

# Developing BIM360 Capability In Kenya To Optimise Construction Of The Largest Waste Recycling Facility In East Africa.

**William Kemoli**

Lead Civil Engineer | @KemoliWilliam





## About the speaker

### William Kemoli

William is the lead Civil Engineer in Sanergy Inc. He is currently spearheading the construction of the largest waste recycling facility in East Africa for Sanergy.





## Access to Sanitation

- Slum populations will increase from 1 billion citizens today to more than 3 billion citizens by 2050.
- 80% of waste from slums is left untreated
- 260B lost globally each year in economic productivity





## What are slums?

- These are informal urban settlements
- 200 such settlements in Nairobi
- 60% of the Nairobi population lives in slums
- Slums occupy just 6% of the land.





## Solid Waste Management Problem

Nairobi produces 1 million tons of solid waste per year and only 50% is collected.





## Declining Agricultural Sector

- Kenya is at crisis levels in terms of declining agricultural productivity yet agriculture is vital to Kenya
- Smaller parcels of land are farmed with little downtime to allow soil to replenish their nutrients



# Summary of Challenges Facing Cities

Below is a summary of the challenges facing cities:

- Access to Sanitation Slums
- Solid Waste Management
- Decline in Agricultural Productivity

Sanergy applies a circular economy approach to solve waste management challenges for booming cities.

