

VineMAP Report

Customer name: vinescapes

Email: vinescapes

Telephone:

Reference:

Date: 22 July 2019

Products:

1. Topographic suitability & grading
2. Soil suitability information
3. Landcover suitability and designated 'protected' areas
4. Flood risk and access maps
5. All terrestrial reports (Reports 1 - 4)
6. Climate (including Frost Risk / Report No.7)
7. **Frost risk**
8. All terrestrial and climate suitability reports

Area coverage: 11.4 hectares (ha)

Location: Stanford le Hope, England, United Kingdom

National Grid reference: TQ 687 857

Report description:

This report was generated using Vinescapes' Vineyard suitability Mapping and Assessment Program (VineMAP), powered by maploom. Maps, data, scoring and results within this report are provided to assist in viticulture suitability assessments. Where serious consideration is being given to establishing a vineyard on land evaluated within this report professional expertise should be sought from Vinescapes to advise on and undertake additional analysis. This includes detailed soil assessments, site and soil amelioration requirements, vineyard design, variety and planting material recommendations, business planning and project management. This report should not be relied on as the sole determinant for viticulture suitability, vineyard establishment or wine production business ventures.

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Site Overview – Stanford le Hope, England, United Kingdom

Variable	Result	Suitability score
Topography	-	-
Elevation	-	-
Aspect	-	-
Slope	-	-
Soil	Undetermined	Undetermined
Suitable landcover	-	
Area with no protected status	-	
Excellent potential vineyard area	-	
Good potential vineyard area	-	
Low potential vineyard area	-	
	10-year averages	Suitability score
Growing season* average temperature (GST)	-	-
Growing Degree Days (GDD)	-	-
15th March - 31st May frost days	3.6	5/20
Average frost temperatures	-1.1°C	10/20
Growing season rainfall	-	-
June rainfall	-	-
Combined climatic suitability	-	-

* The growing season in England is roughly April to October

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Frost risk

Frost

Frosts, especially radiation frosts during mid-March – May are amongst the most common detrimental effects of minimum temperature extremes on *Vitis vinifera* L. grapevines. Notwithstanding frost protection, they pose a significant economic risk to vineyards. Frost events can kill or severely damage emerging buds and shoots and reduce yields and grape quality parameters. Cool-climate wine producing regions are particularly exposed to the risk of early season frost events when the advancement of budburst occurs in response to increased spring air temperatures.

Days of air frost ($\leq 0^{\circ}\text{C}$) are provided in this report for the 15th March – 14th April and the 15th April – 31st May. During the latter period buds, inflorescences and young shoots are likely to be at a higher risk of damage as they are more exposed. However, degree of exposure / development will depend on varietal, clone and seasonal weather conditions at the vineyard location as well as vineyard management.

Notwithstanding frost protection, frost risk is also a function of cold air flow and drainage through and from a vineyard site. Under radiation frost conditions cold air will flow downslope until its route is obstructed by vegetation, physical constructs or topography. At this point cold air will accumulate and cause a risk to vines.

Frost event data and coverage

Frost event / meteorological data used in VineMAP for 2008–2017 is provided through a 2.5 x 2.5km gridded re-analysis of interpolated weather station data covering England (Source: Irish Meteorological Service reanalysis, powered by Weatherquest Ltd.).

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Frost risk

Results

The 10-year average of frost days, in the locality of the selected land, is considered **high risk**.

The sub-zero temperature average is considered **high risk**.

This risk rating is relative to the ability of cold air to drain adequately from the land (see below for cold air flow and accumulation maps) and frost protection, **BUT** please note that only 1 frost event can cause significant damage to young buds and shoots.

Climatic variable	Result	Classification	Score	Notes
Frost days (15th March - 31st May)	3.6	>5 (extreme risk)	0/20	For results showing moderate risk or above please view the Cold Air Flow and Cold Air Accumulation maps for an indication of in-site risk locations and contact Vinescapes for frost protection advice.
		3-5 (high risk)	5/20	
		1-3 (moderate risk)	10/20	
		0-1 (low risk)	15/20	
		0	20/20	
Average frost temperatures (15th March – 31st May)	-1.1	< -3 (extreme risk)	0/20	For results showing moderate risk or above please view the Cold Air Flow and Cold Air Accumulation maps for an indication of in-site risk locations and contact Vinescapes for frost protection advice.
		-2 - -3 (high risk)	5/20	
		-1 - -2 (moderate risk)	10/20	
		-0 - -1 (low risk)	15/20	
		0	20/20	

