



Tuas Water Reclamation Plant (TWRP)

Mark Wong

Head of TWRP, DTSS 2, PUB



SAFETY • SCHEDULE • BUDGET • QUALITY



Agenda



Deep Tunnel Sewerage System (DTSS)

DTSS PHASE 2

Extends deep tunnel sewerage system by
2025
to serve the western part of Singapore

DTSS PHASE 1

Completed in
2008
to serve the eastern part of Singapore

48 km of tunnels and
60 km of link sewers

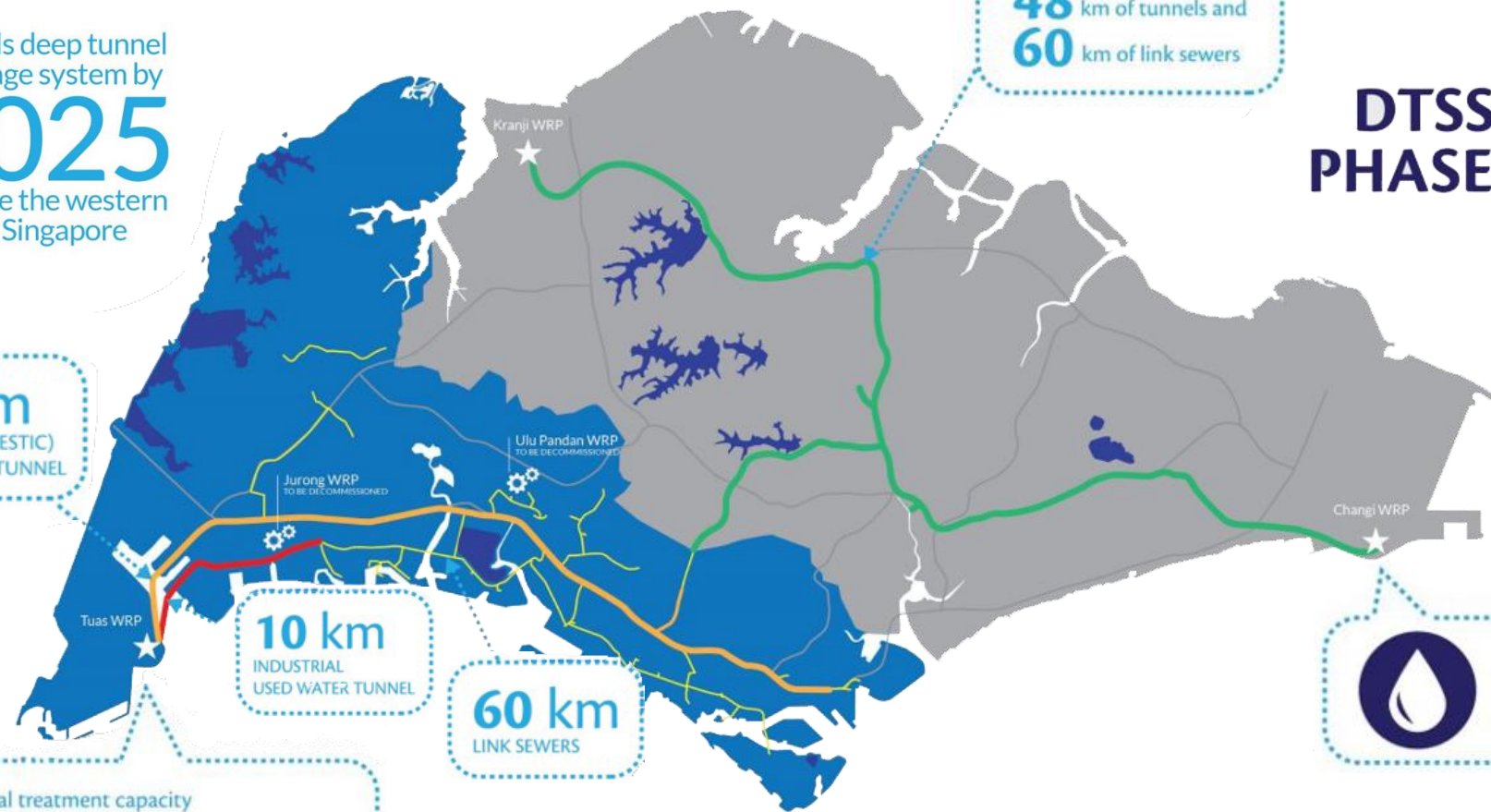
30 km
SOUTH (DOMESTIC)
USED WATER TUNNEL

