

Stearns County, Minnesota - Aggregate Resources
Sand and Gravel Potential
stea_sgp

Metadata Summary

<i>Originator</i>	Minnesota Department of Natural Resources, Division of Lands and Minerals, Mineral Potential Evaluation Section
<i>Abstract</i>	This dataset consists of information about the geology, geological characteristics, and sand and gravel potential of 595 map units. Five fields relate to the surficial geology of the map unit, including a unique map unit id, sediment, landform, surficial geology description, and dominant lithology. Six fields relate to sand and gravel characteristics, including probability, quality, texture, overburden thickness, deposit size, and sand and gravel thickness. These characteristics were used to calculate the aggregate potential of the map unit for sand and gravel.
<i>Browse Graphic</i>	none available
<i>Time Period of Content Date</i>	2011
<i>Currentness Reference</i>	Data were gathered from 2005 to 2011. Data were compiled and interpreted from the Spring of 2011 to the Spring of 2012.
<i>Access Constraints</i>	
<i>Use Constraints</i>	Acknowledgement of the Minnesota Department of Transportation and the Minnesota Department of Natural Resources is appreciated for products derived from these data.
<i>Distributor Organization</i>	Minnesota Department of Natural Resources, Division of Lands and Minerals
<i>Ordering Instructions</i>	<p>Stearns County's aggregate resource spatial datasets (shapefiles & file geodatabase) are included in the file Stearnsdata.zip, accessible from the MN DNR Aggregate Mapping web page: http://www.dnr.state.mn.us/lands_minerals/aggregate_maps/completed/index.html</p> <p>The spatial datasets include: sand and gravel resource potential, crushed stone potential, test-holes drilled, geologic field observations, aggregate pits, Minnesota Geological Survey (MGS) County Well Index (CWI) data points, Mn/DOT Aggregate Source Information System (ASIS) points, and Mn/DOT ASIS pit quality table.</p>
<i>Online Linkage</i>	Click here to download data. (See Ordering Instructions above for details.) By clicking here, you agree to the notice in "Distribution Liability" in Section 6 of this metadata.

Full Metadata

Stearns County Aggregate Resources: stea_sgp (sand and gravel potential)

Section 1	Identification Information		
Originator	Minnesota Department of Natural Resources, Division of Lands and Minerals, Mineral Potential Evaluation Section		
Title	Stearns County Aggregate Resources: stea_sgp (sand and gravel potential)		
Abstract	This dataset consists of information about the geology, geological characteristics, and sand and gravel potential of 595 map units. Five fields relate to the surficial geology of the map unit, including a unique map unit id, sediment, landform, surficial geology description, and dominant lithology. Six fields relate to sand and gravel characteristics, including probability, quality, texture, overburden thickness, deposit size, and sand and gravel thickness. These characteristics were used to calculate the aggregate potential of the map unit for sand and gravel.		
Purpose	To summarize the geological characteristics, surficial geology, and aggregate potential (sand, gravel) of the different units. To help categorize the geological characteristics and incorporate them into a model to help determine the aggregate potential of the deposit.		
Time Period of Content Date	2012		
Currentness Reference	Data were gathered from 2005 to 2011. Data were compiled and interpreted from the Spring of 2011 to the Spring of 2012.		
Progress	Complete		
Maintenance and Update Frequency	None planned		
Spatial Extent of Data	Stearns County, Minnesota		
Bounding Coordinates	-93.13 -94.05 45.79 45.72		
Place Keywords	Stearns County, Minnesota		
Theme Keywords	Aggregate potential, sand and gravel, surficial geology, geomorphology, glacial geology, geological characteristics, probability, quality		
Theme Keyword Thesaurus			
Access Constraints			
Use Constraints	Acknowledgement of the Minnesota Department of Transportation and the Minnesota Department of Natural Resources is appreciated for products derived from these data.		
Contact Person Information	Aggregate Resource Mapping Program, Industrial Minerals Geologist or GIS Specialist Minnesota Department of Natural Resources, Division of Lands and Minerals 500 Lafayette Road - St. Paul, MN 55155-4045 Phone: 651-259-5959 FAX: 651-296-5939 E-mail: aggregatemap@state.mn.us		

Browse Graphic

none available

**Browse Graphic
File Description****Associated Data
Sets**

Stearns County's aggregate resource spatial datasets (shapefiles & file geodatabase) are included in the file Stearnsdata.zip, accessible from the MN DNR Aggregate Mapping web page:

http://www.dnr.state.mn.us/lands_minerals/aggregate_maps/completed/index.html

The spatial datasets include: sand and gravel resource potential, crushed stone potential, test-holes drilled, geologic field observations, aggregate pits, Minnesota Geological Survey (MGS) County Well Index (CWI) data points, Mn/DOT Aggregate Source Information System (ASIS) points, and Mn/DOT ASIS pit quality table.

