By 2030 eThekwini will be Africa's most caring and liveable city

FORECAST EARLY WARNING SYSTEM with COMMUNITY BASED WARNING SYSTEMS
Saving Lives on 11 April 2022

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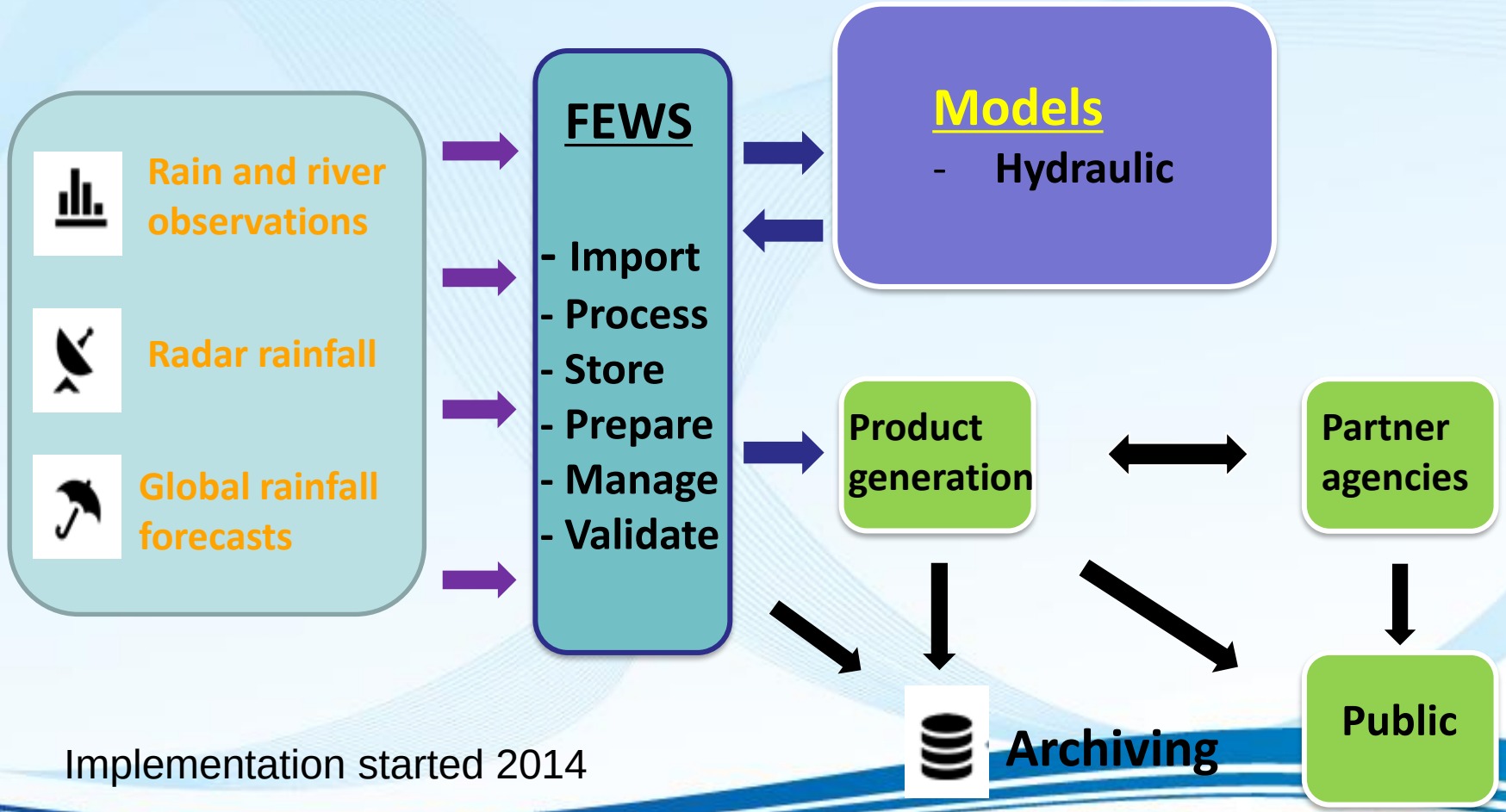
FEWS
Information Dissemination and Management

