfaces over Geotextile and Playground Soft Tiles: These technologies provide relatively smooth, accommodating surfaces. While pour-in-place permeable rubber surfaces can be installed on a variety of surfaces and terrains, interlocking playground soft tiles need to be installed over a properly engineered subbase and are difficult to install in curved and angular areas. Both products are typically constructed of recycled rubber materials. These types of materials are considered most appropriate for the informal gathering areas; however, permeable rubber surfaces could also be used in high-traffic and landscape areas.

- Concrete: Concrete is a suitable technology in high-traffic areas based on its durability. Installation requires a higher degree of engineering than other technologies considered to ensure proper functioning and to address water runoff. If used as a temporary measure, this technology would preclude further assessment beneath the pavement. This technology is more appropriately considered as part of a final remedial remedy for the Site.

Table 1 presents a qualitative comparison of these technologies based on their relative cost-effectiveness, ease of maintenance, durability, drainage impacts, and constructability, as well as a qualitative evaluation of the suitability of the cover technology for informal gathering areas and whether the technology could be part of the final remedy. In Table 2, the parameters evaluated are ranked on a score of 0 (lowest) to 5 (highest) to develop a qualitative total for each technology. The parameters are described below.

- Cost-effectiveness includes costs associated with design, materials, and installation.
    - For example, due to its significantly lower design, material, and installation costs, post and cable fencing is a significantly more cost-effective alternative for landscape areas than the installation of artificial turf.
- Ease of maintenance includes the level of effort to maintain the effectiveness and appearance of the temporary remedy until the final remedy is installed.
    - For example, while sod is a suitable temporary technology for all areas at the Site, the need for irrigation and maintenance (e.g., mowing) but easy repairs are contrasted with alternatives like an artificial turf or concrete which might only need periodic washing, but are more difficult to repair during future investigations.
- Durability addresses the ability of the materials used to provide an effective barrier to residential exposure for the duration of the temporary remedy.
    - For example, wood chips over erosion control matting in areas of high-traffic would be significantly less durable than the installation of concrete or a permeable rubber surface over a geotextile.
- Drainage Impacts reflects the material's effect on site drainage and potential to absorb rainwater or limit runoff, such that flooding or erosion is not induced by the remedy.
    - For example, rainfall on wood chips or sod would not require significant changes to current site drainage, whereas rainfall on playground soft tiles or concrete would increase runoff and potentially require modifications to address site drainage.
- Constructability reflects the ability to quickly and efficiently construct the remedy while limiting the impact to the residents, including reducing the ground preparation and excavation, as soil disturbing activities increase the potential for exposure during construction.
    - For example, installation of playground soft tiles would likely require excavation for the construction of a proper subbase whereas installation of sod and wire mesh or a permeable rubber surface over a geotextile fabric could be performed after simply preparing the existing surface in place.

- Suitability for use in the informal gathering areas reflects whether the temporary technology provides a relatively smooth, non-abrasive, semi-cushioned surface that is amenable to use by residents, including children.
    - For example, playground soft tiles are significantly more suitable for children to play on than restricting access to the area entirely via fencing or than installing an aggregate rock material in the area.
- Part of the final remedy reflects that potential for installing the temporary technology with the intent of the temporary technology becoming part of the permanent remedy for the area.
    - Due to its high durability, a concrete barrier could potentially be used as part of the final solution. In contrast, the use of an aggregate rock material over a geotextile fabric is unlikely to be used as part of the final solution.

As seen in Table 2, no single remedial technology is optimal for all three Site-use categories in Lendrum Court area. While sod, artificial turf, and permeable rubber surfaces are potentially applicable for all three Site-use categories, other technologies have equal or higher relative scores in each of the individual Site-use categories. Therefore, the remedial alternative should consider a combination of potential temporary technologies based on Site-use categories. Fencing is an appropriate technology to limit exposure to large areas in a cost-effective way. Covering technologies are appropriate for remaining areas where residents walk and gather.