Section 2**Data Quality Information****Attribute Accuracy****Logical Consistency****Completeness**

The sand and gravel potential map units were delineated using ArcGIS 9.3.1. Delineations are based on the interpretation of high resolution elevation data (LiDAR) using 3 meter cell-sized digital elevation model; several sets of DOQ's with flight dates ranging from the 1991 to 2010 and at varying scales; field work including visits to several gravel pits, test holes drilled for ground truthing and quality sampling. Digitizing was completed at a scale of 1:14,000. The final data sets represent a reconnaissance-scale survey mapped at 1:50,000.

**Horizontal
Positional Accuracy**

1:50,000

**Vertical Positional
Accuracy**

Not applicable.

Lineage

Color, color-infrared (CIR), and black-and-white aerial photographs were used to delineate geological landforms and aggregate resources. Sources include; Stereoscopic pairs of color infrared aerial photographs (NAPP, 9in x 9in at 1:40000 scale, April 1991 and April 1992); On-screen landform analysis was used with FSA (Farm Services Administration) Color Aerial Photography collected from the following years, with their associated pixel resolution in parenthesis; 2003-04 (1 meter), 2005 (10 meter), 2006 (10 meter), 2008 (1 meter), 2009 (1 meter), FSA CIR (Color Infrared) Imagery collected in 2008 (1 meter), FSA Imagery collected in 2010 (1 meter). Aerial photographic interpretation was completed with a glacial mapping technique known as the landsystems approach. This technique relies on the principle that depositional glacial landforms are composed of a predictable range of sediments, some consisting of sorted sand and gravel and others consisting of silts, clays, or unsorted materials. In addition to the landsystems approach, several other general characteristics helped determine the nature of the material, such as tonal contrasts, texture, context, shape, size, trend, association, and patterns. These characteristics can help determine the properties of the surface material (e.g., certain vegetation grows on well drained soils such as sand and gravel, which on an aerial photograph has a distinctive texture, tone, pattern, etc.).

The landform recognition approach (part of the landsystems approach) was also used when interpreting the topography within the MPES Report 362 project boundary. Glacial landforms have distinct and unique shapes and patterns that can be observed in their topographic expression. Topographic maps (USGS 1:24000), digital elevation models, and shaded relief maps were all used to help delineate these sand and gravel bearing features. The topographic expression of a feature can also be observed by looking at the distribution of lakes and wetlands. For example, a string of lakes and/or wetlands may be the signature of a glacial outwash channel or collapsed channel, which may host sand or gravel deposits. Several aggregate bearing features were located using this technique (outwash channels, collapsed channels, glaciofluvial fans, eskers, and terraces).

Other mapping sources include the Soil Survey Geographic Database for Stearns County, Minnesota, published December 3rd, 2009, from the USDA-NRCS (United States Department of Agriculture - Natural Resource Conservation Service); 3-meter LiDAR DEMs (Digital Elevation Models) from Stearns County; and CWI (County Well Index) database of located and unlocated wells from the Minnesota Department of Health and MGS (Minnesota Geological Survey), downloaded in 2007.

Related geological maps were referenced including: MN DNR Report 356 Plate II: Aggregate Resources,

Benton County, Minnesota by Ellingson, J.B, 2002, MGS Miscellaneous Map M-115, Surficial Geology of the Saint Cloud 30' x60' Quadrangle, Central Minnesota, by G. Meyer, A. Kneable, and J. Ellingson, 2001; MGS County Atlas C10, Surficial Geology of Stearns County, by G. Meyer and A. Kneable, 2001 and MGS State Map Series S21: Preliminary Bedrock Outcrop Map, 2010. Gravel pits and quarries were extracted from several sources (refer to stea_pits) and reviewed in the field or on air photos.