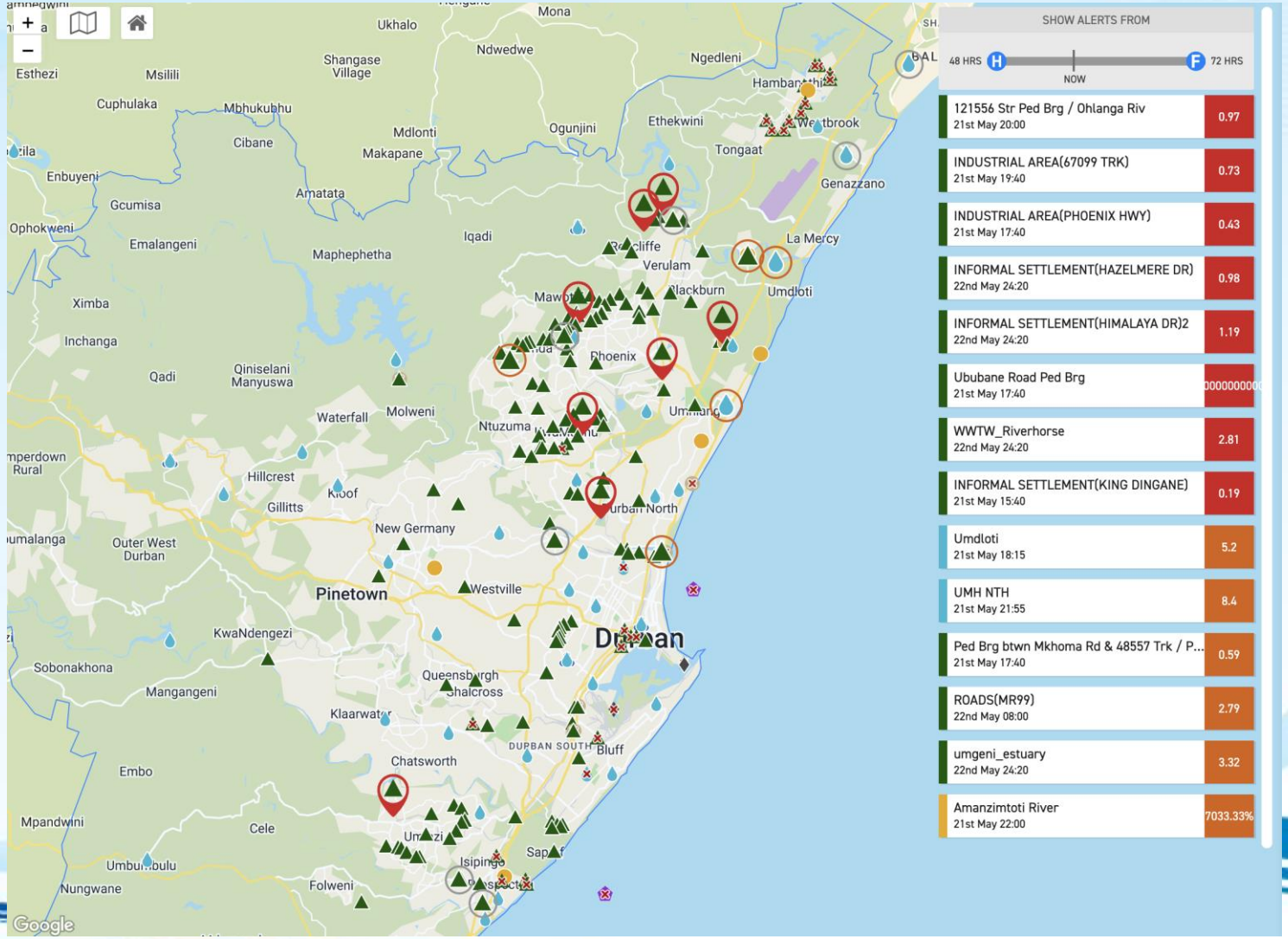


Implementation started 2014

FEWS process

- SAWS provides 3 Day Forecast every 12 hours
- The FEWS system runs the river hydraulic models every 12 hours
- The FEWS system then highlights if any critical point alert level is likely to be exceeded.
- The Coastal, Stormwater and Catchment Management(CSCM) team then monitors the forecasts and informs Disaster management through a Whatsapp group of any alerts shown by the system.
- CSCM also liaises with the South African Weather Service (SAWS) team and assesses other global forecast models.
- Disaster Management then instructs communications on public announcements on the back of SAWS warnings.
- CSCM monitors the real time Rain Gauges, Level gauges and the SAWS radar to assess the severity of the storm and its directions.
- This information is fed via a Whatsapp group to Disaster Management who informs communities.

