Royal HaskoningDHV
Enhancing Society Together

Deltares
Enabling Delta Life

NEPS
National Engineering & Planning Services

TU Delft
Technische Universiteit Delft

Pan Hlaing River Integrated Development Plan

Global Water Partnership, Yangon

Alwin Commandeur
1 June 2017
Open

RHDHV in Myanmar

30+ years — Experience working on maritime, industry and water projects in Myanmar **since 1986**.

30 people — Strong and energetic local team working from office and on various construction sites.

4 years — Re- established a branch office in Yangon in 2013 and formed a legal entity in 2015.

Local knowledge — Through project experience and due to majority local team.

Reputation — Unrivalled local track record, reputation and network in Myanmar.

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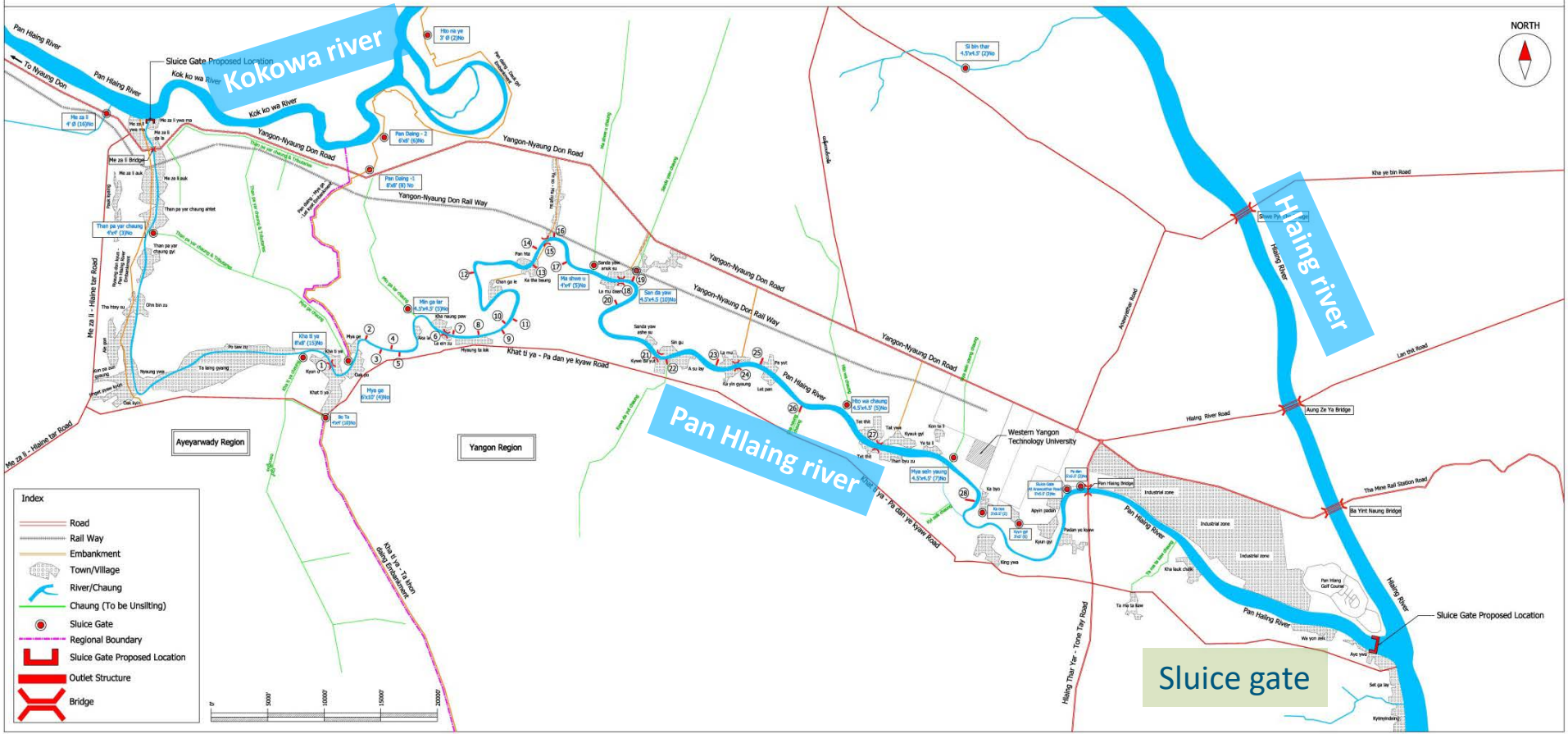
PAN HLAING RIVER REHABILITATION PROJECT



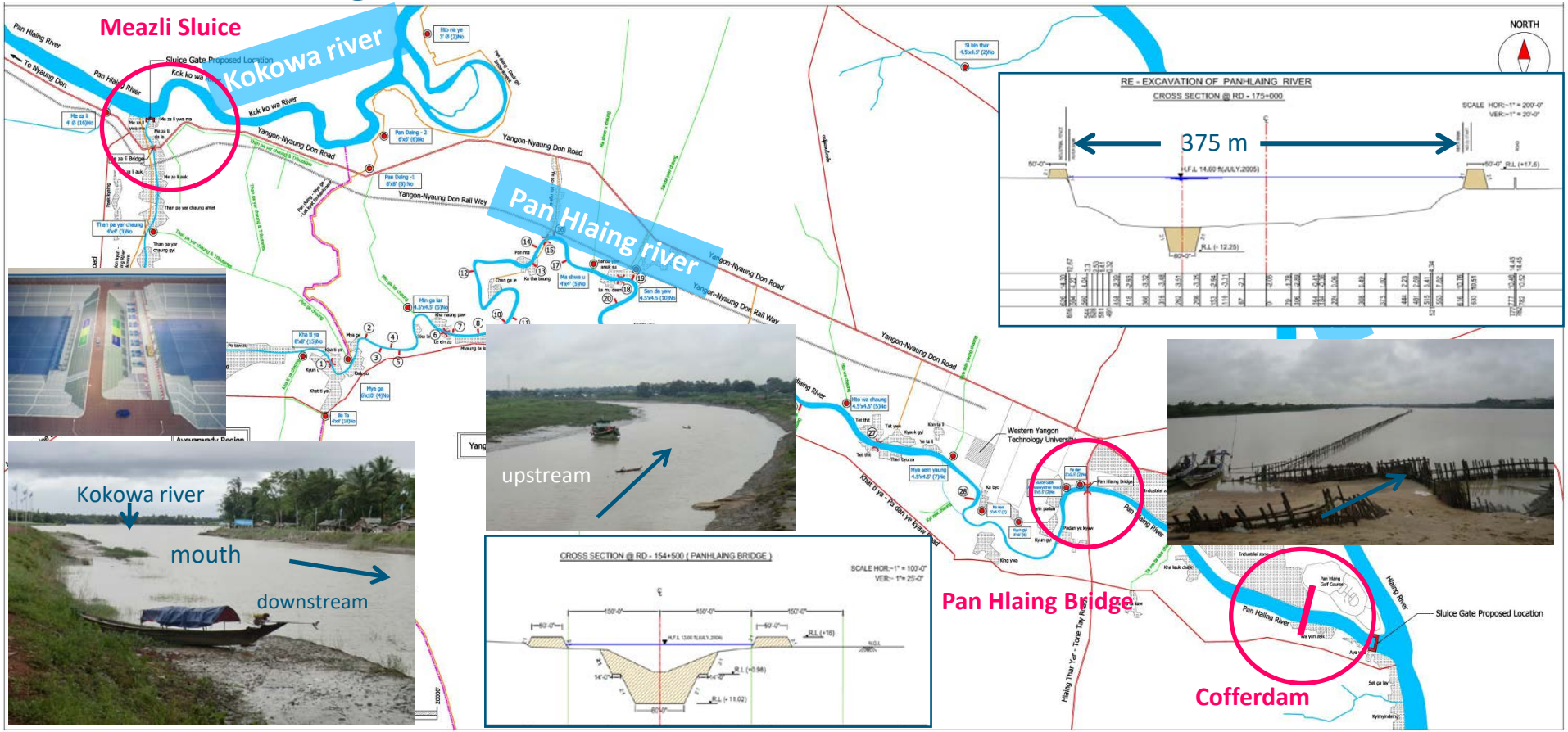
Feasibility Study of Pan Hlaing Sluice

- Pan Hlaing River Integral Development Plan (PHRIDP)
  - Flood protection
  - Water supply for agriculture and irrigation
  - Socio-economical developments Pan Hlaing River area
  - Sluice complex sketch design in the Pan Hlaing River