10 km
INDUSTRIAL
USED WATER TUNNEL

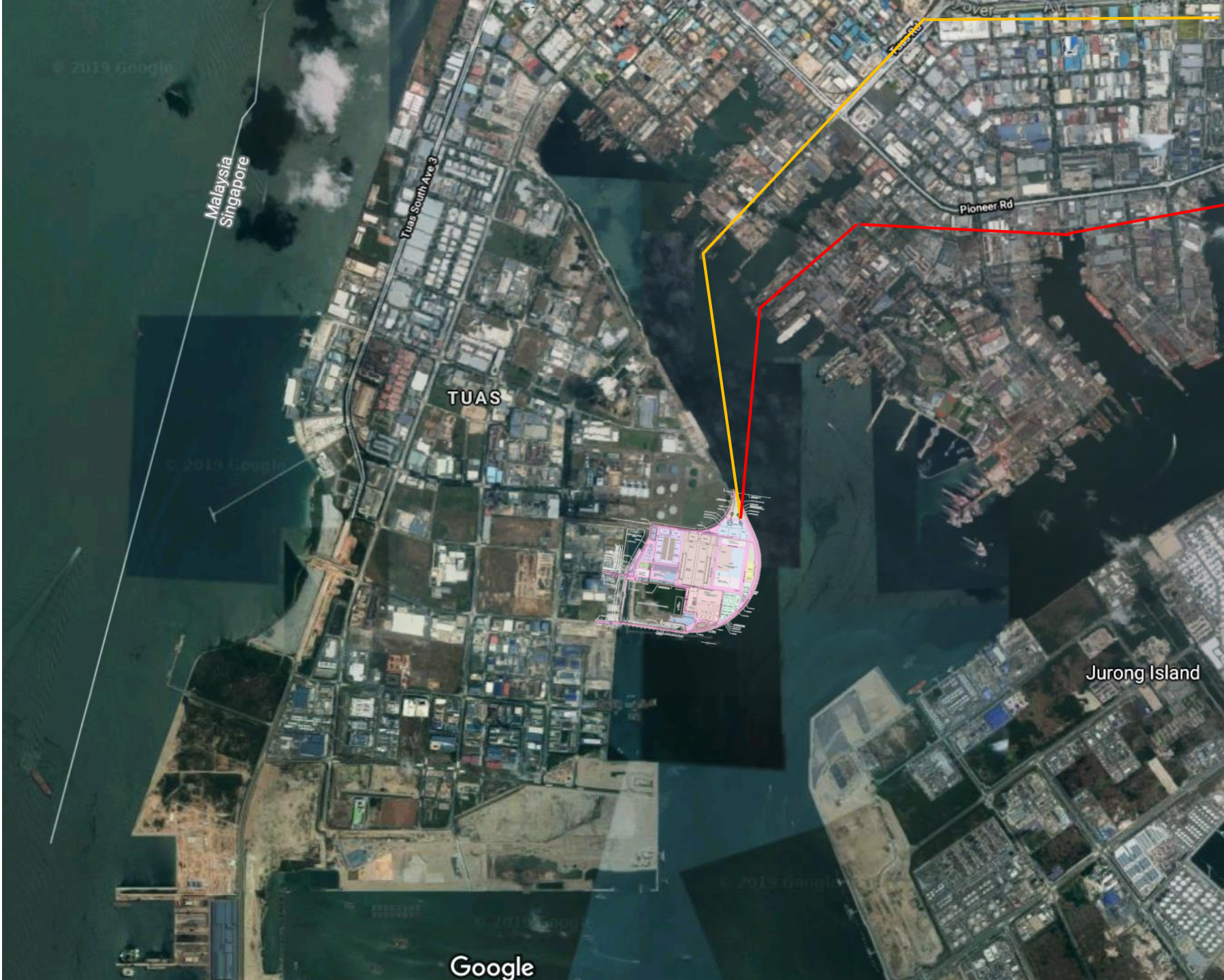
60 km
LINK SEWERS

800,000 m³/day
Initial Used Water Treatment Capacity

Initial treatment capacity
650,000 m³/day
Domestic Used Water Treatment Module
150,000 m³/day
Industrial Used Water Treatment Module



TWRP Location





Tuas South Avenue 9

Tuas South Lane

Tuas Nexus Drive

Route 2

Route 3

Influent Pumping Stations

Industrial Liquids Modules

Domestic Liquids Modules

Wet Weather Treatment Facility

Integrated Waste Management Facility (IWMF)

Admin

Solids

RORO

Outfall

≈1km

≈1km



**Wet Weather
Treatment Facility**



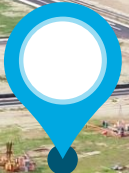
Outfall



Solids



Admin Building



Influent Pumping Stations



Domestic Liquids Modules



Industrial Liquids Modules

DTSS 2 Safety Mission

Eye Protection

Hand Gloves

Long Sleeve Shirt

Reflective Vest

Long Pants

Safety Boots

Helmet with Chin Strap

