

# Suffolk County LiDAR Survey

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## IDENTIFICATION INFORMATION

### Citation:

#### Citation Information:

Originator: Terrapoint USA  
Publication Date: 20070528  
Title: Suffolk County LiDAR Survey  
Edition: One  
Geospatial Data Presentation Form: Map

#### Publication Information:

Publication Place: Houston, Texas  
Publisher: Terrapoint USA

#### Other Citation Details:

Project Area = 2359 square kilometers  
Two LiDAR Systems were used in the acquisition of this project:  
Optech 3100EA and Terrapoint ALTMS 20KHZ (U5)

#### - Sensor 1

Type Of Scanner = Optech 3100EA  
Data Acquisition Height = 1550 meters AGL  
Scanner Field Of View = 46 degrees  
Scan Frequency = 30.8 Hertz  
Pulse Repetition Rate = 71 Kilohertz  
Aircraft Speed = 150 Knots  
Swath Width = 1316 m  
Nominal Ground Sample Distance = 1.25 meters (no overlap)  
Number of Returns Per Pulse = 4 (last)  
Distance Between Flight Lines = 658m

#### - Sensor 2

Type Of Scanner = Terrapoint ALTMS (U5)  
Data Acquisition Height = 1667 meters AGL  
ScannerField Of View = 46 degrees  
Scan Frequency = 64 Hertz  
Pulse Repetition Rate = 20 Kilohertz  
Aircraft Speed = 150 Knots  
Swath Width = 326 m  
Nominal Ground Sample Distance = 1 meters (no overlap)  
Number of Returns Per Pulse = 4 (last)  
Distance Between Flight Lines = 164m

Online Linkage: [www.terrapoint.com](http://www.terrapoint.com)

#### Larger Work Citation:

##### Citation Information:

Originator: Terrapoint USA  
Publication Date: 20070130  
Title: Suffolk County LiDAR Survey  
Publication Information:  
Publication Place: Houston, Texas  
Publisher: Terrapoint USA  
Online Linkage: [www.terrapoint.com](http://www.terrapoint.com)

### Description:

#### Abstract:

LIDAR data is remotely sensed high-resolution elevation

data collected by an airborne collection platform. By positioning laser range finding with the use of 1 second GPS with 100hz inertial measurement unit corrections; Terrapoint's LIDAR instruments are able to make highly detailed geospatial elevation products of the ground, man-made structures and vegetation. The LiDAR flightlines for this project was planned for a 50% acquisition overlap. The nominal resolution of this project without overlap is 1.25m (Optech) and 1m (ALTMS) spacing. Four returns were recorded for each pulse in addition to an intensity value. GPS Week Time, Echo, Intensity, Flightline number and scan angle attributes were provided for each LiDAR point. Data is provided as random points, in LAS v1.0 format, classified according to ASPRS Class Code 2=Ground 1=Undefined.

**Purpose:**

The purpose of this LiDAR data was to produce high accuracy 3D elevation based geospatial products for coastal flood mapping.

**Supplemental Information:**

Please note that the LiDAR intensity is not calibrated or normalized. The intensity value is meant to provide relative signal return strengths for features imaged by the sensor.

Water is included in the bare earth ground model, except where the entire tile is covered by water.

**Time Period of Content:****Time Period Information:****Range of Dates/Times:**

Beginning Date: 20070421

Ending Date: 20070429

Currentness Reference: Ground Condition

**Status:**

Progress: Complete

Maintenance and Update Frequency: None planned

**Spatial Domain:****Bounding Coordinates:**

West Bounding Coordinate: -73.5039

East Bounding Coordinate: -71.8388

North Bounding Coordinate: 41.3238

South Bounding Coordinate: 40.5860

**Keywords:****Theme:**

Theme Keyword Thesaurus: None

Theme Keyword: ASPRS standards

Theme Keyword: DEM

Theme Keyword: digital elevation model

Theme Keyword: elevation

Theme Keyword: LAS\_v1.0

Theme Keyword: laser

Theme Keyword: LiDAR

Theme Keyword: OPTECH\_3100EA

Theme Keyword: surface model

Theme Keyword: topography

Theme Keyword: Terrapoint ALTMS U5

**Place:**

Place Keyword Thesaurus: None

Place Keyword: Suffolk County

Place Keyword: Long Island

Place Keyword: New York

Place Keyword: Northeast

Place Keyword: United States

**Access Constraints:**

Dewberry & Davis LLC has full rights and ownership of this LiDAR dataset; hence any data requests should be channeled through Dewberry & Davis LLC.