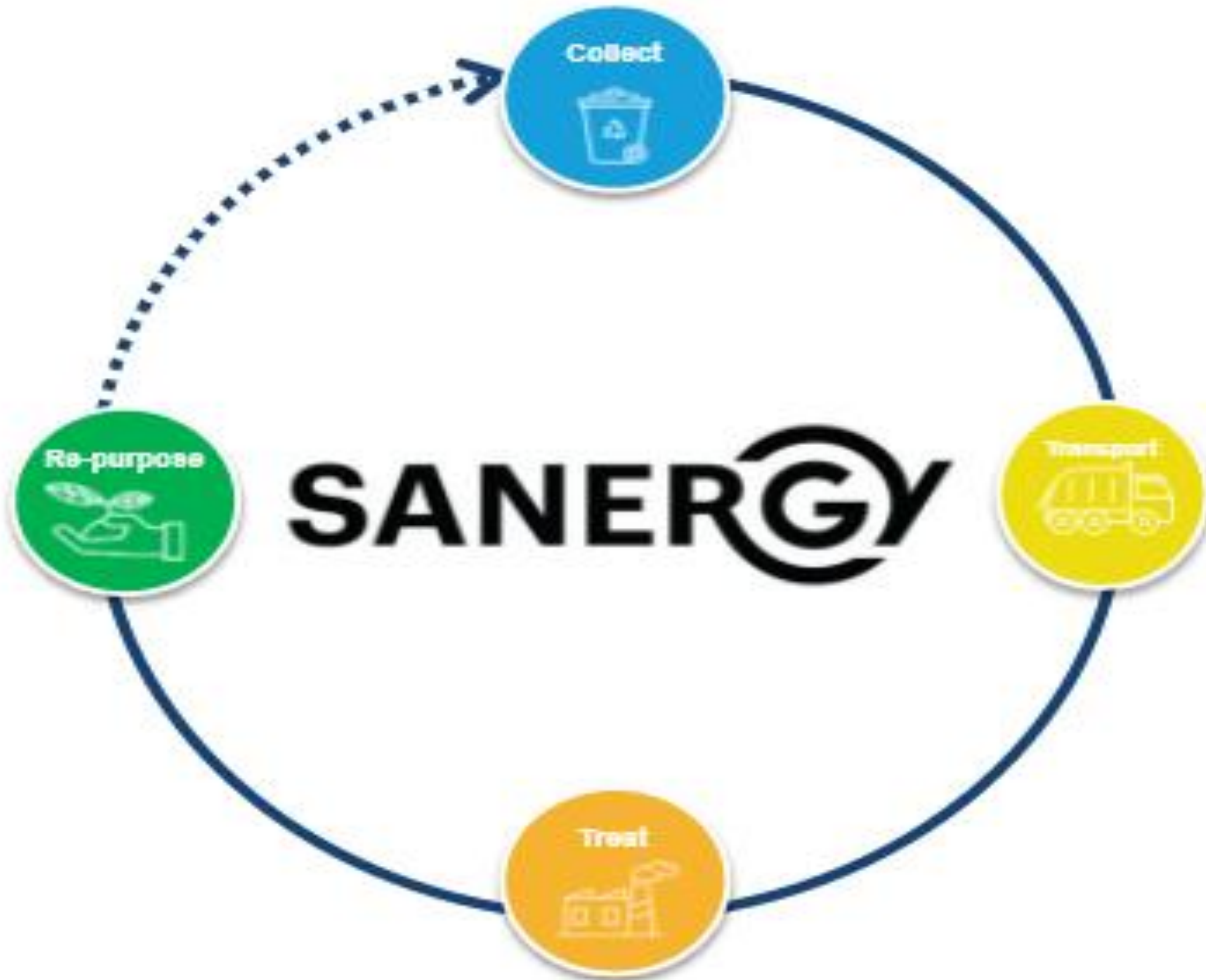


Image caption goes here





We collect  
600t/month of  
waste from  
sanitation,  
municipal,  
catering and  
agricultural  
sources across  
Nairobi.







We safely  
and  
professionally  
transport all  
waste  
with our fleet of  
trucks and  
container  
system.







We treat  
the waste  
at our  
processing  
plant.







We upcycle  
100% of the  
waste into  
valuable  
agricultural  
inputs.







We promote  
sustainable  
local  
agriculture  
with organic  
products.





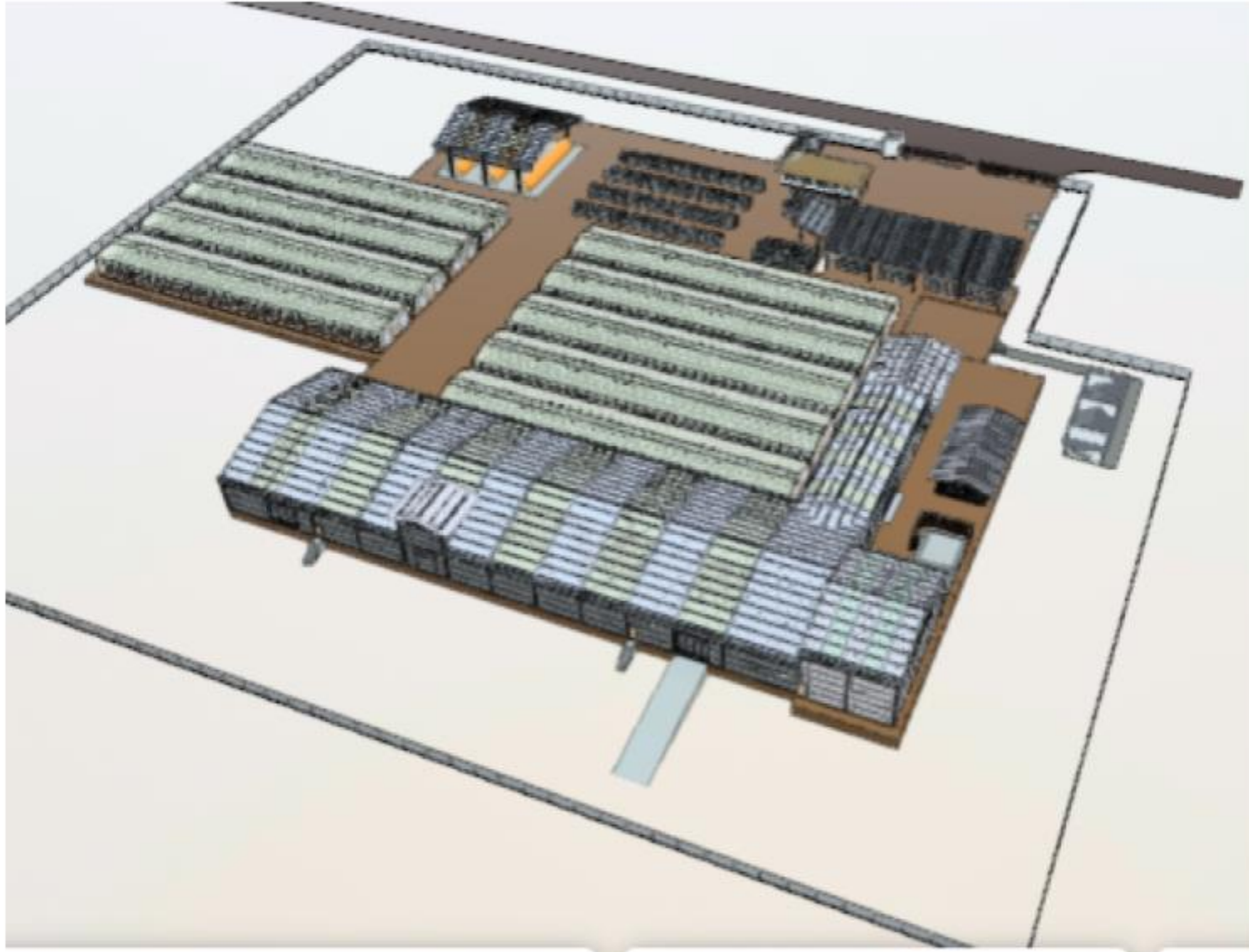


We  
ensure  
safety of  
all our  
processes  
and products.





