



June 3rd 2020

AI automated progres monitoring for solar farms development

Approach

Participates in

Accelerator
Programme



esri™



Qualified Provider

ORACLE

Introduction

✓ AI Clearing is a Tech start-up leveraging AI and advanced GIS analytics to automate infrastructure construction progress reporting

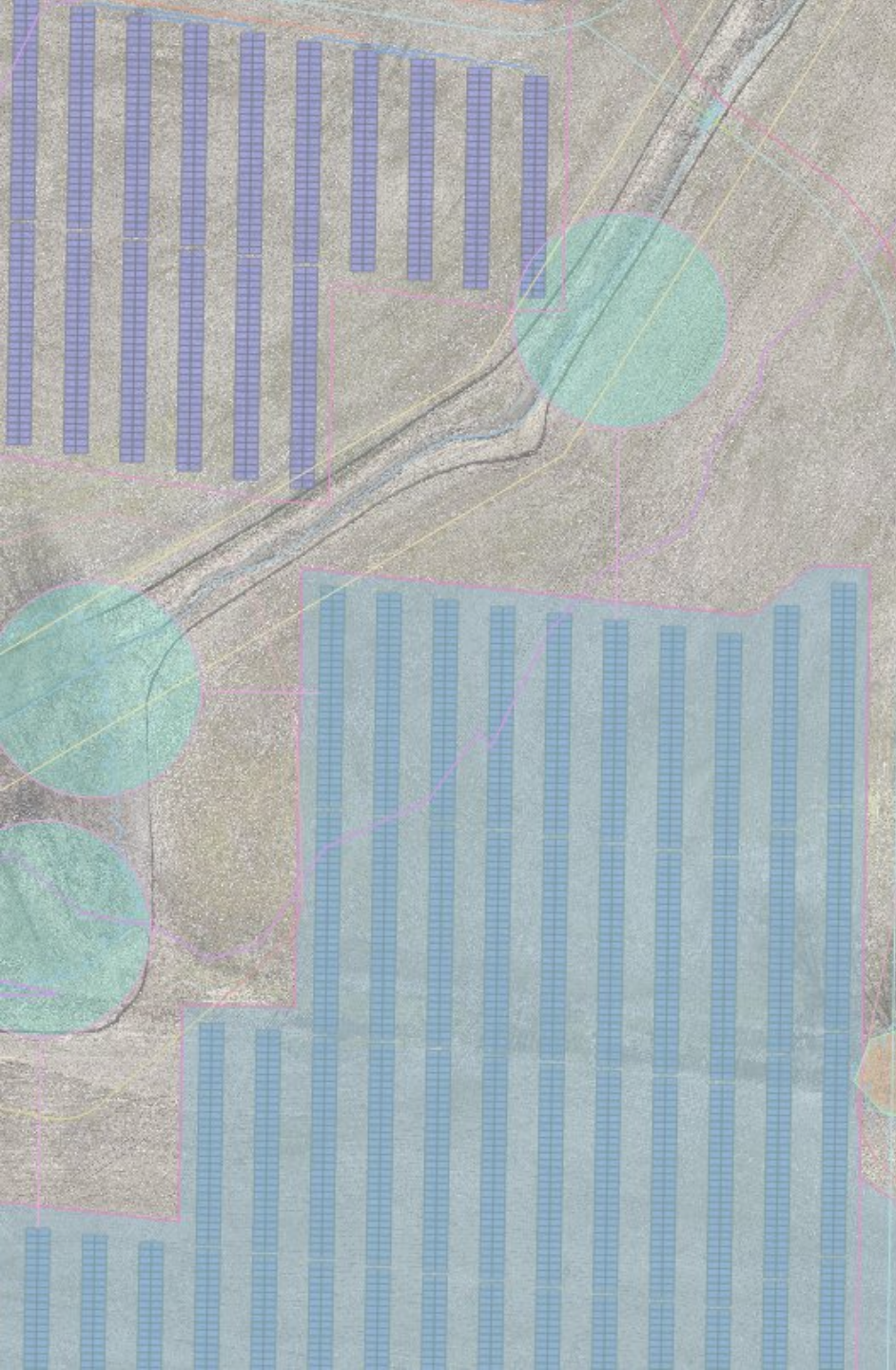
✓ We offer SaaS solution
– AIC Engine
– that significantly shortens construction progress tracking

✓ AIC Engine is based on machine learning solutions that automate the analytics process. The use of drone data allows to create reports that cover 100% of the construction site surface in 3 dimensions