Table 1 shows that a combination of potential temporary technologies may be applicable for each of the three Site-use categories. For the relatively large landscape area within Lendrum Court, fencing is clearly the most appropriate technology to cost-effectively limit exposure. For high-traffic areas, aggregate rock material, sand-set pavers, boardwalks, or permeable rubber surface are equally appropriate technologies to limit exposure. Factoring in the suitability of the potential temporary alternatives for use in the informal gathering areas, sod is the most appropriate temporary technology.

Recommended Alternative

EKI recommends covering the high-traffic and informal gathering areas and restricting access to landscape areas within Lendrum Court. The proposed alternative involves:

- installing post and cable fencing around exposed surface soils in the moderately sloped landscape areas to restrict access (approximately 1,875 linear feet to limit access to the majority of the surface area, as shown on Figure 1);
- installing aggregate base walkways in high-traffic areas to doors at the front and sides of residences;
- installing sand-set pavers near the sliding doors at the back of Buildings 1257 and 1258 and covering the surface soils in low to moderate traffic areas of relatively flat topography around portions of Buildings 1257 and 1258 and the front of Building 1259 with geotextile fabric, gopher-resistant mesh, and wood chips; and,

- installing a gopher-resistant mesh and sod in the informal gathering areas shown on Figure 1.

As stated above the actual materials used to implement this alternative can vary; thus the Trust has flexibility to work with its landscaping crew, tenants, and residents to find specific materials that address the concept of these technologies and still are protective of the residents by reducing the potential exposure to site soils.

To avoid disturbing or excavating surface soils, EKI recommends installing the surface covering materials (i.e., sand-set pavers, aggregate base, or wood chips) with geotextile or erosion control matting directly on top of the currently exposed vegetation and surface soils. For sod installation, no geotextile would be installed under the sod to allow the new roots to attach to the existing top soil. Gopher-resistant mesh would be installed under all the cover materials.

Placing covering materials directly on the existing soil will require preparation prior to placement. For the covering materials such as sand-set pavers, aggregate base, or wood chips, the existing surface would be compacted using equipment that does not penetrate the surface (e.g., vibrating plates or a heavy roller to achieve compaction). Also batter boards should be installed at the edges of surface covering materials to limit movement of these materials and degradation of the physical barrier. The thickness of the engineered cover material should be at least 2 inches, which combined with a geotextile membrane, should provide a sufficient barrier to contact with the underlying overburden soils. Preparation for sod would require removing some of the excess vegetation and roughening the existing surface soil layer to allow the sod roots to grow into the existing soil layer. Fencing posts should be driven to avoid generating soil residuals from augering posts.

These concepts and a draft figure were presented to DTSC representatives (23 January 2014 meeting at the Trust's offices, and 27 February 2014 at DTSC's office), and DTSC indicated the approach was appropriate. During meetings with Lendrum Court tenants and nearby residents (28 January 2014 and 5 March 2014), the Trust previewed these measures and received direct feedback, as well as favorable comments on the concept and approach.

Because the implementation of any of these recommended technologies is relatively straight forward, EKI recommends that Figure 1 be used as the design document indicating the location of the each of the three site use categories and the Trust select a contractor to implement the plan presented in this technical memorandum using a design-build project delivery method. These fencing and cover technologies can be implemented without the preparation of detailed plans and specifications which will result in a more timely implementation of the selected alternative and, therefore, more quickly limit the potential exposure of the Lendrum Court residents. EKI has preliminarily discussed this project with potential contractors to assess their availability, design/build experience, and qualifications and has determined that qualified contractors are available to perform this work.

Please contact us (650) 292-9100 if you have questions.

Attachments

Table 1 Qualitative Comparison of Potential Temporary Technologies to Break the Exposure Pathway

Table 2 Summary Comparison of Potential Temporary Technologies to Break the Exposure Pathway

Figure 1 Proposed Alternatives to Break the Exposure Pathway at Lendrum Court

References

DTSC, 2014a. Letter from George Chow to Ms. Eileen Fanelli of the Presidio Trust dated 9 January 2014, requesting a technical memorandum on proposed actions to minimize the exposure of Lendrum Court residents to surface soils while a final remedial action is developed.

DTSC, 2014b. Letter from George Chow to Ms. Eileen Fanelli of the Presidio Trust dated 9 January 2014, regarding comments on the *Draft Lendrum Court Investigation Summary Report and Screening Risk Evaluation, Presidio of San Francisco,* dated November 2013.

