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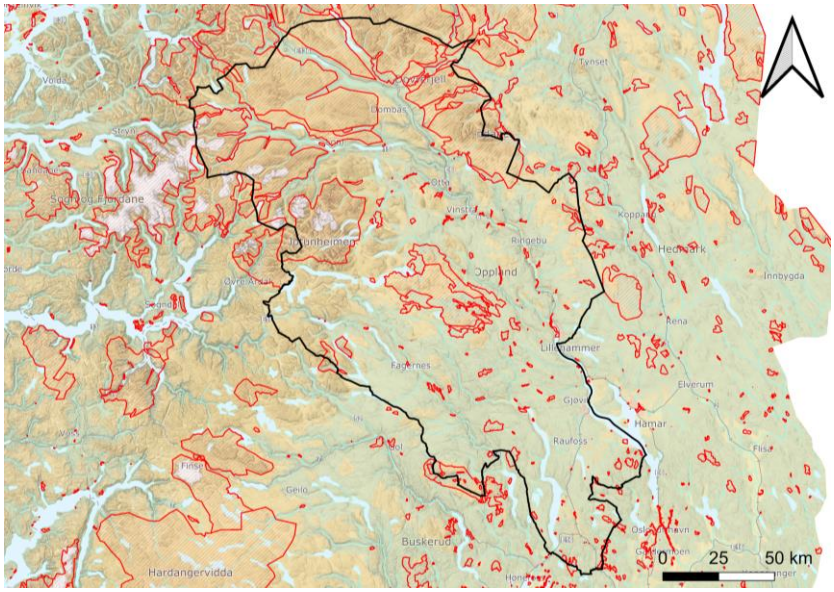
PROTECTED AREAS



Caption Protected areas (in red) in and around the county of Oppland, Norway (source: Kartverket.no)

PRODUCT DESCRIPTION

Category

☒ Topographic information	☐ Surface deformation
☐ Impact assessment	☐ Precision ortho-images
☐ Change detection / continuous monitoring	☒ Terrain information
☒ Land cover / use	☐ Water quantity & quality
☐ Near surface geology	

Uses

Exploration, Environmental Assessment & Permitting

- Baseline information to assess and minimise the potential impact of mining activities on nearby protected areas.

Design, Construction & Operations

- Baseline information for site design and layout infrastructure and progressive rehabilitation steps

Mine Closure & Aftercare

- Baseline information for rehabilitation/revegetation steps

Challenges addressed

Exploration – Mapping Infrastructure

Permitting Process – Restricted Lands

Development and Operations – Existing Infrastructure

Development and Operations – Site Layout Design

Development and Operations – Affected Land Status

Closure and Aftercare – Environmental Monitoring

Closure and Aftercare – Affected Stakeholders

Geo-information needs

E-4: Infrastructural mapping;

P-10: Protected areas

DO-1: Access to site - national roads, rails...;

DO-2: Site design and layout infrastructure;

DO-4: Land disturbed by mining activities;

CA-1: Demonstration of rehabilitation/revegetation;

CA-2: Characterisation of flora and fauna;

CA-6: Demonstrate no impact on special area of conservation;

CA-8: Farming activities - confirm the return to baseline conditions for crops/animals

Description

This product provides an overview of the protected areas in the region of interest. Their mapping and locations relative to the potential mining site are of importance in the exploration, assessment and approval steps of the mining cycle. Products such as *Natura2000* (protected areas in the European Union), location of national parks, conservation areas and cultural heritage (i.e., types of protected areas) are often directly available from national mapping authorities. In the eventually of such product being unavailable or of insufficient accuracy, the locations of protected areas can be directly extracted from optical imagery products (provided the help of a biologist/environmental engineer with local knowledge).

A summary of the most used satellites (on which, optical sensors are available) are given in the table of the input data sources section.

Known restrictions / limitations

Spatial resolution of the boundary of protected areas from satellite-based EO are relatively coarse and may require additional refinement depending on the distance from

the potential mining area.

Lifecycle stage and demand

Exploration	Environmental Assessment & Permitting	Design, Construction & Operations	Mine Closure & Aftercare
■■■	■■■■	■■	■■

Geographic coverage

Demand and coverage are global.