FEWS SYSTEM OUTPUT

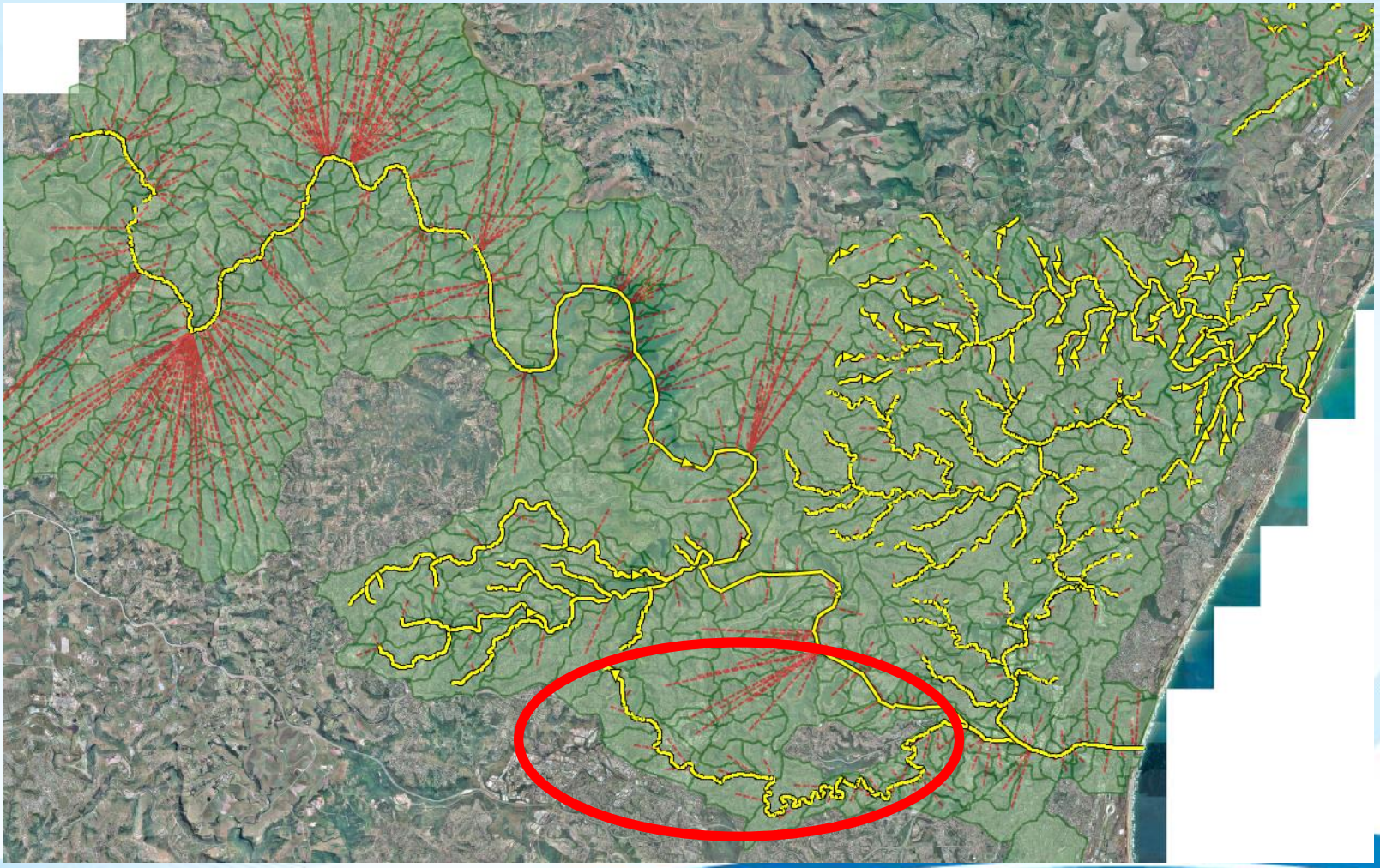


QUARRY ROAD INFORMAL SETTLEMENT COMMUNITY BASED EARLY WARNING SYSTEM

A SYSTEM IN PRACTICE

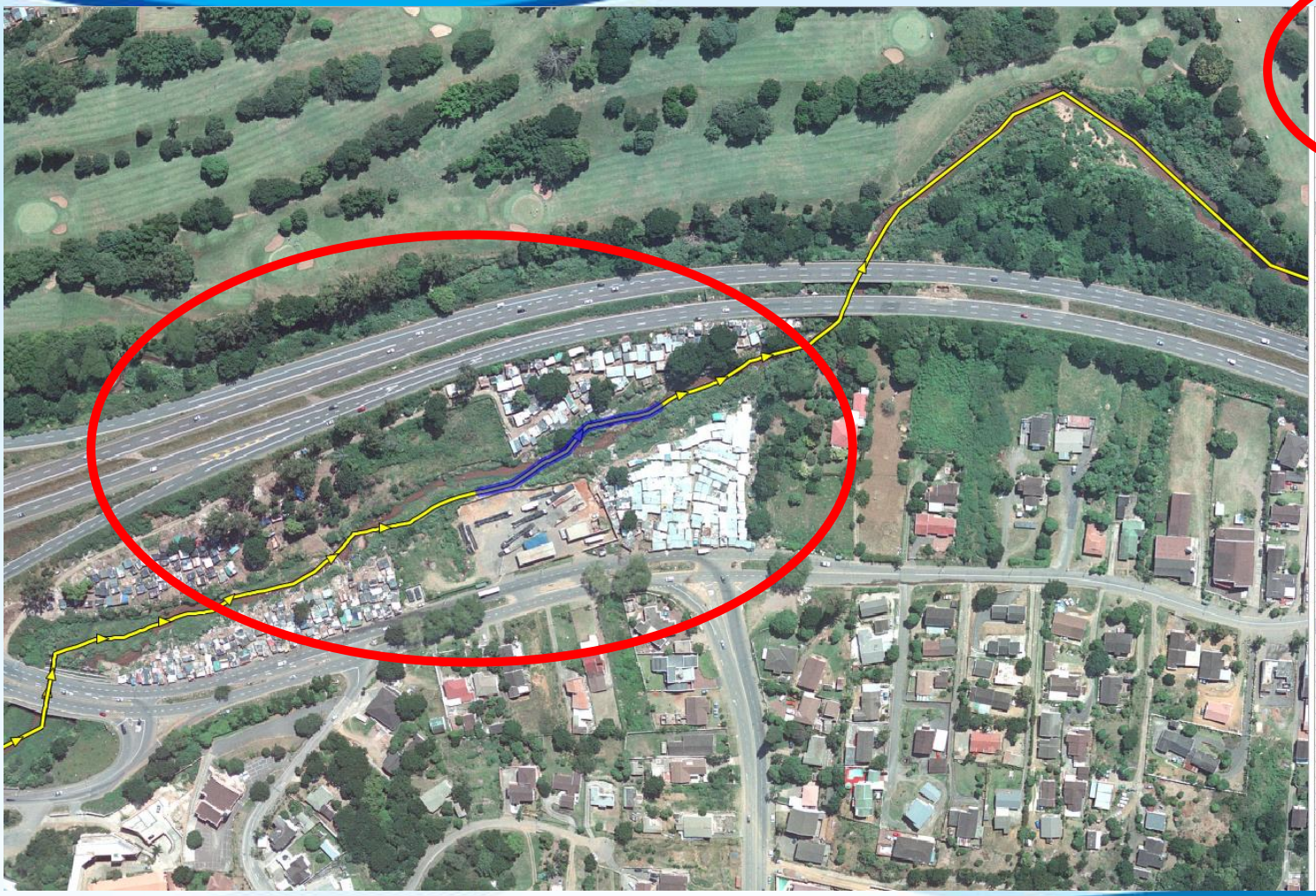
HYDRAULIC MODELS

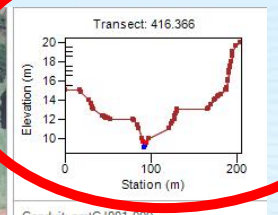
Palmiet River



HYDRAULIC MODELS

Palmiet River





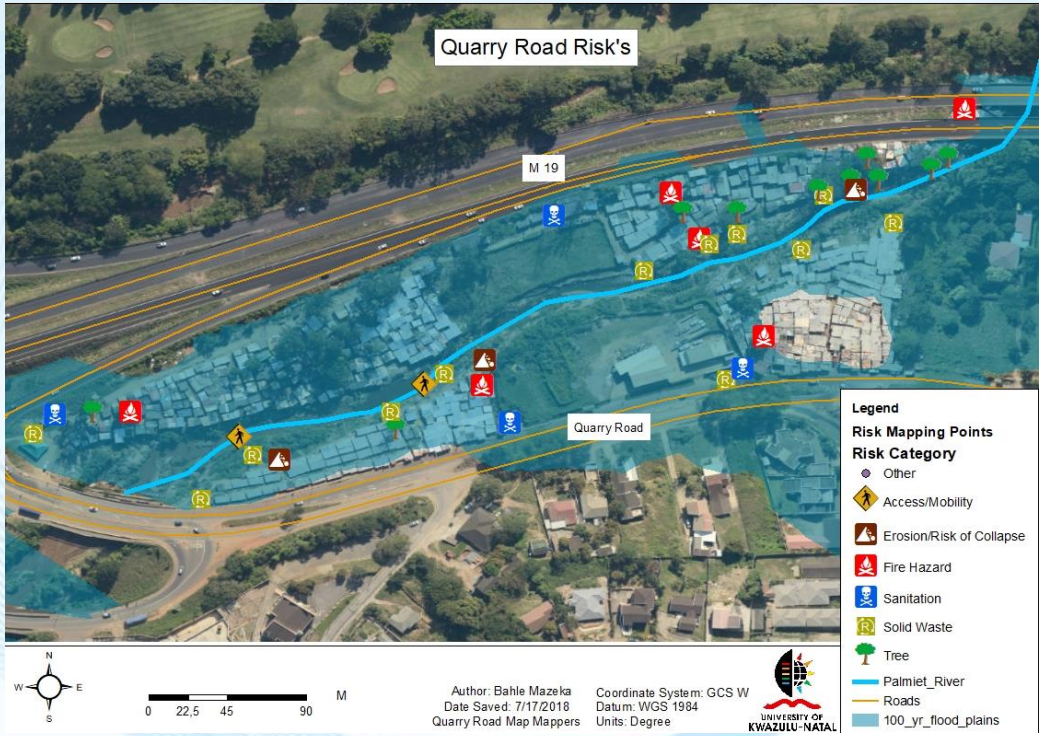
Conduit: pmtCJ001-009

Attributes	
Name	pmtCJ001-009
Inlet Node	pmtJ001-009
Outlet Node	pmtJ001-008
Description	River: PalmietReach: Ma
Tag	
Length (m)	116.26
Roughness	0.01
Inlet Offset (m)	0
Outlet Offset (m)	0
Initial Flow (m³/s)	0
Flow Limit (m³/s)	0
Entry Loss Coeff.	0
Exit Loss Coeff.	0
Avg. Loss Coeff.	0
Seepage Rate (mn	0
Flap Gate	NO
Cross-Section	IRREGULAR
Geom1 (m)	0
Geom2 (m)	0
Geom3	0
Geom4	0
Barrels	1
Transect	416.366
Shape Curve	
Culvert Code	
Results	
Max. |Flow| (m³/s)	0
Time Max. Flow	05/06/2015 00:00
Max. |Velocity| (m/s	0
Max/Full Flow	0
Max/Full Depth	0
Max. Spread (m)	0
Max. Volume (m³)	0
Full Both Ends (h)	0
Full Upstream (h)	0
Full Downstream (h	0
Above Full Normal	0
Capacity Limited (h	0
Length Factor (frac	1

Name
User-assigned name of Conduit.