DTSC, 2014c. Letter from George Chow to Ms. Eileen Fanelli of the Presidio Trust dated 7 March 2014, approving the *Final Lendrum Court Investigation Summary Report and Screening Risk Evaluation,* dated 28 February 2014.

EKI, 2014. *Lendrum Court Investigation Summary Report and Screening Risk Evaluation, Presidio of San Francisco, California.* Erler & Kalinowski, Inc., February 2014.

TABLE 1
Qualitative Comparison of Potential Temporary Technologies to Break the Exposure Pathway
Lendrum Court Area
Presidio Trust, San Francisco, California

Comparison Criteria	Temporary Technology to Break the Exposure Pathway				
	Post and Cable Fencing	Sod	Artificial Turf	Wood Chips over Erosion Control Matting	Aggregate Rock Material over Geotextile (a)
Cost-Effectiveness Design, material, and installation costs	- Low design costs - Low material costs - Low installation costs - Isolate large areas with small amount of materials	- Moderate design costs to limit gopher activity - Relatively low purchase costs - Moderate installation costs - High maintenance costs	- High design costs - High material costs - High installation costs	- Low design costs - Low material costs - Low installation costs - Wood chips readily available	- Low design costs - Relatively low material costs - Relatively low installation costs
Easy to Maintain Level of effort required to maintain effectiveness and appearance (12 to 18 months)	- Minimal maintenance - Easy to repair	- Irrigation is required - Routine maintenance required (e.g., mowing) - Easy to repair	- No irrigation is required - Minimal effort to maintain and clean (e.g., periodic washing) - Difficult to repair	- In high-traffic areas, wood chips would need to be replaced frequently due to migration - Matting relatively easy to repair or replace	- Occasional maintenance in high-traffic areas may be required - Relatively easy to repair - Some aggregate rock materials may have tracking issues
Durability Effective barrier for duration of temporary remedy (e.g., resistance to erosion and wear)	- Only slightly susceptible to use and wear	- Moderate durability - Gophers must strictly be controlled for remedy to be effective	- High durability (e.g., expected lifetime approximately 10 years) - Gopher resistant	- Poor durability in high-traffic areas - Gophers must strictly be controlled for remedy to be effective	- Moderate durability in high-traffic areas - Potentially susceptible to wet weather erosion - Gopher resistant
Drainage Impacts Level of effort required to change site drainage to limit adverse effects of rainwater such as erosion and flooding	- No change to site drainage	- No change to site drainage	- Site drainage could be affected by synthetic materials and drainage requirements	- No change to site drainage	- Moderate changes in site drainage
Constructability Ability to quickly and efficiently construct the remedy, limited ground preparation, limited soil disturbance activities, and limited impacts to residents.	- Easily installed - No ground preparation required - No soil disturbing activities	- Existing surfaces need to be scraped prior to installation - Off-site disposal of excess soil may be required - Requires gopher barrier below sod	- Significant engineering required - Significant ground preparation required - Significant soil handling required, including excavation - Off-site disposal of excess soil would be required	- Easily installed - Minimal ground preparation required - Minimal soil disturbing activities - Best-suited for relatively flat areas - Requires gopher barrier below fabric	- Easily installed - Minimal ground preparation required (e.g., compact current materials in place before installation) - Minimal soil disturbing activities - Best-suited for relatively flat areas
Suitability for Use in Informal Gathering Areas Does the technology provide a relatively smooth, non-abrasive, semi-cushioned surface	- Unsuitable as technology designed to prevent access	- Well suited - Favored by residents	- Well suited	- Unsuitable as it doesn't provide a relatively smooth surface and because children could easily damage protective barrier	- Poorly suited as it would be a rough and abrasive surface - Children could easily damage protective barrier
Part of Final Remedy?	- Could potentially be reused as part of final remedy	- Could potentially be used as part of final remedy	- Could potentially be used as part of final remedy	- Unlikely to be used as part of final remedy	- Unlikely to be used as part of final remedy
Applicable Site-Use Category					
Landscape Areas	■	■	■	■	(c)
High-Traffic Areas		■	■	■	■
Informal Gathering Areas		■	■		

