



TAKE CARE OF TEXAS: EDUCATOR MATERIALS

# HANDOUT

## Landfill: An In-Depth Look

### INSIDE LOOK AT A LANDFILL

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- 6 Surface Water Drainage System
- 7 Buffer Zones
- 8 Liner System
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- 10 Landfill Gas Management System
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See the Landfill Handout to Learn More!

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# Landfill: An In-Depth Look

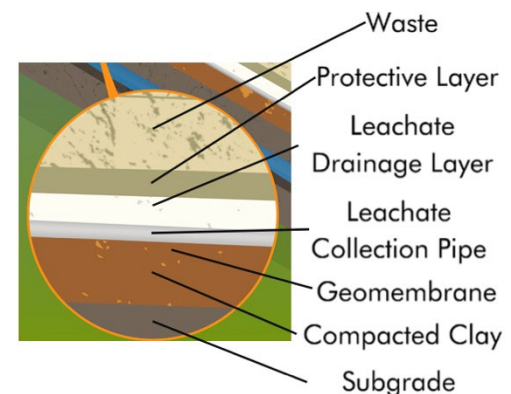
A landfill is a designated area where waste is deposited, compacted, and covered with materials such as soil and other materials to dispose and manage solid waste in an organized and controlled manner. Landfills are regulated sites designed to minimize environmental impacts and public health risks associated with waste disposal. Within a landfill, various systems and protective measures are implemented to contain and treat waste and byproducts effectively.

## To begin the process

A landfill begins with the establishment of a liner system, which consists of layers of soil and synthetic materials with very low permeability to prevent leachate, a harmful liquid created by the decomposition of waste, from seeping into the surrounding soil and groundwater. A leachate collection system is also installed to gather and remove any leachate for safe treatment and disposal. A groundwater monitoring system is installed around the perimeter of the landfill to monitor and protect groundwater quality. To manage the buildup of potentially harmful gases from decomposing waste, a landfill gas management system is installed, which collects landfill gases for incineration at the site or for generation of electricity. A buffer zone is also established around the perimeter of the site to provide an extra layer of protection between the disposal area and the surrounding properties.

### Liner System Features

1. Waste – Solid waste resulting from municipal, community, commercial, institutional, and recreational activities, including garbage, rubbish, ashes, street cleanings, dead animals, abandoned automobiles, and all other solid waste other than industrial solid waste.
2. Protective Layer – Layer of soil placed above the liner to shield it from damage.
3. Leachate Drainage Layer – Layer designed to collect and channel leachate to a collection system.
4. Leachate Collection Pipe – A perforated pipe that collects and transports leachate from the drainage layer to a storage area.
5. Geomembrane – A high-density polyethylene liner that provides a barrier against leachate and gases.
6. Compacted Clay – A dense layer of compressed clay soil layers forming a barrier that reduces the movement of leachate and gases.
7. Subgrade – The prepared base layer of soil or rock beneath the liner system that provides a stable foundation and supports the overall structure of the landfill.



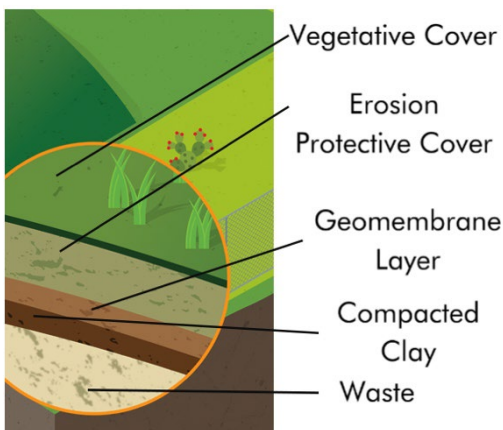
## Active Disposal Area

The active disposal area is where the municipal solid waste is deposited and compacted at the active disposal area and then covered daily to minimize odors, prevent litter, and control pests. A surface water drainage system is also constructed around the disposal area to manage the flow of stormwater and prevent it from coming into contact with the waste.