We will have completed the construction of the largest organics recycling factory in Sub-Saharan Africa.



**72,000**

Metric tonnes  
of organic  
waste per  
year.

**3,600t**

Of insect  
protein

**7,200t**

Of organic  
fertilizer

**8,400t**

Of biomass  
briquettes



# Project Data and Description

## Plant data:

- 50,000 SQM
- Portal frame buildings housing the main processing area
- Climate controlled greenhouses
- Utility areas with RO plant, Generator, Transformer room and storage
- Boiler to produce steam
- 35,000 SQM of open area for composting



# Site Location and Characteristics





# Site Location and Characteristics





# Earthworks and Foundations





# Earthworks and Foundations





# Floods





# Back on track





# Structures coming up





# Structures Complete





# Structures Complete





# Multiple streams of challenges were being solved and implemented simultaneously

These are:

- Integration of Equipment and Building Design
- Construction, Cost and Risk Management
- Aggressive timelines (8 months)
- Co-ordinating over 20 independent parties involved in project
- Sanergy had never performed a project of this scale before



With over 400 people involved in the design and construction of the plant there was a need for a system that can efficiently help in managing such a project; we turned to BIM360





Sanergy's Design and Construction is supported by the



AUTOCAD



REVIT



BIM360



ROBOT



CIVIL 3D



VEHICLE TRACKING



# Pre-construction challenges!

Some of the project specific challenges we faced are as below:

- The entire team had never used BIM360 before
- Consultants and contractors locally are not used to working in a collaborative environment especially a tech based way
- Unreliable WIFI internet connection



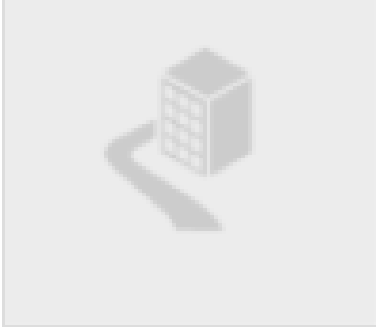
# excitech

naturally balanced partnerships

## Support in setting up and using BIM360

- Excitech is the largest Autodesk Platinum partner in the UK.
- They provide technology solutions and services for the construction sector, supporting the complete project life cycle from design through to construction, building handover and maintenance.
- Excitech were crucial in guiding us through the set up and implementation of BIM360.



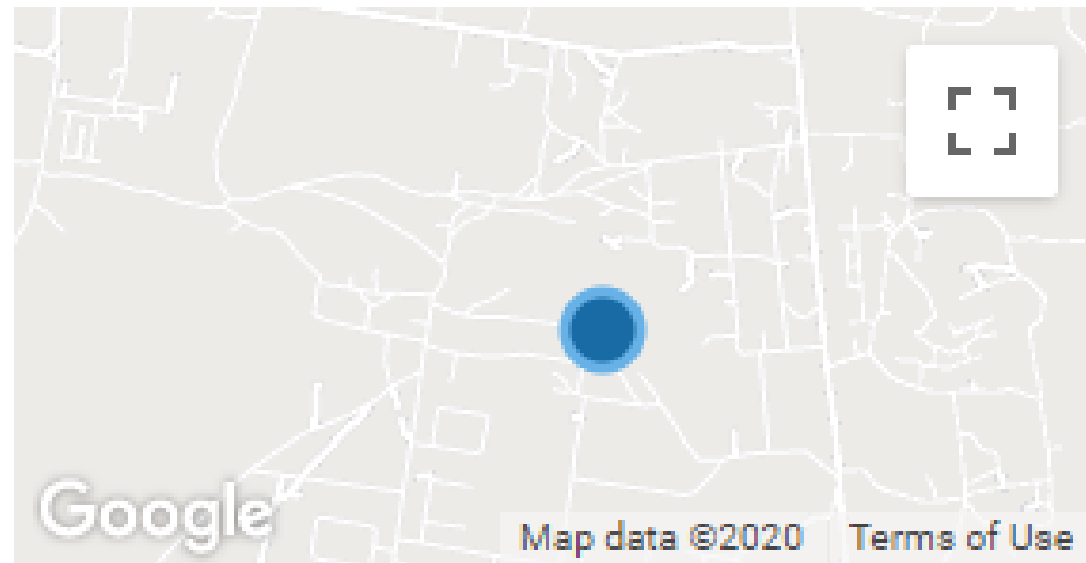


# BSF Larvae Processing and Production Facility

Project Dates: Tue Aug 13 2019 - Tue Jun 01 2021

Customize

## Project Address



PLOT L.R. NO. 23961 – KINANIE, MACHAKOS COUNTY.

