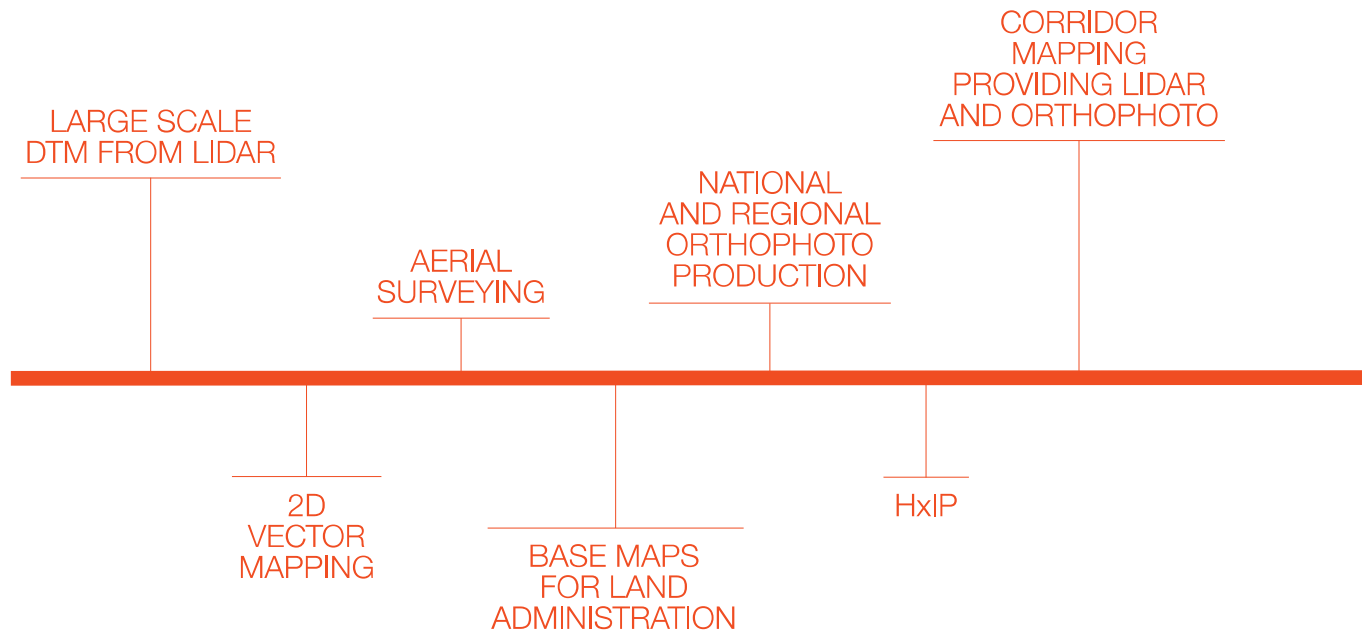


# THE FULL RANGE OF COWI MAPPING



# THE FULL RANGE OF SPECIALIST SERVICES



## LARGE SCALE DTM FROM LIDAR



### LIDAR IN SWEDEN

COWI has executed a large part of the airborne LIDAR data collection for the production of a new national height model in Sweden. Sweden is covering 450.000 km<sup>2</sup>.

COUNTRY Sweden | PERIOD 2009–2014  
CLIENT Lantmäteriet, Sweden

## NATIONAL AND REGIONAL ORTHOPHOTO PRODUCTION



### ORDNANCE SURVEY

Since 2002 COWI has acquired images and mapped an impressive number of square kilometres, providing orthophoto and DTM products as well as vector mapping. With the latest 2014 contract we will continue to produce update of topographic map database.

COUNTRY Great Britain | PERIOD 2002 – 2019  
CLIENT Ordnance Survey Great Britain

## CORRIDOR MAPPING PROVIDING LIDAR AND ORTHOPHOTO



### RAILWAY DTM AND ORTHOPHOTO IN TANZANIA

COWI won the study and design of upgrading three railway lines in Tanzania. COWI Mapping will deliver a highly accurate LiDAR DTM and an orthophoto mosaic from aerial photography for a total of 1400 km corridors.

COUNTRY Tanzania | PERIOD 2013  
CLIENT Ministry of Transportation

## BASE MAPS FOR LAND ADMINISTRATION



### UGANDA

COWI and PASCO JV have been awarded a World Bank funded project to provide digital aerial photography covering the entire Uganda. Deliverables will be a DTM and digital orthophoto.