✓ In our understanding developers of solar farm projects seek for efficient progress monitoring solutions to automate reporting processes and maximize margins

✓ This document presents AI Clearing approach to construction site intelligence and progress reporting for solar farms development





How AI Clearing would like to support you

1

Our solution enables more efficient supervision which enhances profitability of your construction project

2

We are currently a sole supplier of AI based construction progress monitoring services

3

As first and only player on the global market we provide unique technology

- **State of the art semantic segmentation** – The first production level AI engine based on high resolution construction photogrammetry data
 - **Unique data fusion approach** – We use every piece of available digital data to generate high accuracy results. Our workflow uses advanced context-based semantic approach
 - **Workflow automation** – Our workflow design process focuses on automation and scalability from the beginning to deliver reports faster than traditional methods
-

4

Our solution allows for integration with leading software vendors: AutoCad, Navisworks, Oracle (including P6), ArcGis, Hexagon, QGIS etc.

AI Clearing is a solution you were looking for

As we understand you are looking to broaden your presence within the photovoltaic segment where the challenge is the cost and time pressure due to high competition



100% of site surveyed and reported, even with daily changes



Fully autonomous AI based analytics available same day/next day



Increase of team efficiency thanks to better data-based schedule management

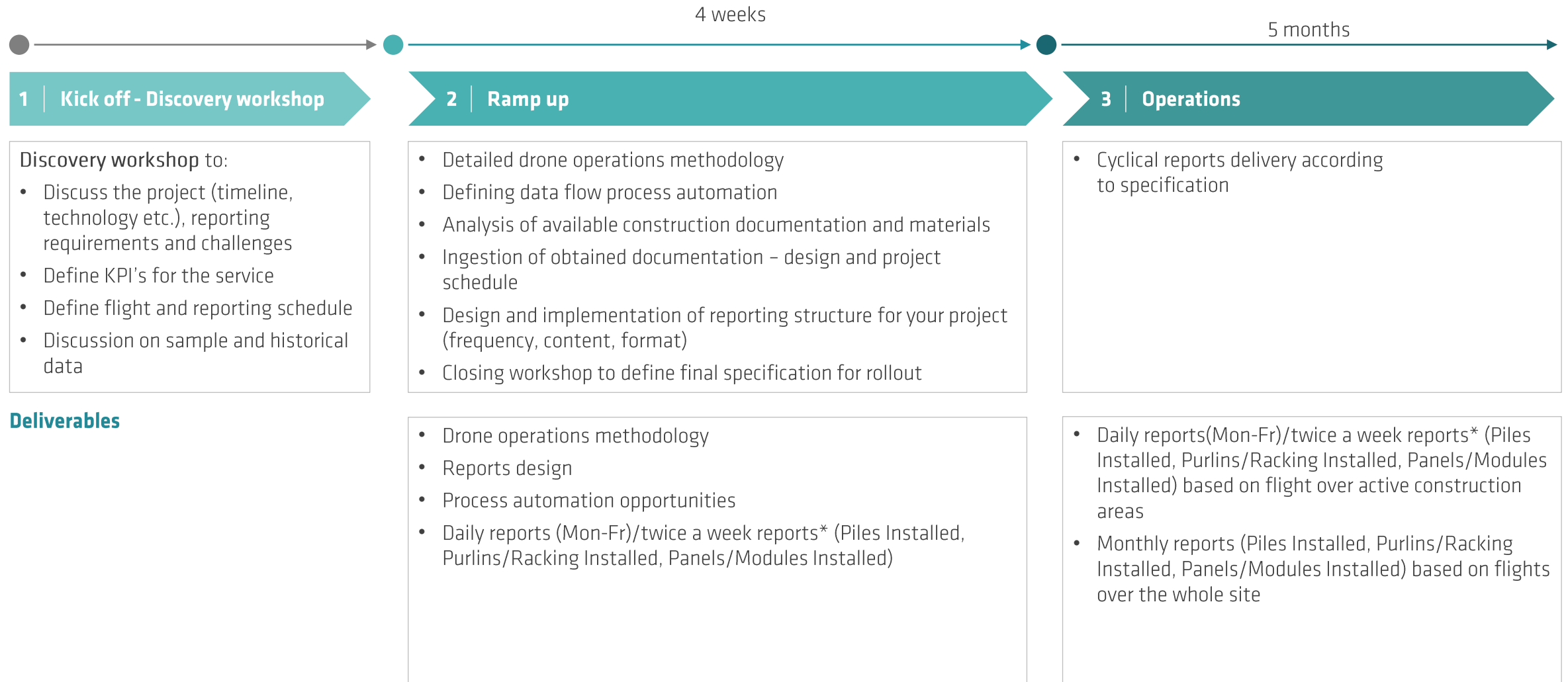


Early warning and error detection – decreased costs of rework and guarantee

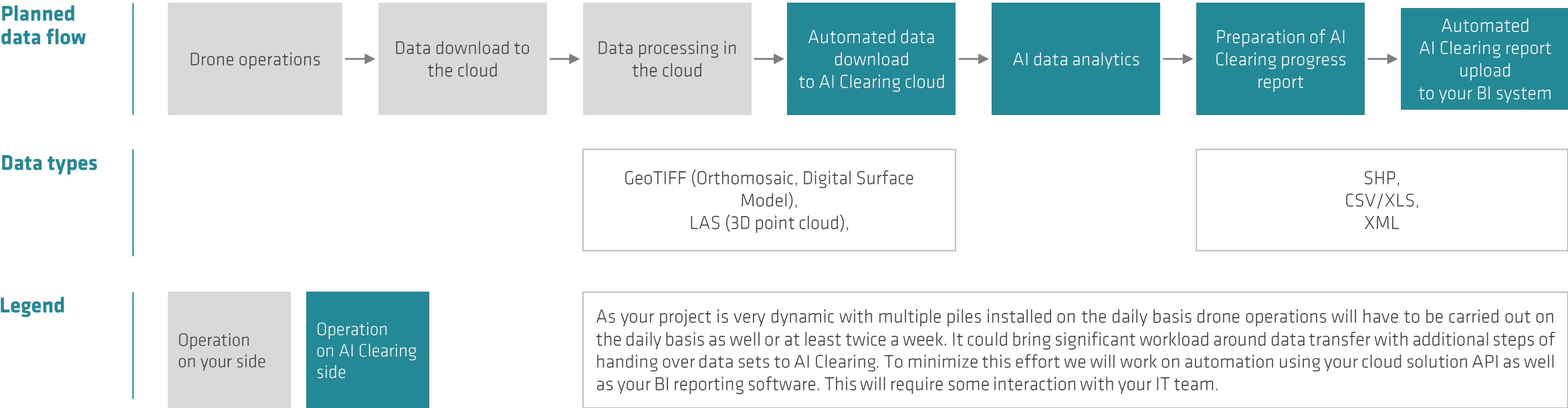


Better margins and value on projects

Our proposal includes 4 weeks of ramp up followed by months of smooth operations with daily or twice a week progress tracking and monthly reports



To make the process reporting seamless we aim to automate data exchange from your cloud solution to AI Clearing and back to your BI system



During ramp up phase we will support you in defining optimal drone operations methodology and suggest process automation opportunities

Drone operations methodology

✓ Input

Ramp up phase deliverables:

1. Drone operations methodology
2. Reports design – specification of data to be shared in each reporting cycle
3. Process automation opportunities

Predefinition of quality parameters:

- Acceptable GSD range
- Acceptable overlap range
- Ground Sampling Points arrangement
- Minimum weather requirements

Analysis of local conditions:

- Light conditions
- Other flights requirements for each construction area (flight permissions etc.)

Scenarios definition:

- Definition of few scenarios to be tested during ramp up phase

✓ Scenarios testing

Testing scenarios:

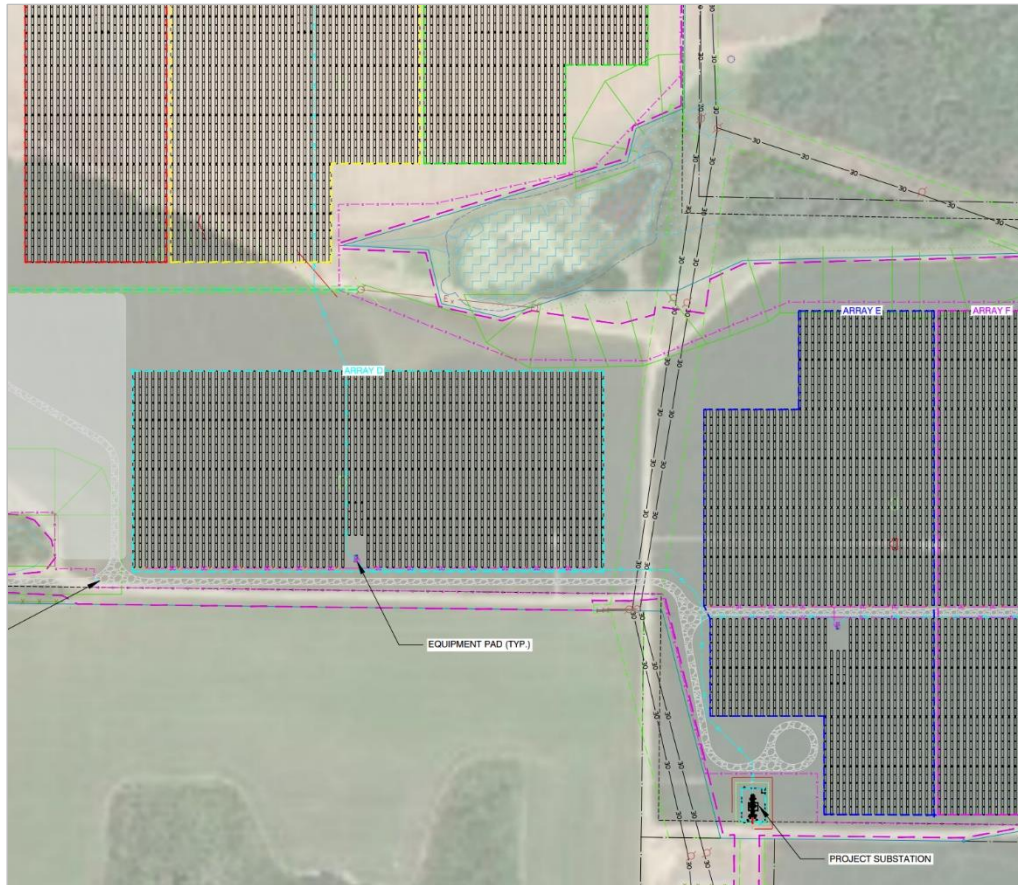
- Data gathering with different quality parameters
- Process testing – data upload to your cloud solution, processing and download to AI Clearing cloud
- Process measurement regarding time

✓ Methodology development

- Preparation of drone operations methodology covering all necessary flight parameters
- Development of final drone operations schedule for daily and weekly reporting

Operations phase will cover regular reporting throughout the project duration (here just an example)

Your solar farm project site (example)



Project characteristics

Project duration:
8 months

Size:
154 acres of construction site

Number of modules to be installed:
19 202

AIC Service characteristics

Option1:~160 daily progress reports
Option2: ~64 reports with 2 times a week frequency

8 monthly reports

~25 acres to be monitored for daily reporting
154 acres to be monitored for monthly reporting

Reports will be available following working day before the working hours both in scenario for morning and afternoon flights if the data are available for us same day

Daily reporting on pile installation progress (example):

CET	9.00	11.00	13.00	15.00	17.00	19.00	21.00	23.00	1.00	3.00	5.00	7.00	9.00
Drone operations	•				•								
Data download to the cloud		•				•							
Data processing in the cloud			•				•						
Data download to AI Clearing cloud				•				•					
AI data analytics										•			
Preparation of AI Clearing progress report											•		
Automated AI Clearing report upload to your BI system												•	

Scenario 1

Morning drone operations

Scenario 2

Evening drone operations

Reporting

Initially we assume around 6-8 hours for data download, analytics and upload
With full IT integration we will target 2-4 hours

Legend

Operation on your side

Operation on AI Clearing side

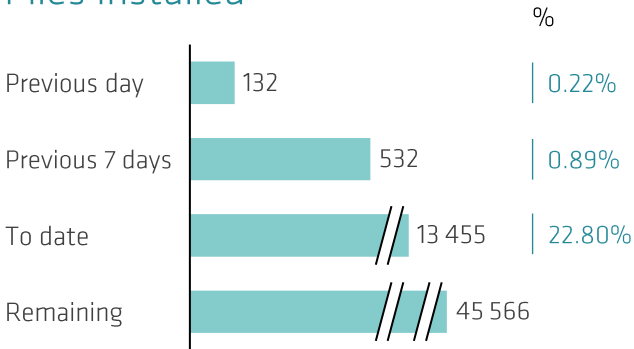
- Daily reports (from Monday to Friday) on Piles installed, Purlins/Racking installed, Panels/Modules installed progress will be available to you following morning at your cloud
- From the start we will strive to fully integrate our IT ecosystem to shorten report delivery time
- Report delivery time will be dependant on data processing time and process automation around data download and upload
- Drone operations, data download/upload and processing times will be evaluated in detail during ramp up phase and the automation schedule and potential optimisation recommendations will be set accordingly

