

Archaeological Predictive Map Sint Eustatius, Caribbean Netherlands

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Products

- GIS format: 7 ArcGIS shape files, one for each of the archeological map layers listed in the legend.
- PDF format: 2 versions, one at B1 paper size for printing at scale 1 : 10 000 and one at A3 paper size for printing at scale 1 : 25 000.

Approach

- The map displays the information available in March 2013.
- No distinction was made between pre-colonial and historic sites or between pre-colonial and historic expectancy zones.
- Archaeological sites from the SECAR inventory [1] are displayed as complexes (such as plantations), not showing individual structures.
- Wall complexes from the SECAR inventory [1] are indicated as sites, where possible. Isolated walls are marked individually.
- Most archaeological sites and walls are mapped by RTK GPS survey [2][3][4][5] or by satellite image mapping [6] using local knowledge of R. Stelten and M.L.P. Hoogland.
- The Golden Rock site location has been copied from the Golden Rock report [7].
- Walls mapped during the 2008 survey [8] have been dotted, suggesting their approximate handheld GPS location in the landscape if these walls could not be retraced in the field in 2012 due to accessibility problems and if they could not be retraced in the aerial photograph of the island either.
- The historic city has been mapped using the city outlines of the 1781 map [9] and the 1916 map [10].
- Zones have been labelled as having a high expectancy for archaeological values when:
 - they directly border known archaeological sites of which the limits have not yet been well established, and the archaeological remains can be expected to expand beyond the indicated site boundaries (based on expert knowledge of R. Stelten, P. Soffers and M.S. de Waal);
 - they offer attractive conditions for pre-colonial habitation or exploitation (based on expert knowledge of R. Stelten, P. Soffers and M.S. de Waal);
 - they are indicated on the 1781 map [9] as being the location of a plantation, of which the remains have not (yet) been discovered.
- Zones have been labelled as having a medium expectancy for archaeological values when:
 - they immediately surround a zone of high expectancy, thus creating a buffer area towards low expectancy zones taking local topography into account (based on expert knowledge of R. Stelten, P. Soffers and M.S. de Waal);
 - they offer mediocre conditions for pre-colonial habitation or exploitation (based on expert knowledge of R. Stelten, P. Soffers and M.S. de Waal);
 - they are indicated on the 1742 map [11] giving the approximate location of a plantation, of which the remains have not (yet) been discovered;
 - they have been labelled as sites in the 2008 survey [8], even though these site locations could not be retraced in the field in 2012;
 - they have ecological signs of human presence, even though no material cultural remains have been found as yet (e.g., the crater of the Quill).
- The remainder of the island has been classified as having low expectancy for archaeological values.
- The Quill Natural Park border follows the 250 m height contour line from the planning office GIS [12].
- The Boven Natural Park border has been digitized from a georeferenced national park trails map [13].
- The displayed topographic information is a selection of the classes of the planning office GIS [12]. Some road sections have been added using local knowledge of R. Stelten and the satellite image [6].

Precision

Due to the use of non-orthorectified satellite image, handheld GPS and RTK GPS without reference station data, and recent and historic topographic maps, the precision of most of the map is < 10 m. The precision of the used sources was estimated by J. Lesparre (based on expert knowledge) and is listed below.

- The 2011 RTK GPS survey [2] has a precision of < 0.1 m.
- Some problems during the 2012 RTK GPS survey [3] with the reference station resulted in degradation of precision. The precision of these coordinates is < 0.1 m for points where reference station data was available and < 10 m for points where reference station data was not available.
- The DP reference points [4] have a precision of <0.1 m.
- The 1963 map [5] lists the used heights of the RTK-GPS reference points (DP) with 0.1 m resolution.
- The satellite image [6] is a non-orthorectified, pansharpenered RGB image with 0.5 m resolution. Its < 1 degree off-nadir viewing angle results in a predicted maximum relief displacement of 5.8 m. This results in mapped points with a precision of < 10 m, provided that the points are recognisable in the image.
- The georeferenced figure 4 of the Golden Rock report [7] has a precision of at best 10 m.
- The 2008 survey [8] has a precision of < 10 m.
- The 1781 map [9] could not be georeferenced accurately.
- The 1916 map [10] has a precision of < 10 m due to its scale.
- The 1742 map [11] could not be georeferenced accurately.
- The planning office GIS [12] seems to deviate 15 m in northing and 3 m in easting (mean difference of 7 triples of corresponding points in the satellite image, mainly corners of buildings), probably due to different coordinate reference systems. This is graphically corrected in the PDF maps, resulting in a precision of < 10 m.
- The national park trails map [13] has a precision of < 10 m due to its scale.
- The 1795 map [14] could not be georeferenced at all. It has been used as a general source only.
- The 1812 map [15] has not been georeferenced. It has been used as a general source only.
- The 1811-1829 map [16] has not been georeferenced. It has been used as a general source only.
- The 1839-1846 map [17] has not been georeferenced. It has been used as a general source only.
- The 1915 map [18] has not been georeferenced. It has been used as a general source only.

Recommendations for future work

An update of the map is foreseen for 2014. Following updates are recommended at least every five years. The following improvements are recommended.

- Mapping newly discovered sites or updated information on known sites, underwater archaeology sites, second world war sites, monumental trees and places of remembrance.
- Adding site data to the GIS layers, including St. Eustatius site ID's and digital site information.
- Adding distinctions between pre-colonial and historic sites and pre-colonial and historic expectancy zones.
- Mapping (protected) archaeological monuments (when indicated by island's local government).
- Mapping local government regulations and archaeological advice for different areas in St. Eustatius, as soon as St. Eustatius has developed a research agenda and has outlined requirements for archaeological research.