## Weather

83°

Clear

Tue 84° Wed 85° Thu 85° Fri 86°

## Project Field Issues

ID	Title	Due Date
50	Hazardous waste register plus MSDS	Nov 16, 2019
39	Food handlers certificate	Nov 16, 2019
58	Fall Protection Plan	Nov 16, 2019
51	Temporary hazardous and non-hazardous waste storage	Nov 16, 2019
55	Fire extinguishers	Nov 16, 2019

5 of 694 Open Issues | [View all \(694\)](#)

## Home Page

- Provides high level data e.g.:
  - Address
  - Weather
  - RFI's outstanding





# Collaboration

- Design Collaboration Employing 3d Modeling And Clash Detection



1

2

3

4

5

6

Find items and sections

1 INSPECTION DETAILS

Done

1.1 Package ID

CWP-BO-CE-EW-MBC

Document Issue Note Photo

KM

#140 Package ID

OPEN

Details

6/6 Sections 35/35 Items

Assigned To:

Clerk Of Works

Location:

Utilities > Boiler

Scheduled:

Jan 30

Date Started:

# Field Management

- Field Management Employing Checklists And Punchlists



		Name ^	Description	Version	Size	Last updated	Updated by	Markup	
<div>Plans</div> <div>Project Files</div> <div>Construction</div> <div>CREOS</div> <div>Excitech</div> <div>Reference Documents</div>	...	<input type="checkbox"/> 0. Documents submitted for approval	--	--	--	Jun 11, 2020 8:55 PM	Walid Kamal	--	
		<input type="checkbox"/> 1. Construction Packages	--	--	--	Feb 12, 2020 10:52 AM	Walid Kamal	--	
		<input type="checkbox"/> 2. Engineering Packages	--	--	--	Oct 14, 2019 10:35 AM	Walid Kamal	--	
		<input type="checkbox"/> 3. Drawings	--	--	--	Oct 14, 2019 10:35 AM	Walid Kamal	--	
		<input type="checkbox"/> 4. QA-QC	--	--	--	Feb 12, 2020 10:52 AM	Walid Kamal	--	
		<input type="checkbox"/> 5. Turnover	--	--	--	May 13, 2020 3:10 PM	Elsie Kiema	--	
		<input type="checkbox"/> 7. Commissioning	--	--	--	Oct 14, 2019 10:35 AM	Walid Kamal	--	
		<input type="checkbox"/> 8. ...	--	--	--	...	...	--	

# Document Management

- Document Management - Folders



Filter

Status	ID	Review name	Workflow	Initiated by	Next action by	Next action due	Documents	Approved	Rejected	
OPEN	87	QA-QC Approval- CIV,STR M...	QA-QC Approval- CIV,STR M...	Solitaire Constructi...	Gerishon Ndegwa	Aug 16, 2020	1	--	--	
OPEN	86	QA-QC Approval- CIV,STR M...	QA-QC Approval- CIV,STR M...	Solitaire Constructi...	Gerishon Ndegwa	Aug 7, 2020	2	--	--	
OPEN	85	QA-QC Approval- CIV,STR M...	QA-QC Approval- CIV,STR M...	Solitaire Constructi...	QA/QC Lead	Oct 9, 2020	1	--	--	
CLOSED	84	QA-QC Approval - EE Materi...	QA-QC Approval - EE Materi...	Domnic Kimani	--	--	2	2	0	
CLOSED	83	Preliminary - Mechanical En...	Preliminary - Mechanical En...	CBE CONSULTANTS ...	--	--	6	6	0	

