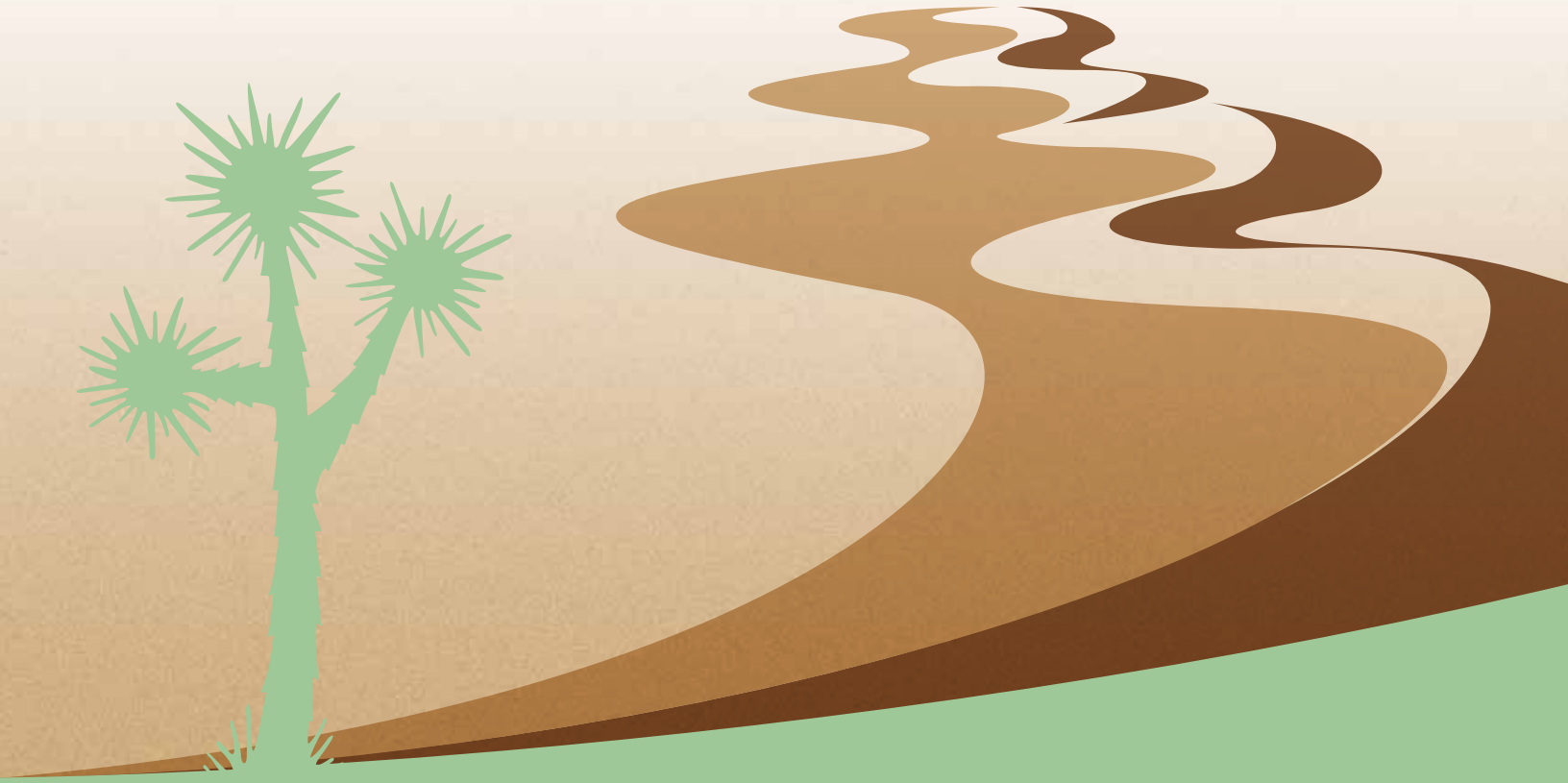
Homeowners Guide

to Controlling Windblown Sand and Dust



Information in this manual applies to high elevation desert regions of Southern California. It is based on approximately 20 years of research conducted by the Dustbusters Research Group in the Antelope Valley of Northern Los Angeles County.