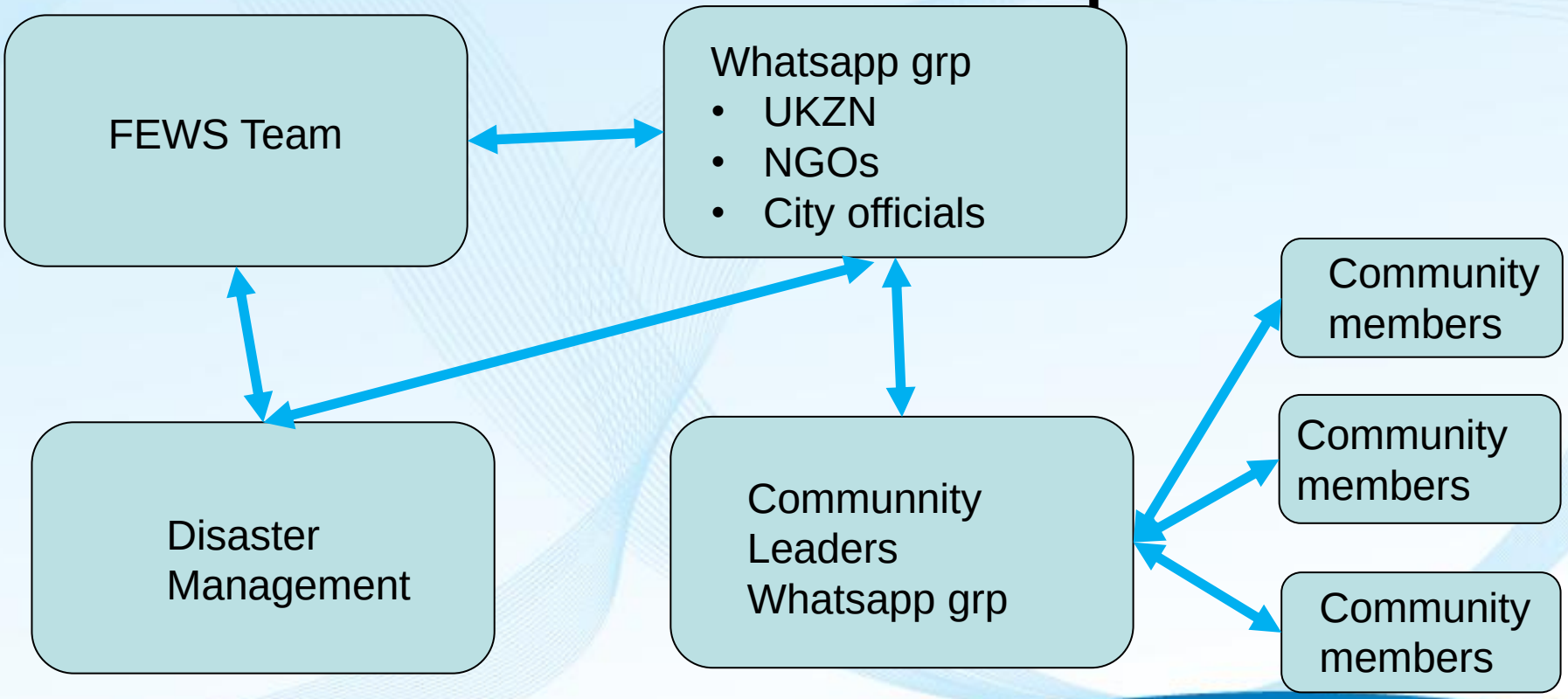
Context of Quarry Road West informal settlement

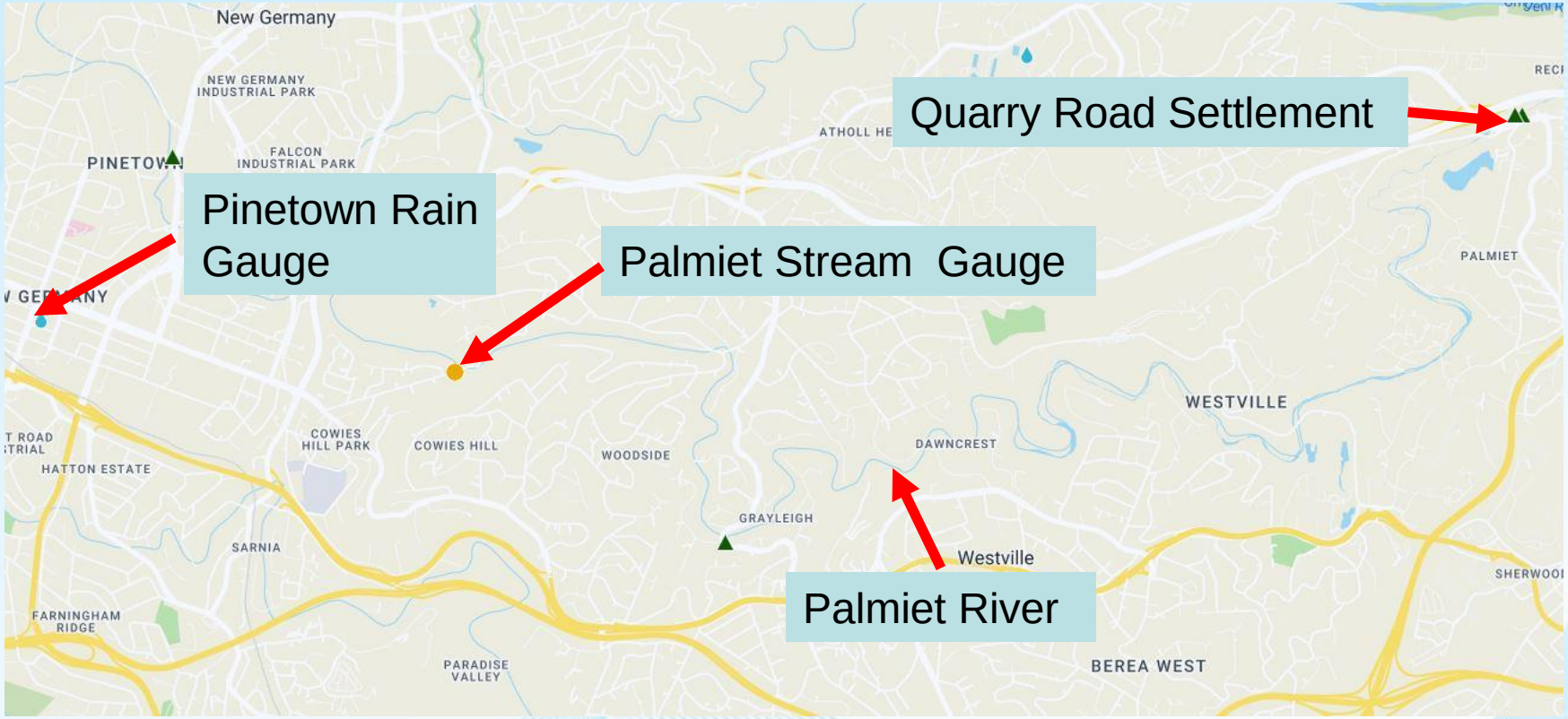
- Quarry Road West is an informal settlement located on a narrow flood plain of the Palmiet River, 1.7 km from where it joins the uMngeni River
- The settlement consists of 1070 informal houses located in four sections, two on each side of the river
- Established in ‘1987’ on a raised ‘hillock’ above the 1: 100 year floodline and then expanded into the floodplain.
- The settlement is subject to frequent flooding after heavy rainfall due to the rapid rising of the river and flooding from the adjacent roads and stormwater infrastructure
- highly vulnerable settlement (socio-economic and environmental risks)
- Researchers from Built Environment Development Section, UKZN began to engage with leadership in the community in 2014
  - We would like to explore the relationship you have with the river, with you …