We aim for **ZERO HARM** and promote the well-being of everyone.

We will not be limited by past practices, and are committed to surpass current industry norms.

No injury is too small and one injury is one too many.

Every person on the DTSS Phase 2 project has the responsibility and is empowered to take action on issues of **SAFETY**.

PTW

Do not work without a valid Permit to Work when required by Law

Do not work whilst under the influence of alcohol

Do not smoke within Designated Hazardous Areas

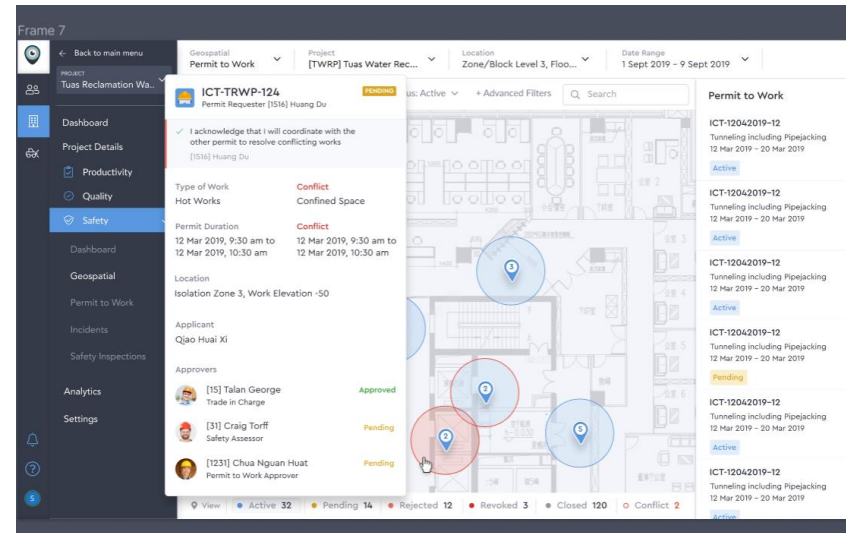
Do not set off unauthorized naked lights within Designated Hazardous Areas

Do not work without Lock-out-tag when isolation of energy is required

Do not exceed the speed limit

Do not work without fall prevention / protection in place

Safety: Raising the Bar



- Experiential learning with training simulators at the TWRP Safety Training Facility