ANTELOPE VALLEY DUSTBUSTERS

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Front Cover: Residential and car damage resulting from a windblown sand event.

Back Cover:

Dustbusters Research Group

In 1991, the Dustbusters Research Group formed a task force to develop best management practices for mitigating wind erosion, reducing blowing dust, and improving air quality in the Antelope Valley. Since then, Dustbusters has developed and implemented a land treatment program to minimize wind erosion through vegetative and mechanical procedures.

The Dustbusters Research Group consists of private entities as well as federal, city and county government representatives. These include the USDA Natural Resources Conservation Service, Southern California Edison, Antelope Valley Air Quality Management District, City of Los Angeles Department of World Airports, University of California Cooperative Extension, San Diego State University, Midwest Research Institute, Los Angeles County Fire Department – Forestry Division, Antelope Valley Resource Conservation District, and local farmers from Bolthouse Farms, Calandri Farms, Giba Farms, Kindig Farms, Nebeker Ranch, and Munz Ranch.

Summary

Homeowners in the high elevation Mojave Desert and other Southwestern U.S. locations encounter extended droughts, high winds, *soil** erosion, and other circumstances that result in blowing dust. Any process that results in minimal soil cover also invites dust problems. Wind speeds in this area can exceed 50 mph. When the wind blows, dust will follow.

Many public and private agencies are available to help homeowners manage their dust problems. The techniques described in this Guide may serve as a starting point. However, a comprehensive program often requires consultation with experts.

For assistance, homeowners in the Antelope Valley can contact one or more of the resources listed in the Resources Guide. Homeowners in other areas may also benefit by using web-based resources listed in the Resources Guide or by contacting similar agencies in their own areas.

Figure 1: The undisturbed desert is stable and is not a source of blowing dust.

* The definitions of italicized words are listed in the Glossary of Terms.

Introduction

Statement of Problem

When it's windy in the desert, *sand* and *dust* may blow across your property, and sand may build up around your home and yard. (See Figure 2.) Blowing sand and dust can damage property, cause respiratory health problems, and lower real estate values.

Figure 2: During high wind events, the disturbed parts of the desert experience blowing sand and dust.

For homeowners, there are usually two sources of sand and dust:

- Accumulations of loose sand *upwind* of your property
- *Bare ground* with sand deposits or loose soil on your property.

The sand deposits on your property probably accumulated during high wind events that blew the sand from upwind locations. In addition, the blowing sand probably contributed to the loose soil and damaged vegetation on your property.

This Guide tells you the cause of these problems and how to solve them. It will help you understand what you need to know about:

- Sources of sand and dust
- A two-part process for controlling sand and dust
- Guidelines for carrying out both parts of the process.

To lessen the problem for those who own land that is downwind of your property, it is important that you keep your loose sand and soil within your property line.

Sources of Sand and Dust

Desert soils are typically crusted and protected from the wind by scattered native vegetation. Even areas of loose sand are protected if the coverage of vegetation is sufficient. However, vehicle traffic, construction activities and farming can damage or destroy the vegetation and crusts.

As a result, high winds can pick up loose sand particles from the desert soil surface and bounce them along the ground. The bouncing or *saltation* of sand particles sandblasts the soil surface and causes fine dust to be lofted into the air. (See Figure 3.) This process is called wind erosion.

Only restoration of mature native vegetation can fully return eroded desert soil to its natural condition. This process can take many years. In order to survive, young vegetation in the form of seedlings must be protected from *sandblasting*. So the first step in the dust *control* process is to stop the sand flow.