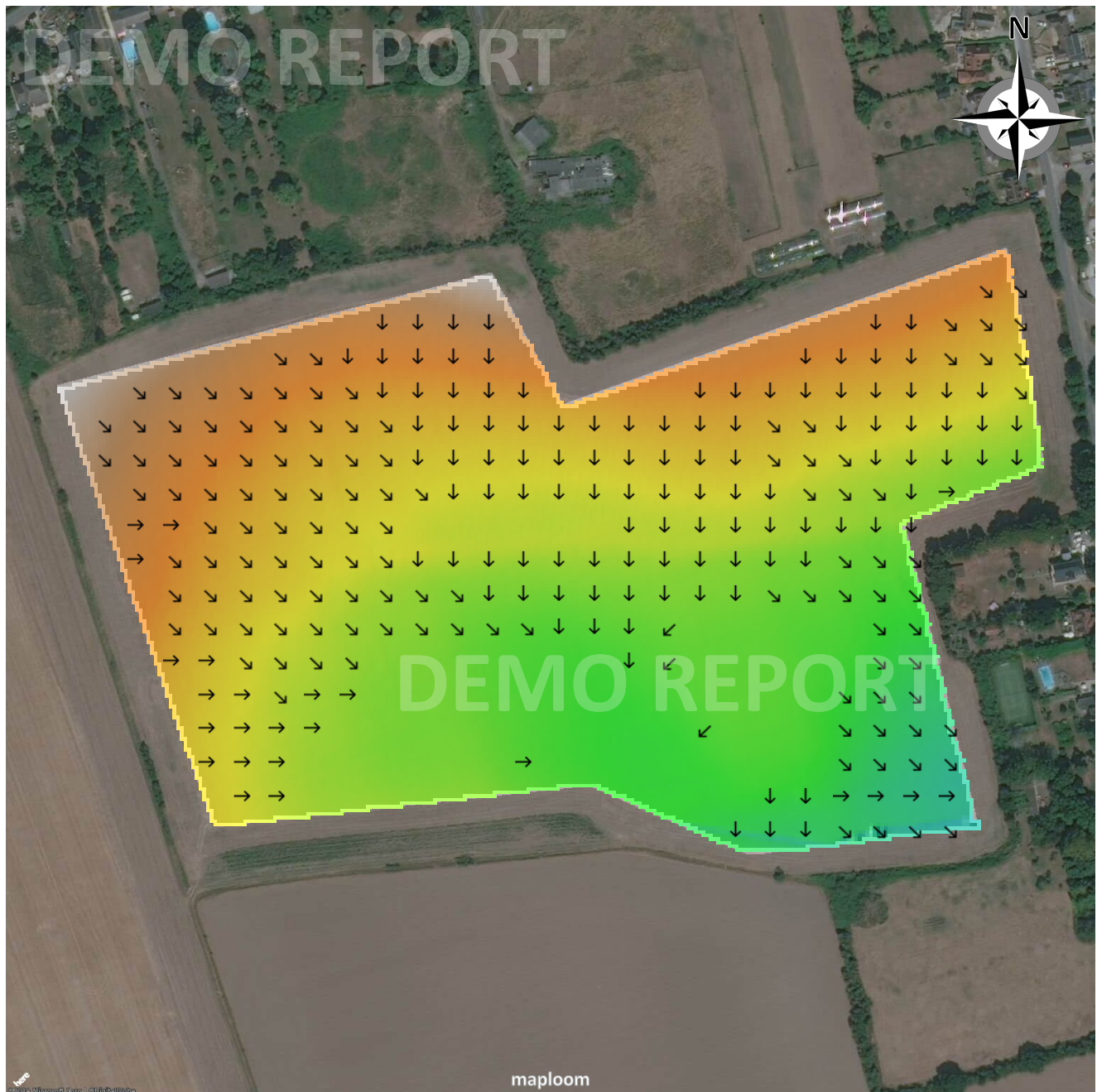
Climatic variable	Year	15/03 - 14/04	15/04 - 31/05	Minimum temperatures recorded on the frost days
Yearly 15th March - 31st May frost days and temperatures		Days < 0°C	Days < 0°C	
	2017	0	1	-0.8
	2016	0	2	-0.1,-0.2
	2015	1	0	-1.6
	2014	1	0	-0.5
	2013	15	2	-0.5,-1.1,-0.4,-0.6,-2,-2.7,-2.3,-2.8,-1.6,-2.5,-0.5,-0.7,-0.3,-0.5,-3.7,-0.4,-0.2
	2012	1	1	-1.5,-1
	2011	2	0	-1,-0.2
	2010	0	0	
	2009	3	0	-0.6,-0.9,-0.1
	2008	7	0	-1.8,-1.7,-1.4,-1,-1.2,-2,-0.2
	Average	3.0	0.6	-1.1

