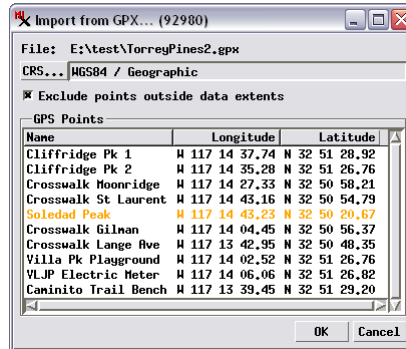


# Import GPS Control Points from GPX File

GPX (the GPS Exchange Format) is an XML data format for the interchange of GPS data (waypoints, routes, and tracks) between applications. Using the Georeference process in TNTmips you can import GPS points directly from GPX files to use as control points in georeferencing your spatial data objects.

Choosing the Import option from the Control Points menu prompts you to select a GPX file containing GPS locations. (You can also select a file of control points exported from another object as a TXT or CSV file). If you select a GPX file, the Import from GPX window opens (see illustration above). This window lists the GPS points contained in the file and their latitude/longitude coordinates (GPX currently supports only WGS84 / Geographic coordinates). You have the option to exclude points outside the extents of your input object; such points are listed in a color in the Import from GPX window. During import the GPS point coordinates are converted (if necessary) to the reference system you have selected to use for your input object. The imported



```
<?xml version="1.0" encoding="UTF-16"?>
<gpx
  version="1.0"
  creator="ExpertGPS 1.1.1 - http://www.topografix.com">
  <name>Torrey Pines GPS Waypoints</name>
  <desc>GPS points for georeferencing IKONOS image</desc>
  <bounds minlat="32.839075" minlon="-117.245323"
    maxlat="32.858112" maxlon="-117.227625">
  </bounds>
  <wpt lat="32.858033" lon="-117.243817">
    <name>Cliffridge Pk 1</name>
    <desc>Center of pitchers mound, larger baseball diamond.</desc>
    <sym>Dot</sym>
    <type>Feature</type>
  </wpt>
  ...
</gpx>
```

Excerpt of a sample GPX log containing GPS waypoints.

The Import from GPX window lists the point coordinates read from the GPX file you have selected to import. The Name column is populated using text from the <name> tag (if any) for each GPS point. If the toggle to *Exclude points outside data extents* is turned on, entries for such points are shown in color, as for the Soledad Peak point in this example.

ID	Name	Column	Row	Easting	Northing	Longitude	Latitude	Residual (c)
1		0,00	0,00	476885,000	3635933,667	117,247056 W	32,861262 N	0,00
2		0,00	6253,00	476885,000	3634057,767	117,247009 W	32,844341 N	0,00
3		6310,00	6253,00	478778,000	3634057,767	117,226780 W	32,844379 N	0,00
4		6310,00	0,00	478778,000	3635933,667	117,226823 W	32,861300 N	0,00
5	Cliffridge Pk 1	1007,32	1195,61	477187,197	3635574,983	117,243817 W	32,858033 N	0,00
6	Cliffridge Pk 2	1220,14	1417,82	477251,042	3635508,321	117,243133 W	32,857433 N	0,00
7	Crosswalk Moonridge	1902,10	4349,37	477455,631	3634628,855	117,240925 W	32,849504 N	0,00
8	Crosswalk St Laurent	529,49	4697,26	477043,846	3634524,487	117,245323 W	32,848954 N	0,00
9	Crosswalk Gilman	3083,90	4542,66	478050,171	3634570,868	117,234570 W	32,848993 N	0,00
10	Crosswalk Lange Ave	5745,20	5370,42	478608,560	3634322,541	117,228597 W	32,846764 N	0,00
11	Villa Pk Playground	4098,31	1424,23	478102,494	3635506,397	117,234033 W	32,857433 N	0,00
12	VLJP Electric Meter	3751,43	1417,27	478010,429	3635508,486	117,235017 W	32,857450 N	0,00
13	Caninito Trail Bench	6057,43	1177,69	478702,228	3635580,359	117,227625 W	32,858112 N	0,00

Control point list after import of GPS points (5 through 13; points 1 through 4 are corner points from the image's original affine georeference). If you have included a Name column in the point list (selected using Options / Columns), point names from the GPX file are shown. Map coordinates from the GPX file are automatically converted to the reference coordinate system if necessary. The previous control points and the selected residual model are automatically used to estimate image coordinates (shown in red) for the imported points. Switch to Edit mode to correctly position the imported points relative to the input image.



GPS control point in estimated image location after import (left), and relocated to its correct image position using Edit mode (right).

position of each point relative to the input object. If you determine that a point is not accurately located (based on its description in the GPX file or other notes from the GPS survey), use the crosshairs tool in the Edit mode to move the point to the correct object coordinates. The illustration to the left shows an example where a GPS

point known to be at the center of the pitcher's mound of a baseball diamond is manually relocated from its estimated position. Once you have checked and relocated all of the GPS control points, you should examine the residuals. If you believe the GPS points to be the most accurate control points, you may wish to disable the pre-existing control points to see if that produces a better fit to the georeference model (lower residual values) and if so, delete them.

ID	Name	Column	Row	Easting	Northing	Longitude	Latitude	Residual (c)
<input type="checkbox"/>	1	0,00	0,00	476885,000	3635933,667	117,247056 W	32,861262 N	40,42
<input type="checkbox"/>	2	0,00	6253,00	476885,000	3634057,767	117,247009 W	32,844341 N	126,23
<input type="checkbox"/>	3	6310,00	6253,00	478778,000	3634057,767	117,226780 W	32,844379 N	124,72
<input type="checkbox"/>	4	6310,00	0,00	478778,000	3635933,667	117,226823 W	32,861300 N	42,15
<input checked="" type="checkbox"/>	5 Cliffridge Pk 1	1007,02	1204,88	477187,197	3635574,983	117,243817 W	32,858033 N	0,44
<input checked="" type="checkbox"/>	6 Cliffridge Pk 2	1218,76	1421,28	477251,042	3635508,321	117,243133 W	32,857433 N	0,61
<input checked="" type="checkbox"/>	7 Crosswalk Moonridge	1887,33	4275,74	477455,631	3634628,855	117,240925 W	32,849504 N	0,17
<input checked="" type="checkbox"/>	8 Crosswalk St Laurent	512,39	4613,88	477043,846	3634524,487	117,245323 W	32,848954 N	1,17
<input checked="" type="checkbox"/>	9 Crosswalk Gilman	3870,00	4463,62	478050,171	3634570,868	117,234570 W	32,848993 N	0,93
<input checked="" type="checkbox"/>	10 Crosswalk Lange Ave	5730,37	5271,03	478608,560	3634322,541	117,228597 W	32,846764 N	0,87
<input checked="" type="checkbox"/>	11 Villa Pk Playground	4060,16	1427,70	478102,494	3635506,397	117,234033 W	32,857433 N	0,93
<input checked="" type="checkbox"/>	12 VLJP Electric Meter	3754,66	1420,27	478010,429	3635508,486	117,235017 W	32,857450 N	0,96
<input checked="" type="checkbox"/>	13 Caninito Trail Bench	6064,36	1186,24	478702,228	3635580,359	117,227625 W	32,858112 N	1,05

Control point list after repositioning the GPS control points and disabling the initial four corner control points.