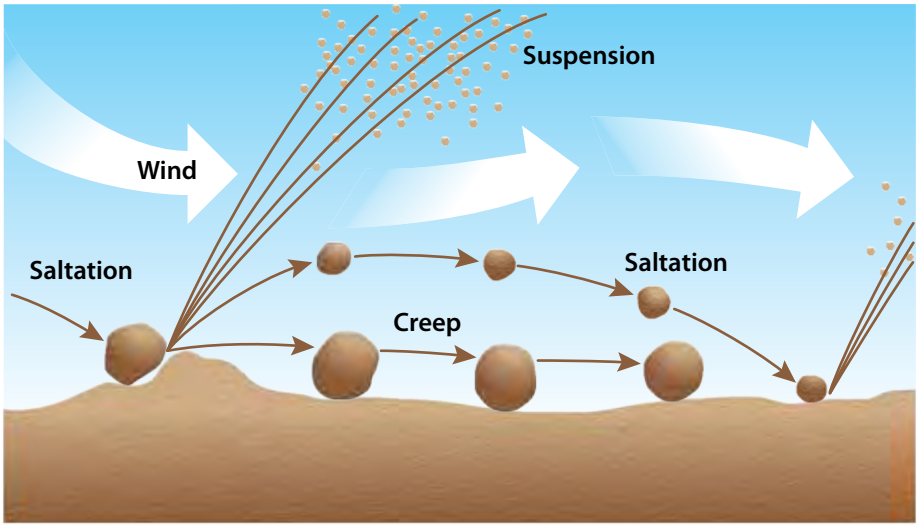

Figure 3: Wind erosion begins with particle creep (rolling) of large particles. Soon, saltation (bouncing) of sand particles begins. These energetic particles erode even stable soil, causing suspension of dust particles into the air.

Purpose and Description of Guides

Information in this Guide will assist homeowners with control of blowing sand and dust. It is based on approximately 20 years of research conducted in Antelope Valley by the Dustbusters. Two other Guides have been prepared, for large area land managers and for growers. (Website reference--cross reference Homeowners Guide and Agricultural Guide URLs here)

Process for Controlling Sand and Dust

The problem of sand and dust control can be divided into two steps:

- Step 1: Stop the flow of intruding sand onto the owner's property from nearby upwind properties.
- Step 2: Stabilize the loose soil on the owner's property.

The fine dust that is lofted above a height of 3 feet from the ground cannot be captured effectively, so this Guide emphasizes controlling the sand flow that generates coarse dust. Controlling the sand flow prevents most of the generation of fine dust.

Figure 4: This residence experienced blown sand deposits in an unstable landscape.

A number of dust control measures address the problem of sand and dust control and have been evaluated by Dustbusters in the Antelope Valley. Table 1 lists these measures and their associated United States Department of Agriculture / Natural Resources Conservation Service (USDA/NRCS) Conservation Practice and Reference Code.

Table 1: Dust control practices to consider in the Antelope Valley and their associated USDA/NRCS Conservation Practice and Reference Code.

Situation	Suggested Practices	Conservation Practice	USDA/NRCS Reference Code*
Stop flow of sand from upwind	Wind breaks and wind barriers	Windbreak / Shelterbelt Establishment	380
		Herbaceous Wind Barriers	603
	Large vegetation	Herbaceous Wind Barriers	603
		Tree/Shrub Establishment	612
	Temporary	Cover Crop	340
	Berms		Trial studies being conducted
	Stacked straw bales		Trial studies being conducted
Stabilize loose soil	Native/locally adapted vegetation	Conservation Cover	327
	Native/locally adapted vegetation	Critical Area Planting	342
	Mulch – wood chips or gravel	Mulching	484
	Emergency tillage	Cross Wind Ridges	589A
	Herbaceous cover	Cross Wind Trap Strips	589C
	Roughened surface or furrows across the wind	Surface Roughening or Emergency Tillage	609

NOTE: This list identifies the most common (but not all) Conservation Practices for homeowners. For information about additional options or for assistance, homeowners can contact the Antelope Valley U. S. Department of Agriculture Natural Resources Conservation Service (USDA/NRCS) office at 661-945-2604. Additional resources are listed in the Resources Guide.

The following information provides a two-step approach to selecting and implementing cost-effective measures for controlling dust.

* For more detailed information about these Conservation Practices, go to the USDA/NRCS website *http://www.ca.nrcs.usda.gov/*. Under Quick Access in left margin, select Electronic Field Office Technical Guide (eFOTG). Then click on California Map to select county. Page opens to display list of eFOTG sections in left margin. Select Section IV; then select Table of Contents. As an option, select Conservation Practices under the individual folders that appear under the Table of Contents heading.