# Document Management

- Document Management - Reviews



Status	ID ▾	Title	Sent by	Recipients	Created time	Documents	
TRANSMITTAL SENT	27	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Apr 30, 2020 9:45 AM	1	...
TRANSMITTAL SENT	26	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Apr 29, 2020 12:22 PM	1	...
TRANSMITTAL SENT	25	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Apr 22, 2020 11:55 AM	1	...
TRANSMITTAL SENT	24	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Apr 3, 2020 10:18 AM	3	...
TRANSMITTAL SENT	23	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Mar 25, 2020 5:35 PM	3	...
TRANSMITTAL SENT	22	Civil Drawings	William Kemoli	Eunice Kibor, Walid Kamal, Geri...	Feb 10, 2020 11:32 AM	11	...
TRANSMITTAL SENT	21	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Jan 24, 2020 6:41 PM	1	...
TRANSMITTAL SENT	20	Coordination	Michael Ngare	Walid Kamal, Elsie Kiema, Willi...	Dec 22, 2019 12:38 PM	1	...

# Document Management

- Document Management - Transmittals

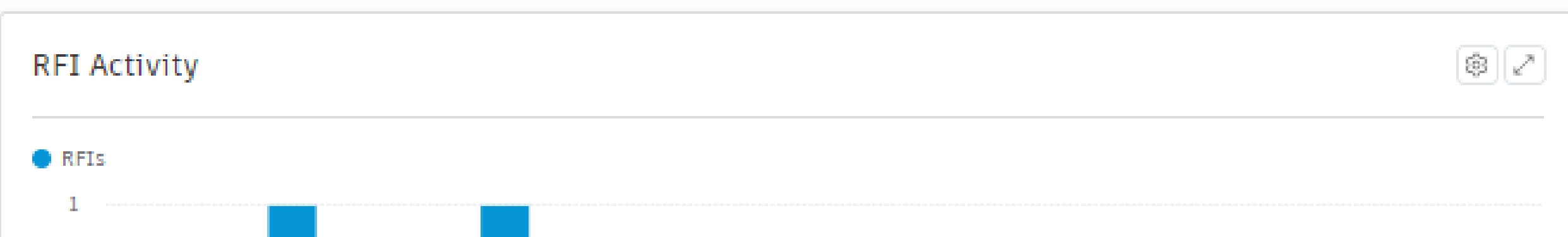
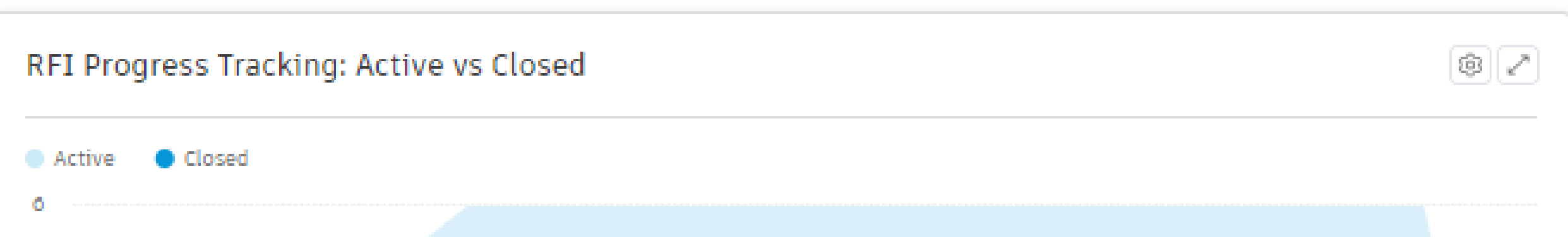
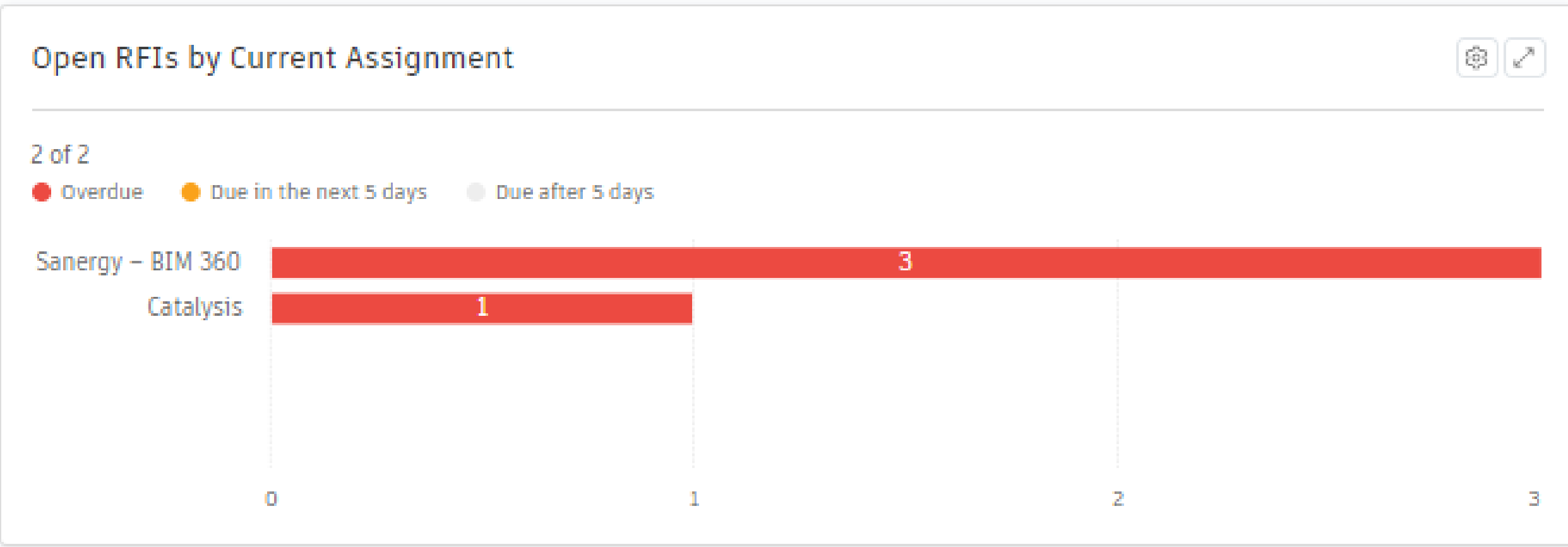
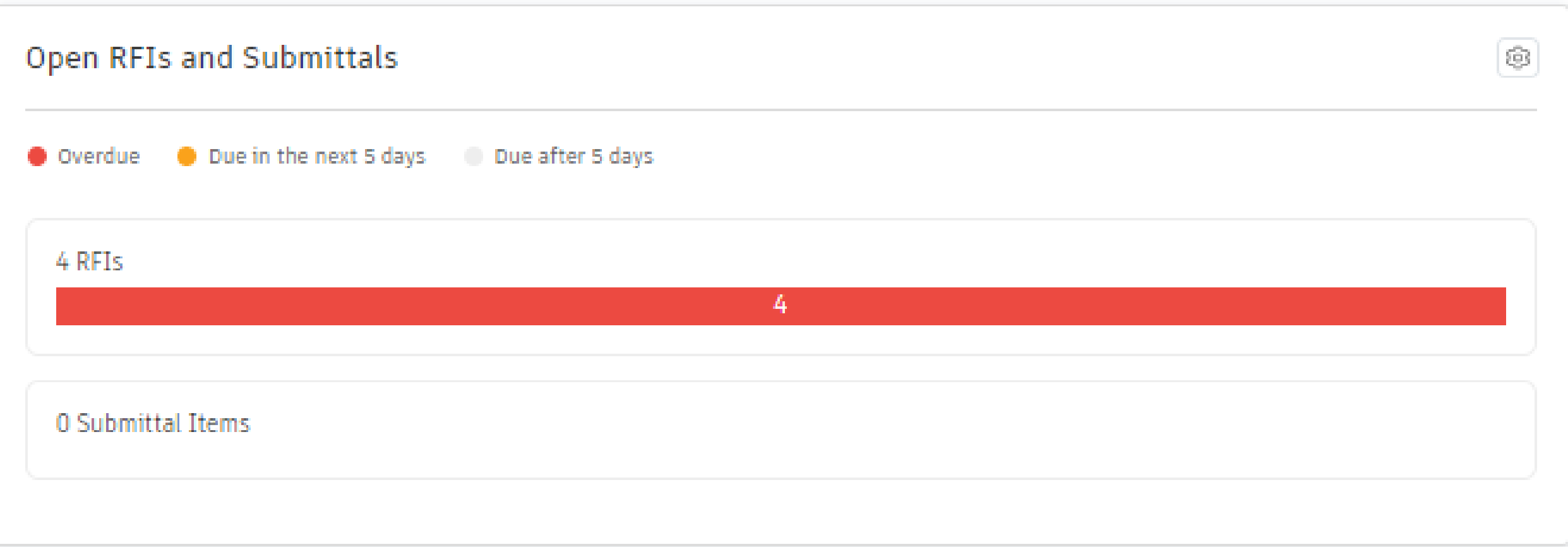