We will deliver you daily or be-weekly and monthly reports measuring key progress metrics

EXAMPLE

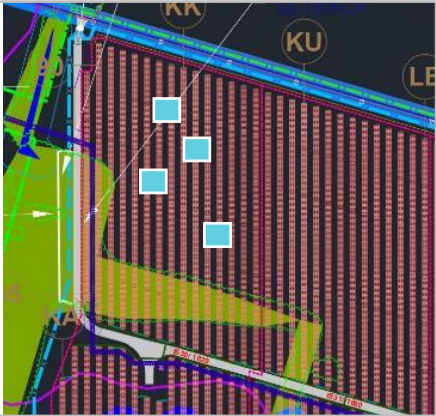
Daily

Piles Installed



Issues detected

4 Piles x,y positioning issue

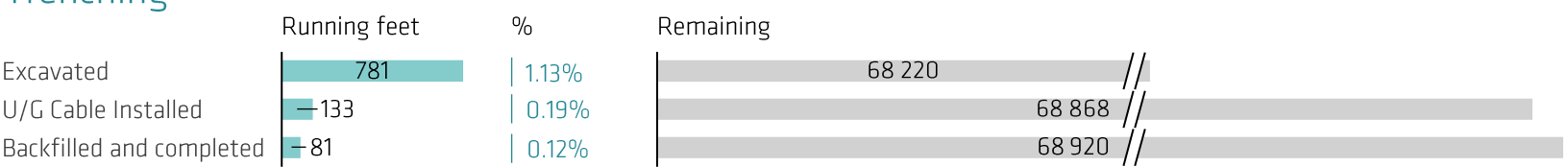


Single source of truth for all the teams at your site

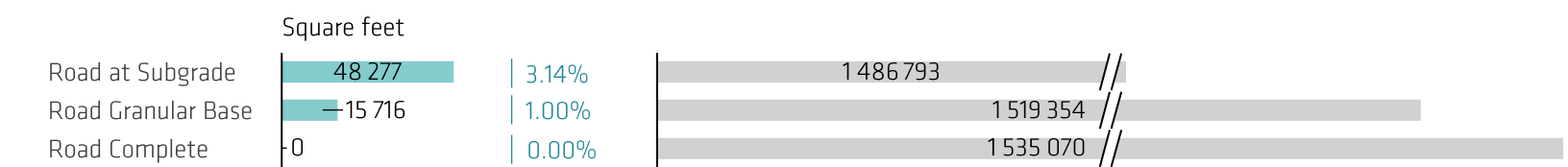
Immediate, high-level project status information and issue reporting

Weekly/on demand

Trenching



Roads



Visualization and direct access to reports and geospatial data

Integration with your cloud solution and BI system

The reports will be delivered in PDF format and directly into your BI system or you can use our on-line dashboard

ILLUSTRATIVE



For most efficient AI Clearing work we welcome data of the following specification

Drone Imagery



- RGB images with high geometric and radiometric quality – without significant blur, noise, overexposure or underexposure, distortions, aberrations, rolling-shutter effect etc.
- Regular photogrammetric block of images with proper values of parameters such as Ground Sampling Distance (in most cases – 0.8 in./2 cm), forward and lateral overlap (mostly 80x80 %), imaging angles (nadir or oblique) etc. – dedicated for each analyzed object
- Leveraging existing Wintgra equipment to get best RTK/PPK resolution – imaging positions accuracy about 30 cm
- Fixed focal length – preferred prime lens camera
- Images taken with the highest possible resolution for the camera

Ground Control Points



- Appropriate distribution of Ground Control Points on the ground including Check Points
- Ground Control Points marked in the way that they could be properly measured on images
- Proper accuracy of Ground Control Points field survey – not worse than 0.8 in./2 cm



Pricing

Scope	Total price (USD)
Option 1 – Discovery workshop, Ramp up phase and delivery of daily (Monday to Friday) and monthly reports on defined KPI's for the total of 8 months of the project	To be discussed
Option 2 – Discovery workshop, Ramp up phase and delivery of two reports per week and monthly reports on defined KPI's for the total of 8 months of the project	To be discussed

- The above fee is net of any taxes
- AI Clearing will not be responsible for project delays caused by force majeure which in case of drone operations covers unfavorable weather conditions (f.ex. heavy wind, rain, snow, magnetic storms on the sun) or lack of necessary permissions to fly (rejection by authorities)
- Payment conditions are 14 days after issuing an invoice. Invoices will be issued after each month of reporting