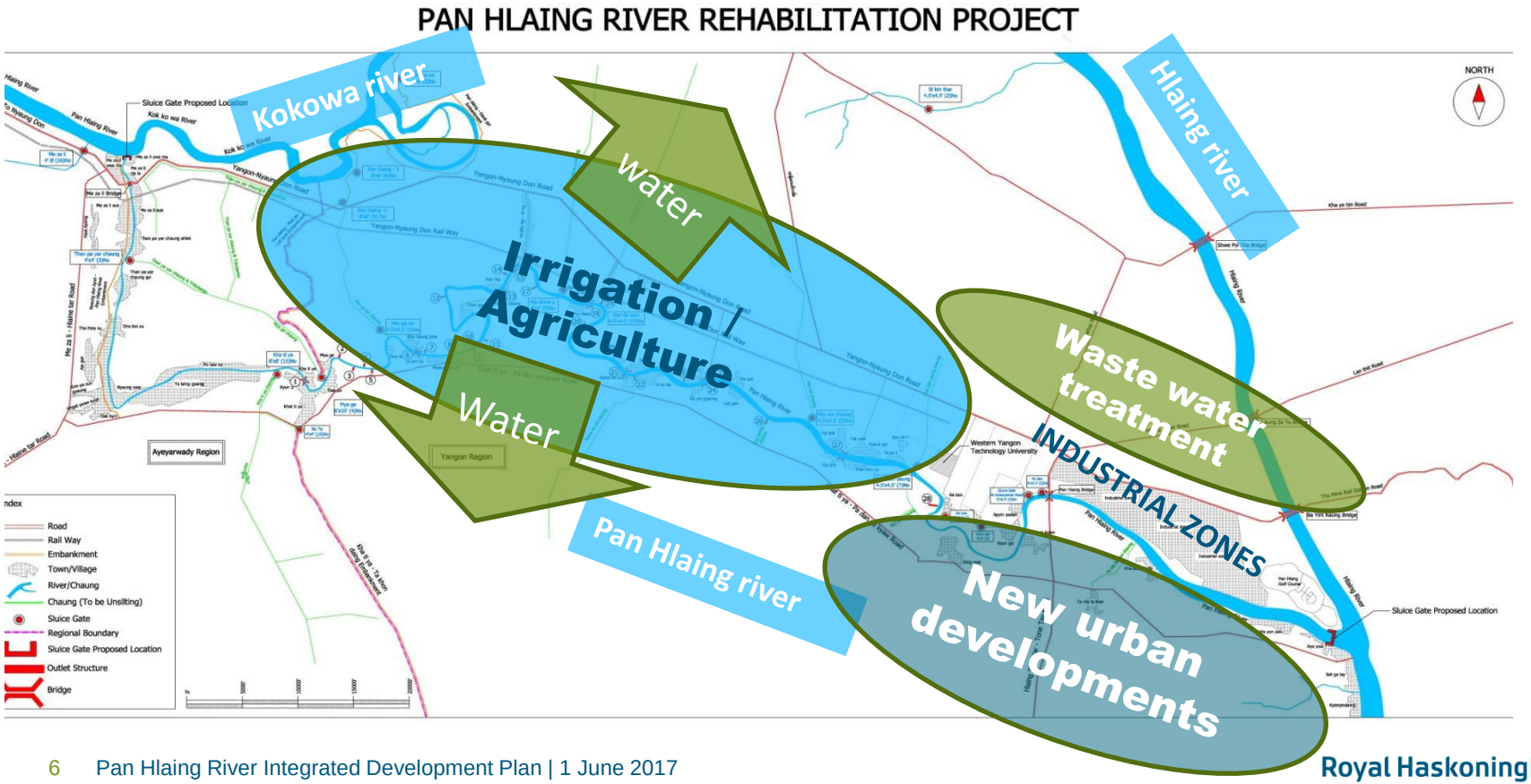
- In close collaboration with stakeholders
- Supervise Geotechnical Investigation work
- Capacity Building at local Universities

Site visit May 2015

Pan Hlaing River Overview



Interest and Future Developments



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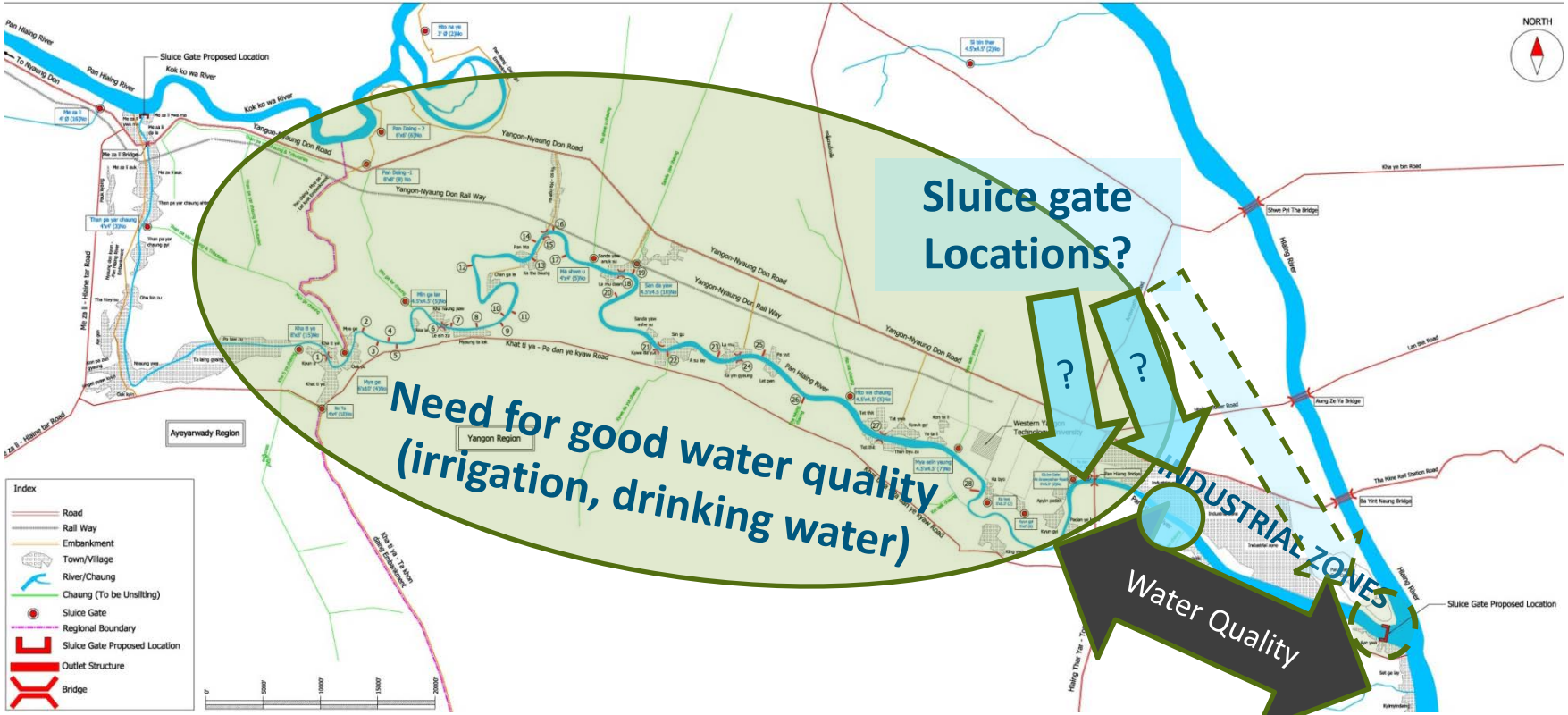
Challenges and Sluice gate locations



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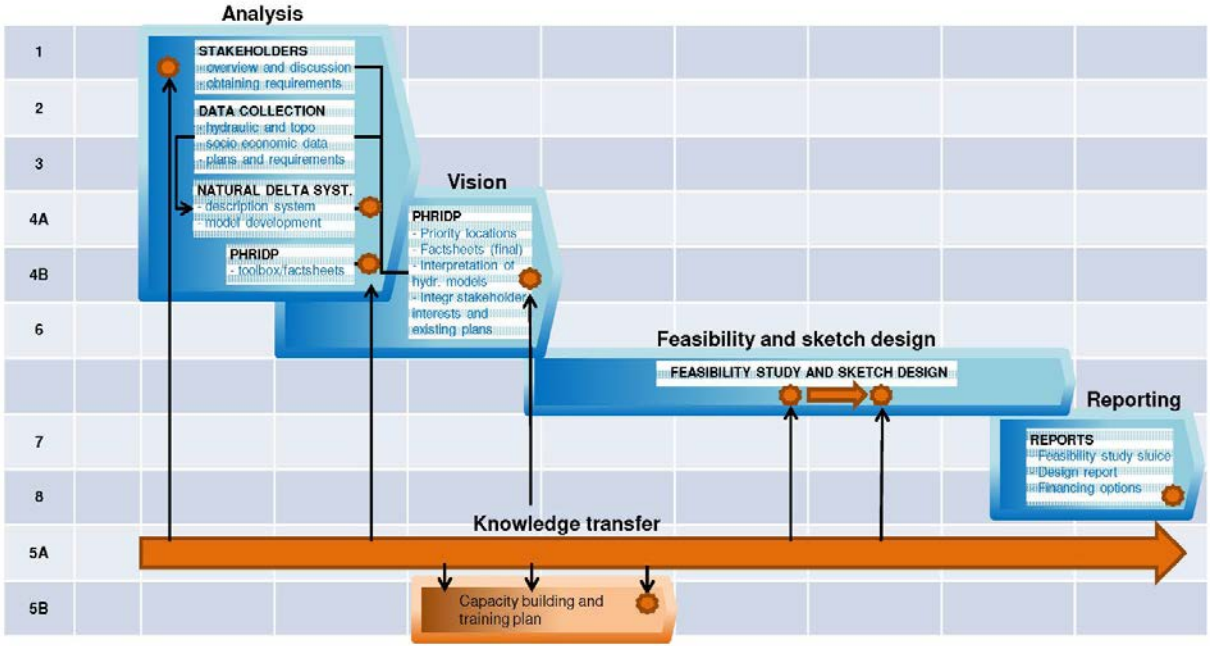
Approach

Months	1 - AUG	2 - SEP	3 - OCT	4 - NOV	5 - DEC	6 - JAN	7 - FEB	8 - MAR
Deliverable / Activity	• Inception report / Draft PHRIDP • Policy & Stakeholder Analysis • Data overview and database • SOBEK-model • Report delta/river system		• Toolbox/factsheets PHRIDP • PHRIDP • Specifications sluice • Proposed capacity building plan		• Feasibility study and sketch design sluice complex (draft)		• Feasibility sluice complex (final) • Final feasibility study report (incl. financing options) • Final workshop	



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Fact-sheets & Co-design approach

- Help practitioners with implementing comparable projects
- Describe tools and approaches that can be used
- Describe lessons learnt
- Approaches and tools illustrated by application of Learning-by-Doing projects
- Links to sources for more information

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Fact-sheets & Co-design approach

- Graduate students Yangon Technological University and Myanmar Maritime University help with filling the factsheet, based on guest lectures and excursion.