- UKZN has established a strong research relationship with the informal community over past 5 years and have trained 35 community based researchers who co-produce knowledge with UKZN researchers
  - Baseline data on the history and geography of the settlement
  - Engagement in the Palmiet Catchment Rehabilitation Project
  - Community based and participatory GIS mapping of the settlement
  - Development of community based waste management system (challenging) and river clean-ups
  - Risk mapping of the settlement (community based, GIS and drone mapping analysis)
  - Ongoing development of a climate smart informal settlement handbook
  - Exploring the ‘narratives of home’ in an informal settlement
  - Community based early warning system

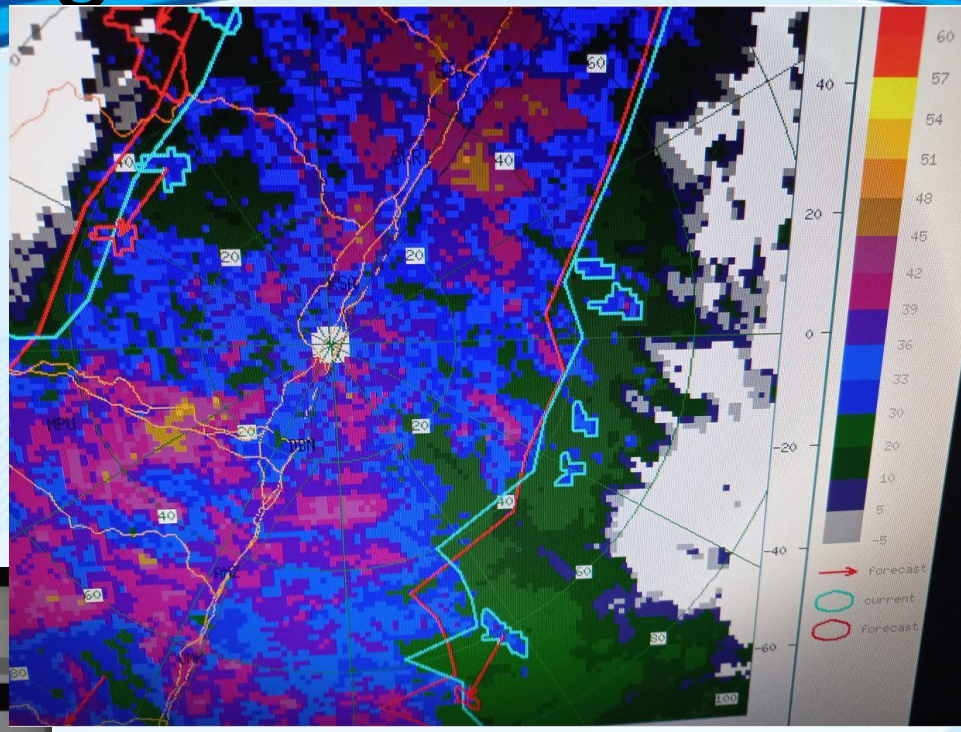
Quarry Road Settlement Communication plan

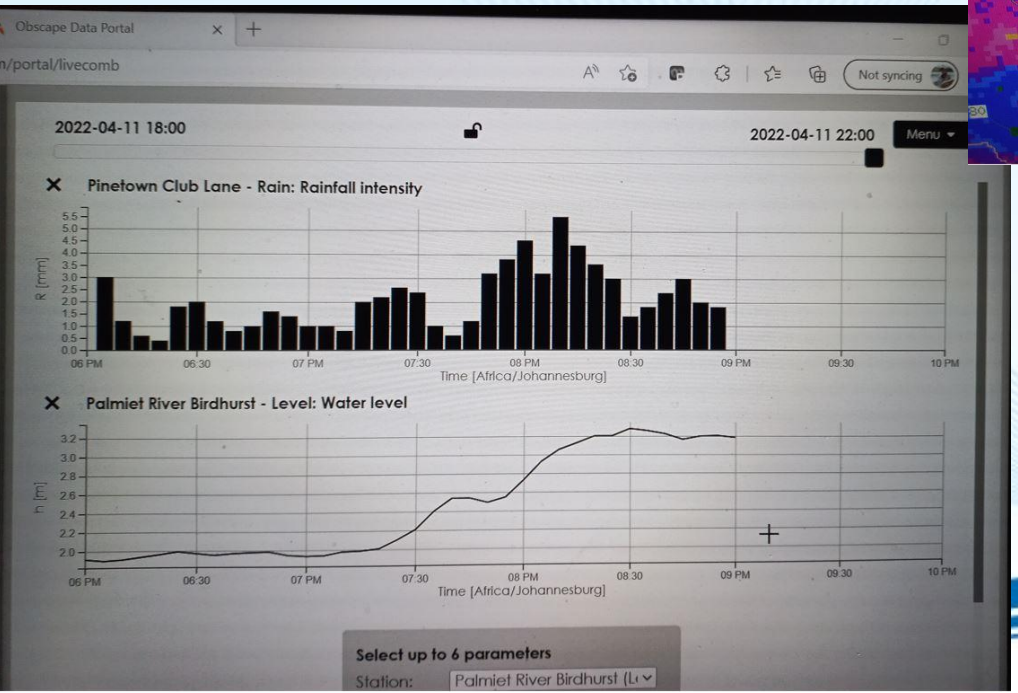



New Germany
NEW GERMANY INDUSTRIAL PARK
PINETOWN
FALCON INDUSTRIAL PARK
ATHOLL HE
Quarry Road Settlement
Pinetown Rain Gauge
Palmiet Stream Gauge
PALMIET
WESTVILLE
COWIES HILL PARK
COWIES HILL
WOODSIDE
DAWNCREST
HATTON ESTATE
GRAYLEIGH
SARNIA
Westville
Palmiet River
FARNINGHAM RIDGE
PARADISE VALLEY
BEREA WEST