Source Scale
Denominator

24000

Section 3	Spatial Data Organization Information		
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<i>Native Data Set Environment</i>	ArcGIS 9.3		
<i>Geographic Reference for Tabular Data</i>			
<i>Spatial Object Type</i>	Vector		
<i>Vendor Specific Object Types</i>	Polygon		
<i>Tiling Scheme</i>	None		

Section 4	Spatial Reference Information		
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<i>Horizontal Coordinate Scheme</i>	UTM		
<i>Ellipsoid</i>	GRS80		
<i>Horizontal Datum</i>	NAD83		
<i>Horizontal Units</i>	Meters		
<i>Distance Resolution</i>			
<i>Altitude Datum</i>	Not applicable		
<i>Depth Datum</i>	Not applicable		
<i>UTM Zone Number</i>	15E		

Section 5	Entity and Attribute Information		
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<i>Entity and Attribute Overview</i>	The polygons were delineated to represent geological features, geological characteristics, and aggregate potential for sand and gravel.		
<i>Entity and Attribute Detailed Citation</i>	See beyond Section 7 for detailed field and attribute information		

Section 6	Distribution Information		
<i>Publisher</i>	Minnesota Department of Natural Resources, Division of Lands and Minerals, Mineral Potential Evaluation Section		
<i>Publication Date</i>	2012		
<i>Contact Person Information</i>	Aggregate Resource Mapping Program Industrial Minerals Geologist or GIS Specialist Minnesota Department of Natural Resources, Division of Lands and Minerals 500 Lafayette Road St. Paul, MN 55155-4045 Phone: 651-259-5959 FAX: 651-296-5939 E-mail: aggregatemap@state.mn.us		
<i>Distributor's Data Set Identifier</i>	Stearns County Aggregate Resources, Sand and Gravel Potential		
<i>Distribution Liability</i>	The State of Minnesota makes no representations or warranties express or implied, with respect to the use of the information contained herein regardless of its format or the means of its transmission. There is no guarantee or representation to the user as to the accuracy, currency, suitability, completeness, usefulness, or reliability of this information for any purpose. The user accepts the information "as is." The State of Minnesota assumes no responsibility for loss or damage incurred as a result of any user's reliance on this information. All maps, reports, data, and other information contained herein are protected by copyright. Permission is granted to copy and use the materials herein for any lawful noncommercial purpose. Any user of this information agrees not to transmit or provide access to all or any part of this information to another party unless the user shall include with the information a copy of this disclaimer.		
<i>Transfer Format Name</i>			
<i>Transfer Format Version Number</i>			
<i>Transfer Size</i>	mb for data, mb for associated maps		
<i>Ordering Instructions</i>	Stearns County's aggregate resource spatial datasets (shapefiles & file geodatabase) are included in the file Stearnsdata.zip, accessible from the MN DNR Aggregate Mapping web page: http://www.dnr.state.mn.us/lands_minerals/aggregate_maps/completed/index.html The spatial datasets include: sand and gravel resource potential, crushed stone potential, test-holes drilled, geologic field observations, aggregate pits, Minnesota Geological Survey (MGS) County Well Index (CWI) data points, Mn/DOT Aggregate Source Information System (ASIS) points, and Mn/DOT ASIS pit quality table.		
<i>Online Linkage</i>	Click here to download data. (See Ordering Instructions above for details.) By clicking here, you agree to the notice in "Distribution Liability" above.		

Section 7	Metadata Reference Information		
<i>Metadata Date</i>	2012		
<i>Contact Person Information</i>	Aggregate Resource Mapping Program, Industrial Minerals Geologist or GIS Specialist Minnesota Department of Natural Resources, Division of Lands and Minerals 500 Lafayette Road St. Paul, MN 55155-4045 Phone: 651-259-5959 FAX: 651-296-5939 E-mail: aggregatemap@state.mn.us		

<i>Metadata Standard Name</i>	Minnesota Geographic Metadata Guidelines
<i>Metadata Standard Version</i>	2.1
<i>Metadata Standard Online Linkage</i>	http://www.lmic.state.mn.us/gc/stds/metadata.htm