Motivation:

- Maximize knowledge uptake by Myanmar partners
- Promote understanding of used tools, approaches
- Exposure to practice for students to increase popularity IWRM

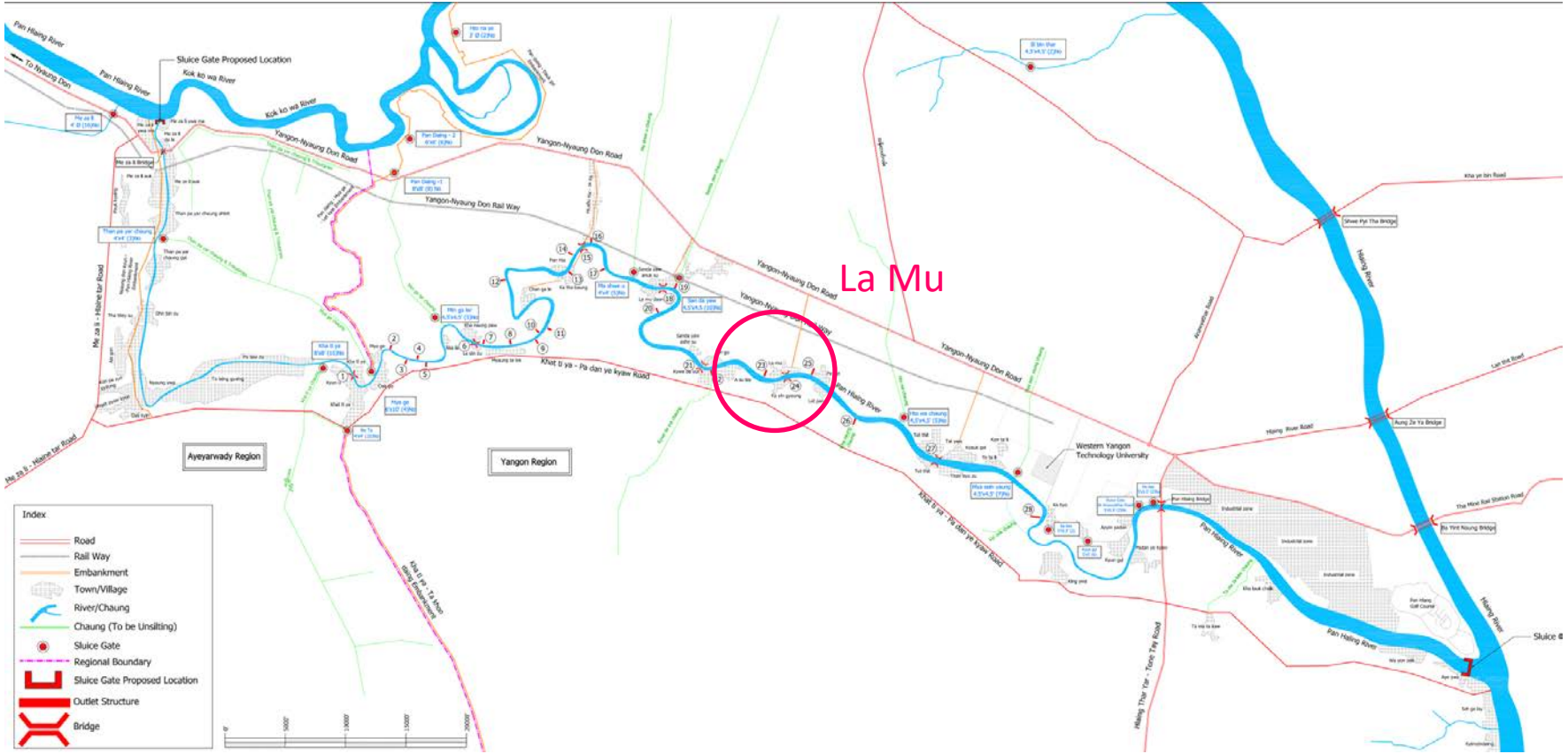
Sedimentation Processes

View of Pan Hlaing River in dry season

Silt deposition in Pan Hlaing River at U/S of highway bridge (Low tide)

Silt deposition in Pan Hlaing River at U/S of highway bridge (Low tide)

Sedimentation in the middle of the reach



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Sedimentation in the middle of the reach

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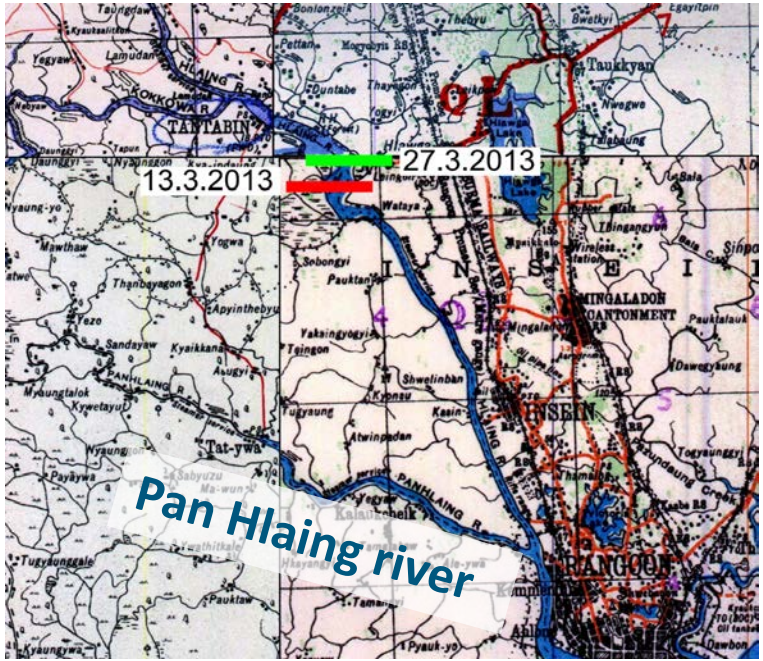
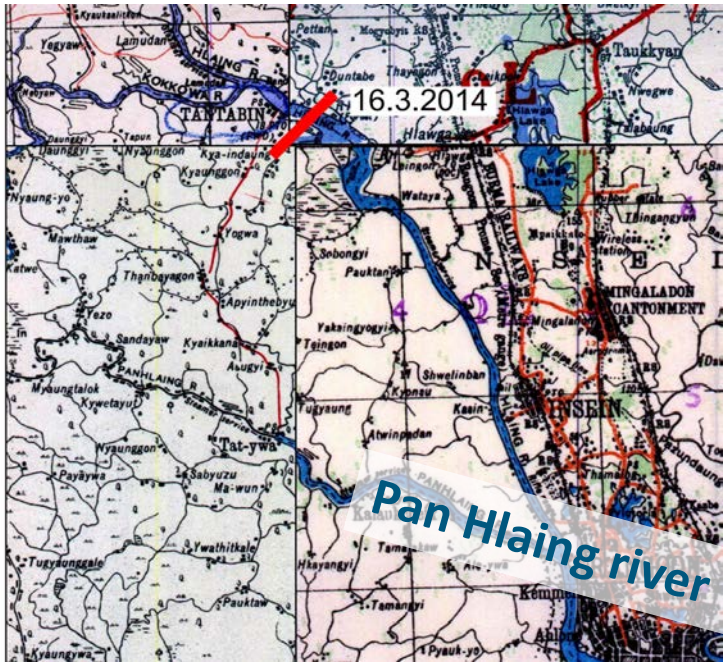
Salinity front (maximum 2013-2014)



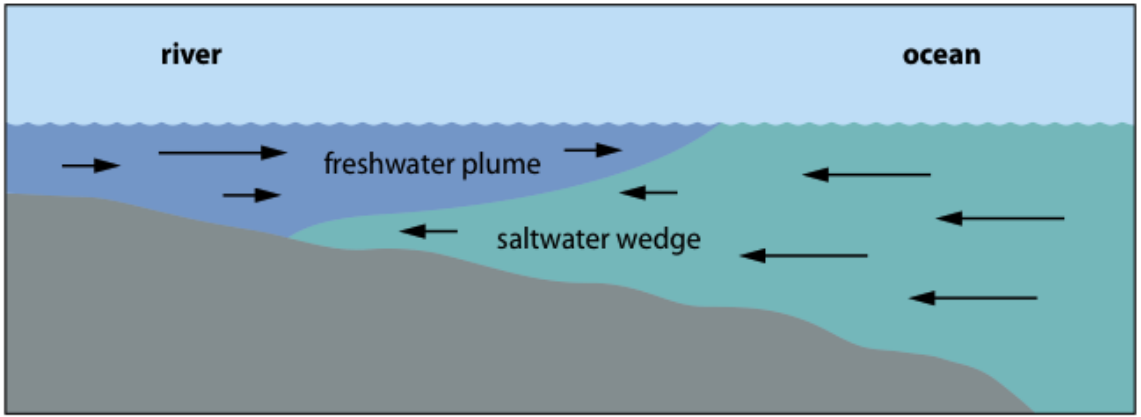


Low river flow (March)

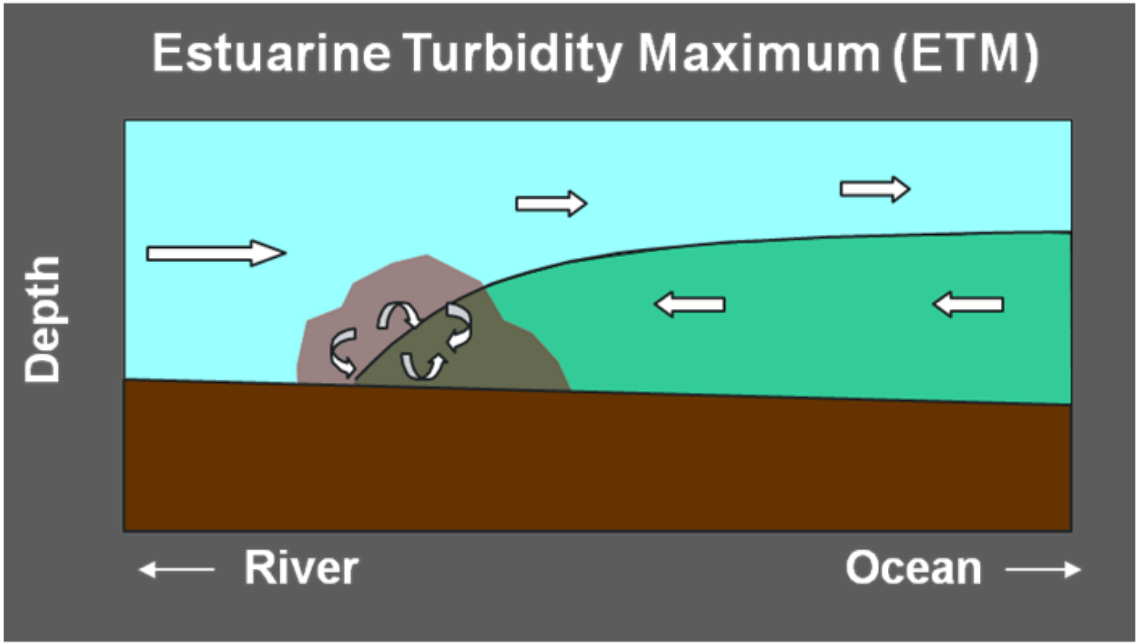
Salt intrusion

Relevant parameters for saltwater wedge:

- Water depth (large depth, further intrusion)
- Fresh water discharge (pushes back salt wedge)
- Estuarine mixing