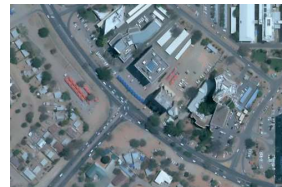
COUNTRY Uganda | PERIOD 2015–2017  
CLIENT Ministry of Lands, Housing and Urban Development

### TANZANIA

COWI has been awarded a World Bank funded project to provide digital aerial photography of 4,300 km<sup>2</sup> covering the greater Dar-es-Salaam Metropole.

COUNTRY Tanzania | PERIOD 2016–2017  
CLIENT Ministry of Lands, Housing and Human Settlements Development

## AERIAL SURVEY



### BOTSWANA

During 2015, COWI's survey aircraft have captured 100 settlements totaling almost 9,000 km<sup>2</sup> at 25 cm GSD. The imagery was used to create a DTM and digital orthophoto, which will be used by DSM for line map updating and general planning.

COUNTRY Botswana | PERIOD 2015  
CLIENT Department of Surveys & Mapping

## EUROPE – ORTHOPHOTO IN 30 CM & DSM



COWI is a part of the HxIP program and is acquiring and producing

## CORRIDOR MAPPING PROVIDING LIDAR AND ORTHOPHOTO

80 cm Digital Surface Model & 30 cm colour and NIR orthophoto covering Europe and the USA. The data are offered to all interested clients and shipped via FTP, hard disc or instantly available through WMS.

COUNTRY Europe | PERIOD 2015–2017

## 2D VECTOR MAPPING



### BOTSWANA

In 2015, COWI was contracted by the Department of Surveys & Mapping to provide revised digital line map data for 10 settlements in Botswana. The scope of the project was to update the existing digital line maps of 10 settlements at 1:5000 scale using satellite imagery acquired in 2013/2014. In addition, COWI provided capacity building and skills development training for DSM staff members at COWI's mapping facility in India.

COUNTRY Botswana | PERIOD 2015–2017  
CLIENT Department of Surveys & Mapping

## 2D/3D VECTOR MAPPING

### MGCP HIGH RESOLUTION VECTOR DATA

Since 2007 COWI has produced High Resolution Vector Data for the Danish, Norwegian and Swedish Armed Forces' contribution to

## LEAK DETECTION IN PIPELINE NETWORKS FROM THERMAL SURVEYS

## 2D/3D VECTOR MAPPING

## 3D CITY MODELLING

## INDUSTRIAL HIGH DEFINITION SURVEYING

## HIGH RESOLUTION ORTHOPHOTO

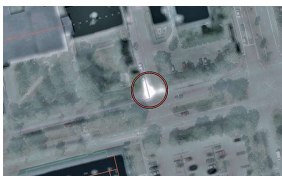
## COWI PANORAMIC VIEW

## UAV MAPPING

the Multinational Geospatial Co-Production Program (MGCP). The production has included vector mapping in scale 1:50,000 and 1:100,000 of more than 2.2 mil. km<sup>2</sup>.

**PERIOD** 2007–2018 | **CLIENT** Norwegian Defence

## LEAK DETECTION IN PIPELINE NETWORKS FROM THERMAL SURVEYS



AERIAL THERMOGRAPHIC SURVEY OF DISTRICT HEATING SYSTEMS IN NETHERLANDS

The purpose of the project was to detect leaks within the pipeline network by using aerial thermal surveys. The thermograms were analyzed to identify temperature anomalies in order to target possible leakage sites in the network.

**COUNTRY** The Netherlands | **PERIOD** 2013  
**CLIENT** District heating company

## INDUSTRIAL HIGH DEFINITION SURVEYING



OFFSHORE 3D LASER SCANNING AND 3D SURVEY IN THE NORTH SEA During the summer 2014, Maersk Oil had to replace two flare towers on the Tyra fields. COWI was assigned to perform 3D surveys during onshore fabrication and offshore installation. Terrestrial laser scanners were used for as built documentation and hook up spool design, 3D surveys by total stations were conducted to create benchmark networks and dimensional control. Advanced multi stations were used for mating procedures and clearance check and COWI Kinect was used for as built documentation of fabricated hook up spools. The replacement was a high risk profile project with very tight schedule due to the total shutdown required. COWI mobilized 5 skilled surveyors for the offshore hook up with close to 700 hrs.

**COUNTRY** Denmark/Offshore | **PERIOD** 2014  
**CLIENT** Maersk Oil & Seaway Heavy Lifting

## HIGH RESOLUTION ORTHOPHOTO



ORTHOPHOTOS OF DENMARK COWI has this summer again completed the production of a nationwide orthophoto product for Denmark. The first full coverage was made back in 1995.

