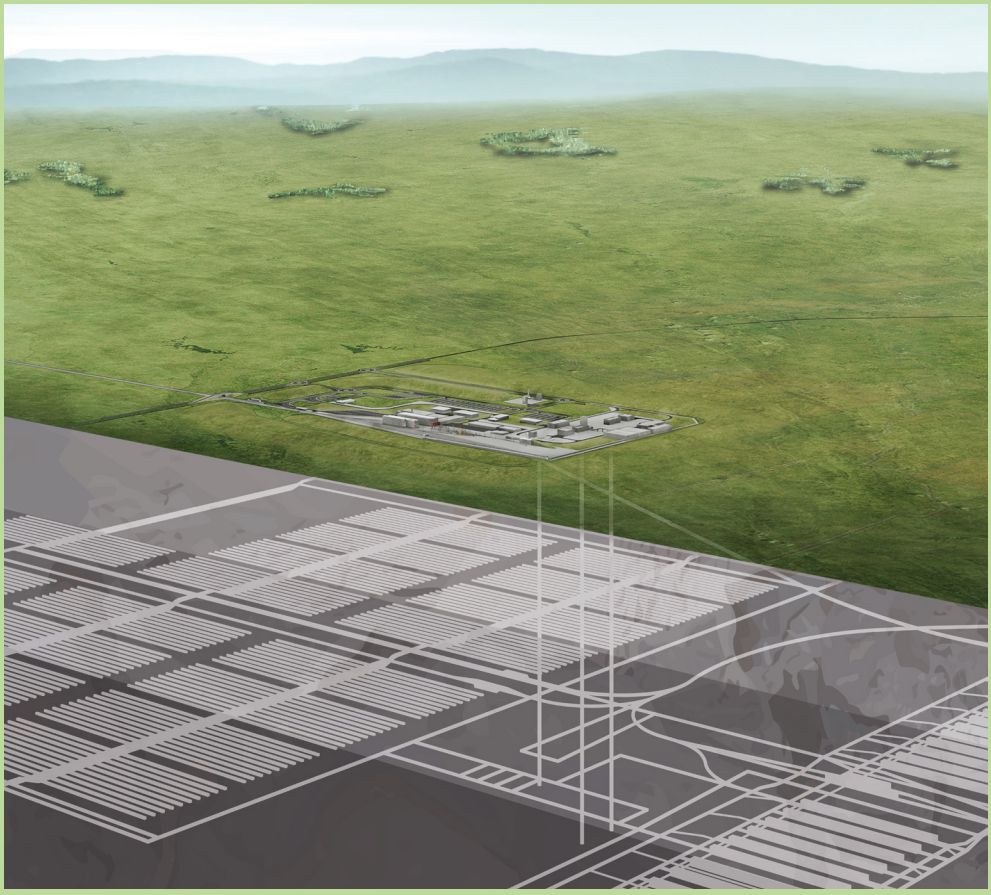
What will a GDF look like?



Radioactive Waste Management

What will a GDF look like?

A Geological Disposal Facility, or GDF, will be a highly engineered facility. It will have both surface and underground areas, linked by a sloping tunnel and/or shafts. The underground areas do not need to be located directly below the surface site – they could be separated by several kilometres. This means a surface facility on the coast could provide access to a disposal area under the sea bed.

GDF surface facilities will look like a secure industrial complex and will occupy about one square kilometre of land.