Step 1:
Stop Flow of Sand from Upwind

Wind Barriers and Wind Breaks

The first step in controlling sand and dust problems is to prevent blowing sand from entering your property. You can control blowing sand from areas outside your property by placing *wind barriers* or *wind breaks* along the upwind property boundaries that face the direction of high winds. You can block wind flow with:

Wind barriers – these provide total wind blockage

- *Berms* made from wood chips or soil
- Walls of concrete blocks or other structural materials
- Stacks of hay bales
- Solid fences

Wind breaks – these provide partial wind blockage

- *Porous fences* (lattice design)
- Rows of large vegetation – trees and shrubs

Blowing sand seldom reaches a height greater than 3 feet above the ground. Thus, to effectively stop windblown sand, it is important that the wind barriers or wind breaks be at least 3 feet high. A taller wind barrier or wind break has greater capacity for trapping blowing sand. For example, if the height is 6 feet rather than 3 feet, the capacity is increased by at least 4 times.

Berms made from wood chips or soil

Berms can be constructed of wood chips or soil. (See Figures 5 and 6.) A 3-foot high berm will stop sand from entering your property and will shelter vegetation and shrubs planted *downwind* of it. When the berm fills in (saturates) with sand on its upwind side, the sand will flow over the top of the berm and

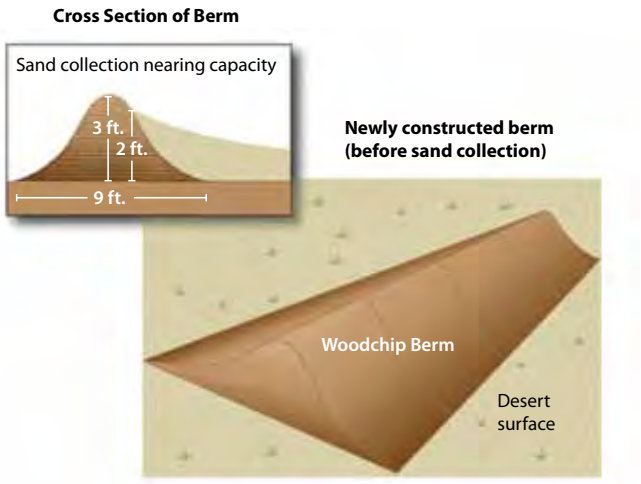

Figure 5: These diagrams show the structure and cross section of a berm.

deposit on the downwind side. This will make the berm ineffective.

So it is important to maintain the berm before this saturation condition is reached. This can be done either (a) by removing the sand deposit or (b) by using it to build a taller berm in the same place.

Figure 6: Berms are semi-permanent features on the landscape that provide effective reduction of blowing sand.

If the first option is selected, it may be reasonable to remove the accumulated sand from the berm by hand if the accumulation is less than 18 inches deep. Otherwise motorized equipment such as a small tractor should be used. Transfer any sand that is removed from the berm to a location where it is protected from the wind by a shelter or covering.

The second option is much more feasible for a wood chip berm rather than a soil berm. Although this step can be done manually, it would be convenient to use a small tractor for rebuilding a wood chip berm. First lift the wood chips, allowing the sand to drop to the ground. Then stack the chips on top of the sand.

Fences or walls that are solid wind barriers

Wood fences or concrete block walls are examples of solid wind barriers. These barriers collect blowing sand on the upwind side until the collected sand reaches the top of the barrier. Because these barrier surfaces are vertical, they collect much more sand than a sloped berm of the same height. So solid wind barriers require more work to remove the accumulated sand.

Fences that are partial wind barriers

Porous polyethylene wind fencing (lattice design) is an example of a partial wind barrier. (See Figure 7.) Wind fencing is available from many hardware stores. Lattice fence material slows the wind but does not block it. Sand is deposited on the ground mostly on the downwind side.

Figure 7: This 50% wind porosity fencing causes dust to deposit more on the downwind side of the fence.

A standard fence height of 4 feet will cause blowing sand to deposit within 40 feet downwind of the fence. The area of sand accumulation is large, so the buildup of sand depth is slower and cleanup is less frequent than with solid wind barriers of the same height.

Figure 8: The row of shrubs is protected from sandblasting by a wind fence.

Large vegetation – trees and shrubs

Rows of large vegetation, such as trees and shrubs, collect sand in a way similar to porous wind fences. They also provide an attractive wind barrier, even after the upwind sand encroachment problem stops. To grow properly, vegetation needs a fine, moist subsurface of soil and protection from sandblasting.