TABLE 1
Qualitative Comparison of Potential Temporary Technologies to Break the Exposure Pathway
Lendrum Court Area
Presidio Trust, San Francisco, California

Comparison Criteria	Temporary Technology to Break the Exposure Pathway				
	Sand-set Pavers over Geotextile	Boardwalk	Permeable Rubber Surface over Geotextile	Playground Soft Tiles (b)	Concrete
Cost-Effectiveness Design, material, and installation costs	- Moderate design costs - Moderate material costs - Moderate installation costs	- Moderate design costs - Moderate material costs - High installation costs	- Moderate design costs - Moderate material costs - Moderate installation costs	- High design costs - High material costs - High installation costs	- Moderate design costs - Moderate material costs - Moderate installation costs
Easy to Maintain Level of effort required to maintain effectiveness and appearance	- Relatively easy to maintain, occasional sweeping required - Relatively easy to repair	- Relatively easy to maintain - Relatively easy to repair	- Relatively easy to maintain, occasional sweeping/vacuuming required - Easy to repair	- Relatively easy to maintain, occasional sweeping required - Difficult to repair	- Easy to maintain - Relatively easy to repair
Durability Effective barrier for duration of temporary remedy (e.g., resistance to erosion and wear)	- Good durability - Potentially susceptible to wet weather erosion - Gopher resistant	- Good durability	- High durability (properly installed, the expected lifetime is approximately 10 years) - Gopher resistant	- High durability (expected lifetime approximately 10 years) - Gopher resistant	- Very durable (expected lifetime over 10 years) - Gopher resistant
Drainage Impacts Level of effort required to change site drainage to limit adverse effects of rainwater such as erosion and flooding	- Moderate changes to site drainage - Some runoff expected	- Should not impact site drainage	- Site drainage could be affected by synthetic materials and drainage requirements	- Site drainage could be affected by synthetic materials and drainage requirements - Runoff expected	- Significant changes to site drainage - Runoff expected
Constructability Ability to quickly and efficiently construct the remedy, limited ground preparation, limited soil disturbance activities, and limited impacts to residents.	- Easily installed - Some ground preparation required - Potentially reusable - Best-suited for relatively flat areas, but with proper engineering could also be installed in sloped areas	- Easily installed - Some ground preparation required - Best-suited for relatively flat areas, but with proper engineering could also be installed in sloped areas	- Easily installed - Minimal ground preparation required (e.g., compact current materials in place before installation) - Can install in sloped areas - Can easily install around existing site features shape	- Significant engineering required - Significant ground preparation required to anchor tiles - Significant soil handling required, including excavation - Off-site disposal of excess soil may be required - Not well-suited for sloped areas - Difficult to install in curved and angular areas	- Due to its durability, significant planning and coordination required with the Fort Scott Development Team will be required. - Significant ground preparation required. - Significant soil handling required, including excavation - Off-site disposal of excess soil may be required
Suitability for Use in Informal Gathering Areas Does the technology provide a relatively smooth, non-abrasive, semi-cushioned surface	- Moderately suited	- Poorly suited	- Suitable, though surface is slightly abrasive	- Well suited	- Moderately suited
Part of Final Remedy?	- Could potentially be reused as part of final remedy	- Unlikely to be used as part of final remedy	- Unlikely to be used as part of final remedy	- Unlikely to be used as part of final remedy	- Could potentially be used as part of final remedy
Applicable Site-Use Category Landscape Areas			■		
High-Traffic Areas	■	■	■		■
Informal Gathering Areas			■	■	

TABLE 1

Qualitative Comparison of Potential Temporary Technologies to Break the Exposure Pathway

Lendrum Court Area

Presidio Trust, San Francisco, California

Notes:

(a) Aggregate rock materials include stabilized decomposed granite, angular aggregate, aggregate base, and other materials. While the exact characteristics of these materials vary slightly with respect to the comparison criteria, these materials are similar enough that they were grouped together for this evaluation.