Sedimentation processes at salt wedge



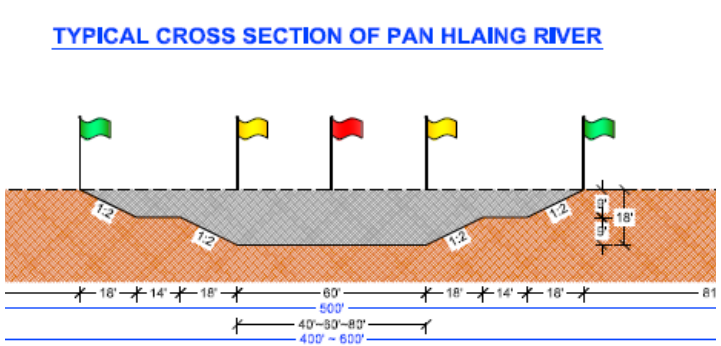
(image courtesy of Dong Yoon Lee, Virginia Commonwealth University)

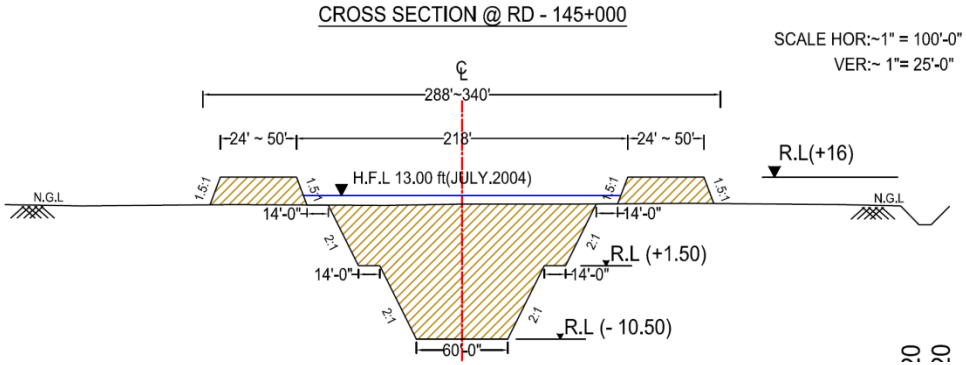
Sedimentation processes

Pan Hlaing River sediments

Mud deposits (50% clay + 50% silt)

Excavations by IWUMD





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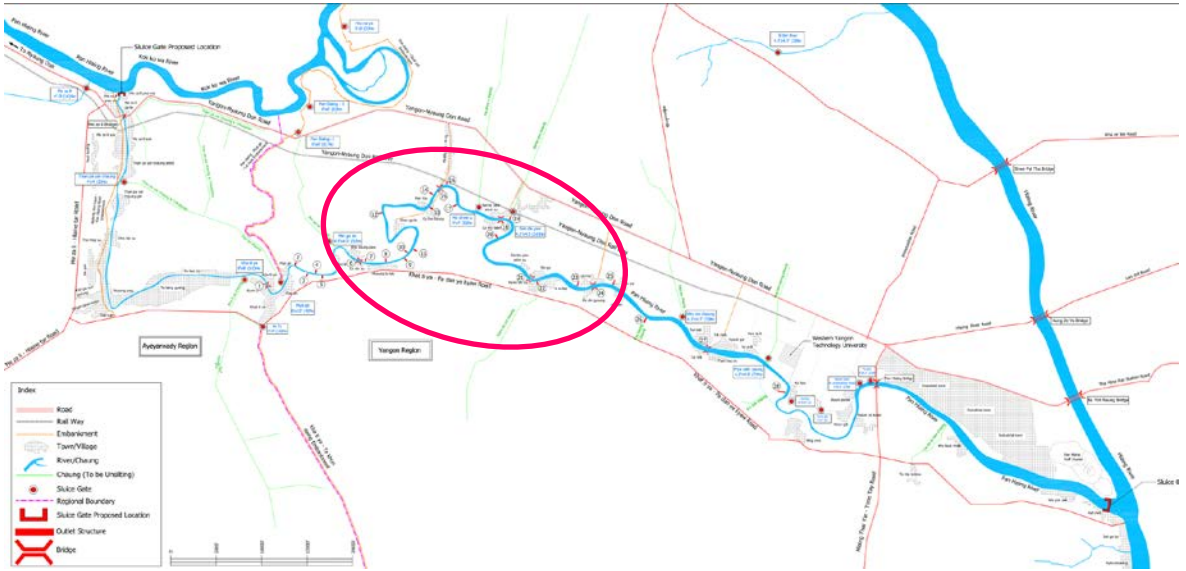
1D SOBEK Model

October 2015



Made use of a basic model to explain why this sedimentation happened

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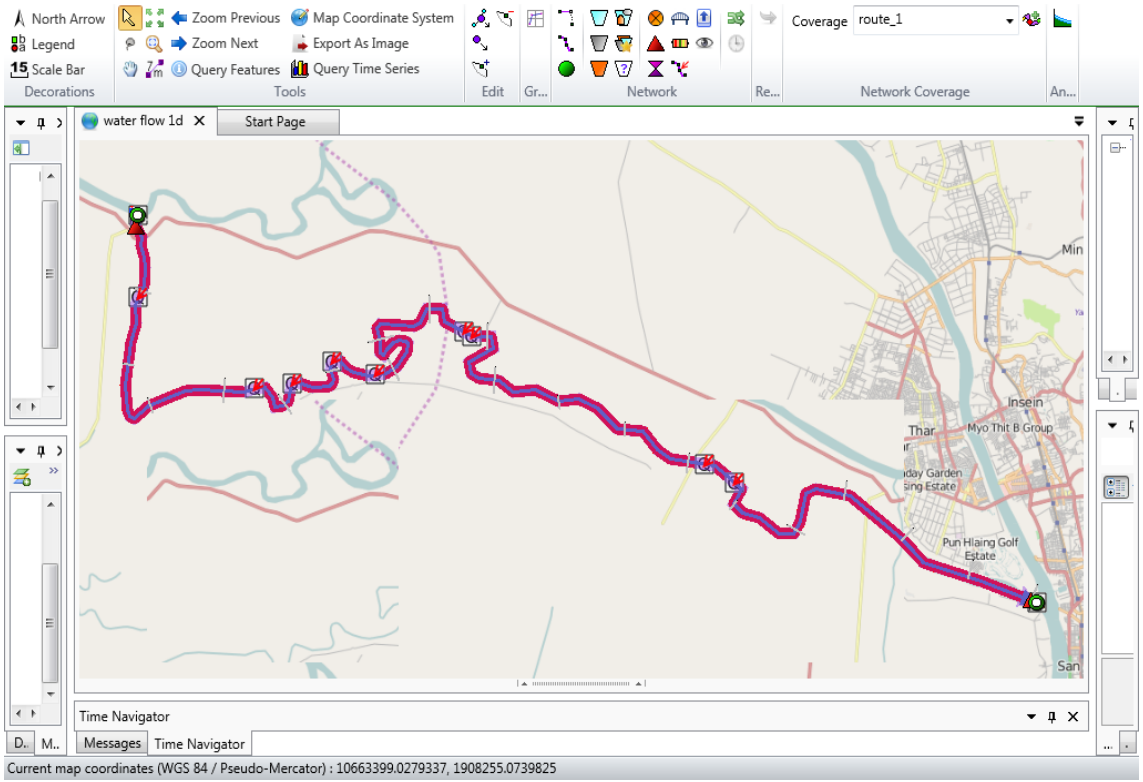
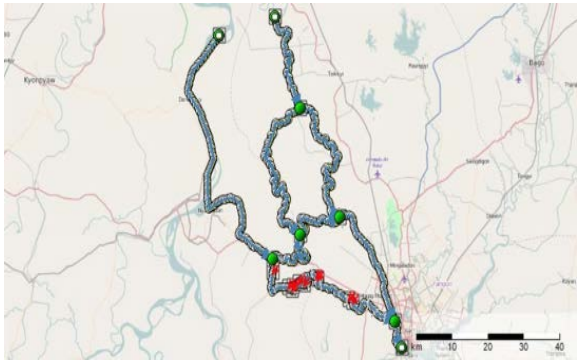
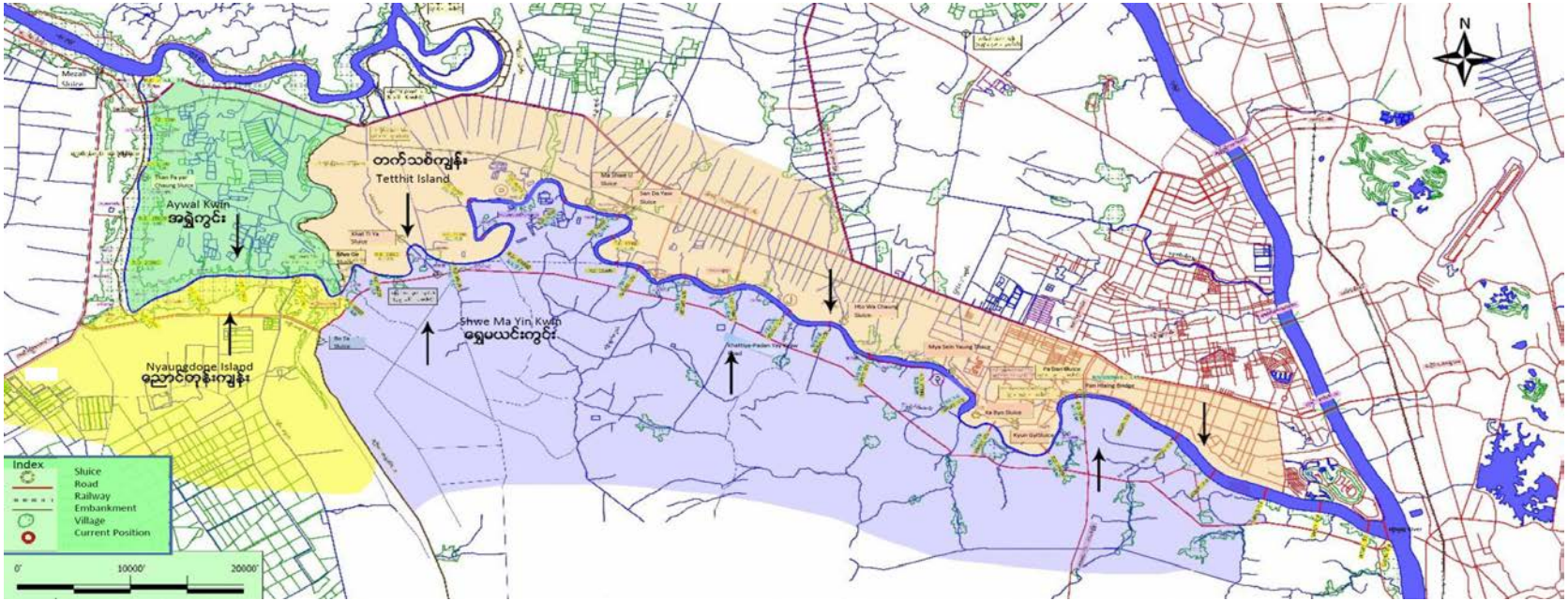
1D SOBEK Model