Monitoring Tools

Radar



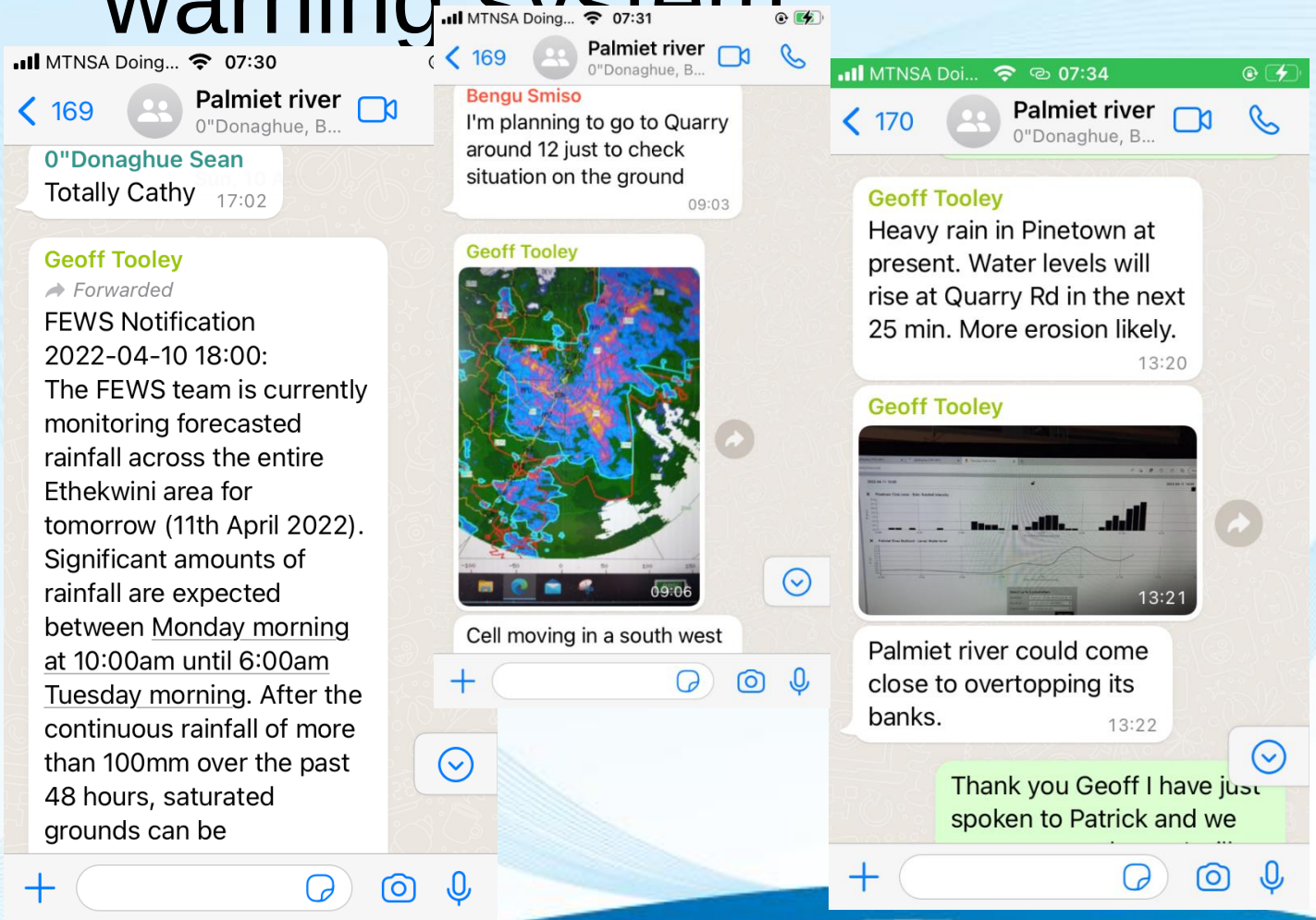


Pinetown Rain Gauge

Palmiet Stream Gauge

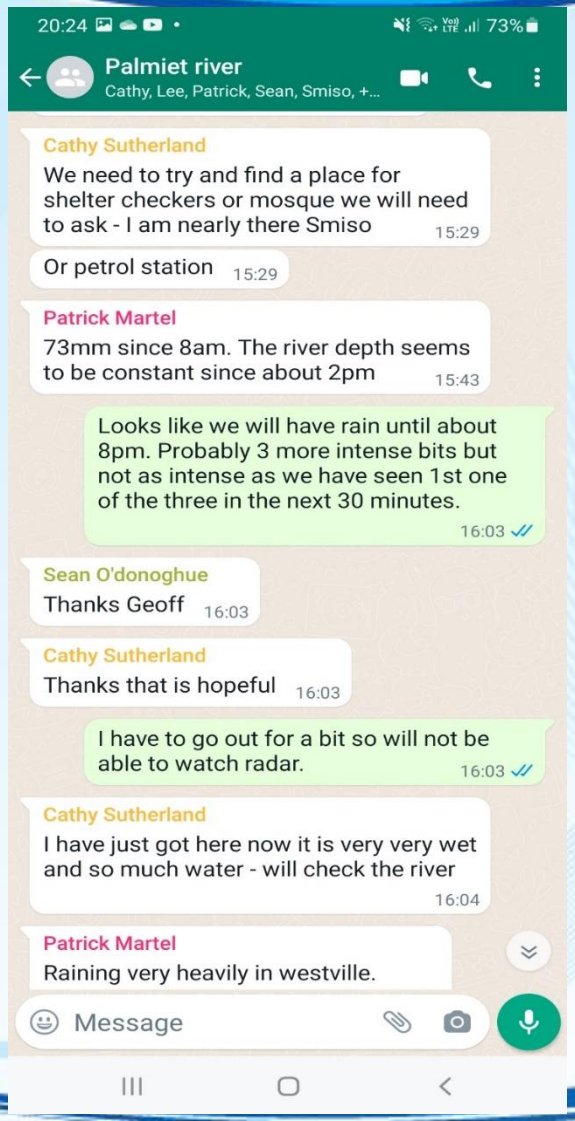
Community based early flooding warning system

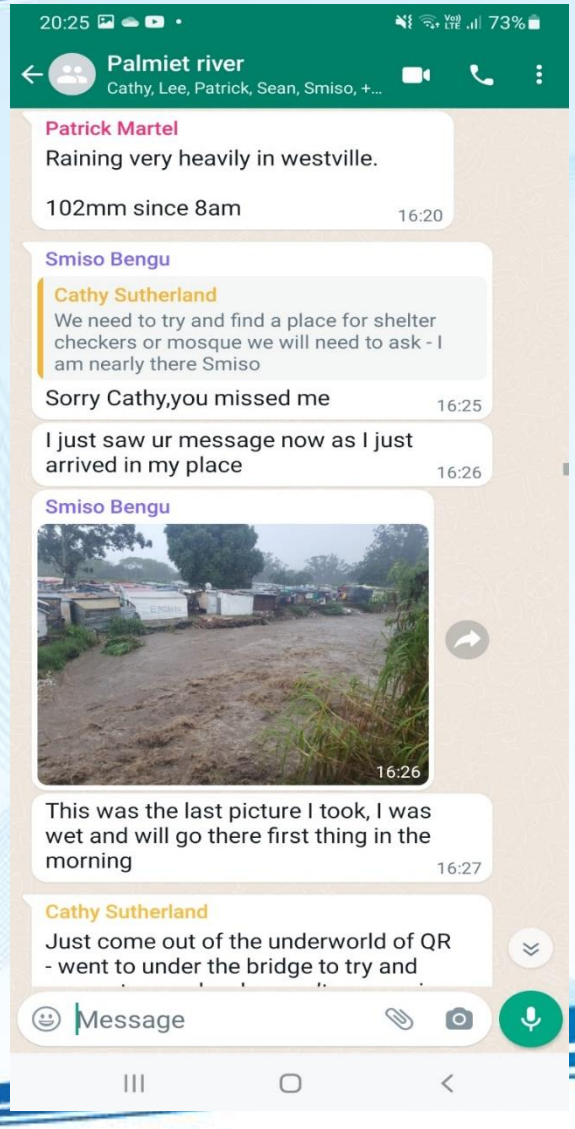
- Coastal Stormwater and Catchment Management, eThekwini Municipality (FEWS, river level data), Climate Protection Branch, eThekwini Municipality, School of Built Environment and Development Studies, Quarry Road West informal settlement ‘mapmakers’/Enviro-champs, Palmiet River Valley Conservancy
- FEWS, scientific monitoring, community based evidence, whatsapp groups and on the ground engagements