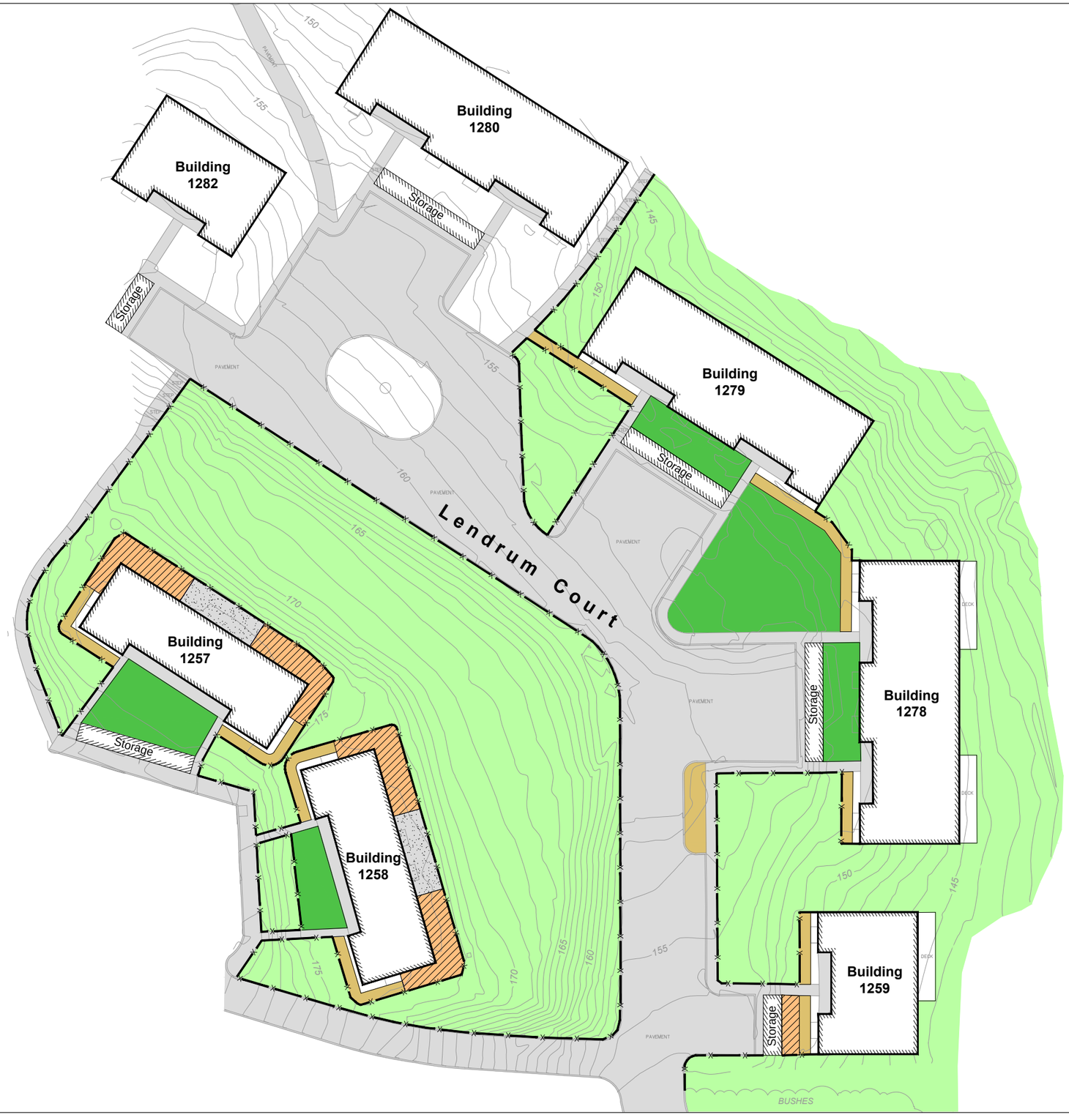
(b) Playground soft tiles will not be installed to provide fall protection and will need to be installed over a properly engineered subbase.

(c) Geocells, a cellular confinement system which is typically composed of strips of high-density polyethylene material that can be expanded on-site to form a honeycomb-like structure, could be used in sloped Landscape Areas to prevent erosion. Nevertheless, the high cost of this material and its durability makes this technology more appropriate for a final remedy than a temporary remedy.