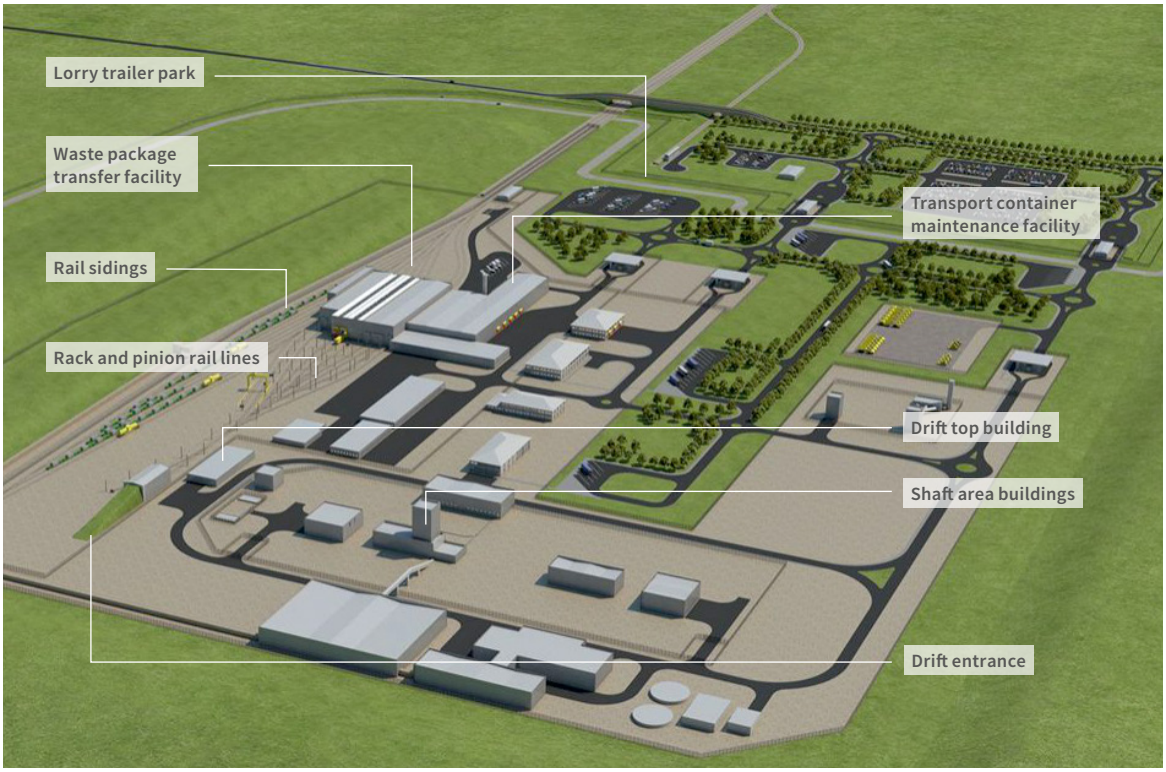


Figure 1: An illustrative aerial view of a GDF surface layout.

The surface facilities of a GDF will receive different types of radioactive waste packages from across England and Wales and make them ready for their journey underground. Most waste packages will arrive at a GDF site by rail, with some arriving by road. Waste packages could also arrive by sea, depending on the location.

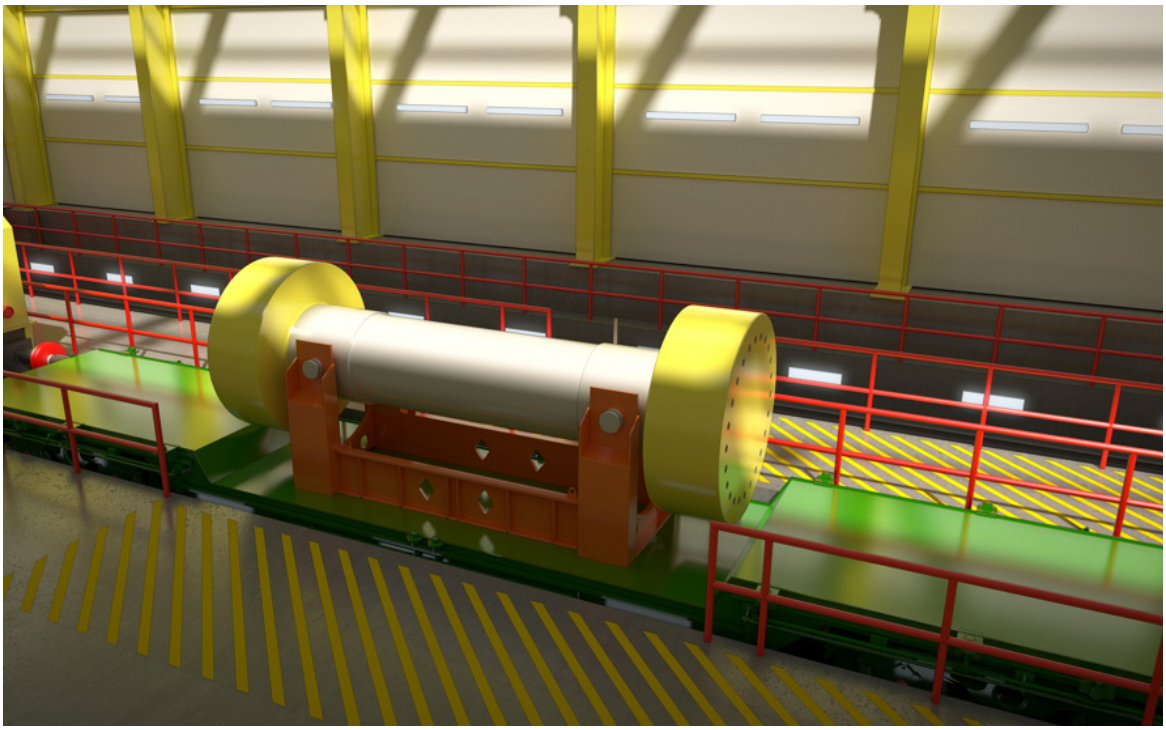


Figure 2: A package of spent fuel on a rail wagon. The waste package destined for a GDF is contained within an outer transport container, with 'impact limiters' on each end to provide added protection during its journey to the GDF.