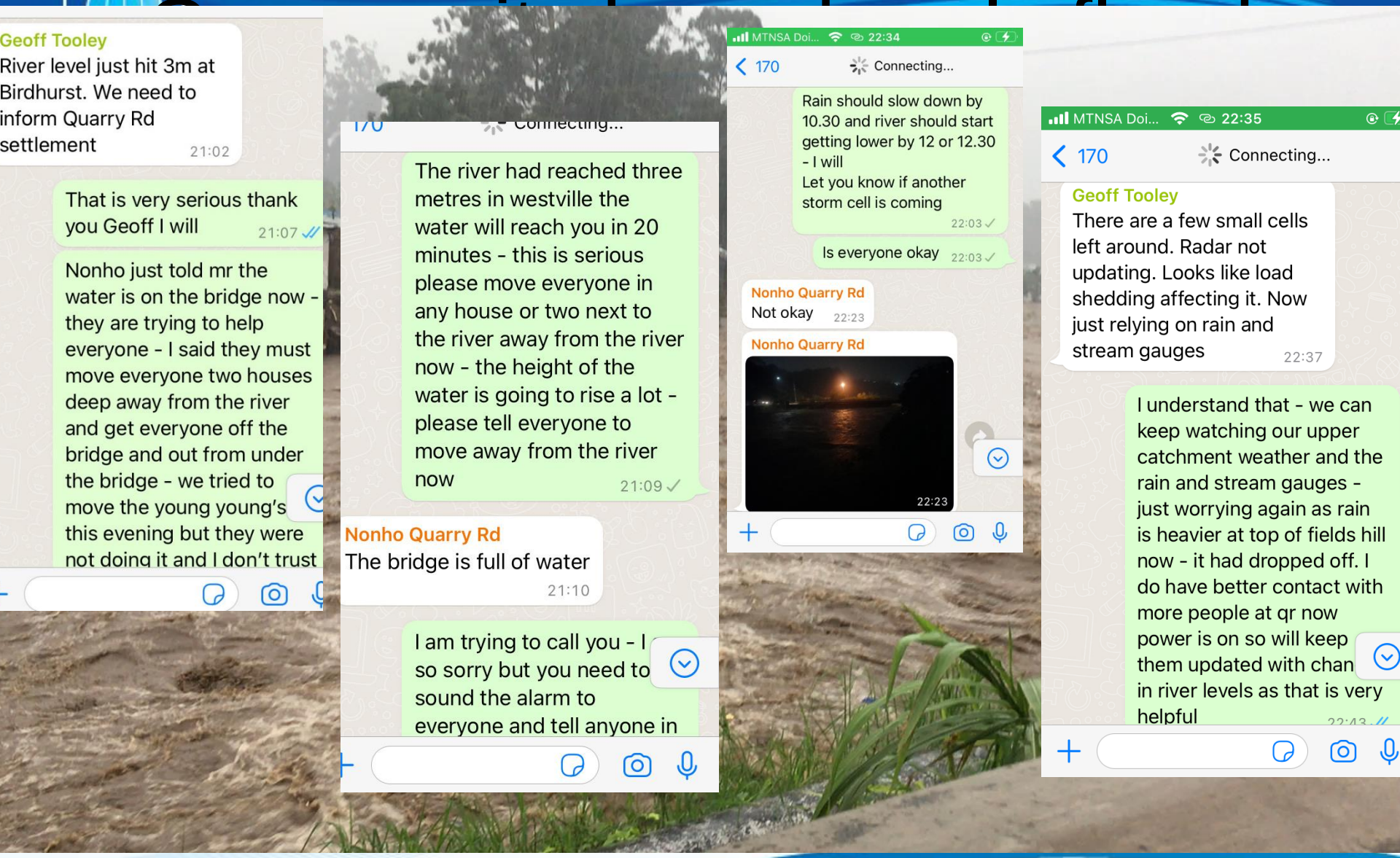


11/4/2022

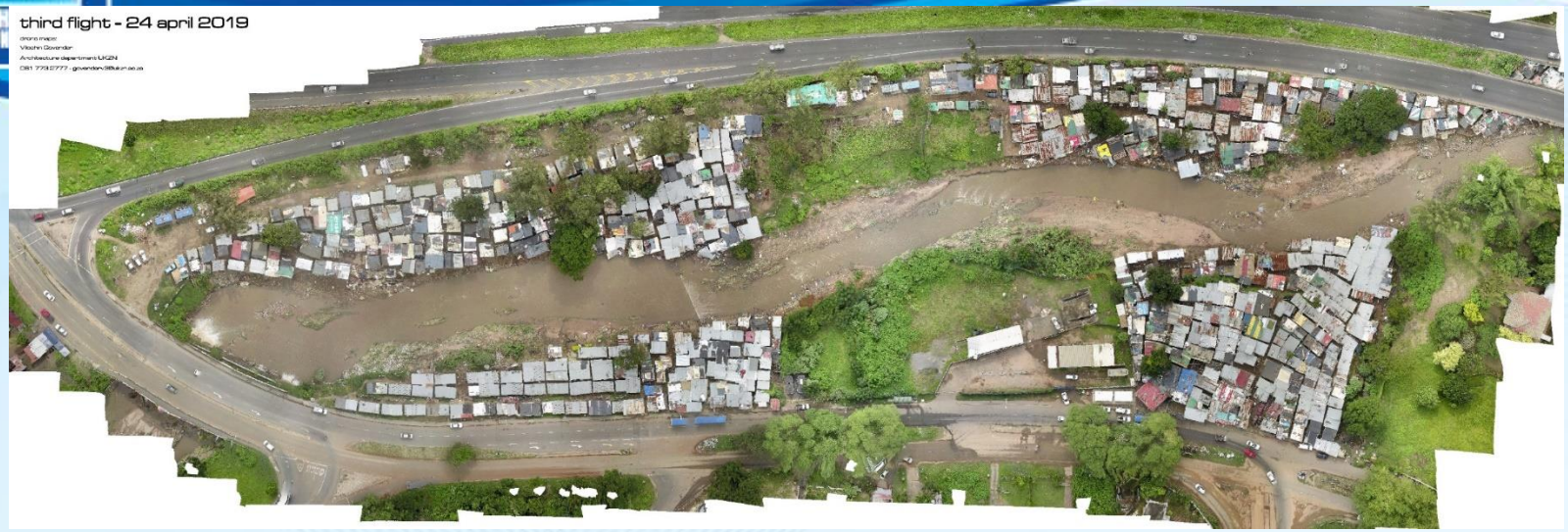
Palmiet River Whatsapp Group






Geoff Tooley
River level just hit 3m at Birdhurst. We need to inform Quarry Rd settlement
21:02
That is very serious thank you Geoff I will
21:07
Nonho just told mr the water is on the bridge now - they are trying to help everyone - I said they must move everyone two houses deep away from the river and get everyone off the bridge and out from under the bridge - we tried to move the young young's this evening but they were not doing it and I don't trust
Connecting...
The river had reached three metres in westville the water will reach you in 20 minutes - this is serious please move everyone in any house or two next to the river away from the river now - the height of the water is going to rise a lot - please tell everyone to move away from the river now
21:09
Nonho Quarry Rd
The bridge is full of water
21:10
I am trying to call you - I so sorry but you need to sound the alarm to everyone and tell anyone in
MTNSA Doi... 22:34
170
Connecting...
Rain should slow down by 10.30 and river should start getting lower by 12 or 12.30 - I will
Let you know if another storm cell is coming
22:03
Is everyone okay
22:03
Nonho Quarry Rd
Not okay
22:23
Nonho Quarry Rd
22:23
MTNSA Doi... 22:35
170
Connecting...
Geoff Tooley
There are a few small cells left around. Radar not updating. Looks like load shedding affecting it. Now just relying on rain and stream gauges
22:37
I understand that - we can keep watching our upper catchment weather and the rain and stream gauges - just worrying again as rain is heavier at top of fields hill now - it had dropped off. I do have better contact with more people at qr now power is on so will keep them updated with chan in river levels as that is very helpful


Palace Lodge
Fibre is here!

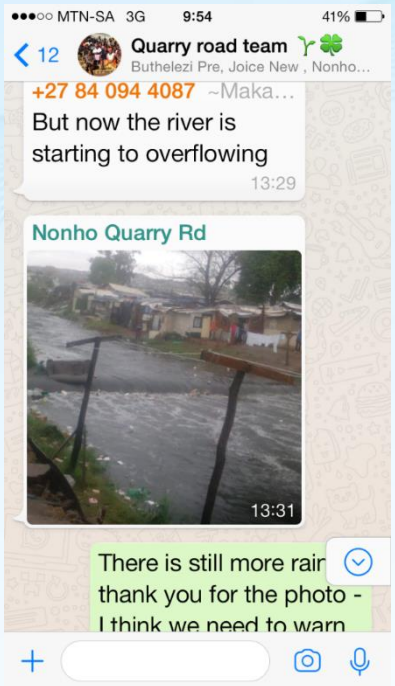

third flight - 24 april 2019

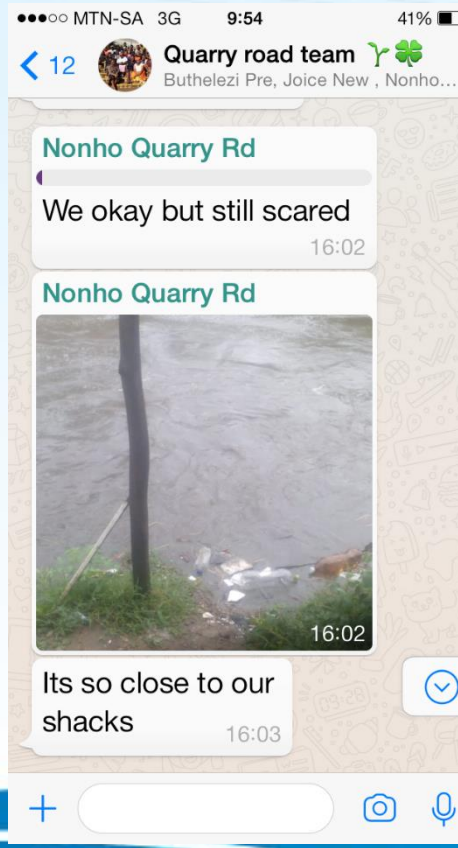

fifth flight - 13 april 2022


YAJUR CHOTAI

Key learnings: Community based flood early warning system

- Initiated by researchers at BEDS, UKZN who were receiving rainfall data from Lee D'Eathe's (Riverwatch) on the PRRP whatsapp group (sustained effort and learning)
  - Lee D'Eathe was posting rainfall data and flood warnings as a result of collecting and disseminating data from his rain gauge at his home in the middle course of the river
  - 40 minutes to reach the bridge, concern above 40 mm (local knowledge and testing)
- UKZN researchers would phone leaders and members of the mapmakers team at Quarry West informal settlement to warn them that the river was rising
- Caution from Sean O'Donoghue (CPB, eThekwini Municipality) only SAWS can issue weather warnings
- Partnership with Geoff Tooley (CSCM) eThekwini Municipality: FEWS system
- Availability of wifi and whatsapp communication has been essential