Table Name	Field Name	Definition	Valid Values	Descriptions
stea_sgp.dbf	SGPOT_ID	Number, 4	e.g., 99-9999	Unique identifier for the field-mapping units.
	SEDIMENT	Text, 50	e.g., Bedrock Outcrop; Silt, and Sand over Till; Organics over Sand and Gravel; Sand and Gravel over Bedrock; see below text values and their descriptions for subsequent information. Multiple values may be used in descriptions.	General description of the dominant sediment material for each mapping unit.
			Bedrock	Presence of bedrock in the form of an outcrop, boulder or below sediment.
			Clay	Clay is very fine-grained sediment that is less than 0.004 mm in size.
			Gravel	Rock fragments of specific particle size that is larger than 2 mm and less than 63 mm.
			Organics	Soil that contains decaying organic matter.
			Sand	Rock fragments that range in diameter from 0.0625 to 2 mm.
			Sand with Gravel	Sediment that contains a mixture of rocks in varying sizes ranging from 0.0625 to 64 mm. This description is given to sediment that contains less than 15% by volume gravel.
			Sand and Gravel	Sediment that contains a mixture of rocks in varying sizes ranging from 0.0625 to 64 mm. This description is given to sediment that contains greater than 15% by volume gravel.
			Silt	Rock fragments that have a diameter between 0.004 to 0.0625 mm.
			Till	A term used to describe the unsorted sediment deposited by glaciers-contains a mixture of clay, silt, sand, gravel, cobbles and boulders.
	SGPOT_DESC	Text, 125	e.g., Mostly till with isolated pockets of sand and gravel.	A summarized description of each mapping unit.
	LANDFORM	Text, 50	See Below	The geological landform associated with each mapping unit.
			Alluvial Bar	A island or point bars observed in the Mississippi River that was deposited and consists of river sediments (clay, silt, sand, and/or gravel).
			Alluvial Valley	Valley carved by flowing water like a

				river, stream or creek valley.
			Arcuate Depressions – Stagnation Feature	Depressions in the ground that have a arcuate shape. Interpreted as a debris-rich band of ice that stagnates. As the ice melts, slumps from the edges and partially buries ice. Resulting landform is a depression where the stagnant ice was located.
			Bedrock Outcrop	An exposure bedrock
			Collapsed Channel	A channel formed beneath glacial ice that subsequently collapsed and filled in by glacial sediment
			Collapsed Outwash Feature	Outwash that flowed on top of within stagnant glacial ice
			Dissected Topography	Observed in association with streamlined ground moraine, this landform is interpreted as an eroded portion of the streamlined ground moraine, exposing lower sand and gravel and other sediments with higher permeability.
			End and/or Thrust Moraine	The terminal, or furthest, position of ice. This map unit includes end moraines that are either deposited by an accumulation of sediment and/or end moraines formed by glacial thrusting of older sediments and bedrock.
			Ground Moraine	Till covered areas with irregular topography forming gently rolling hills or plains. It is accumulated under glacial ice as transports and deposits sediment.
			Ice Contact Feature	A landform consisting of sediments that was initially contained or bound by glacial ice. Steep slopes characterize these landforms where ice once existed. Common ice contact features include eskers, kames, and ice-walled lakes.
			Interlobate Complex	A landform interpreted as an accumulation of a complex of sediment deposited at the lateral margin of two glacial lobes. The landform consists of both sorted and unsorted sediment that is too complex to differentiate between sedimentary characteristics.
			Lacustrine Feature	An accumulation of sediments deposited in a glacial lake or empoundment of water.
			Outwash Feature	A landform consisting of stratified sediments, chiefly sand and gravel, removed or “washed out” from a glacier by meltwater streams and