**Use Constraints:**

Any conclusions from results of the analysis of this LiDAR are not the responsibility of Terrapoint. The LiDAR data was thoroughly visually verified to represent the true ground conditions at time of collection. Users should be aware of this limitations of this dataset if using for critical applications.

**Point\_of\_Contact:****Contact\_Information:****Contact\_Organization\_Primary:****Contact\_Organization:** Terrapoint USA**Contact\_Person:** Claude Vickers**Contact\_Position:** Production Manager**Contact\_Address:****Address\_Type:** mailing and physical address**Address:** 251216 Grogan's Park Drive**City:** The Woodlands**State\_or\_Province:** Texas**Postal\_Code:** 77380**Country:** USA**Contact\_Voice\_Telephone:** 1-877-80-TERRA**Contact\_Facsimile\_Telephone:** 1-281-296-0869**Contact\_Electronic\_Mail\_Address:** claud.vickers@terrapoint.com**Hours\_of\_Service:** Monday to Friday, 8:30 - 4:30, Eastern Time**Native\_Data\_Set\_Environment:****ArcView version** 3.1 shapefile format**c:\projects\6127\_fgdc\basedata\suf\_sp\_col\_index04.shp**[Top](#)

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**DATA\_QUALITY\_INFORMATION****Attribute\_Accuracy:****Attribute\_Accuracy\_Report:**

Raw elevation measurements have been tested to 0.42 feet vertical accuracy at 95 percent confidence level

**Logical\_Consistency\_Report:**

All LiDAR files delivered were verified and tested to ensure they open and are positioned properly.

**Completeness\_Report:**

According to Terrapoint standards; the following aspects of the LiDAR data was verified during the course of the project processing:

- Data completeness and integrity
- Data accuracy and errors
- Anomaly checks through full-feature hillshades
- Post automated classification Bare-earth verification
- RMSE inspection of final bare-earth model using kinematic GPS
- Final quality control of deliverable products; ensuring integrity; graphical quality; conformance to Terrapoint standards are met for all delivered products.

**Positional\_Accuracy:****Horizontal\_Positional\_Accuracy:****Horizontal\_Positional\_Accuracy\_Report:**

Compiled to meet 3 foot ~~vertical~~ <sup>horizontal</sup> accuracy at the 95 percent confidence level

**Vertical\_Positional\_Accuracy:****Vertical\_Positional\_Accuracy\_Report:**

Tested 0.42 feet vertical accuracy at 95 percent confidence level

**Lineage:****Source\_Information:****Source\_Citation:****Citation\_Information:****Originator:****Publication\_Date:** 20070130**Title:** Suffolk LiDAR Survey**Edition:** One**Geospatial\_Data\_Presentation\_Form:** map**Publication\_Information:****Publication\_Place:** Houston, Texas**Publisher:** Terrapoint USA**Other\_Citation\_Details:**