The waste packages will be unloaded from their transport vehicle and loaded onto specially designed vehicles for transfer underground. If a lot of packages arrive at once (e.g. on a train), then some will be stored on the surface for a short period. There will also be facilities for cleaning and maintaining the outer containers used to transport some waste packages and the transport vehicles themselves.

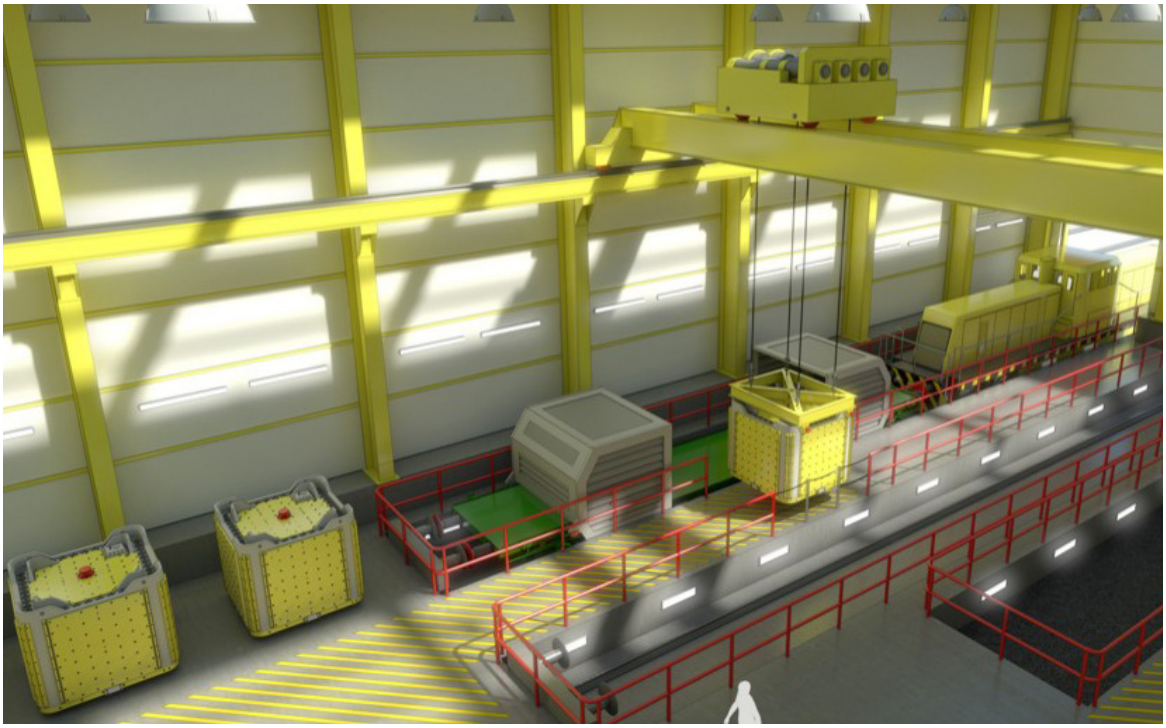


Figure 3: What a waste package receipt building at a GDF is expected to look like.

There will be various other facilities on the surface, including offices, control rooms, workshops, laboratories, railway sidings, roads and car parks. There will also be areas for storing excavation equipment and construction materials, as well as for storing excavated rock. Later on, once the waste has been placed underground, some of this rock may be used for backfilling the excavated areas and closing the GDF. The rest will be landscaped or transported off-site.

The exact layout of the GDF surface facilities will depend on the geography of a particular site. It will also depend on how much space is available, and the arrangement of existing roads, railways, power lines and water supplies. We will work with local communities to develop the design and layout of GDF surface facilities to ensure they are sympathetic to the local environment.

Access to the underground areas of a GDF will be by way of several vertical shafts and possibly a sloping tunnel, called a 'drift'. These will be used for:

1. Taking construction materials and waste packages underground.
2. Bringing excavated rock to the surface.
3. Transferring equipment and personnel from the surface to the underground and back again.
4. Ventilating the underground areas.

Access to the underground area will be strictly controlled, as will access to the surface site.