## Reaching capacity

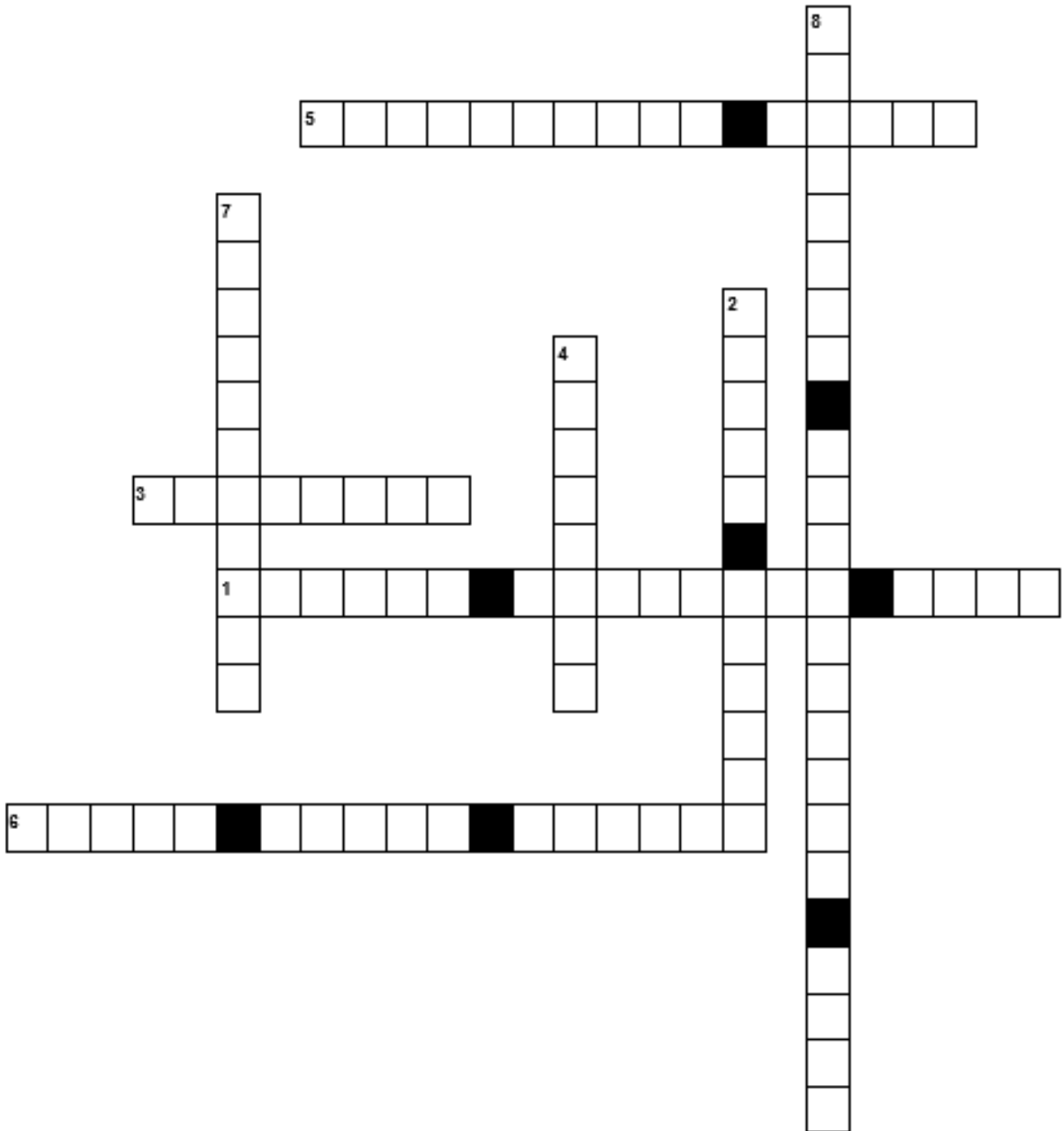
When a section of the landfill reaches full capacity, a final cover system is installed to seal off that section of the landfill and minimize water infiltration. The landfill capacity is measured in cubic yards and includes the waste and daily cover. After all sections of the landfill are closed and the final cover system is installed, the land can be used for a variety of other uses ranging from a soccer field to a multifamily residential development. Authorizations from TCEQ are required before activities can occur over a closed landfill. Monitoring of landfill gas and groundwater continue for many years after the final cover is installed.