Online\_Linkage: www.terrapoint.com  
Larger\_Work\_Citation:  
Citation\_Information:  
Originator: Terrapoint USA  
Publication\_Date: 20070130  
Title: Middlesex LiDAR Survey  
Publication\_Information:  
Publication\_Place: Houston, Texas  
Publisher: Terrapoint USA  
Online\_Linkage: www.terrapoint.com  
Source\_Scale\_Denominator: unknown  
Type\_of\_Source\_Media: Hard Drive  
Source\_Time\_Period\_of\_Content:  
Time\_Period\_Information:  
Range\_of\_Dates/Times:  
Beginning\_Date: 200605  
Ending\_Date: 200701  
Source\_Currentness\_Reference: unknown  
Source\_Citation\_Abbreviation:  
Source\_Contribution:  
LiDAR data representing Suffolk County  
Source\_Information:  
Source\_Citation:  
Citation\_Information:  
Originator: Terrapoint USA  
Publication\_Date: 20070528  
Title: Suffolk County LiDAR Survey  
Edition: One  
Geospatial\_Data\_Presentation\_Form: map  
Publication\_Information:  
Publication\_Place: Houston, Texas  
Publisher: Terrapoint USA  
Other\_Citation\_Details:  
Online\_Linkage: www.terrapoint.com  
Larger\_Work\_Citation:  
Citation\_Information:  
Originator: Terrapoint USA  
Publication\_Date: 20070130  
Title: Suffolk County LiDAR Survey  
Publication\_Information:  
Publication\_Place: Houston, Texas  
Publisher: Terrapoint USA  
Online\_Linkage: www.terrapoint.com  
Source\_Scale\_Denominator: unknown  
Type\_of\_Source\_Media: Hard Drive  
Source\_Time\_Period\_of\_Content:  
Time\_Period\_Information:  
Range\_of\_Dates/Times:  
Beginning\_Date: 200605  
Ending\_Date: 200701  
Source\_Currentness\_Reference: unknown  
Source\_Citation\_Abbreviation:  
Source\_Contribution:  
LiDAR data representing Suffolk County  
Process\_Step:  
Process\_Description:  
- General Overview  
The Airborne LiDAR survey was conducted using an OPTECH 3100EA flying at a nominal height of 1550 metres AGL with a total angular coverage of 40 degrees and a Terrapoint ALTMS U5 flying at a nominal height of 1067 metres with a total angular coverage of 34 degrees . Flight line spacing was nominally 564 metres for the Optech and 164 metres for the ALTMS, providing overlap of 50% on adjacent flight lines. All of the lines were flown in a general east/west direction for the project.  
- Aircraft  
Two aircrafts were used for the survey: a Piper Navajo, registration C-GPJT and a Cessna 402, registration C-FFAP. These aircrafts have a flight range of approximately 6.5 and a 7 hours respectively and were flown at an average

altitude of 1550 and 1067 metres AGL (Above Ground Level) respectively, thereby encountering flying altitudes of approximately 1550 and 1067 metres above Mean Sea Level (MSL) respectively. The aircrafts were staged from the Brookhaven NY Airport, and ferried daily to the project site for flight operations.

- GPS Receivers

A combination of Sokkia GSR 2600 and NovAtel DL-4+ dual frequency GPS receivers were used to support the airborne operations of this survey and to establish the GPS control network.

- Number of Flights and Flight Lines

A total of 11 missions were flown for this project with flight times ranging approximately 42 hours under good meteorological and GPS conditions. A total of 262 flight lines were flown over the project area to provide complete coverage. The acquisition of this project was divided into two blocks to **maintain resonable length flight lines:**

East block = 107 flight lines

West block = 155 flight lines

**Source\_Used\_Citation\_Abbreviation:** Acquisition Process

**Process\_Date:** 200604

**Source\_Produced\_Citation\_Abbreviation:** ACQ

**Process\_Contact:**

**Contact\_Information:**

**Contact\_Person\_Primary:**

**Contact\_Organization:** Terrapoint USA

**Contact\_Person:** Shiva Shenoy

**Contact\_Position:** Operations Manager

**Contact\_Address:**

**Address\_Type:** mailing and physical address

**Address:** 251216 Grogan's Park Drive

**City:** The Woodlands

**State\_or\_Province:** Texas

**Postal\_Code:** 77380

**Country:** USA

**Contact\_Voice\_Telephone:** 1-877-80-TERRA

**Contact\_Facsimile\_Telephone:** 1-281-296-0869

**Contact\_Electronic\_Mail\_Address:** shiva.shenoy@terrapoint.com

**Hours\_of\_Service:** Monday to Friday, 8:30 - 4:30, Central Time

**Process\_Step:**

**Process\_Description:**

- Airborne GPS Kinematic

Airborne GPS kinematic data was processed on-site using GrafNav kinematic On-The-Fly (OTF) software. Flights were flown with a minimum of 6 satellites in view (130 above the horizon) and with a PDOP of better than 4.5. Distances from base station to aircraft were kept to a maximum of 35 km, to ensure a strong OTF (On-The-Fly) solution. For all flights, the GPS data can be classified as excellent, with GPS residuals of 5cm average but no larger than 9 cm being recorded.