- Network of actors grew over time but sustained trusted relationships
- People intensive system: but most are local, municipal (how do we expand technology) and intermediaries (how do we expand this actor group)





EVENTS OF 10 and11 April 2022

- Community leaders warned of flood risk
- Because of Community developed hazard maps the community could understand the information provided
- Academia, NGOs and council staff could assist onsite and remotely
- Community was watching and feeding back information on the flood
- Community was ready to respond to the risk
- Community responded when the risk became dangerous.
- No lives lost due to drowning as the community was knowledgeable, informed, aware and ready to respond – one life lost due to electrocution.

Fine tuning the community based flood warning system

- Access to cell phone technology
  - Community access to smart phones and wifi/internet access
  - Whatsapp groups: messages more quickly disseminated amongst mapmakers
- Integrating data from a wide range of sources
  - SAWS
  - eThekwini Municipality weather warnings via SMS
  - Civic science reporting from Riverwatch
  - Community monitoring on river levels reported back to UKZN researchers on whatsapp group: photographs and descriptions of river levels
- UKZN researchers provide emergency services on municipality emergency call centre with more detailed information about the changing level of risk
- Ongoing engagements between eThekwini Municipality, UKZN and community members to keep improving the flood warning system
  - Experimenting with governing flood risk through the co-production of knowledge

Benefits of community based flood warning system

- Residents of Quarry Road informal settlement, particularly the ‘mapmakers’, have become sensitized to understanding the science and relative ‘predictability’ of risk
- Awareness and knowledge sharing in the community has increased and residents report ‘batoning down the hatches’ once they have received storm and flood warnings
- Community responds to risk and this has decreased the impacts of storms and floods in the settlement
  - “After the last warning I called my neighbour who works at Checkers (a retail store near the settlement) that a flood was coming and he left work and came running home and moved all his belongings to another house. His house was damaged by the floods and he would have lost everything but the warning I gave him saved him” (Thembisa, 28 November, 2018)
- Residents are developing a range of adaptation practices to deal with the risk of storms and floods
- A form of community based adaptation
- Emergency services and Disaster Risk Management are being provided with ‘real-time’ detailed local knowledge which may support their efforts to manage flood risk in the city
- Social learning and engagement between state, research institutions and citizens

Thank You

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