Underground, a GDF will have all of the systems and services needed to ensure the safety of workers, such as ventilation systems, rest areas and emergency detection / response systems, and to move waste packages into position. At the planned disposal depth, a network of tunnels will lead to the locations where waste packages will be placed.

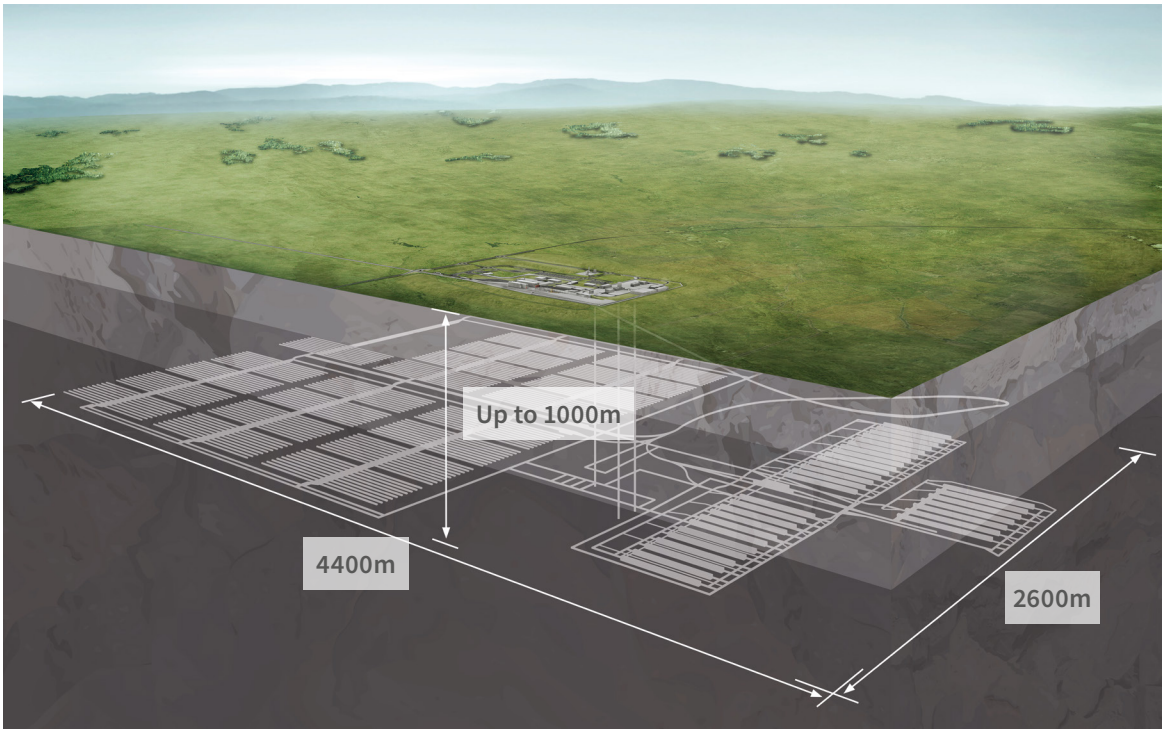


Figure 4: Drawing is illustrative only, not to scale and shows underground disposal tunnels and vaults.

An important consideration in GDF design is the amount of heat given out by different waste packages, through radioactive decay. Broadly speaking, higher activity wastes can be divided into those that generate a lot of heat, referred to as High Heat Generating Wastes (HHGW), and those that generate less heat, referred to as Low Heat Generating Wastes (LHGW). A GDF will have separate underground disposal areas for HHGW and LHGW.

Packages of HHGW will be disposed of in tunnels spaced far enough apart for the heat to dissipate so that temperatures do not rise to levels where the engineered barriers or rock could be damaged. Packages of LHGW do not need to be separated from each other to prevent heat building up, so can be stacked in vaults.

Some waste packages will be moved into position using conventional handing equipment such as forklift trucks or overhead cranes, whilst others will require specially designed 'emplacement' machines. The levels of radiation given off by some waste packages mean that workers cannot handle them directly. Where this is the case, workers will stand behind radiation shields / windows and move packages into place from a distance.

When the last waste package has been put in place, the surrounding spaces in the disposal vaults and tunnels will backfilled with bentonite (a type of clay), cement or crushed rock. All the access ways will then be backfilled and sealed to stop people gaining access to the GDF. Once this has taken place the surface facilities can be removed and the surface site restored for further use.

Figure 5: Positioning waste packages in a GDF using a fork-lift truck.

Figure 6: Positioning waste packages in a GDF using an overhead crane.