- Calculation of 3D laser points (raw data)

The post-processing software to derive X, Y, Z values from roll, pitch, yaw, and range is Optech's Realm. Data

- Classification and Editing

The data was processed using the software TerraScan, and following the methodology described herein. The initial step is the setup of the TerraScan project, which is done by importing client provided tile boundary index encompassing the entire project areas. The 3D laser point clouds, in binary format, were imported into the TerraScan project and divided in 5665 tiles, as per the contract specifications. tiled, the laser points were classified using a proprietary routine in TerraScan. This routine removes any obvious outliers from the dataset following which the ground layer is extracted from the point cloud. The ground extraction process encompassed in this routine takes place by building an iterative surface model. This surface model is generated using three main parameters: building size, iteration angle and iteration distance. The

initial model is based on low points being selected by a "roaming window" with the assumption is that these are the ground points. The size of this roaming window is determined by the building size parameter. The low points are triangulated and the remaining points are evaluated and subsequently added to the model if they meet the iteration angle and distance constraints. This process is repeated until no additional points are added within an iteration. A critical parameter is the maximum terrain angle constraint, which determines the maximum terrain angle allowed within the classification model. The data is then manually quality controlled with the use of hillshading, cross-sections and profiles. Any points found to be of class vegetation, building or error during the quality control process, are removed from the ground model and placed on the appropriate layer. An integrity check is also performed simultaneously to verify that ground features such as rock cuts, elevated roads and crests are present. Once data has been cleaned and complete, it is then reviewed by a supervisor via manual inspection and through the use of a hillshade mosaic of the entire project area.

-Projection Transformation

The data was processed in the native UTM zone in meters and then transformed to the New York Long Island State Plane final projection system and US survey feet using an in-house transformation software which uses the Corpscon DLL.

Source\_Used\_Citation\_Abbreviation: Data Processing

Process\_Date: 200605\_200701

Source\_Produced\_Citation\_Abbreviation: PRD

Process\_Contact:

Contact\_Information:

Contact\_Person\_Primary:

Contact\_Organization: Terrapoint USA

Contact\_Person: Claude Vickers

Contact\_Position: Production Manager

Contact\_Address:

Address\_Type: mailing and physical address

Address: 251216 Grogan's Park Drive

City: The Woodlands

State\_or\_Province: Texas

Postal\_Code: 77380

Country: USA

Contact\_Voice\_Telephone: 1-877-80-TERRA

Contact\_Facsimile\_Telephone: 1-281-296-0869

Contact\_Electronic\_Mail\_Address: claud.vickers@terrapoint.com

Hours\_of\_Service: Monday to Friday, 8:30 - 4:30, Eastern Time

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## SPATIAL\_DATA\_ORGANIZATION\_INFORMATION

Direct\_Spatial\_Reference\_Method: Vector

Point\_and\_Vector\_Object\_Information:

SDTS\_Terms\_Description:

SDTS\_Point\_and\_Vector\_Object\_Type: GT-polygon composed of chains

Point\_and\_Vector\_Object\_Count: 5665

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## SPATIAL\_REFERENCE\_INFORMATION

Horizontal\_Coordinate\_System\_Definition:

Planar:

**Grid Coordinate System:**

Grid\_Coordinate\_System\_Name: State Plane Coordinate System 1983

**State Plane Coordinate System:**

SPCS\_Zone\_Identifier: New York, Long Island

**Lambert Conformal Conic:**

Standard\_Parallel: 40.666667

Standard\_Parallel: 41.033333

Longitude\_of\_Central\_Meridian: -74.000000

Latitude\_of\_Projection\_Origin: 40.166667

False\_Easting: 984249.999900

False\_Northing: 0.000000

**Planar Coordinate Information:**

Planar\_Coordinate\_Encoding\_Method: Coordinate pair

**Coordinate Representation:**

Abscissa\_Resolution: 0.01

Ordinate\_Resolution: 0.01

Planar\_Distance\_Units: US Survey Feet

**Geodetic Model:**

Horizontal\_Datum\_Name: North American Datum of 1983

Ellipsoid\_Name: GRS 80

Semi-major\_Axis: 20925604.4720406

Denominator\_of\_Flattening\_Ratio: 298.26

**Vertical Coordinate System Definition:****Altitude System Definition:**

Altitude\_Datum\_Name: North American Vertical Datum of 1988

Altitude\_Resolution: 0.01

Altitude\_Distance\_Units: 0.01

Altitude\_Encoding\_Method: Explicit elevation coordinate included with horizontal coordinates

**Depth System Definition:**

Depth\_Datum\_Name:

Depth\_Resolution:

Depth\_Distance\_Units:

Depth\_Encoding\_Method:

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**ENTITY\_AND\_ATTRIBUTE\_INFORMATION****Overview Description:****Entity and Attribute Overview:**

LiDAR point data in LAS 1.0 format

ASPRS classification scheme (1 = undefined; 2 = ground)

Contains the following fields of information:

Class, GPS WeekTime, Easting, Northing, Elevation, Scan

Angle(integer), Echo Number, Echo, Intensity, Flightline

**Entity and Attribute Detail Citation:**[Top](#)**DISTRIBUTION\_INFORMATION****Distributor:****Contact Information:****Contact Organization Primary:**

Contact\_Organization: Terrapoint USA

Contact\_Person: Claude Vickers

Contact\_Position: Production Manager

**Contact Address:**

Address\_Type: mailing and physical address

Address: 251216 Grogan's Park Drive

City: The Woodlands

State\_or\_Province: Texas

Postal\_Code: 77380

Country: USA

Contact\_Voice\_Telephone: 1-877-80-TERRA  
Contact\_Facsimile\_Telephone: 1-281-296-0869  
Contact\_Electronic\_Mail\_Address: claud.vickers@terrapoint.com  
Hours\_of\_Service: Monday to Friday, 8:30 - 4:30, Eastern Time

**Resource\_Description:**

The LiDAR data was captured for Dewberry & Davis for coastal flood mapping purposes

**Distribution\_Liability:**

Users must assume responsibility to determine the appropriate use of this LiDAR dataset.  
The LiDAR has been compiled to 3 foot vertical accuracy; tested to 0.42 feet vertical accuracy at 95 percent confidence level.  
Data is representative of ground conditions at time of acquisition only.

**Standard\_Order\_Process:****Digital\_Form:****Digital\_Transfer\_Information:**

Format\_Name: LAS1.0

**Digital\_Transfer\_Option:****Offline\_Option:**

Offline\_Media: DVD, HD

Recording\_Format: Standard

**Compatibility\_Information:**

**Fees:** Current Handling and Processing Terrapoint Fees  
Current Handling and Processing Terrapoint Fees  
Current Terrapoint Handling and Processing Fees

**Ordering\_Instructions:**

Proper release required from Dewberry & Davis LLC for orders outside of Dewberry & Davis LLC. Please contact Terrapoint sales for general Terrapoint LiDAR library sales.

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**METADATA\_REFERENCE\_INFORMATION**

Metadata\_Date: 20070531

Metadata\_Review\_Date: none

**Metadata\_Contact:****Contact\_Information:****Contact\_Organization\_Primary:**

Contact\_Organization: Terrapoint USA

Contact\_Person: Claude Vickers

Contact\_Position: Production Manager

**Contact\_Address:**

Address\_Type: Mailing and physical address

Address: 251216 Grogan's Park Drive

City: The Woodlands

State\_or\_Province: Texas

Postal\_Code: 77380

Country: USA

Contact\_Voice\_Telephone: 1-877-80-TERRA

Contact\_Facsimile\_Telephone: 1-281-296-0869

Contact\_Electronic\_Mail\_Address: claud.vickers@terrapoint.com

Hours\_of\_Service: Monday to Friday, 8:30 - 4:30, Eastern Time

Metadata\_Standard\_Name: FGDC CSDGM

Metadata\_Standard\_Version: FGDC-STD-001-1998

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