### Final Cover Features

1. Vegetative Cover – The top layer vegetation planted to prevent erosion, promote evapotranspiration, and enhance aesthetics.
2. Erosion Protective Cover – A layer of soil placed below the vegetative cover to shield the lower layers from environmental factors like plant roots and animal activity.
3. Geomembrane Layer – A synthetic membrane of high-density polyethylene placed over the infiltration layer.
4. Compacted Clay – A compacted layer of clay soil, compressed to form a low-permeable barrier that prevents water infiltration into the landfill and prevents the escape of gases.

# Crossword Puzzle



## ACROSS

1. Where the municipal solid waste is deposited
3. Prepared base layer of soil or rock beneath the liner system
5. Layer of soil placed above the liner to shield it from damage
6. Installed to seal off that section of the landfill and minimize water infiltration

## DOWN

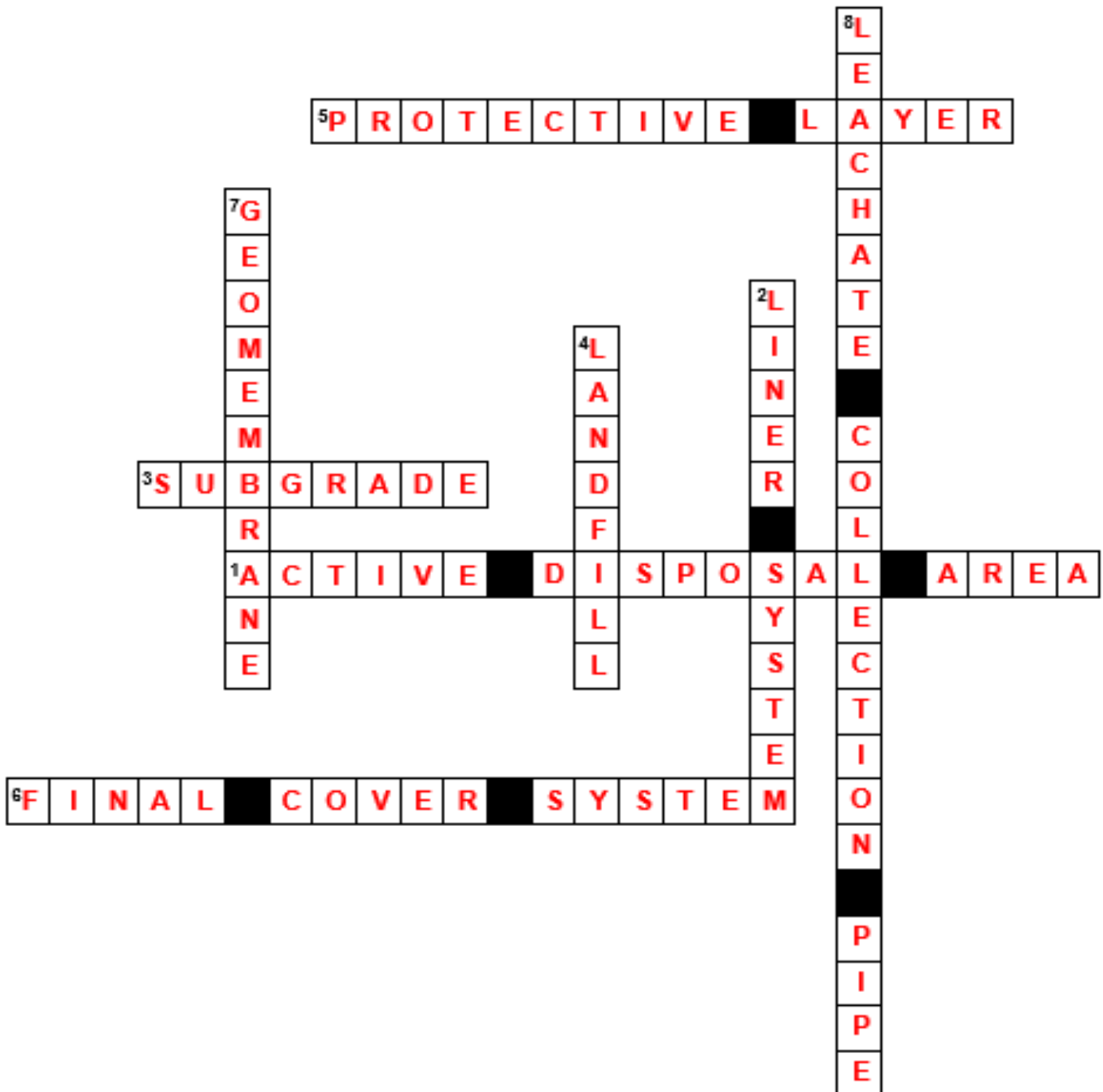
2. Consists of layers of soil and synthetic materials
4. A designated area where waste is deposited, compacted, and covered with materials
7. A high-density polyethylene liner that provides a barrier against leachate and gases
8. A perforated pipe that collects and transports leachate from the drainage layer to a storage area