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Cold air flow

Resolution: 2m
 Data source: LiDAR Digital Terrain Model

0 m 200 m



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Cold air flow. This map shows the terrain and slope direction of the selected area. Under radiation frost conditions cold air flows down slope and has the potential to be trapped where surface features (e.g. trees, hedges or buildings) form barriers to prevent the cold air from dispersing. Areas where arrows converge or the flow meets natural barriers have the potential for frost risk as cold air may accumulate and engulf planted areas.

Elevation legend

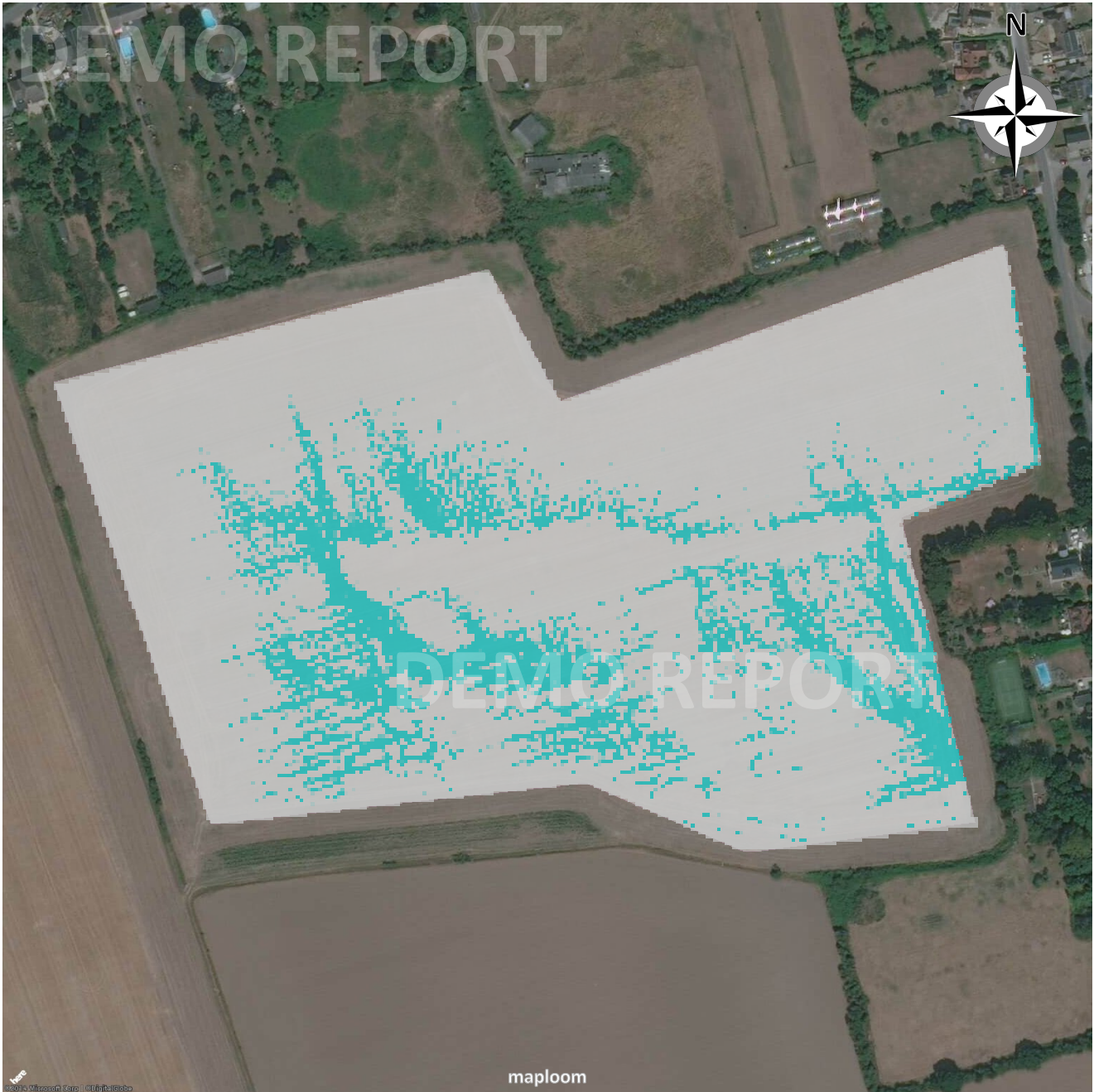
- 12.1-14.3 m
- 14.8-17.0 m
- 17.5-19.7 m
- 20.2-22.4 m
- 22.9-25.1 m
- 25.6-27.8 m