				deposited in front of or beyond the end moraine or the margin of an active glacier.
			Outwash Terrace	Terrace deposited by meltwater flowing through a glacial outwash channel. Generally sediments deposited in terraces are sorted sand and gravel, silt is possible and local till can be incorporated by erosional activity.
			Palimpsest Topography	A landform or landscape that has been overridden by a glacier and has been thinly covered by the glacier. As a result, the landform is a function of an earlier glacial event and slightly modified by the next glacial event.
			Plunge Pool	A pool created at the base of a waterfall.
			Recessional Moraine	Consisting of mostly till as well as stratified sediments. A recessional moraine forms during standstills in a glaciers retreat. The resulting landform is an arcuate ridge-like accumulation of till that can range from a distinct ridge to a large-scaled hummocky landform. Besides till, they also bear sorted outwash deposits.
			Stagnation Moraine	A landform that is characterized by hummocky terrain formed by the stagnation of glacial ice.
			Water Modified Moraine	Moraine features that have been modified by glacial meltwater or glacial lakes. It is interpreted that the landform has been eroded but deposition of meltwater sediment or lake sediment is thin and discontinuous.
	Potential	Text, 75	See Below	
			Significant Potential for Sand and Gravel Resources	Geologic units that are inferred to contain sand and gravel. These units exhibit the geologic characteristics that typically produce sand and gravel deposits. Existing gravel pit and MN/DOT aggregate sources lying within these units are considered identified or known resources. These resources include the classes High and Moderate potential for sand and gravel deposits.
			Nonsignificant Potential for Sand and Gravel Resources	Units that generally have little or no potential for significant aggregate resources. These units exhibit geologic characteristics that are typically not consistent with significant aggregate deposits. These units typically contain clay, silt, fine sand, unsorted sediments (till), or very thin layers of sand and gravel. Nonsignificant potential regions

				also coincide where bedrock is at or near the surface. Or these units may include aggregate deposits that are too small to map.
	CLASS	Text, 75	See Below	
			High Potential for Sand and Gravel Resources	Includes landforms such as outwash features, ice contact features, and end/thrust moraines. Predominant sediment typically consists of sand and gravel. The probability that a potential sand and gravel resource exists within any map unit is moderately high to very high. Deposit thickness ranges from 10-60+ feet with less than 20 feet of overburden. The sand and gravel resources occurring in this unit are moderate to very large in areal extent and the textural characteristics are moderate to very good. The quality is moderate to very high relative to other sand and gravel resources within stea_sgp
			Moderate Potential for Sand and Gravel Resources	Includes landforms such as outwash features, ice contact features, and end/thrust moraines and palimpsest topography. Predominant sediment ranges from sand with gravel to sand and gravel. The probability that a potential sand and gravel resource exists within any map unit is moderate to very high. Deposit thickness is typically greater than 10 feet, but in some landforms can range from 0-50+ feet with 0-20+ feet of overburden. The sand and gravel resources occurring in this unit are moderate to moderately large in areal extent and the textural characteristics are moderate to good. The quality is typically moderate to high relative to other sand and gravel resources within stea_sgp.
			Low Potential for Sand and Gravel Resources	Includes landforms such as alluvial features, outwash features, ice contact features, moraines, and collapsed channels. Predominant sediment varies and can include silty sand, sand, sand with gravel, silty sand and gravel, and sand and gravel. The probability that a potential sand and gravel resource exists within any map unit is low to moderately low. Deposit thickness typically is less than 10 feet, but can range from 0-70+ feet with overburden thickness ranging from 0-45+ feet. The sand and gravel resources occurring in this unit are very small to moderate in

				areal extent and the textural characteristics are poor to good. The quality ranges from low to high relative to other sand and gravel resources within stea_sgp
			Limited Potential for Sand and Gravel Resources	Includes landforms such as alluvial features, moraines, collapsed channels, and bedrock. The deposits of this unit contain all or one of the following: clay with boulders (till), bedrock, clay, silt, sand, and/or gravel. The probability that a significant sand and gravel resource exists within this unit is very low to moderately low. The thickness of the deposits is typically less than 5 feet, but can range from 0-60+ feet with overburden thickness ranging from 0-100+ feet. The sand and gravel resources occurring in this unit are very small to small in areal extent and textural characteristics are very poor to moderately poor. The quality ranges from very low to moderately low relative to other sand and gravel resources within Stearns County. A limited potential rating includes the circumstance where characteristics are unknown; there was insufficient data to give a higher ranking; limited access to an area for further investigation; and/or no obvious landform-sediment association
	PROBABLTY	Text, 20	Very High, High, Moderately High, Moderate, Moderately Low, Low, Very Low	The relative degree of certainty that sand and gravel exists within a unit. Based on air photo interpretations, field observations, CWI, drilling, presence of gravel pits, etc. Each unit is relative to the other units and range from very high to very low.
	SIZE	Text, 20	Very large, Large, Moderately Large, Moderate, Moderately Small, Small, Very Small	The relative size of the sand and gravel deposit.
	ACREAGE	Text, 8	See Below	The size of the deposit in acres.
			30+	Very Large
			20-30	Large
			15-20	Moderately Large
			10-15	Moderate
			5-10	Moderately Small
			3-5	Small
			< 3	Very Small
	TEXTURE	Text, 20	Very Good, Good,	A relative scale of the textural quality

