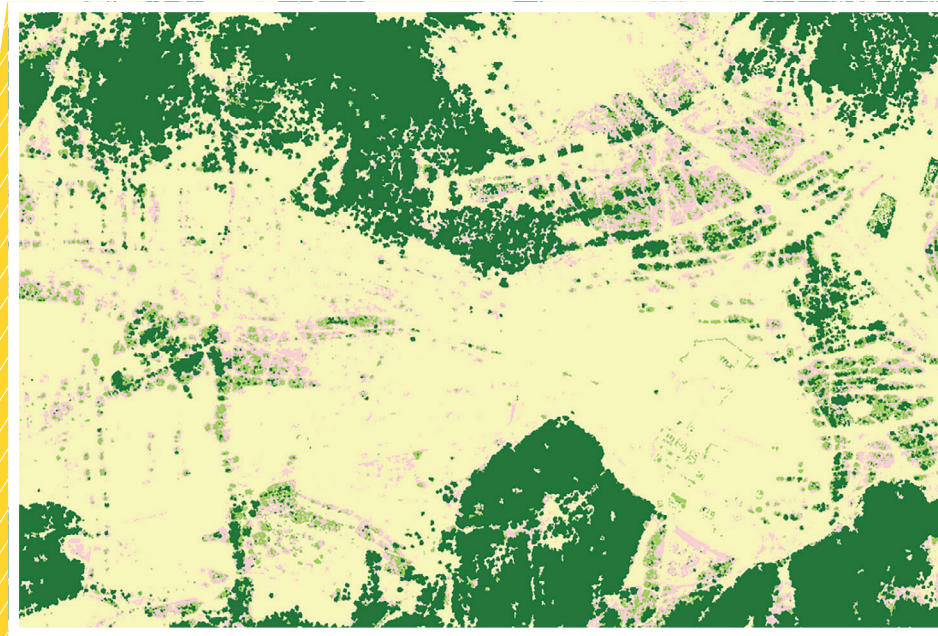


# Evaluation Monitoring

LIDAR has also been used to monitor land use and land cover changes. Comparison analysis of temporal LiDAR datasets coupled with multispectral imagery highlights distribution and growth rates of woody vegetation, a significant encroachment issue for open maneuver land. Findings strongly support prioritization of ITAM land maintenance activities.

Object-based image analysis yielded reliable and cost-effective information regarding the status of shrub encroachment. The results allowed for enhanced planning and control of future activities by, e.g., more effectively locating and calculating the size of suitable areas for clearance cutting; providing polygons and coordinates to GPS-guided machines; and minimizing on-site support to contractors by improving area prioritization, designating special focus areas, estimating time and material needs and costs and directing contractors' work and invoicing.



## Vegetation Classification

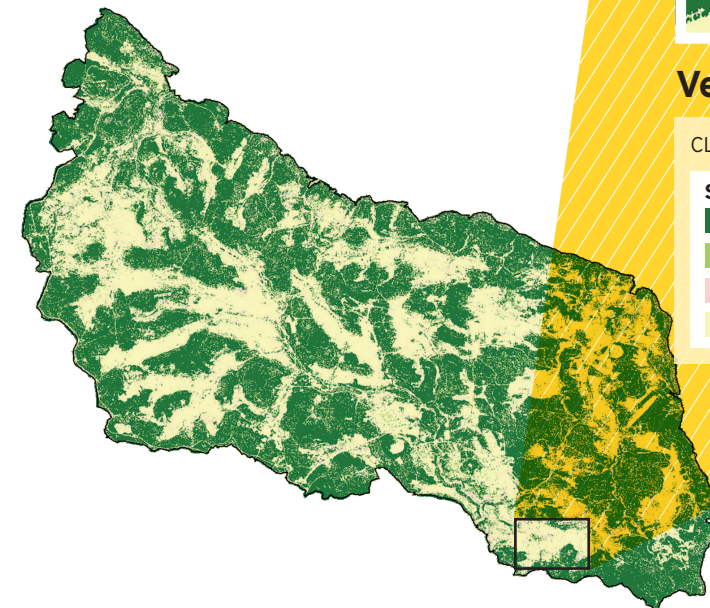
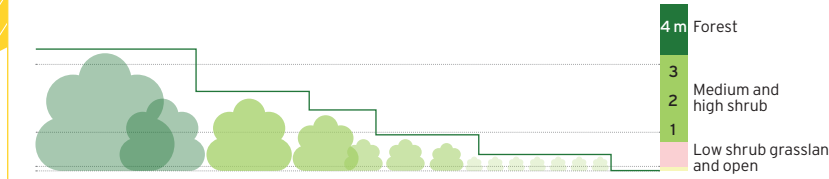
### CLASSIFICATION RESULTS FOR 2012