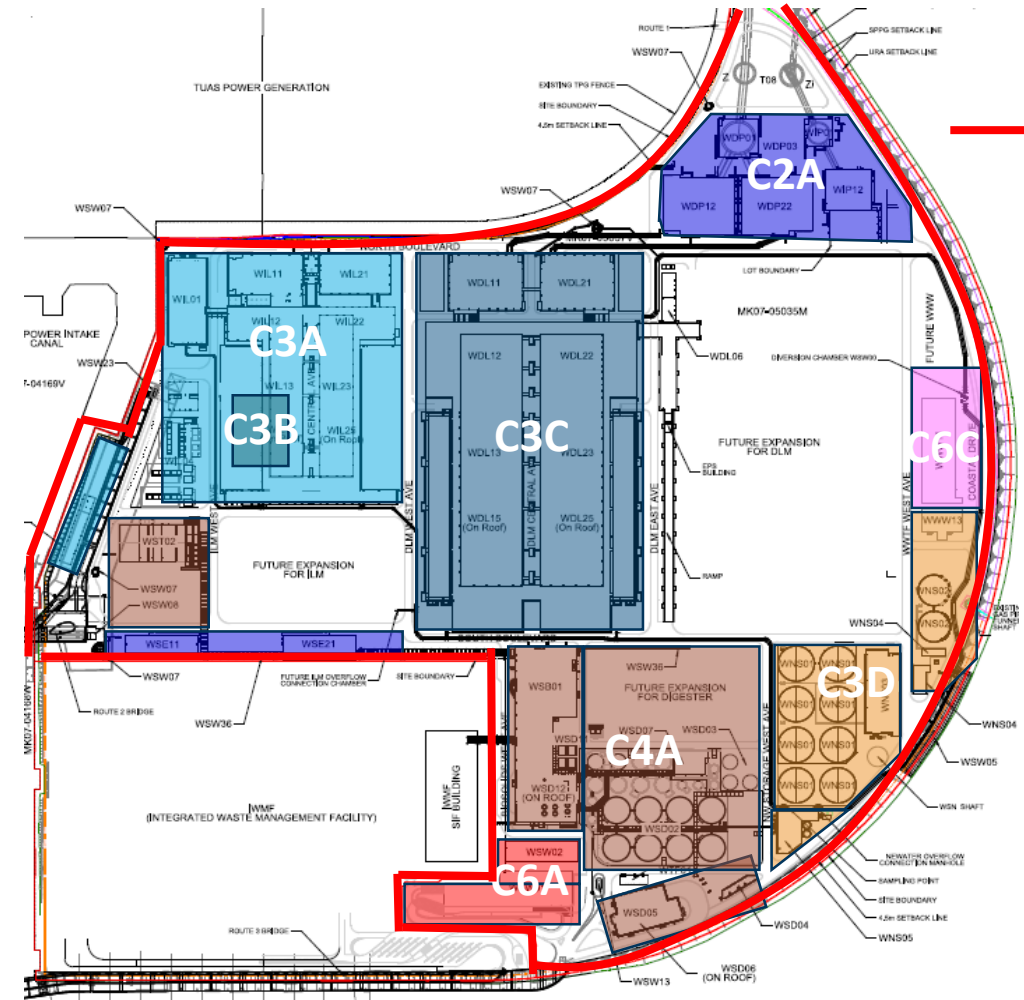
- Electronic Permit-to-Work (ePTW) and Incident Management System

- Tenderers shall not accumulate 15 or more demerit points.