Plant the vegetation along the downwind edge of a berm or other wind barrier. (See Figure 8.) This protects the vegetation during the early stages of its growth. Use tubular or cone-shaped coverings constructed of wire mesh or other materials designed to protect seedlings from sandblasting and animals.

Plant trees or shrubs in a single row or in a pattern of multiple rows that provides a wind blockage of about 50 percent. In other words, about half of the wind flow will be blocked between the ground and the height of the vegetation. As with other wind barriers, large vegetation protects land areas to a downwind distance of 10 times the vegetation height. For example, a row of 10-foot tall trees will protect downwind areas from eroding out to a distance of 100 feet.

Making a Selection

The following tables will help you make choices for controlling blowing sand, based on three important considerations:

- Cost
- Appearance
- Effectiveness.

Dustbusters researchers have rated the suitability of each option for stopping sand flow. Table 2 rates three popular wind barriers and wind breaks for capturing blowing sand. **In Table 2, wood chips score the highest, with cost being a deciding factor. Wood chips have the clear advantage of being biodegradable and suitable as a future soil amendment.**

You may wish to rate each sub-factor differently, which may lead to a different score. In addition, you may gather information that leads to variations of these options. For example, you may decide to evaluate a soil berm rather than a wood chip berm. Your local experts can offer valuable information and recommendations to assist your decision-making process.

For guidance, job sheets, and other information, contact the Antelope Valley United States Department of Agriculture / Natural Resources Conservation Service (USDA/NRCS) office at 661-945-2604. For more detailed information about vegetation, go to USDA/NRCS website at *http://www.ca.nrcs.usda.gov/*.

Once you have completed your preliminary ratings, proceed to the implementation steps outlined in the next section.

Table 2: Rating of Wind Breaks and Barriers

Control Characteristic		Rating: 1 (least favorable) to 5 (most favorable)		
Factor	**Subfactor**	**Wood Chip Berm**	**Tall Vegetation**	**Porous Wind Fence**
Cost	Materials	5	1	2
	Installation	4	2	2
	Maintenance	4	2	1
Appearance	0-2 years	2	4	3
	More than 2 years	2	5	2
Effectiveness	0-1 year	5	3	4
	1-3 years	5	4	4
	More than 3 years	4	5	4
Overall Score		**31/40 = 78%**	**26/40 = 65%**	**22/40 = 55%**

Step 2:
Stabilize Loose Soil on Your Property

Stabilization Options

The second step in controlling sand and dust problems is to stabilize any areas of sand or loose soil on your property. Cover areas of loose soil or accumulated sand with a thin layer (3 – 4 inches) of wind-resistant material, such as wood chips or gravel. This is a quick, easy way to temporarily stabilize the ground surface. This layer can provide protection for up to 5 years, as long as no new sand accumulation covers the wind-resistant material.

You can also use small vegetation such as grasses to stabilize the soil. However, you must protect the vegetation from blowing sand while it gets established. One way to protect the vegetation is by growing it in the protection zone of a wind barrier or wind break. This zone extends downwind from the base of the wind barrier or wind break to a distance of 10 barrier/break heights. For example, a 4-foot high wind fence will protect an area up to 40 feet downwind of the fence.

Limit activities that disturb soil

Undisturbed soil has a natural stability and resistance to wind erosion. The best approach to preventing windblown sand and dust is to limit the areas where soil is disturbed. For example, whenever possible, plan the schedule and locations of construction or other activities so that soil disturbance is minimized. The purpose of this planning is to limit disturbance of desert soils to the time immediately before construction activities begin and to the seasons when high winds are at a minimum. Highest winds tend to occur in the spring.

Making a Selection

The following tables will help you make choices for stabilizing loose soil or sand, based on three key considerations:

- Cost
- Appearance
- Effectiveness.

Dustbusters researchers have rated the suitability of each control option. Table 3 shows ratings of three popular stabilizers for protecting loose soil or sand on homeowner property. **In Table 3, wood chip coverings score the highest, with cost being a deciding factor.**

You may wish to rate each sub-factor differently, which may lead to a different score. In addition, you may gather information that leads to variations of these options. For example, you may decide to evaluate a different type of covering. Much of your decision may be based on the knowledge and recommendations of experts in your locality.