Acknowledgements

- The map was created by ARGEOgraph in MapInfo. M. Verbruggen (MA), director of RAAP Archeologisch Adviesbureau (the Netherlands), was so kind as to allow ARGEOgraph to use one of RAAP's MapInfo licenses.

Sources

- [1] Inventory of archaeological sites of St. Eustatius Center for Archaeological Research, version March 2013.
- [2] RTK GPS survey data acquired by Leiden University students in 2011 obtained from: Gilmore, R.G., M.L.P. Hoogland & C.L. Hofman, 2011. *An archaeological assessment of Cul-de-Sac (The Farm), (SE93 & SE133). Phase 2. St. Eustatius, Caribisch Nederland.* June-August, 2011. SECAR/Leiden University, Faculty of Archaeology. Fieldwork report, Leiden University.
- [3] RTK GPS survey data acquired by Leiden University students F. van Spelde and P. Soffers in 2012.
- [4] List of horizontal coordinates of DP reference points.
- [5] St. Eustatius topographic map by KLM Aerocarto, published by Cadastral Survey Department of the Netherlands Antilles in 1963.
- [6] WorldView-2 satellite image of 18 February 2011, purchased by SECAR from MapMart.
- [7] Versteeg, A.H. & K. Schinkel, 1992 (eds.). *The archaeology of St. Eustatius, the Golden Rock site.* The St. Eustatius Historical Foundation, St. Eustatius & The Foundation for Scientific Research in the Caribbean Region, Amsterdam. ELKA drukkerijen, Tilburg.
- [8] Handheld navigation GPS survey data acquired by dr. G. Gilmore during the Northern Hills survey in 2008.

- [9] *Topographic map St. Eustatia, Topographically Drawn & Humbly Dedicated to his Excellency General Vaughan Commander in Chief of His Majestys Forces in the West Indies created by P.F. Martin in 1781*, obtained from William L. Clements Library University of Michigan Manuscripts Division, John Vaughan Papers, Maps 7-F-8.
- [10] *Topographische kaart van Sint Eustatius schaal 1:20.000*, map printed by J. Smulders & Co. in 1916.
- [11] *Plaan van St. Eustatius, map created by an unknown cartographer in 1742*, obtained from Algemeen Rijksarchief 4.MIKO 339.
- [12] Topographic GIS layers obtained from planning office of Sint Eustatius.
- [13] Boven National Park and Signal Hill National park: Trail system map image trails_boven_hres.jpg obtained from STENAPA manager.
- [14] The Island of St. Eustatius corruptly St. Eustatia; created by William Faden in 1795. In: Schiltkamp J.A. & J. Th. de Smidt, 1978. *West Indisch Plakaatboek*. Emmering.
- [15] *Kaart van het Eiland St. Eustatius*; created by W. Blanken after 1812. Library Leiden University, Special Collections Department [Leeszaal Bijzondere Collecties], COLLBN 002-10-030.
- [16] *Topographical Chart of the Island Saint Eustatius*; created by Samuel Fahlberg between 1811 and 1829. Algemeen Rijksarchief 4. MIKO 1706.
- [17] *Topographische Kaart van het Eiland Sint Eustatius*; created by A.H. Bisschop Grevelink between 1839 and 1846. Algemeen Rijksarchief 4. MIKO 645.
- [18] *Topographische Kaart van Sint Eustatius*; created by J.V.D. Werbata in 1915. Algemeen Rijksarchief 4. MIKO 2107.

Relevant archaeological reports

- Eastman, J.A., 1996. *An Archaeological Assessment of St. Eustatius, Netherlands Antilles*. Unpublished MA Thesis, College of William and Mary, Department of Anthropology.
- Gilmore, R.G. & B.D. Goodrich, 1999, *An Archaeological Assessment of the Pleasures Estate, Sint Eustatius*. St. Eustatius Archaeological Research Series, Number 10. The College of William and Mary, Department of Anthropology.
- Gilmore, R.G., M.L.P. Hoogland & C.L. Hofman, 2011. *An Archaeological Assessment of Cul-de-Sac (The Farm). Phase 2, St. Eustatius, Caribisch Nederland*. Unpublished report, St. Eustatius Center for Archaeological Research / Leiden University, Faculty of Archaeology.
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- Stelten, R., 2010. *Relics of a Forgotten Colony: The Cannon and Anchors of St. Eustatius*. Unpublished MA Thesis, Leiden University, Faculty of Archaeology.
- Stelten, R., 2011, *Schotsenhoek Plantation Archaeological Watching Brief: Report on the November 2011 campaign in the Cul de Sac area, St. Eustatius, Caribbean Netherlands*. Unpublished report, St. Eustatius Center for Archaeological Research.
- Stelten, R., 2011, *NuStar Archaeological Watching Brief: Report on the February-April 2011 campaign in the Cul de Sac area, St. Eustatius*. Unpublished report, St. Eustatius Center for Archaeological Research.
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- Stelten R., 2012, *An Archaeological Assessment of Steward Plantation, St. Eustatius, Caribbean Netherlands*. Unpublished report, St. Eustatius Center for Archaeological Research.
- Stelten R., 2012, *Archaeological predictive model, Cul de Sac area (the Farm), St. Eustatius, Caribbean Netherlands*. Unpublished report, St. Eustatius Center for Archaeological Research.