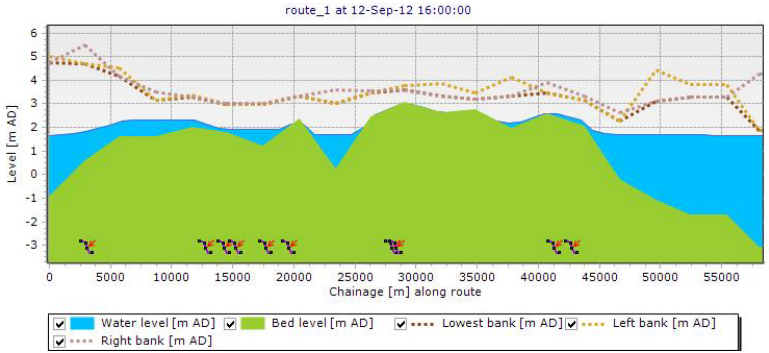


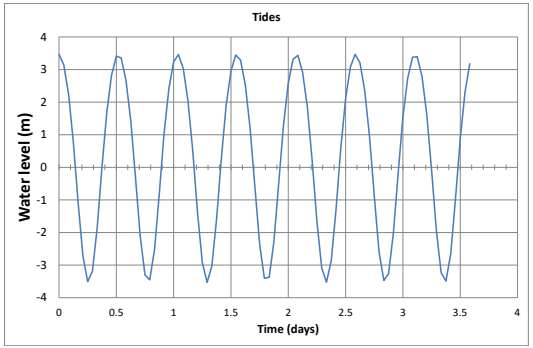


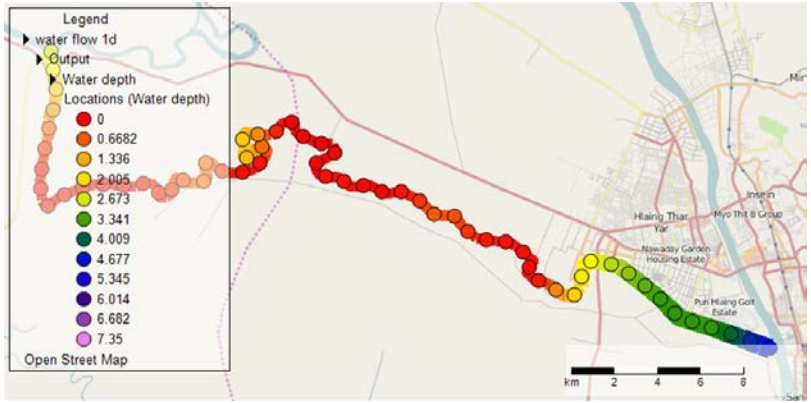
Lateral inflow (irrigation/drainage)



Model Outcomes







- Tides dominant force
  - **"Sediment pumping" by tides**
  - Reduced tidal damping (floods)
- Considerations
  - Impacts of sluices (opening and closing)
  - Input of sediment from Kokowa River / or flushing of deposited sediments

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Natural system

- Significant sedimentation (significant salt intrusion)
- Limited fresh water in dry season
- Significant limitations for agriculture, residential and industry
- Improve above for Yangon's ambitions in agriculture and city development

Salt intrusion / sedimentation

- Can be addressed by sluice
- Sedimentation in front of sluice may require flushing/maintenance dredging
- *Gate location preferred close to river mouth*

Water balance aspects

- Estimated water demand may just be met
- Water supply important
- Increased water supply will be challenging
- *Large retention area preferred → sluice closer to river mouth*

Drainage

- Controlled water levels expected to limit flood events
- Drainage capacity sufficient
- *Large retention area preferred → sluice closer to river mouth*

Stakeholder Analysis

Meeting with officials from Irrigation Department

Irrigation Department (ID)

- ✓ river section designed under the scope of irrigation and drainage functions
- ✓ suggests that by-pass channel and pipe pumping (to Hlaing River) for waste water discharging from industrial zones
- ✓ supply the fresh water for agricultural development scheme and Industrial zone
- ✓ prevent the sea water intrusion (saline water) and siltation problem

Meeting with IZ Management Committee

Hlaing Thar Yar Industrial Zone

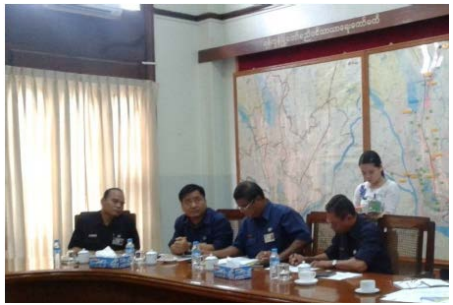
- ✓ want to use Pan Hlaing River as transport route until PH bridge
- ✓ worry about water quality with the lack of proper treatment system from the zone
- ✓ want to have fresh water supply
- ✓ propose to locate the sluice gate near the Pan Haling Bridge with navigability

Meeting with Pan Hlaing Golf Course Estate Management

Pan Hlaing Golf Course Estate

- ✓ Concern that existing free board of the flood gate would be insufficient later
- ✓ the best location of public access should be at the location of existing coffer dam.

Stakeholder Analysis



The team members in discussion with local residents

Meeting with officials from GAD, RDD and SLRD

Yangon City Development Committee (YCDC)

- ✓ has a conceptual new town plan on 4,745 hectares defined by boundaries between Pan Hlaing River, Twante Canal and Hlaingtharyar -Twante Road.
- ✓ Water supply for this new city from Pan Hlaing River - potential solution.
- ✓ to add bridge in sluice design to link the new town with existing Yangon city

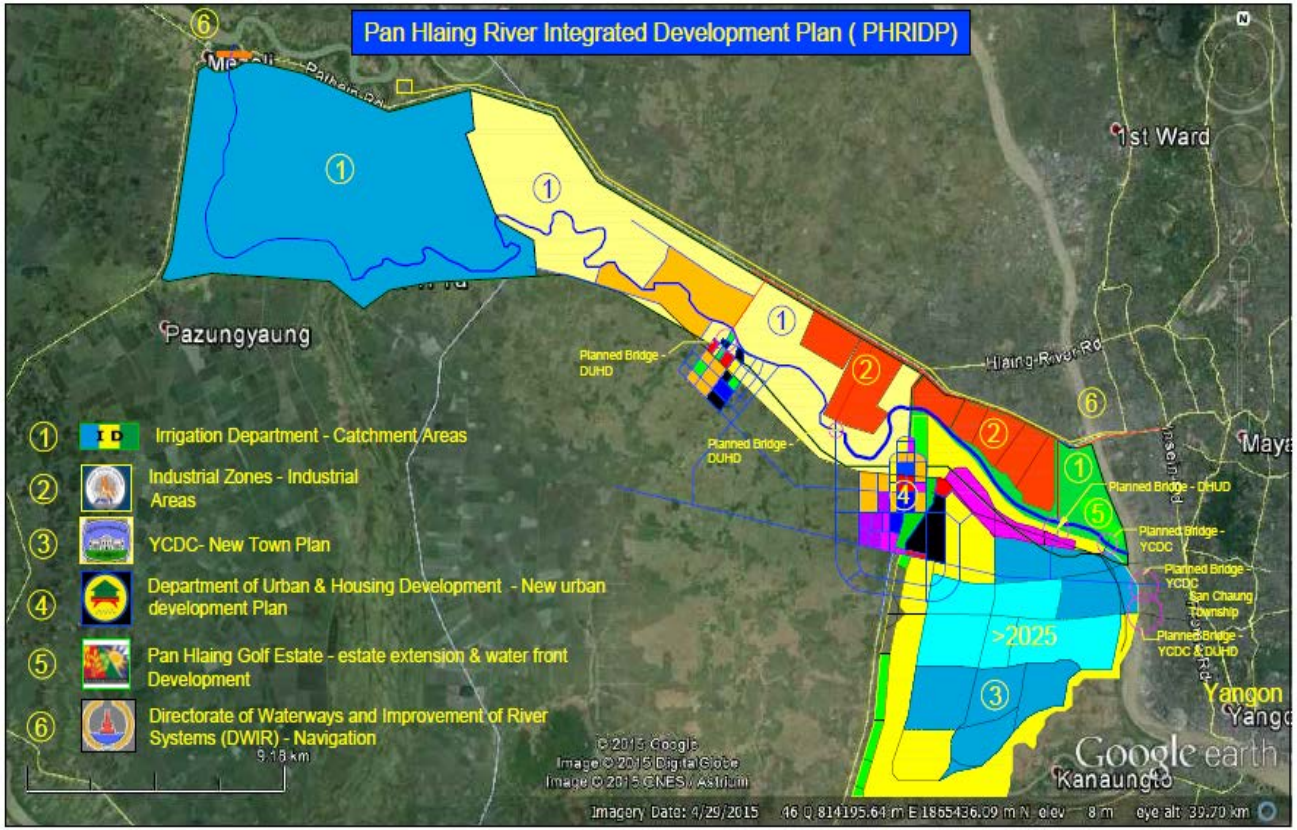
Farmers and Residents living along the River

- ✓ generally satisfied with the excavation works
- ✓ continuous access to fresh water improves their well-being
- ✓ worried about flood & drainage
- ✓ willing to continue to use the river for transportation after the project
- ✓ want to get fresh water for drinking and domestic uses
- ✓ increase their agricultural production