For additional guidance, job sheets, and other information, contact the Antelope Valley USDA/NRCS office at 661-945-2604. For more detailed information about vegetation, go to USDA/NRCS website at *http://www.ca.nrcs.usda.gov/*.

Once you have completed your preliminary ratings, proceed to the implementation steps outlined in the next section.

Table 3: Rating of Stabilizers for Loose Soil

Control Characteristic		Rating: 1 (least favorable) to 5 (most favorable)		
Factor	**Subfactor**	**Wood Chip Layer**	**Vegetation**	**Gravel**
Cost	Materials	5	2	3
	Installation	5	2	4
	Maintenance	5	3	5
Appearance	0-2 years	4	4	4
	More than 2 years	3	5	3
Effectiveness	0-1 year	5	4	5
	1-3 years	4	5	3
	More than 3 years	3	5	1
Overall Score		**34/40 = 85%**	**30/40 = 75%**	**28/40 = 70%**

Steps for Control Implementation

Use the following four steps to evaluate and make choices for sand and dust controls:

Step 1: Answer the following questions. Your answers will help you select specific controls and estimate implementation costs.

- Where are the boundaries of your residential property?
- What buildings other than the house are located on your property?
- Where are the upwind sources of the sand that impact your property?
- Are the upwind sand sources temporary or will they continue for several years?
- What is the main direction of high winds that carry most of the sand onto your property?
- What areas of your property are covered by sand or loose soil?
- How important to you is the appearance of the control measure in relation to cost?
- Is frequent maintenance of the control acceptable if significant cost savings result?
- Is there enough water to irrigate trees or shrubs planted as a wind break?

Step 2: Draw a map. (See Figure 9.)

- Sketch an overhead map that shows property boundaries and the location of the house and other buildings.
- Show the locations of any loose sand and soil areas on your property.
- Draw an arrow that shows the prevailing direction of high winds.
- Show the general locations of upwind sources of loose sand that blows toward your property from outside areas during high winds. This may require a larger map.
- Identify the best locations on your property for wind barriers or wind breaks. Determine the approximate length and height of wind breaks or wind barriers that you are considering.

Step 3: Identify locations for installing wind barriers or wind breaks.

- Plan a layout of wind barriers or wind breaks along your upwind property line that will stop blowing sand from entering your property.
- Draw lines representing the planned wind barriers or wind breaks on the map created in Step 2.
- Shade in the ground surface areas that will be protected by the wind barriers or wind breaks.
- Develop a general plan for periodically maintaining the wind barriers or wind breaks as the captured sand accumulates.

Example of residential lot map:

As shown in Figure 9, the residential lot is oriented north and south and the prevailing wind direction is from the west southwest as shown by the arrow. The locations of planned berms and tree rows are shown along the west boundary and a portion of the south boundary of the lot.

The proposed berm/tree row configuration will protect most of the property from intruding sand, as shown. Much of the property can also be protected from potential structural damage by high winds, depending on the height of the tree row.

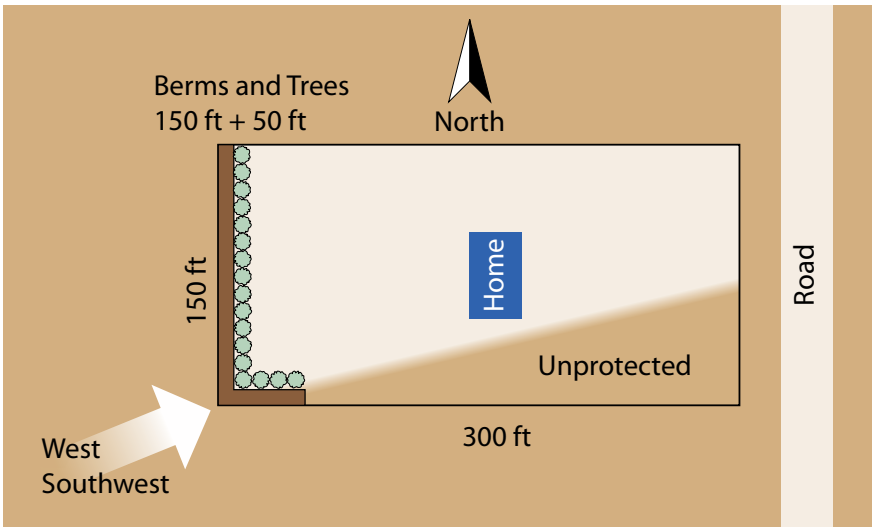

Figure 9: Diagram of overhead map of homeowner property.