EARSC Thematic Domain

Domain – Land

Sub-domain – Land use

Product description – Assess land value, ownership and type

PRODUCT SPECIFICATIONS

Input data sources

Satellite	*Sentinel-2*	*Landsat-8*	*GeoEye-1*	Worldview-1, 2 and 3	SPOT 6, 7	Pleiades
Status	In operation	In operation	In operation	In operation	In operation	In operation
Operator	ESA	NASA	Digital Globe	Digital Globe	Airbus	
Data availability	Public	Public	Commercial	Commercial	Commercial	al
Resolution (m)	10 - 60	15 - 100	0.46	0.31 - 0.46	1.5	0.5
Coverage	Global	Global	Global	Global	Global	Global
Frequency (day)	5	16	< 3	< 2	< 1	< 1
Launch year	2015	2013	2008	2007/2009/2014	2012/2014	2011

Website	link	link	link	link	link	link

NOTE: Airborne and drone imagery products for local and regional analysis might also be used in order to obtain higher image resolution.

Minimum Mapping Unit (MMU)

Minimum detectable feature size (d*ependent on input pixel resolution, ~1 – 3* px)

Accuracy / constraints

Thematic accuracy:

Protected areas should be detected given the fact the areas are larger than the minimum detectable feature size.

Spatial accuracy:

Dependent on the input pixel resolution; typically, *~0.5 - 1* pixel.

Accuracy assessment approach & quality control measures

Dependent on the input pixel resolution; typically, *~0.5 - 1* pixel.

Frequency / timeliness

Digitalization of protected areas (if not available) from imagery products can be completed within a few hours/days of work, dependent on the extent of the potential mining area and the presence of nearby protected areas (one-time task).

Availability

Data from Sentinel satellites are freely available through the open data policy of the European Space Agency. Data is made available typically within 6-12 hours of satellite fly-over.

GeoEye-1, Worldview, SPOT and Pleiades data are commercially licensed and must be purchased through operator/vendor. Usually available within hour(s) of satellite fly-over.

Airborne and drone imagery products can be purchased through operator/vendor. Usually available within hours or days after acquisition.

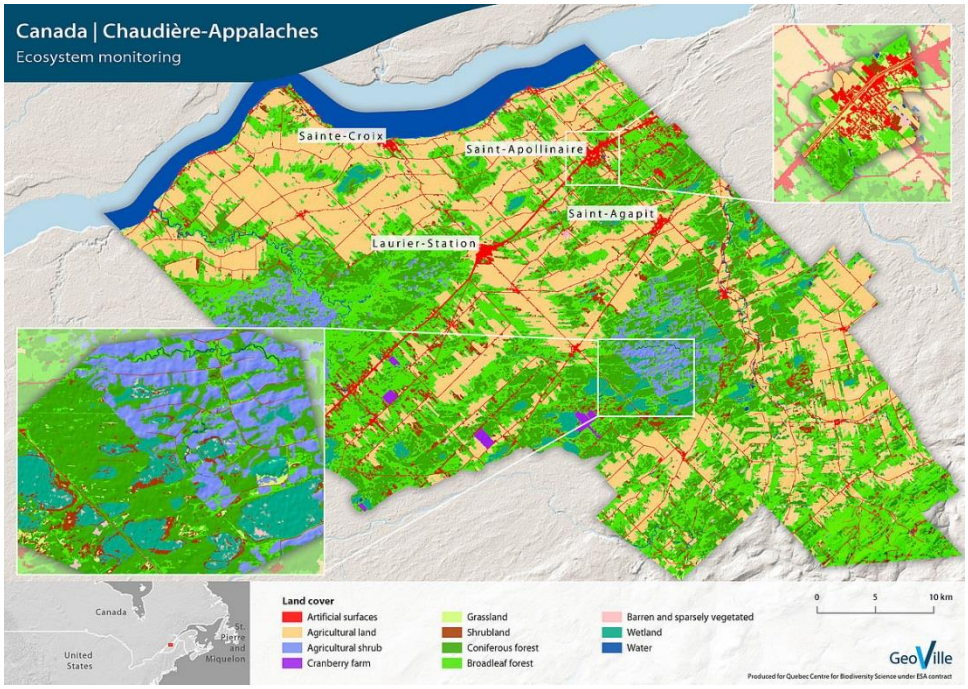
Delivery / output format

Protected areas

Map of protected areas (national parks, cultural locations…) in the region of interest

Output: vector formats - shapefile, client-specified spatial formats, report on key indicators

USE CASE



Canada Appalaches – Ecosystem monitoring

The aim of this project was to assess the ecosystem of the entire Chaudiere-Appalaches region in Canada. A detailed very high-resolution land cover classification was provided for the region. This method may also be applied in the mining sector to identify areas (of conservation) which may need to be protected/avoided during mining operations.