<div><div><div></div></div><div>Search</div></div> <div>Filtering is on</div> <div>Export</div> <div>Create Issue</div>											
ID	Type	Sub-type	Title	Location	Assigned to	Company	Due date	Linked document			
1115	Punch List	Punch List	smoothen/even-off cla...	... > Packaging	Victor Bwire	Steel Structures	Oct 23, 2020	-	2	0	
1114	Punch List	Punch List	leakage at the handwas...	... > Packaging	Steve Hydrobuild	Hydrobuild Me...	Oct 23, 2020	-	1	0	
1113	Punch List	Punch List	window stays for windo...	... > Packaging	Steven Juka	Solitaire	Oct 23, 2020	-	2	0	
1110	Punch List	Punch List	missing electrical lighti...	-	Steven Juka	Solitaire	Oct 23, 2020	-	1	0	
1109	Punch List	Punch List	missing electrical lighti...	-	Steven Juka	Solitaire	Oct 23, 2020	-	0	0	
1108	Punch List	Punch List	Lower emergency EXIT ...	Processing	Domnic Kimani	Sawarn Electical	Oct 23, 2020	-	1	0	

# Document Management

- Document Management - Issues



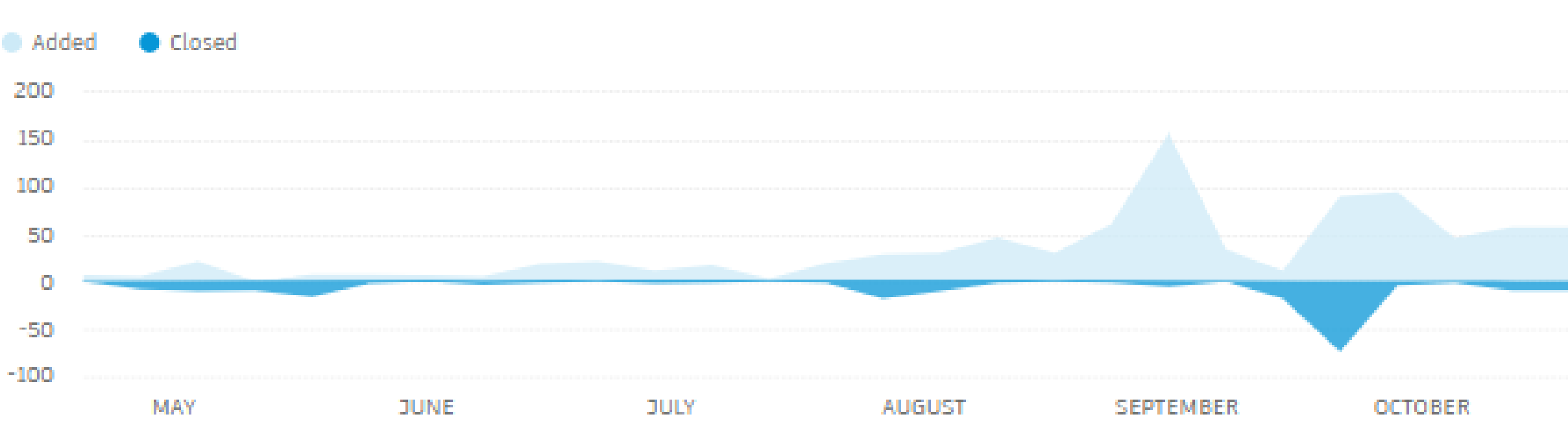


# Insight

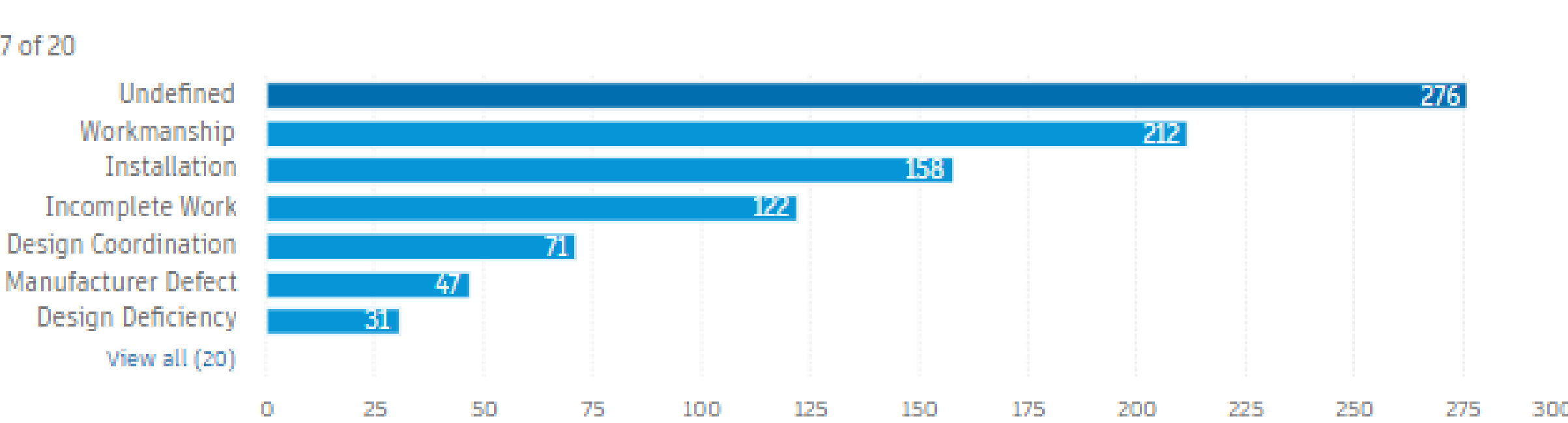
- Project Controls



All Issue Activity: Added vs Closed



Issue Root Cause



Total Issues to Date: Active vs Closed



Quality Checklist Conformance



# Insight

- Quality



Safety Issues Status

 Open  Work completed  Ready to inspect  Not approved



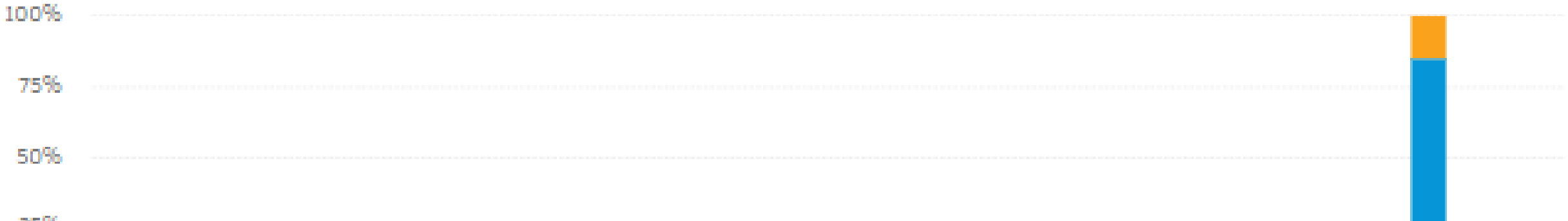
Safety Issues by Company

5 of 5



Safety Checklist Conformance

 Failed  Passed



# Insight

- Safety



# Advantages of BIM360 and problems solved

Some of the problems solved by BIM360 are:

- Easier to track project data - Home Page, BIM Insight
- Better Collaboration and Communication - Document Management, RFI's, Issues
- Improved Coordination and Clash Detection - Design Collaboration, Model Hosting
- Reduced Cost and Mitigated Risk - Document Management and Change order process
- Better field management - Hand held device app