Step 4: Identify areas where loose sand or soil on the property will be protected.

- Identify areas of loose soil or sand that will be stabilized.
- Circle the areas for stabilization on the map created in Step 2.
- Determine what areas of loose soil or sand will be protected by wind barriers or wind breaks.
- Develop a general plan for monitoring the stabilized areas of loose soil or sand to make sure that the protective layer does not become covered with sand during high wind events.

How to Build a Wood Chip Berm

These instructions describe how to build a wood chip berm that will stop sand from blowing onto your property. For purposes of illustration, the height of the berm is 3 feet – the minimum height required for effectiveness.

Step 1: Calculate the volume of wood chips required.

- To calculate the volume (cubic yards) of wood chips needed for a 3-foot high berm, multiply length of the berm (feet) by 2 cubic yards of wood chips per foot.

Step 2: Procure the wood chips

- Find a supplier. Local tree trimmers, utility companies, and city governments can be a source for free wood chips. Often, the wood chips are delivered free of charge but may arrive at random times.
- Arrange for delivery. Ask the supplier for the schedule. Tell the supplier where and what volume of wood chips to dump on your property. Don't expect the delivery truck to place the wood chips evenly in a row along upwind edge of your property, unless you have arranged for this separately.

Step 3: Install the wood chip berm

- Use a wheelbarrow and large shovel or pitch fork to transfer the wood chips to points along the upwind edge of property following the line(s) indicated on the property map. Alternatively, this work can be performed much more easily with a small rental tractor with implements and a truck or flatbed trailer for loading, hauling and distributing the wood chips.
- Construct the berm at least 3 feet high by transferring wood chips from the nearby piles, and be sure that it is oriented perpendicular to the wind. (See Figure 6.) As noted above, use a tractor with implements to construct the berm or do this manually with a shovel and rake.
- Place the berm at least 10 feet inside the property line. This will allow you to access the upwind side of the berm for maintenance without crossing onto your neighbor's property.

Step 4: Maintain the wood chip berm

- Maintain the berm when the accumulated sand on the upwind side reaches half the height of the berm. To do this, use a pitch fork or shovel to lift and restack the wood chips, allowing the sand to fall through to the ground. Alternatively, a small tractor with implements can be used for this purpose.

How to Build a Wind Break of Vegetation

These instructions describe how to build a wind break of trees or shrubs to stop sand from blowing onto your property.

Step 1: Select and purchase the vegetation

- Select vegetation that will grow at least 5 feet high and will flourish in your local soil and climate conditions. A local nursery sponsored by the Antelope Valley Resource Conservation District (AVRCD) sells this wind break vegetation at cost. Nursery staff can advise you about trees or shrubs suitable for this purpose.
- Determine the spacing of trees or shrubs and the total number of plants needed.
- Purchase the trees and shrubs at the time that the wood chip berm or other wind barrier is built. The berm or barrier will successfully block blowing sand and prevent it from damaging the new vegetation.

Step 2: Plant the rows of trees or shrubs

- Use a tractor with implements to prepare the soil or do the preparation manually.
- Follow USDA/NRCS instructions for planting the vegetation wind breaks, including recommendations for spacing, root depth, irrigation, and protection from animals.
- Plant the vegetation in autumn to assure the best survival rate.
- If you use seedlings, use cone-shaped or tube-shaped vented coverings designed to protect them from sandblasting or animals during their early stages of growth. Wire mesh can also be used for this purpose.
- Install irrigation lines or make other provisions for regular watering, as needed.

Step 3: Inspect and maintain the vegetation

- Periodically inspect the new trees or shrubs for plant vitality and for any structural damage by sand or animals.
- Add water and nutrients to the soil around the vegetation, as needed.

How to Stabilize Soil with Wood Chips

These instructions describe how to use wood chips to stabilize areas of loose sand or soil on your property.

Step 1: Calculate the volume of wood chips required.