**Status 2012**

- Forest
- Medium and high shrub
- Low shrub
- Grassland and open

HEIGHT CLASSES	% OF CLASSIFIED AREA 2007	% OF CLASSIFIED AREA 2012
4 m	51.7	50.4
3	1.6	2.4
2	5.7	6.8
1	41.1	40.4

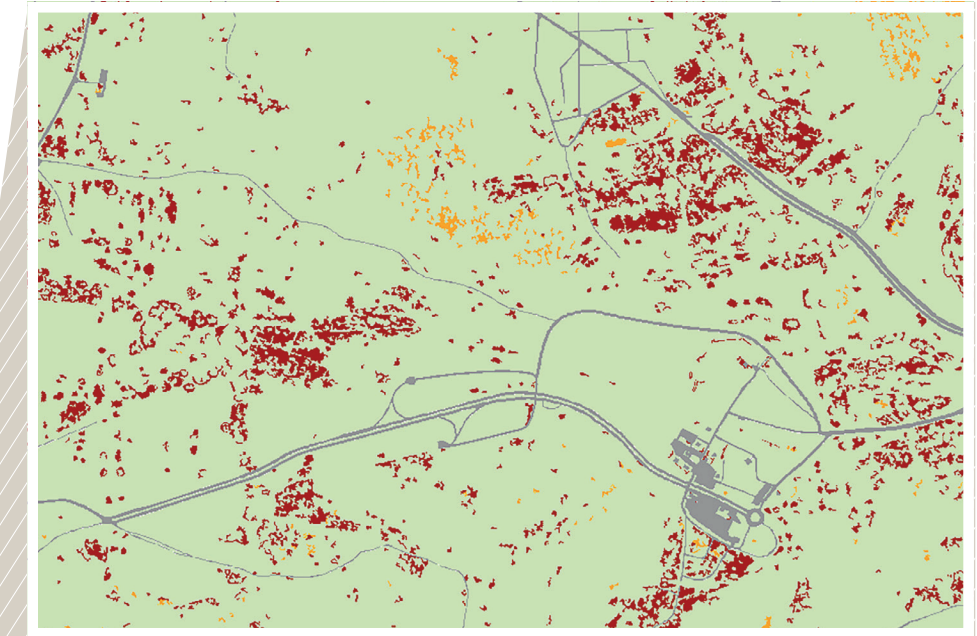
### HEIGHT CLASSIFICATION 2007 & 2012



## BENEFITS OF LAND MANAGEMENT

SHRUB STATUS	LOW	MEDIUM	HIGH
<b>Management action</b>	Grazing, mowing, training activities, spot burning	Mowing, mulching, large-scale burning	Mechanical removal
<b>Approximate cost*</b>	30,000 USD/km <sup>2</sup>	55,000 - 700,000 USD/km <sup>2</sup>	400,000 - 1,000,000 USD/km <sup>2</sup>

\* Costs calculated following FRIELINGHAUS 1998, TAMPE AND HAMPICKE 1995, KELLERMANN AND REINÖHL 1997, LUICK 1995 and DLZ 1994



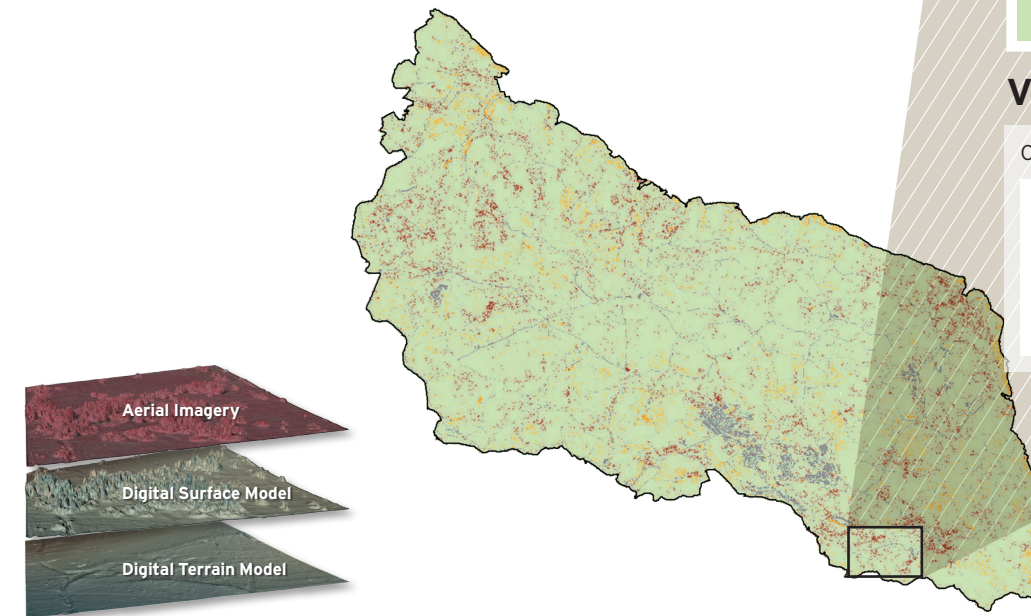
## Vegetation Change Analysis

### CHANGE ANALYSIS

**Shrub Encroachment 2007 - 2012**

- No change
- Moderate change
- Significant change
- Infrastructure

CHANGE (%)	Value
No change	88.7
Moderate change	3.8
Significant change	4.2
Infrastructure	3.3



2007 - 2012	GRASSLAND AND OPEN	LOW SHRUB	MEDIUM AND HIGH SHRUB	FOREST
Grassland and open	Grassland and open	Shrub grown	Shrub grown	LiDAR data error
Low shrub	Mulched	Shrub constant	Shrub grown	LiDAR data error
Medium and high shrub	Mulched	Shrub constant	Shrub constant	New forest
Forest	Clear cut	Clear cut	Forest	Forest constant