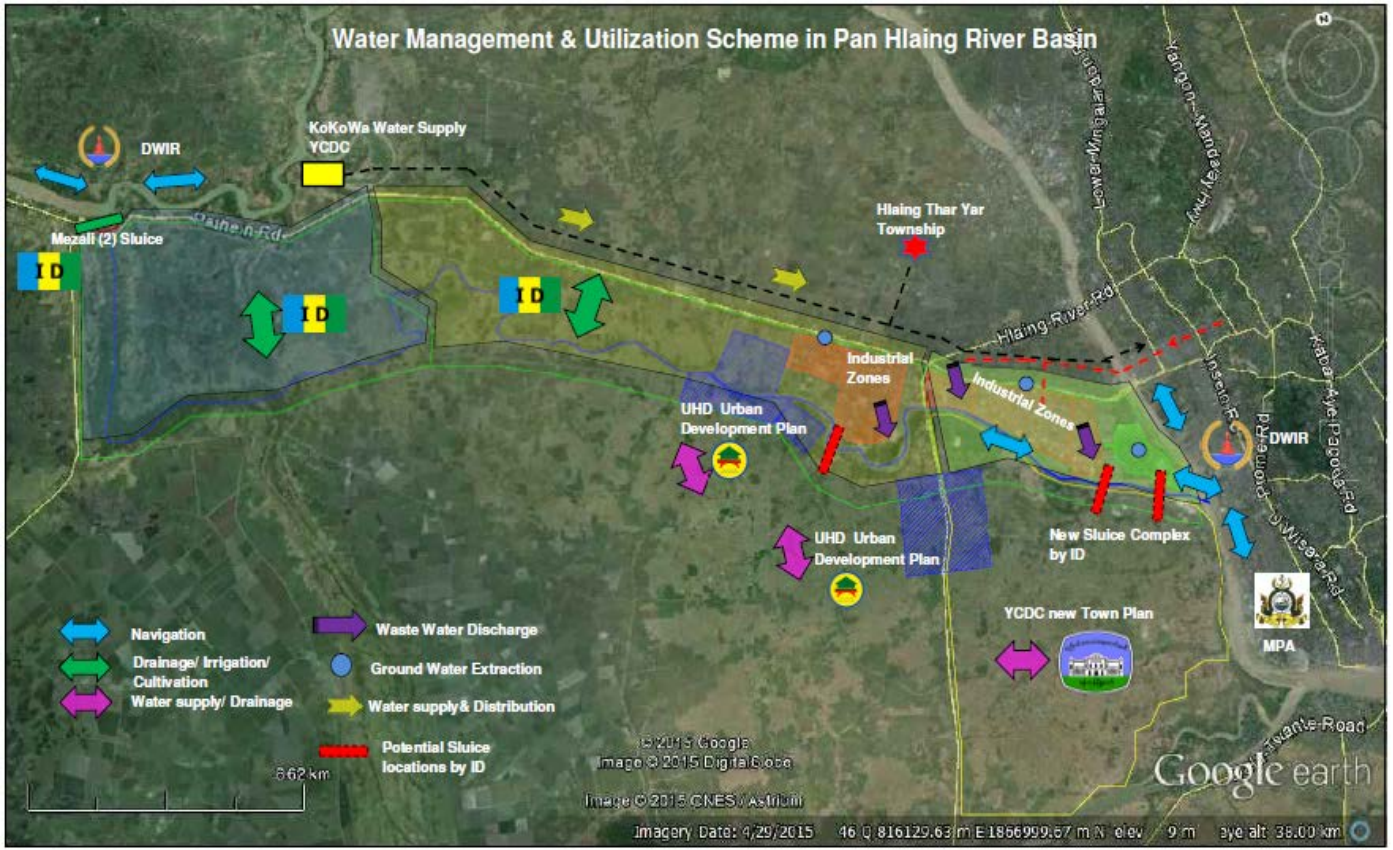
Other Stakeholders

- ✓ General Administration Department
- ✓ Settlement and Land Record Department (Htantapin)
- ✓ concerned of degradation of land and pollution of the Pan Hlaing River water, leading to reduction of fish production.

Overview PHRIDP



Overview PHRIDP



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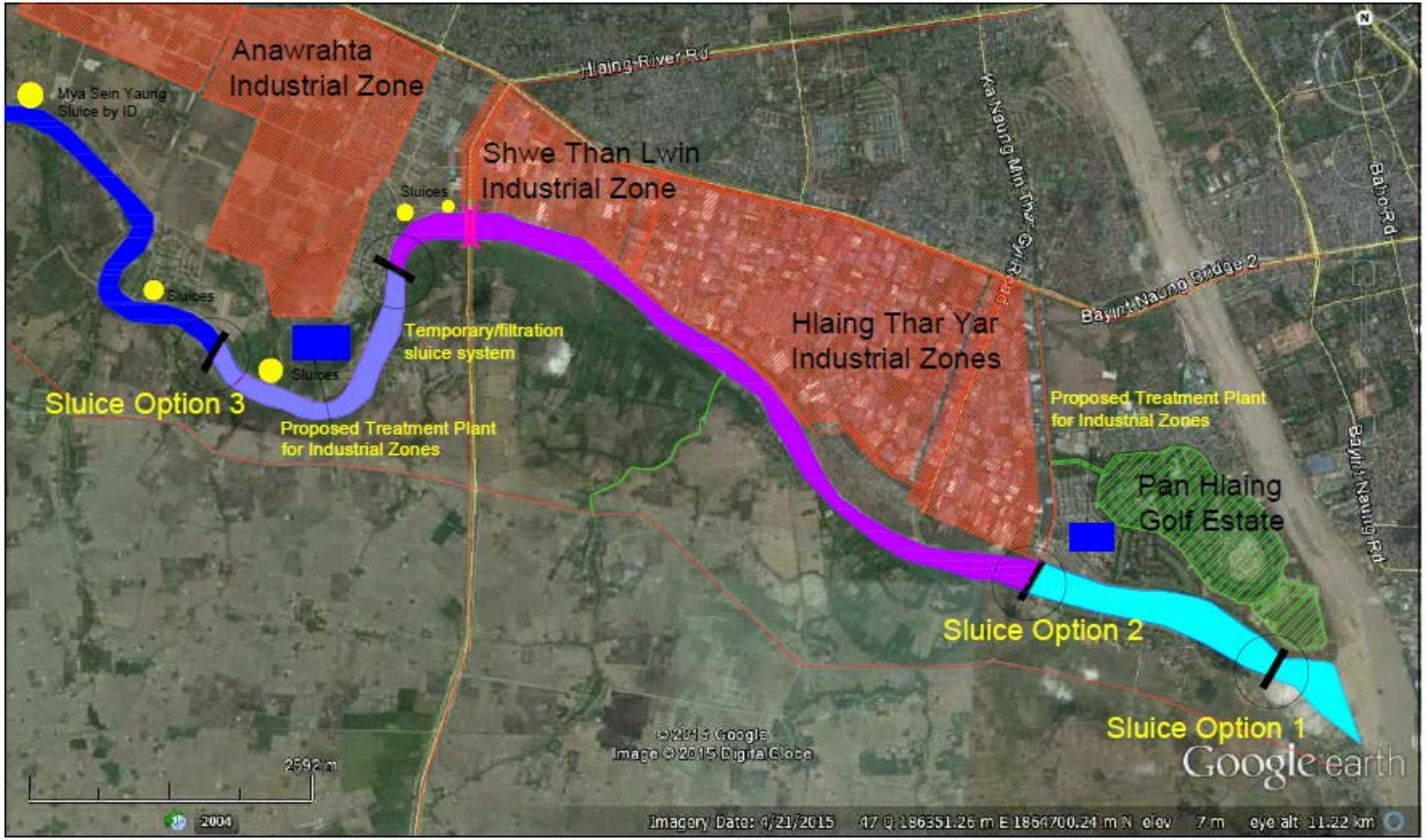
Sluice location options