TABLE 2
Summary Comparison of Potential Temporary Technologies to Break the Exposure Pathway (a)
Lendrum Court Area
Presidio Trust, San Francisco, California

Comparison Criteria	Temporary Technology to Break the Exposure Pathway									
	Post and Cable Fencing	Sod	Artificial Turf	Wood Chips over Erosion Control Matting	Aggregate Rock Material over Geotextile (b)	Sand-set Pavers over Geotextile	Boardwalk	Permeable Rubber Surface over Geotextile	Playground Soft Tiles (c)	Concrete
Cost-Effectiveness Design, material, and installation costs	5	3	0.5	4	3	2	1.5	1.5	0.5	2
Easy to Maintain Level of effort required to maintain effectiveness and appearance (12 to 18 months)	5	0.5 (d)	3	2	3	4	4	4	4	5
Durability Effective barrier for duration of temporary remedy (e.g., resistance to erosion and wear)	4.5	2.5 (d)	4	1	2.5	3.5	4	4	4	4.5
Drainage Impacts Level of effort required to change site drainage to limit adverse effects of rainwater such as erosion and flooding	5	5	4	5	4	3.5	5	4	2.5	0
Constructability Ability to quickly and efficiently construct the remedy, limited ground preparation, limited soil disturbance activities, and limited impacts to residents.	5	4 (e)	0.5	3.5	3.5	3	4	3.5	0.5	0.5
Total	***24.5***	***15***	***12***	***15.5***	***16***	***16***	***18.5***	***17***	***11.5***	***12***
Suitability for Use in Informal Gathering Areas Does the technology provide a relatively smooth, non-abrasive, semi-cushioned surface	0	5	4.5	2	0.5	2	0.5	2.5	4.5	2
Excavation Required?	No	No	Yes	No	No	No	No	No	Yes	Yes
Part of Final Remedy?	Potentially	Potentially	Potentially	Unlikely	Unlikely	Potentially	Unlikely	Unlikely	Unlikely	Potentially
Applicable Site-Use Category										
Landscape Areas	■	■	■	■	(f)			■		
High-Traffic Areas		■	■	■	■	■	■	■		■
Informal Gathering Areas		■	■					■	■	
Include in Temporary Remedial Alternative	■			■	■	■				

Notes:
(a) For the qualitative comparison, the temporary technologies were ranked relative to each other on a scale from 0 (low) to 5 (high) based on their ability to satisfy the comparison criteria.
(b) Aggregate rock materials include stabilized decomposed granite, angular aggregate, aggregate base, and other materials. While the exact characteristics of these materials vary slightly with respect to the comparison criteria, these materials are similar enough that they were grouped together for this evaluation.
(c) Playground soft tiles will not be installed to provide fall protection and will need to be installed over a properly engineered subbase.
(d) Gophers are prevalent in the Lendrum Court Area and must be strictly controlled for this technology to be effective.
(e) Installation of sod would require scraping the current surface and the addition of topsoil to be effective.
(f) Geocells, a cellular confinement system which is typically composed of strips of high-density polyethylene material that can be expanded on-site to form a honeycomb-like structure, could be used in sloped Landscape Areas to prevent erosion. Nevertheless, the high cost of this material and its durability makes this technology more appropriate for a final remedy than a temporary remedy.



N

0 40 80

(Approximate Scale in Feet)

Legend:

- Building
- Paved Areas

Landscape Areas

- Fencing

Informal Gathering Areas

- Sod

High-Traffic Areas

- Sand-Set Pavers
- Aggregate Base
- Wood Chips on Erosion Control Fabric

Notes:

1. All locations are approximate.
2. Survey source: PLS Surveys, Inc., dated 9 July 2013. California State Plane Coordinates NAD1927.

Erler & Kalinowski, Inc.

Proposed Technologies to Break the Exposure Pathway at Lendrum Court

The Presidio Trust
San Francisco, CA
24 March 2014
EKI B00025.07

Figure 1

G:\B00025.07\2014-03\Figure 1 - Proposed Alternatives at Lendrum Court.dwg 3-24-14