AI Clearing technology



AI Clearing processes inputs from construction projects and generates progress reports enabling operational project tracking



 Enabling AI powered fusion of field data with digital designs
Bringing trust and decreasing transaction cost for stakeholders of construction projects

When it comes to AI we are mainly focused on solving semantic segmentation problem – simply speaking identifying all classes of objects at the construction site

Semantic segmentation is classifying every pixel in order to know what is there on an image and where is it located



Our AI Heart recognizes currently total of 44 classes across different types of construction sites and the number is growing

AI HEART classes

Asphalt



Concrete & Concrete rings



Heavy earth equipment & Dump trucks



Heap of sand



Rubble




Reinforcement



1. Background	23. Wooden boards
2. Asphalt	24. Fence
3. Concrete	25. Pavement
4. Concrete rings	26. Rail
5. Pipes	27. Railway crushed stone
6. Tree	28. Railway sleeper
7. Black sand	29. Concrete grid
8. Cable well	30. Paving blocks
9. Cars	31. Aggregate
10. Chipping	32. Lean concrete
11. Container	33. Sand
12. Dump trucks	34. Geotextile
13. Heap of earth	35. Larssen
14. Heap of sand	36. Artificial rocks
15. Heavy earthy equipment	37. Formworks
16. Lantern	38. Retaining walls
17. People	39. Cranes
18. Reinforcement	40. Steel structures
19. Rubble	41. Walls
20. Scaffolding	42. Roofs
21. Silos	43. Foundations
22. Water	44. Floors

AI Clearing Report - presents pre-agreed KPI's in comparison to design, project schedule and previous inspections, red flagging all issues detected

Elements of AIC Report:



Stage Completion Report
04/28/2020

EXAMPLE ONLY

1. PROJECT CHARTER

Construction company name

PCL

Project name

Hillcrest

Report date


04/29/2020

Clearing report number

7.1

Based on inspections from

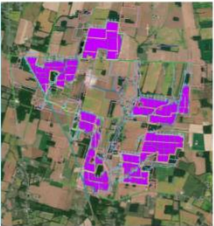
04/21/2020 - 04/28/2020



United States

Ohio

Hillcrest solar farm project



2. PROJECT STATUS

Changes detected

298

Issues detected

2

3. TABLE OF CONTENT

Construction progress - 04/28/2020

2

Construction progress - 04/21/2020 - 04/28/2020

3

Designed objects completion report - piles - 04/28/2020

4

Designed objects completion report - new piles - 04/28/2020

5

Designed objects completion report - strings SAT - 04/28/2020

6

Designed objects completion report - new modules - 04/28/2020

7


Adherence to design - 04/28/2020

8

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Construction progress report based on AIC Engine - powered by AI HEART

1



Stage Completion Report
04/28/2020

EXAMPLE ONLY


8. ADHERENCE TO DESIGN - 04/29/2020


#	COORDINATES	DESCRIPTION
8.1	504406,1504265	Wrong location of piles






8.2	504470,1504332	Built pile not present on the design
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Construction progress report based on AIC Engine - powered by AI HEART



Stage Completion Report
04/28/2020

EXAMPLE ONLY

6. DESIGNED OBJECTS COMPLETION REPORT - STRINGS SAT - 04/28/2020

Strings SAT completion status based on detection installed 60 modules per tracker

Number of strings SAT with different completion

All	60
All completed	56
Remaining	10019
% of Strings SAT with different completion status	
Completed	0.56%
Remaining	99.44%

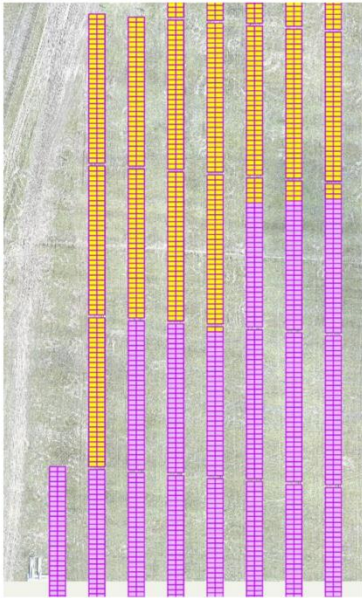
Number of modules with different completion

Modules installed	3596
Remaining	600904
% of modules with different completion status	
Completed	0.59%
Remaining	99.40%

Modules completion status

Completed

Remaining



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Construction progress report based on AIC Engine - powered by AI HEART



Thank you
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