**COUNTRY** Denmark | **PERIOD** 1995–2016

## 3D CITY MODELLING



GENEVA 3D, SWITZERLAND The canton of Geneva awarded COWI to generate a detailed 3D city model of the entire canton. This included approx. 76.000 buildings and 30 Landmarks.

**COUNTRY** Switzerland | **PERIOD** 2008–2009  
**CLIENT** Canton of Geneva

ZURICH 3D, SWITZERLAND The city of Zurich awarded COWI a contract to produce a detailed 3D model of the complete city of Zurich including approx. 50.000 buildings.

**COUNTRY** Switzerland | **PERIOD** 2010–2011  
**CLIENT** The City of Zurich

## UAV MAPPING



RESEARCH STATION ZACKENBERG AND KOBBERJORD In 2014, COWI completed the largest UAV mapping project to date. An area of 60 km<sup>2</sup> at Zackenberg was covered with both RGB and NIR sensors, hence, a total of 120 km<sup>2</sup>

was completed during a period of 3 weeks. In 2015, COWI conducted UAV Mapping of research station Kobbefjord with NIR and RGB sensors. An orthophoto and terrainmodel was the result of both projects.

**COUNTRY** Greenland | **PERIOD** 2014 and 2015  
**CLIENT** Aarhus University, Institute for Bioscience

## COWI PANORAMIC VIEW



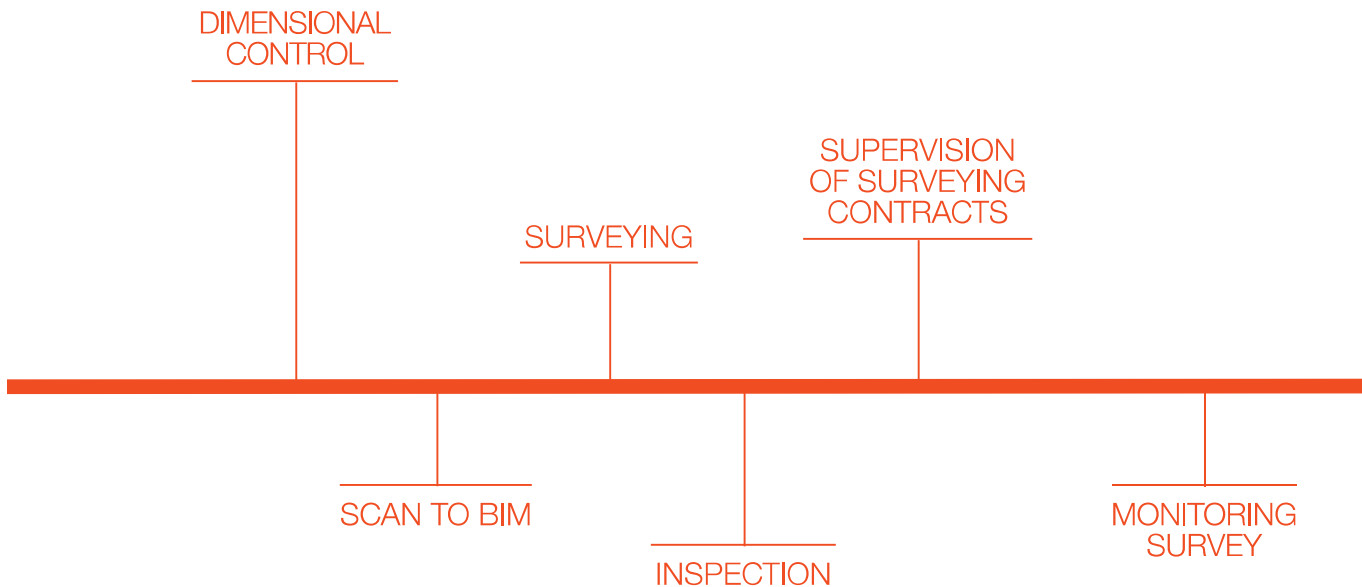
COWI PANORAMIC VIEW OF DANISH ROADS

360° panoramic images have been acquired covering the full road network in Denmark corresponding to more than 100.000 km. Each CPV-image (COWI Panoramic View) is geocoded and accessed through our image server. The data will be used by a broad variety of customers from the public administration and municipalities to finance, insurance, rescue and emergency and consulting engineers.