			Moderately Good, Moderate, Moderately Poor, Poor, Very Poor.	of the sand and gravel resource (sieve analysis). The coarser the material the higher the rating. Fine sand material would have a poorer rating. See MN/DOT Pit sheets for more detail.
	QUALITY	Text, 20	Very High, High, Moderately High, Moderate, Moderately Low, Low, Very Low	A relative scale of the quality of the sand and gravel (soundness, durability, and mineral makeup). Determined from MN/DOT pit sheets.
	DOM_LITHO	Text, 30	See Below	Glacial Lobe Source
			Des Moines Lobe Sediments	A glacial lobe that flowed from the northwest, down the Minnesota River valley to a glacial maximum in Des Moines, Iowa. A sublobe flowed west of Stearns County into central Stearns County. A tan, silty loam with the indicator lithologies of shale and limestones characterizes the till. Sediment from this lobe tends to produce aggregate with lower quality due to the water absorption of the shale and higher percentages of soft limestones and iron oxides.
			Superior Lobe Sediments	Superior lobe is a northeastern sourced glacier flowing from the Lake Superior basin to the southwest. Superior lobe sediments tend to contain rhyolites, basalts, and other Duluth Complex rock types. Aggregate with Superior lobe sediments generally are of high quality and durability, except where it incorporates local Cretaceous-aged bedrock. Superior lobe sediments are observed at the surface in the eastern third of the county.
			Wadena Lobe Sediments	A glacial lobe that flowed south out of Canada and into central Minnesota. Formally known as the Rainy lobe, the name Wadena lobe is actually an older reference; however it is more commonly used for the sediment observed with this glacial advance. Wadena lobe sediments tend to have high limestone and granite content. Aggregate with Wadena lobe sediments generally are of high quality and durability.
			Des Moines/Superior Lobe Sediments	Represents areas where either Des Moines lobe sediments is observed on top of Superior lobe sediments or where there is intermixing of the two sediment sources.
			Des Moines/Wadena Lobe Sediments	Represents areas where Des Moines lobe sediments are observed on top of

				Wadena lobe sediments.
			Superior/Wadena Lobe	Represents areas where Superior lobe sediments are observed on top of Wadena lobe sediments.
	THICKNESS	Text, 15	5-15, 10-30, 20-100+	Gives range of minimum and maximum thickness for sand and gravel deposit.
	THICK_MOD	Text, 1	+	The thickness modifier indicates that the thickness of the unit exceeds the value listed in the Thick_max field.
	THICK_MIN	Number , 19, 5	0, 5, 10, 15, 20, 25, 30	Describes the minimum thickness of the sand and gravel unit.
	THICK_MAX	Number , 19, 5	5, 10, 15, 20, 25, 30, 40, 50, 75	Describes the maximum thickness of the sand and gravel unit.
	OVERBURDEN	Text, 15	0-100+, 0-5, 10-50	Gives range of minimum and maximum thickness for overburden.
	OB_MOD	Text, 1	+	The overburden modifier indicates that the thickness of the overburden exceeds the values listed in the Ob_max field.
	OB_MIN	Number , 19, 5	0, 3, 10, 20	Describes the minimum thickness of the overburden covering the sand and gravel.
	OB_MAX	Number , 19, 5	1, 3, 5, 10, 15, 20, 30, 40, 50	Describes the maximum thickness of the overburden covering the sand and gravel.
	MNDOT_DATA	Text, 3	Yes or No	‘Yes’ indicates that the deposit/mapping unit has a MN DOT ASIS data sourced point or a sampled test hole.
	MAP_LABEL	Text, 2	See Below	A cartographic map label for the sand and gravel potential classifications.
			Hp	High Potential for Sand and Gravel Resources
			Mp	Moderate Potential for Sand and Gravel Resources
			Lp	Low Potential for Sand and Gravel Resources
			Ltd	Limited Potential for Sand and Gravel Resources