flow direction

Cold air accumulation

Resolution: 2m
Data source: LiDAR Digital Terrain Model


0 m 200 m



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Potential cold air accumulation / radiation frost risk areas. In addition to the cold air flow map, this cold air accumulation map provides some indication of the potential for areas where cold air could converge. This is based on a hydrological metric (topographic index) which calculates “wetness” per grid cell based on modelled water flow from the contributing “upstream” area. The light green areas show higher accumulation from a larger contributing up-slope area (and therefore have a greater potential frost risk) than the darker areas. While water and cold air do not behave exactly the same (and cold air sits above the surface), this map is a proxy for where cold air is likely to accumulate and present a radiation frost risk.

Cold air legend

 Greatest cold air accumulation / radiation frost risk areas

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Mapping

Overview

Mapping for this report was generated using the maploom platform. This is a cloud based geospatial analysis and modelling platform that uses open standards and open source analysis tools to deliver a wide range of location-based insights to non-specialist users. Further details can be found at www.maploom.com.

Mapping Datasets

The geospatial datasets used within the report are predominantly drawn from open source datasets. For each map, the data sources and relevant citations are provided.

Further details are summarised below:

Dataset	Map In report	Source	Credit / Disclaimer
Aerial Photography	Extensive use throughout the report	HERE	© HERE, 2019
LiDAR	Extensive use throughout the report	Environment Agency	© Environment Agency copyright and/or database right 2019. All rights reserved.
SSSI - Sites of Special Scientific Interest LNR - Local Nature Reserves NNR – National Nature Reserves SAC – Special Areas of Conservation SPA – Special Protection Areas	Environmental designations	Natural England	© Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right 2019.
Registered Battlefields Registered Parks and Gardens Listed Buildings Scheduled Monuments Building Preservation Notices Certificates of Immunity	Historical Designations	Historic England	© Historic England 2019. Contains Ordnance Survey data © Crown copyright and database right 2019.
World Heritage Sites	Historical Designations	UNESCO	© Historic England 2019 / UNESCO. Contains Ordnance Survey data © Crown copyright and database right 2019.
OpenMap Local	Site Overview: Access	Ordnance Survey	Contains OS data © Crown copyright and database right 2019.
Flood zones 2 and 3	Flood Risk	Environment Agency	© Environment Agency copyright and/or database right 2019. All rights reserved.
CEH Land Cover Map 2015	Land Cover	Centre for Ecology and Hydrology	Rowland, C.S.; Morton, R.D.; Carrasco, L.; McShane, G.; O’Neil, A.W.; Wood, C.M. (2017) Land Cover Map 2015 (25m raster, GB). NERC Environmental Information Data Centre. https://doi.org/10.5285/bb15e200-9349-403c-bda9-b430093807c7



Vinescapes provide wine production services, knowledge and innovation to the English viticulture sector. Vinescapes work with prospective, new and established wine producers to achieve outstanding wine quality and successful business ventures. We can take your vineyard idea from conception to delivery starting from business planning & site selection through to the successful establishment of a vineyard & winery.

Our staff and partners are trusted experts with international acclaim and years of experience delivering the highest quality grape growing and winemaking. We combine to bring our knowledge, expertise and passion to wine businesses across the UK. We provide vineyard assessments (land & climate), vineyard project management & consultancy, winery design & construction, business planning and innovative research & training services.

Aware of the opportunities and risks in English wine production we bring a considered but enthusiastic approach to our work and provide a friendly, high-quality service.

Please contact us at info@vinescapes.com for more information or call us on 07967602670.