**COUNTRY** Denmark | **PERIOD** 2016

COWI PANORAMIC VIEW OF NEW YORK WATER FRONT

COWI initiated May 2015 a project in New York acquiring 360° photos along the 750 km shoreline. Our system was mounted on all sorts of vessels from speed boat, dinghy, barge and even a kayak. The client



has access to the result by using COWI's web-based viewer.

COUNTRY USA | PERIOD 2015

## SCAN TO BIM



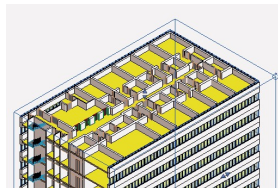
### HANDHELD SCANNING OF PROPERTIES

The Municipality of Helsingør in Denmark appointed COWI's survey group to update 2000 existing 2D drawings of their properties, which include schools, sports-, and culture and administration buildings. The total number of buildings is 400 with more than 16,000 rooms and 392.000 m<sup>2</sup>. COWI utilizes the state-of-the-art handheld scanner, the COWI SLAM. The result is a 3D point cloud that is the basis for an update of the existing drawings.

COUNTRY Denmark | PERIOD 2014-2015  
CLIENT Helsingør Kommune

### 3D BUILDING DOCUMENTATION

Documentation and mapping of high rise building in Copenhagen by use



of COWI SLAM handheld scanning system. The scanning acts as basis for modelling of "as is" REVIT Building Information Model (BIM). The BIM will be used for operation and maintenance and planning of modernization.

COUNTRY Denmark | PERIOD 2016  
CLIENT The Rezidor Hotel Group

### HEATING CENTRAL

3D laser scanning of heating central for creation of 3D BIM model. The project was to cover the actual building with all construction details for facility management purposes and the full extends of the plant for an upgrade and refurbishment project. A high detail point cloud was created from static laser scanning and the 3D BIM model was produced at our production facilities in India.

COUNTRY Denmark | PERIOD 2013-2014  
CLIENT Dantoss

## DIMENSIONAL CONTROL



### 3D DIMENSIONAL CONTROL OF BRIDGE BASCULES

Survey of tracks, terrain and technical equipment on the section from Svanemoellen to Hellerup by use of Amberg GRP5000 laser scanning and GRP 1000 track geometry system. A total of 16 km rails where surveyed and txt and vector files (according to norm BN2-94-2) were delivered to client.

COUNTRY Denmark and Poland | PERIOD 2016  
CLIENT Banedanmark

## INSPECTION



UAV supplements manual inspection of a tall building in Copenhagen. The client/specialist post-inspect the structure using COWI Virtual Inspection (CVI) which combines 3D model overview with 2D details (images). Annotations are simultaneously added to both 2D images and the 3D model and can be reported as e.g. PDF for future inspection purposes.

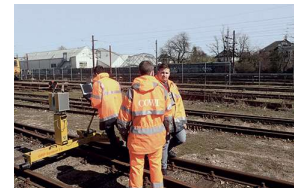
COUNTRY Denmark | PERIOD 2016  
CLIENT Nordes Ejendomme

## SURVEYING

### SUBSIDENCE SURVEY OF OIL PLATFORMS

Subsidence survey campaign in the Al Shaheen field, Qatar. Precision GNSS, benchmark network survey and levelling of 33 offshore platforms.

COUNTRY Qatar | PERIOD 2011-2012  
CLIENT Maersk Oil Qatar



### SURVEY OF THE RAILWAY

Survey of tracks, terrain and technical equipment on the section from Svanemoellen to Hellerup using the Amberg GRP5000 laser scanning and GRP 1000 track geometry system. A total of 16 km rails where surveyed and txt and vector files (according to norm BN2-94-2) were delivered to the client.

COUNTRY Denmark | PERIOD 2016  
CLIENT Banedanmark

## MONITORING SURVEY



### UDDEVALLA BRIDGE

A comprehensive monitoring program has been carried out on the Uddevalla bridge, which is 1712 meter long and has 414 meter main span. A first order network including inklinometer, GNSS and precise levelling on all vital points was successfully established.

COUNTRY Sweden | PERIOD 2008-2011  
CLIENT Trafikverket

COWI's mapping business is based on a broad **range of specialist services**.

We are consistently delivering **value** to our international customers and partners.

We offer the full range of value added services to compliment the provision of geospatial data, including **aerial-, UAV-, mobile- and terrestrial surveys**.



## COWI MAPPING – YOUR 360° PARTNER

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- COWI Mapping projects



### WANT TO KNOW MORE

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### POWERING YOUR 360° SOLUTIONS

COWI is a leading consulting group that creates value for customers, people and society through our 360° approach. We tackle challenges from many vantage points to create coherent solutions for our customers.