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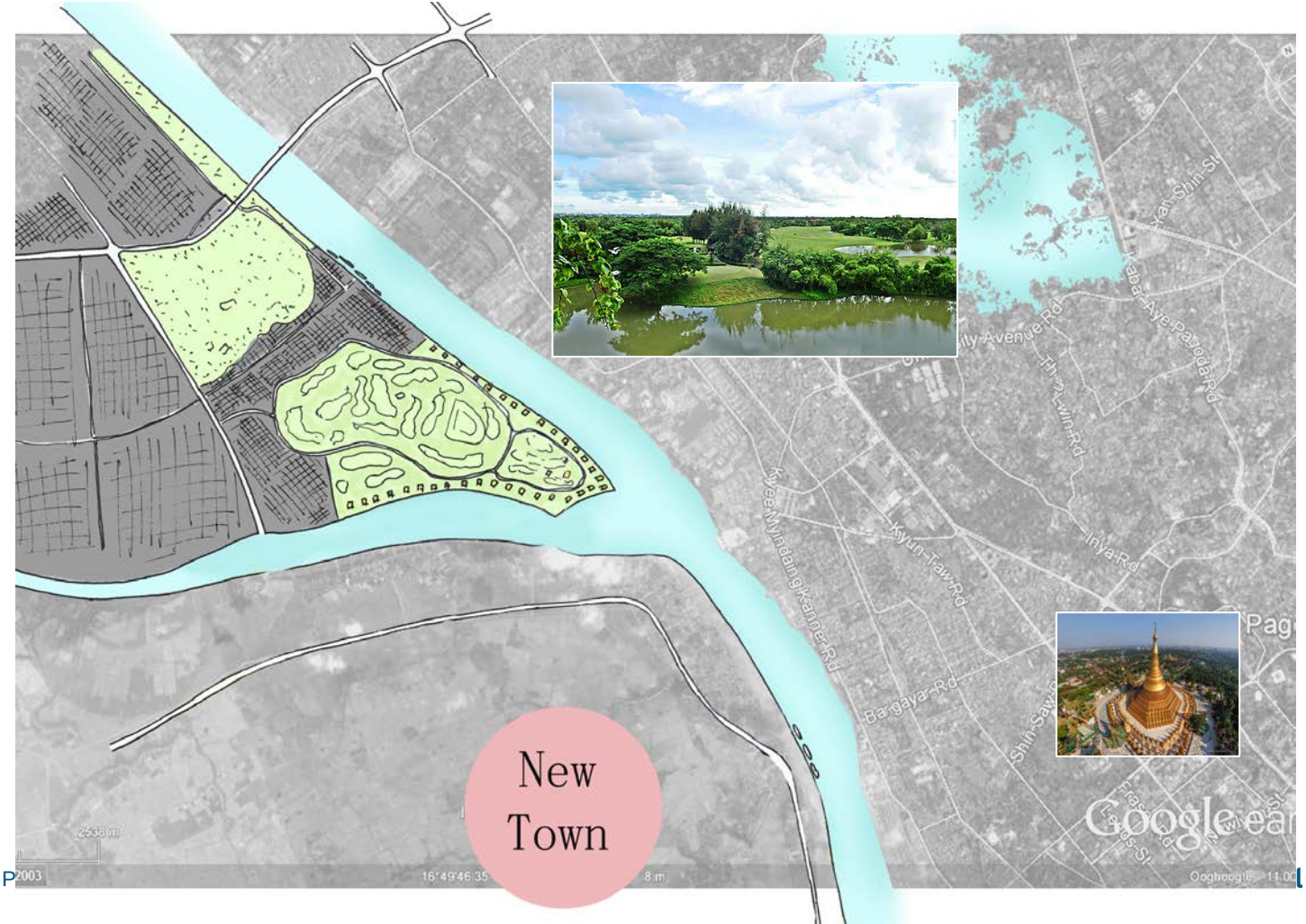
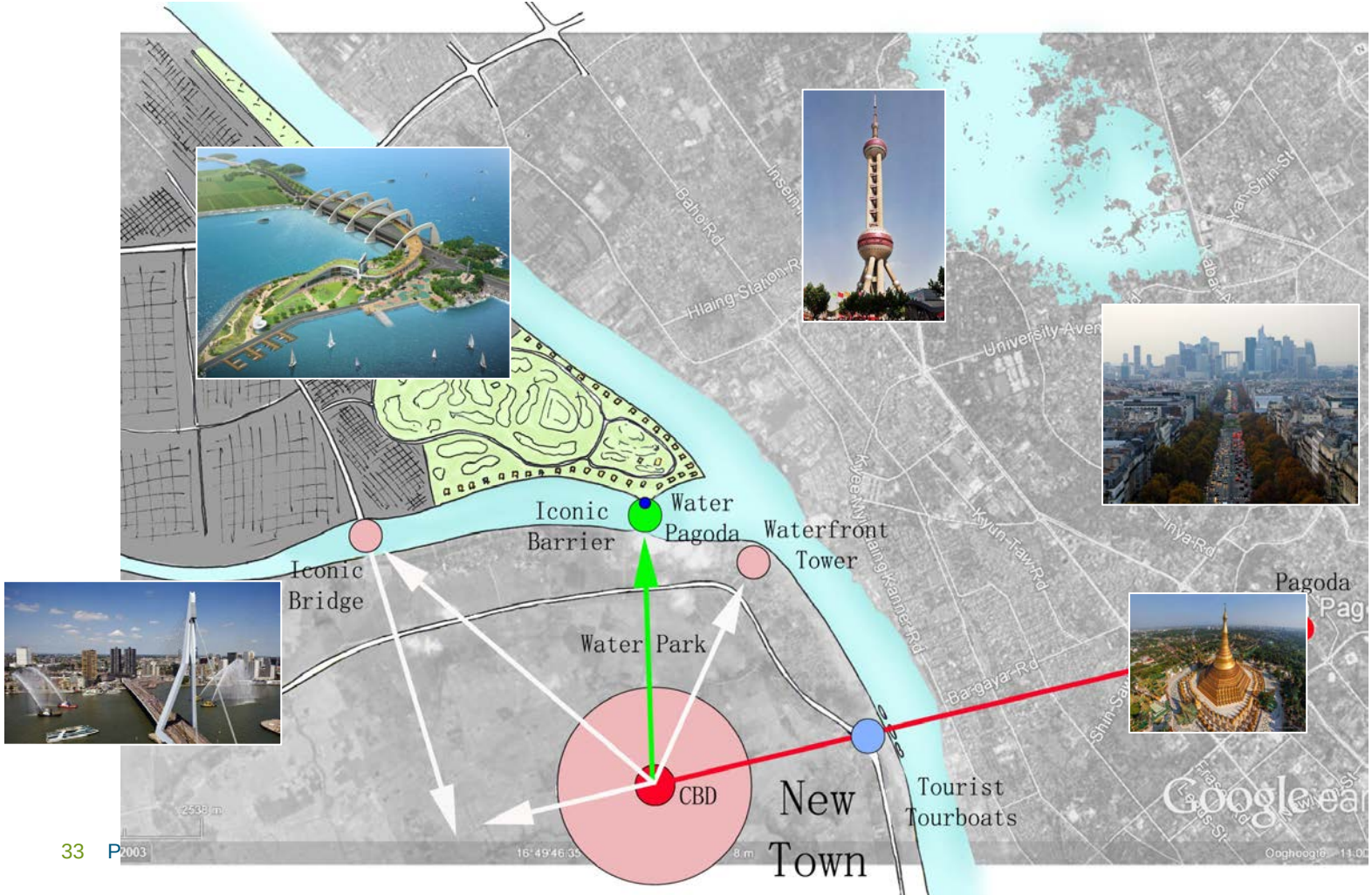
Sluice location recommendation

Myanmar & Water

“Water symbolizes purity, clarity and calmness, and reminds us to cleanse our minds and attain the state of purity”
(Buddism)


New
Town



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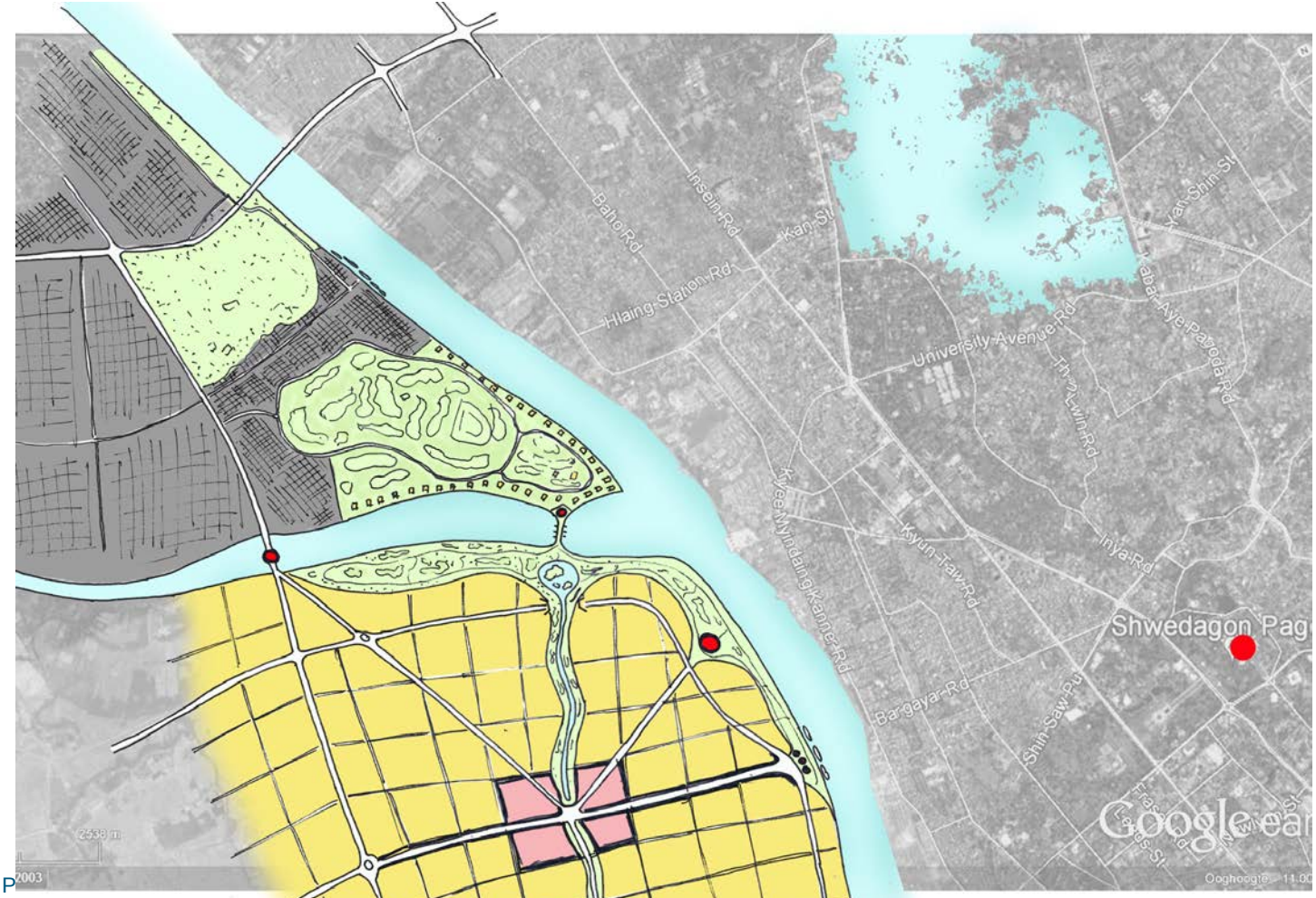

