

Profits Boosted by 10% in Scotland

Earthworks contractor Ground Developments builds Scottish wetlands project with Trimble Business Center – HCE and 3D Grade Control



Cowdenbeath
Scotland

Location

Initiated in 2013 by Scottish Water, the aim of the Cowdenbeath Wetlands Project is to treat heavily-polluted stormwater from two separate overflow streams in the area. Ground Developments (GDL) was appointed by Barhale Construction to evolve a remediation scheme and construct technically challenging geotechnical solutions for the wetland treatment facility. As part of the design, the surrounding wetland area was also selected to be transformed into an ecosystem that adds to the diversity of wildlife in the area.

Looking to gain efficiencies on the project, GDL equipped its dozers and excavators, and Deep Soil Mixing (DSM) equipment with the Trimble GCS900 3D Grade Control System. 3D design data for the machine was prepared using Trimble Business Center - Heavy Construction Edition.

Julius Newman, technical director for GDL, explains that the team selected the Trimble software because he was looking for office software to effectively manage, analyse and process construction data.

"We use Business Center - HCE in a variety of ways," says Newman. "For the Cowdenbeath project, we took initial site topo surveys and CAD files to build 3D design models. While we prefer true survey data, we couldn't access this until we started carrying out work on site ourselves. We quickly found errors in previous surrounding work. Business Center - HCE has a 'flag'

system, where the program identifies potential conflicts at the time of processing data, enabling our engineer to identify conflicts with original, and 'erroneous' data quickly and before construction work starts. From here, we re-established site control, and utilised both Trimble Total Station and GPS-based Site Positioning Systems to support site construction works."

During the design phase, GDL used Business Center - HCE to process, map, and design, analyse and review data. Using created "View Filters" in the software, they were able to easily switch between as-built surveys, engineering designs, contractor design and further analyse information. On a daily basis they used the tool's 3D perspective and sectional "Surface Slicer" views to check information, identify erroneous data and confirm processed work.

GDL also used the Business Center - HCE Data Prep module and editing tools extensively. Newman believes that the "elevate 2D contours" and "project cleanup" functions within the Data Prep module both saved immeasurable amounts of time and eliminated otherwise tedious work. Essentially, Newman was able to elevate contours extremely quickly to turn 2D CAD data into 3D linework, and therefore a 3D model for initial analysis and initial machine control models. The team also removed excessive data and joined lines in the models to provide a clean plan to operators, from where the designs start evolving

significantly. Using Data Prep functionality, Newman identified variations in updated designs very quickly, instead of a manual process which can typically take more than 30 minutes per dataset. Over several weeks and with several surveyors and engineers, this translates to at least a day's worth of work saved per week.

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Overview

Customer Profile:

Ground Developments (GDL) is a leading civil engineering contractor based in Scotland. Core services include earthworks, roads and sewer work.

Business Challenge:

GDL was hired to carry out specialist geotechnical and remediation work for Scottish Waters' Cowdenbeath Wetlands Project. Looking for greater efficiencies, the company turned to its technology partner SITECH and Trimble for help.

Solution:

Trimble's GCS900 Grade Control System, Business Center-HCE software, SPS852 Base Station, SPS882 Rovers, TSC3 controllers and SPS930 Total Station.

Benefits:

- Saved one day per week by using Trimble Business Center - HCE Data Prep module to identify errors and keep pace with design changes.
- Prepared quantity take-offs for civil works and exported quantity reports including volumes and lengths to track pricing
- Accurate forecasting and a better understanding of how to deliver the remaining works more efficiently
- Over 5% increase in plant efficiencies through quicker design re-work and uploading of data
- 10% boost in profit margin due to gains in accuracy and production

The Trimble Business Center - HCE software also allowed Newman to control the real time flow of data between the office and the field. He sent design changes directly to the machine operators through the in-cab CB460 control boxes instead of driving the updated files and design changes to the project site, which can be time consuming and expensive in terms of time lost and fuel burned.

“When carrying out design work, we often utilised Trimble’s superb Google Earth Application, to align our projects with relevant aerial photography,” said Newman. “While we recognise that we often need orthorectified images, it provides us with an excellent baseline for planning and reviewing information during the initial project stages.”

GDL utilised the Takeoff module to import vector georeferenced data as well as pull data automatically from PDFs. This capability eliminated the tedious and time consuming task of trying to interpret PDF or paper datasets. They were able to prepare quantity takeoffs quickly, specifically in regards to recording quantities for pricing civil construction tender packages. GDL can export quantity reports including volumes and lengths to get a comprehensive output for each entity required. They change design strings for various types of product, such as, pipes, curbs, manholes, services, and more, and then use the reporting functionality to prepare an accurate report of each layer type and attribute.

Newman explains that he also uses Business Center - HCE’s Drape Object functionality to review subsurface designs. In the tool, he would place objects on the subsurface layer to check how the object will interface with the ground. For example, the team refined the design of Deep Soil Mixed columns onto the lower strata to accurately establish depths and volumes, ensuring costs were computed and in line with actual construction work. They also used similar methods for reviewing how piling would interface with bedrock. Newman checked columns by essentially draping them onto the ‘firm’ surface, established from soil investigation data. This enabled him to refine the design, material use, and mixture quantities, to ensure maximum efficiency and strength. This becomes critical when ensuring that construction work complies with design specifications and it enables users to verify work is accurate.

“For the wetland project we frequently used the software contour automation, as the contours update with data addition to, or removal from the design surface, making for quick review analysis,” said Newman. “After we get to a well-developed design, we look at using the cut/fill map options for reporting depth ranges as both text and isopach models showing the level differences.”



“ On the Scottish Water project alone we saw a boost to our profit margin of up to 10% ”

Newman explains that since adopting Trimble GPS solutions five years ago, he has seen a significant improvement in project productivity, accuracy, quality assurance and reporting. Basic tasks such as surveying and staking can be performed and managed using Trimble Site Positioning Systems and the SCS900 field software, which leaves more time for higher-level work such as earning new business. Not only that, using Trimble’s GCS900 grade control system has given operators the confidence and ability to become key drivers in delivering jobs more quickly.

“GPS returns are huge,” Newman explains. “We’ve definitely seen greater than 5% increases in plant efficiencies through GPS use and have seen a marked decrease in errors due to the high level of accuracy we receive from the technology. On the Scottish Water project alone we saw a boost to our profit margin of up to 10%. Given that we’ve had some of this equipment for nearly five years now it’s still going strong, and has paid for itself several times over.”

The Scottish Water Project was completed in 2014 and now serves as an effective state of the art water treatment site in the region. The remediation and design proposals and modernised construction methods for earthworks and stabilization helped to complete the project on time. Without the technology, Newman estimates his team would not have been able to deliver extremely high quality work in the same amount of time.



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