Texas Aggregate and Concrete Association (TACA)
Societal and Environmental Benefits of Sand & Gravel Mining

Rivers and streams are nature's transport system for sediment. Sedimentation is a process that impacts rivers and lakes throughout the world regardless of whether sand mining is located nearby. This natural process has occurred for eons and poses a challenge for surface water authorities as the sediment fills streams, rivers and ultimately reservoirs. Many of these authorities utilize hydraulic dredging, a form of mining, to manage and remove these sediments. In 2017, Texas and the greater Houston area experienced the ravaging effects of Hurricane Harvey which led to widespread flooding. Some in the community are stating that sand mining operations along San Jacinto are the source of the sand currently in the river. A more in-depth examination of historical and technical data demonstrate that mining is not the source, but in fact a long-term and sustainable solution. A review of historical aerial photography shows numerous sand bars in the river long before the advent of mining in the adjacent floodplain. These sediment loads are on an unending natural journey toward Lake Houston and they are evidenced by sand bars along the river and at the entrance to Lake Houston. Large scale flooding such as experienced in Hurricane Harvey, speeds up the transport of sand down the river.

In 2018 significant efforts have been made to identify areas that have become silted in by these natural sediment loads and to look for creative solutions for the future including utilizing dredging (mining) to remove sediment from the West Fork of the San Jacinto River and Lake Houston. These are issues which have existed for many decades. In fact, the City of Houston commissioned a study of sedimentation from the floods of October, 1994 and November, 1998 for Lake Houston and areas north. The study report published in 2000 showed regular sedimentation flowing from all the tributaries that feed into Lake Houston and found that sediment load and movement occurred mostly during major storm/flood events.

A 2003 Texas Water Development Board (TWDB) volumetric study of Lake Houston discovered that the largest sediment loads were in the West Fork of the San Jacinto River. This survey also estimated that the reservoir has lost an estimated average of 585.5 acre-feet of storage per year since it was completed in 1953.

In contrast to nature's sedimentation of streams, rivers and reservoirs; sand & gravel mines excavate and remove historic sediment deposits from within the floodplain, as well as some upland areas. One might look at an aerial image or fly over these operations and errantly speculate that these operations are a potential source of sediment in a stream or river. This is not the case. First, not all sand operator stock piles were flooded in the recent storm; and second, the volume of sand in the river and along the floodway massively exceeds what would have been stock piled by companies. In fact, sand operations help to mitigate flooding issues. The excavation and removal process creates open pits which are below grade and do not

typically discharge during storm events. During storm events, these pits capture sediment-laden runoff from upgradient drainage areas and allow the sediment to settle out and not reach the stream or river. By doing so they serve the same function that a retention or detention basin would perform at a commercial development. However, the pits do so on a much larger scale. To construct a retention or detention basin on this scale would cost several million dollars. In numerous states the post mining adaptive reuse of these pits is for water storage, flood control, and habitat creation.

During large scale flood events a stream or river can overtop its banks and begin to flood areas within the floodplain. This occurs when the water cannot discharge fast enough, and it backs up until it begins to spill over into the floodplain, ultimately backing water further and further up the channel. When this occurs the velocity of the water slows significantly, losing its ability to keep sediments in suspension and the stream or river begins to deposit its sediment load. When flood waters back into an area where a sand and gravel pit is located, the pit becomes a sediment trap for the flood waters and their sediments. Thus, capturing these sediments and holding the floodwaters until such time as the peak flood has passed and the waters can slowly begin to recede. Simply stated, in large scale flooding events the sand and gravel pits function to capture sediment and reduce the impacts of peak flood levels. A single 100-acre sand and gravel pit 60 feet deep has a storage volume of 6,000 acre-ft or 1,955,106,000 gallons; equivalent to 10 years of lost storage in Lake Houston based on the 2003 TWDB report.

Sand & gravel mining provides numerous societal and environmental benefits to the communities where these activities are located. Often these benefits happen and go unquantified or even unnoticed. Summarized below are some of the larger, far reaching and perpetual benefits that sand and gravel mining provide.

General benefits of aggregates, sand & gravel

- Provide the necessary and foundational building blocks for our society and are essential for our quality of life
    - The maintenance and expansion of our infrastructure depends on the availability of these materials for:
        - Construction and maintenance of streets, highways, dams, utilities, energy production, homes, businesses, commercial facilities, institutional facilities and parks
- The proximity of these critical materials to the market helps provide cost control and aids in maintaining the economic stability of a community

Benefits of sand & gravel mining along water courses

- Flood storage – many sand & gravel operations are within the 100-year flood plain. These open pits have the potential to retain or detain thousands of acre feet of flood flows. These open pits:
    - Intercept storm water and detain storm water flows, decreasing peak flood flows downstream thus preventing sediment laden runoff from reaching streams.
    - Have the long-term potential to provide much needed flood storage, to offset increases in runoff due to added impervious cover in the watershed
    - Have the potential to provide off channel storage to augment water supply or for later use as releases to support environmental flows (environmental pulses)

- The sand & gravel operations can be utilized in both the near and long term for the placement of dredged materials from silted in lakes, streams or rivers
    - The existing sand & gravel production facilities also allow the economic recovery of usable sand & gravel from the dredging activities. The sand & gravel operators already have existing markets and customers for these recovered materials
    - Existing lakes and reservoirs can be more economically dredged to increase their water storage for public water supply and to improve their flood storage
    - Sediment laden streams and rivers can be cleaned to enhance their ecological condition, to enhance flow and to aid in navigation as well as recreational uses
- Post mining the sand & gravel operations can be reclaimed as open water bodies, habitat, wetlands. This is a common practice in many states and provides:
    - Habitat for aquatic species, birds and terrestrial species as well as opportunities for recreational uses
    - This "Adaptive Reuse" also provides a perpetual societal benefit serving as a green belt and ecological buffer between residential/commercial land uses and the water courses