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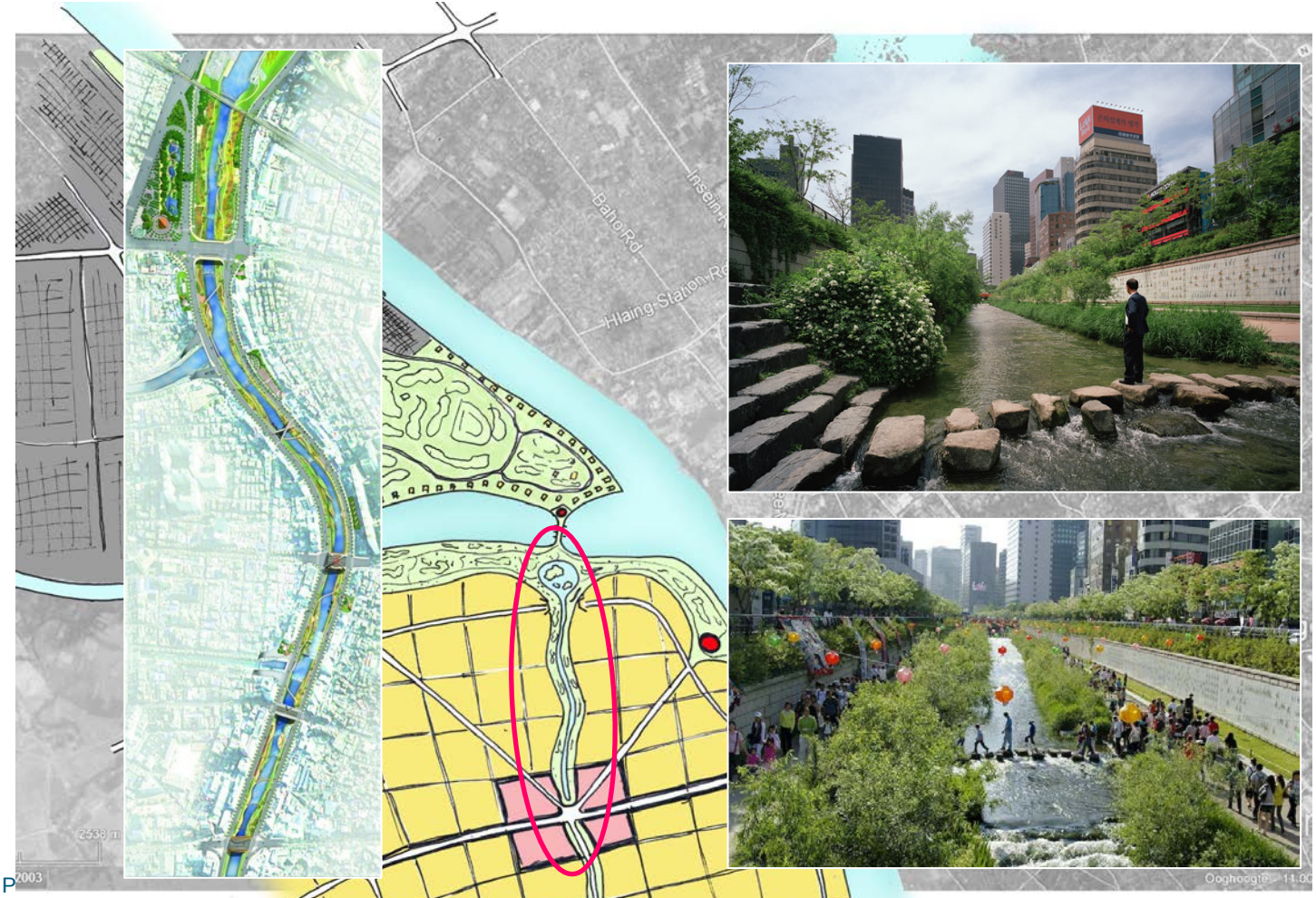

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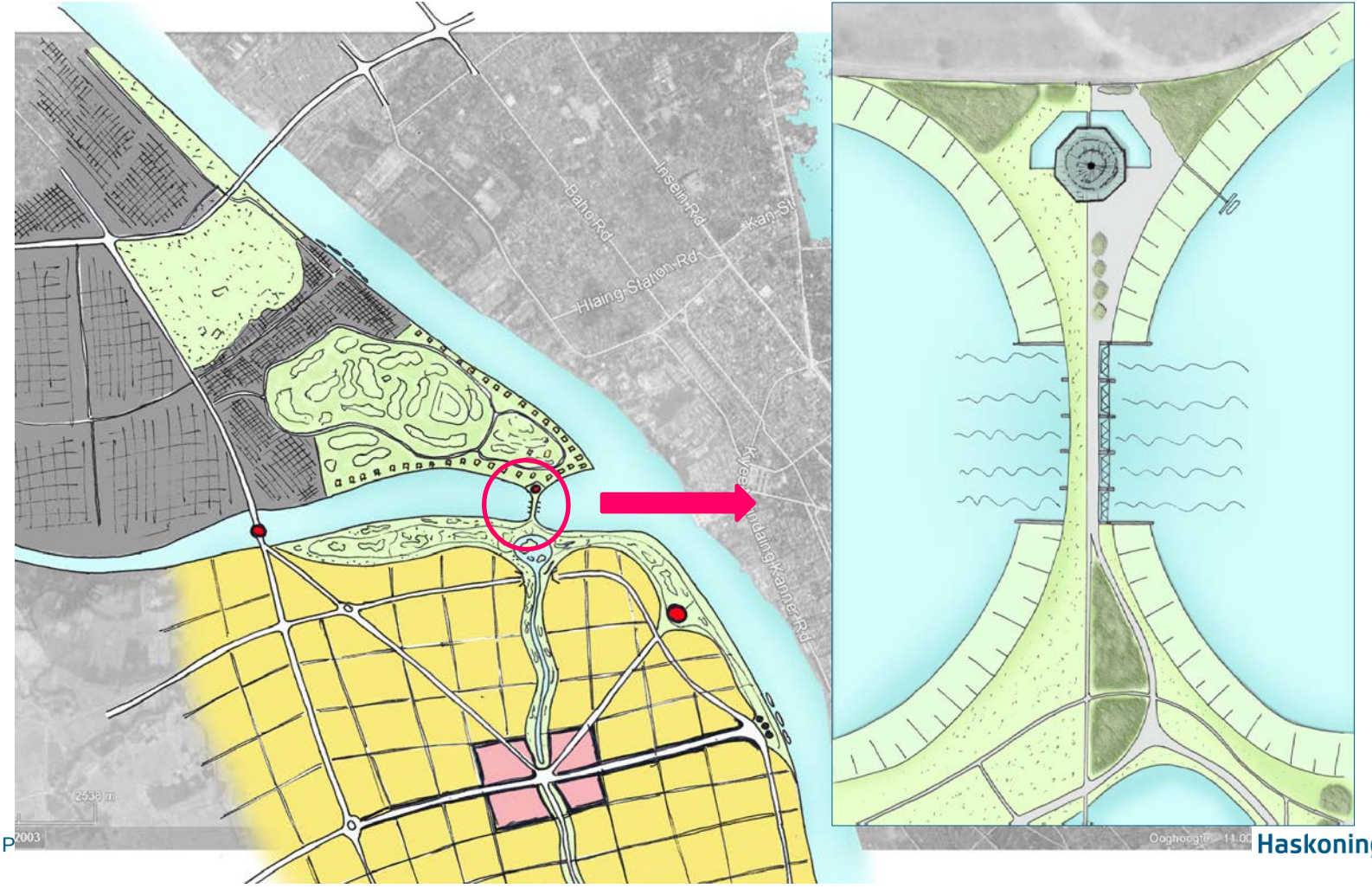

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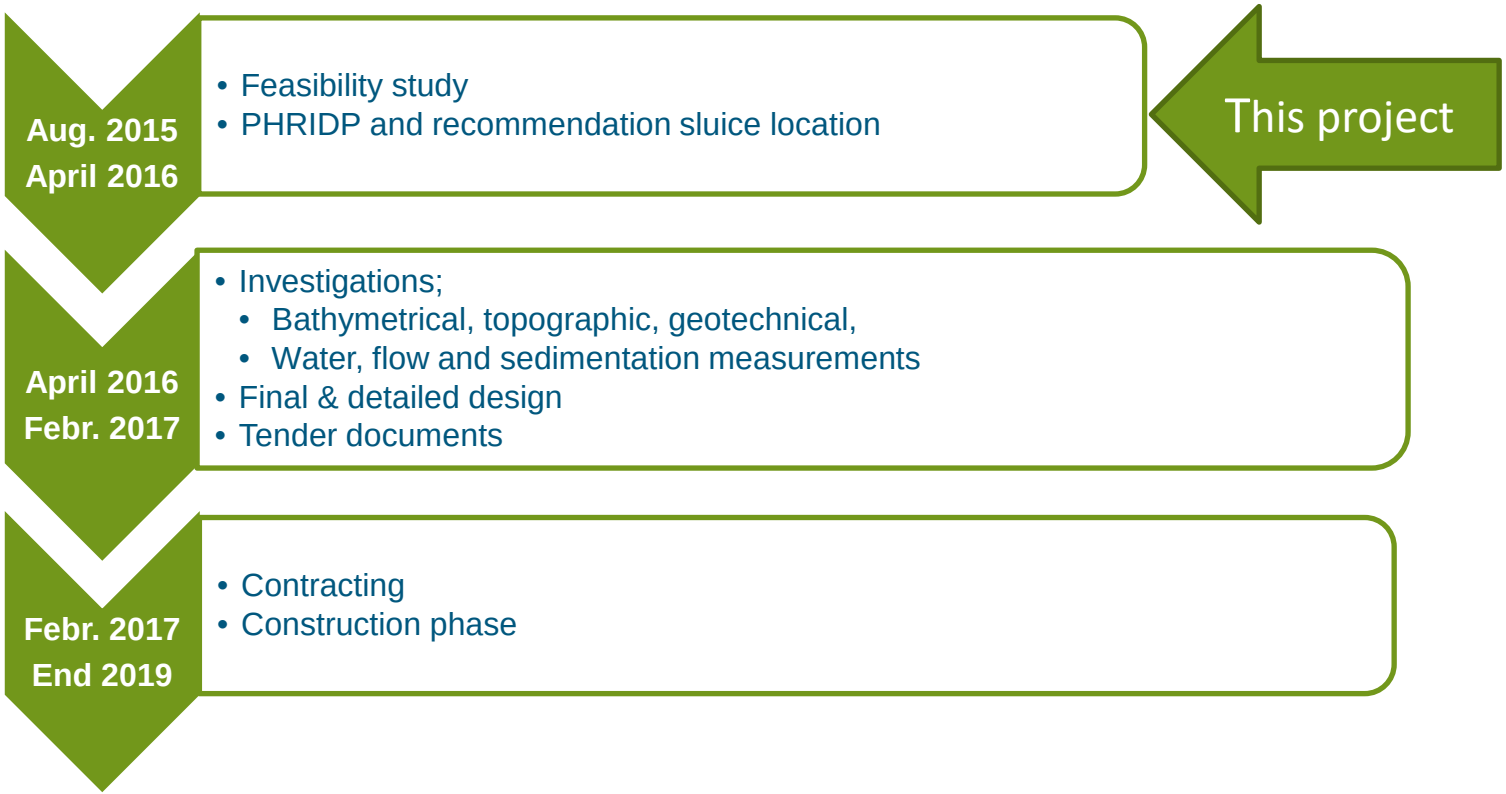
Sluice design and construction phases (initial planning)



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Thank you for your attention!

For more info, please contact me:
Alwin.Commandeur@rhdhv.com

linkedin.com/company/royal-haskoningdhv

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