- To calculate the volume (cubic yards) of wood chips needed to cover an exposed soil area for protection, multiply length by width of the area in feet by 0.33 feet (equivalent of 4 inches). Then divide by 9 to convert the volume of chips from cubic feet to cubic yards.

Step 2: Procure the wood chips

- Find a supplier. Local tree trimmers, utility companies, and city governments can be a source for free wood chips. Often, the wood chips are delivered free of charge but may arrive at random times.
- Arrange for delivery. Ask the supplier for the schedule. Tell the supplier where and what volume of wood chips to dump. Don't expect the delivery truck to place wood chips in numerous piles on your property, unless you have arranged for this separately.

Step 3: Install the wood chip covering

- Use a large shovel or pitchfork and a wheel barrow to load and transport the wood chips from the central pile to smaller piles within the bare soil area to be protected. Alternatively, a small rental tractor with implements can be used for this purpose.
- Use a shovel and rake to spread the wood chips evenly over the bare soil area to a thickness of 4 inches. This layer will keep surface soil from blowing during high winds for up to 5 years. It will also serve as mulch for new plants.

Step 4: Maintain the wood chip covering

- Maintain the wood chip layer if accumulated sand begins to cover it. Use a pitch fork or shovel to lift and restack the wood chips, allowing the sand to fall through to the ground.

Acknowledgments

In addition to the technical contributors listed at the beginning of this document, the following groups have supported the Dustbusters Research Group:

- Financial Contributors
- Resource Providers
- Focus Group participants

Disclaimer

Resources Guide

If you have questions about the content of the Homeowners Guide To Controlling Windbown Sand and Dust, please contact one or more of the following resources:

Antelope Valley Resources Conservation District (CA RCD) at **661-945-2604**; at website *http://www.avrcd.org/*; or email *avrcd@carcd.org*

Antelope Valley Resources Conservation District Nursery (AVRCD) at **661-942-7306**; at website *http://avrcd.org/nursery.htm*; or email *avrcd@carcd.org*

Antelope Valley U. S. Department of Agriculture Natural Resources Conservation Service (USDA/NRCS) office at **661-945-2604**

USDA/NRCS website at *http://www.ca.nrcs.usda.gov/*

Los Angeles County Agricultural Commissioner at **661-723-4485**; or at website *http://acwm.co.la.ca.us/*

Kern County Agricultural Commissioner at **661-868-6300**; at website *http://www.kernag.com/*; or email *agcomm@co.kern.ca.us.*

University of California – Los Angeles County Cooperative Extension – Antelope Valley/ Lancaster Office at **661-974-8824**; or at website *http://celosangeles.ucdavis.edu/*

Other Sources of Information:

Website URL
List of Case Studies
USDA/NRCS Practices
Publications
Reports on Website
WRAP
Extended Abstracts of Reports

Glossary of Terms

Bare ground	Land covered by loose or crusted soil which is not vegetated or otherwise protected from the wind.
Berm	An elongated pile of wood chips, uprooted brush, earth or other material which acts as a wind barrier and captures saltating sand.
Control	Steps taken to reduce the movement of sand and dust during high winds.
Downwind	The direction toward which the wind blows.
Dust	Small soil particles that loft from bare ground when the wind blows. Talcum powder and milled flour are examples of dust-sized particles. Heavy winds can loft airborne dust as high as hundreds of feet above the ground.
Porous fence	A durable, lattice-design fence often used to create barriers for construction sites, sporting events, or gardens. Typically, the fence material is made of non-biodegradable plastic.
Saltation	The bouncing of sand-size particles, typically to as high as 3 feet above ground during high-wind events.
Sand	Intermediate soil particles, comparable in size to beach sand or table salt. Wind transports fine sand (via saltation) in a layer that is confined to about 3 feet above the ground.
Sandblasting	Abrasion of the ground surface or wind barriers, caused by saltating sand particles during high winds.
Soil	A heterogeneous combination of sand, dust and other particles, which may be loose or crusted; the natural body comprised of mineral and organic solids, liquids and gases that occur on the land surface.
Upwind	The direction from which the wind blows.
Wind barrier	A solid obstacle to wind flow, such as a berm, wall or solid fence.
Wind break	A porous obstacle which slows high wind enough for the sand carried in the air to be deposited on the ground, such as a row of trees or a porous fence.