# Word Search

Waste	Byproduct	Protective Layer	Landfill	Subgrade
Leachate Drainage Layer	Geomembrane Layer	Groundwater	Liner System	Compacted Clay
Geomembrane	Vegetative Cover	Leachate Collection Pipe	Active Disposal Area	Final Cover System

M N B V C X Z Q A Z W S G X E D C R F V T G B Y H  
 L K J H G F D S L P M J E N H U B G Y F V C F L D  
 H R D B Q L S L R X H V O O K X Z P F S W Q V E J  
 G F L I N E R S Y S T E M F W P W R K L V P W A C  
 J U A W Q A X I D A K C E T S D S O S Y W F V C B  
 Y H N A U C I V G J F P M R J J I T X J U A I H V  
 I Y D J K H S C R T F L B G V X C E Y G W L S A J  
 K A F B D A H B K Y G W R H X T O C M R H E H T K  
 F C I U V T B Y P I T X A I E N E T N Y G Y J E E  
 I V L P U E C P S P W M N K I D N I O U R B K D O  
 N H L R O C N R W V E G E T A T I V E C O V E R W  
 A Y T F P O T O W D Y B L N B K F E W L U L Q A R  
 L G F D T L I D X F W N A D A Z U L V A N S U I P  
 C D G L N L E U T V C O Y P J D L A M C D G P N T  
 O G L K D E C C V W K S E L I F V Y C M W C X A B  
 V I I S L C J T B Q O X R W C U X E Q E A Y E G C  
 E O Q X I T T A I G T B N X Z E S R L Q T T F E D  
 R T W R D I W Z M K V T H B X V C U X Y E Y W L N  
 S V V Y C O M P A C T E D C L A Y Q B Z R R V A T  
 Y H P I W N P Y T N A E D W Q A S Y V G Z L K Y P  
 S R N M S P J W G U I J I G E O M E M B R A N E Z  
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 E A R C T P C B K J N V R Y R D P X M W J B D S U  
 M Q U R I E T A C T I V E D I S P O S A L A R E A

## Crossword Answer Key



### ACROSS

1. Where the municipal solid waste is deposited
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### DOWN

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## Word Search Answer Key

M N B V C X Z Q A Z W S G X E D C R F V T G B Y H  
L K J H G F D S L P M J E N H U B G Y F V C F L D  
H R D B Q L S L R X H V O O K X Z P F S W Q V E J  
G F L I N E R S Y S T E M F W P W R K L V P W A C  
J U A W Q A X I D A K C E T S D S O S Y W F V C B  
Y H N A U C I V G J F P M R J J I T X J U A I H V  
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K A F B D A H B K Y G W R H X T O C M R H E H T K  
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N H L R O C N R W V E G E T A T I V E C O V E R W  
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L G F D T L I D X F W N A D A Z U L V A N S U I P  
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E A R C T P C B K J N V R Y R D P X M W J B D S U  
M Q U R I E T A C T I V E D I S P O S A L A R E A