- Ease of handover



## However, there is never success without challenges!

Challenges	Solutions Implemented
<ul style="list-style-type: none"><li>● Slow learning curve due to unfamiliarity with software and its apparent complexity</li></ul>	<ul style="list-style-type: none"><li>● Conducting tutorials together with all team members</li></ul>
<ul style="list-style-type: none"><li>● Difficulty employing real time capturing of issues/creation of punchlists with mobile devices due to unreliable internet connectivity</li></ul>	<ul style="list-style-type: none"><li>● Relying on mobile hotspots to collect data on site</li></ul>
<ul style="list-style-type: none"><li>● Managing access and maintaining data integrity was challenging</li></ul>	<ul style="list-style-type: none"><li>● Providing greater access to most stakeholders to be able to view all relevant project data</li></ul>
<ul style="list-style-type: none"><li>● Integrating BIM with different softwares used by vendors and external consultants was difficult especially with 3D models and clash detection</li></ul>	<ul style="list-style-type: none"><li>● Use of pdf comparison feature</li><li>● Remodelling the plant in Revit</li></ul>



# What has Sanergy learnt and what would we do differently next time?

Lessons learnt are:

- Encourage the development of a BIM Management Plan before implementing BIM on a project
- Assign a BIM manager
- Encourage Design in 3D using Autodesk Software



# What would we love to see in BIM360?

Fixes to software bugs



# Conclusion

BIM360 is a very powerful tool and presents solutions to many Project and Construction Management Challenges. With enough familiarity and sensitisation of how it can be employed efficiently should allow for a successful uptake in Kenya.





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