Projected >5,000 workers (peak)
Estimated 50 million manhours

TWRP Contract Packages (as at last industry sharing)

#	Name
C1A	Site Development Works
C2A	Influent Pumping Stations
C3A	Industrial Liquids Modules
C3B	Industrial Water Treatment
C3C	Domestic Liquids Modules and NEWater
C3D	Product Water Storage and Pumping
C4A	Biosolids and Digesters
C5A	Plant Monitoring and Control System
C6A	Administration and Operations Buildings
C6B	Site Completion
C6C	Wet Weather Treatment Facility



- Site-wide Packages:
- C1A
 - C5A
 - C6B

11 Contract Packages

Industrial Liquids

C3A – Industrial Liquids Modules – Civil and Building Services Works

C3B1 – Industrial Liquids Module 1 – MEICA

C3B2 – Industrial Liquids Module 2 – MEICA

C3B3 – Industrial Water Plant

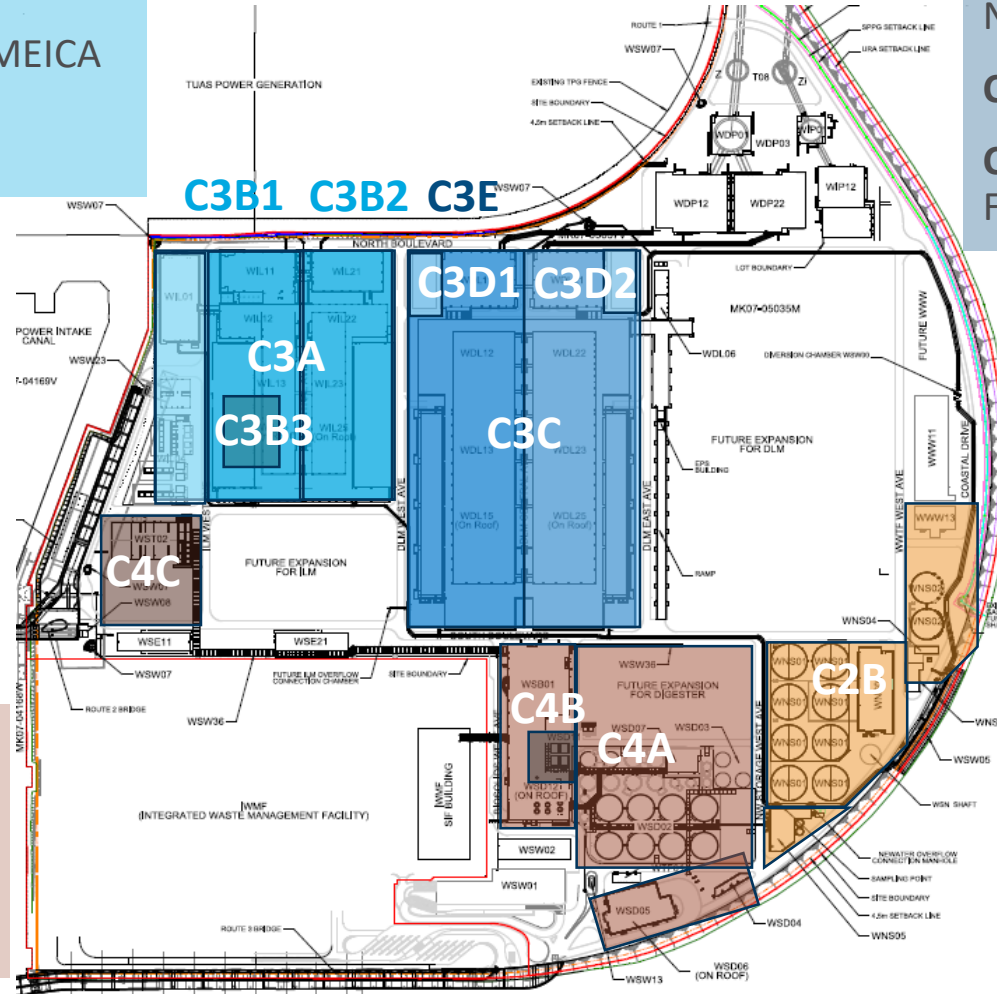
Domestic Liquids

C3C - Domestic Liquids Modules – Civil and Building Services Works

C3D1 – Domestic Liquids Module 1 – MEICA & NEWater

C3D2 – Domestic Liquids Module 2 – MEICA

C3E – Liquids Modules Odour Control Facilities



Solids

C4A – Biosolids and Digesters

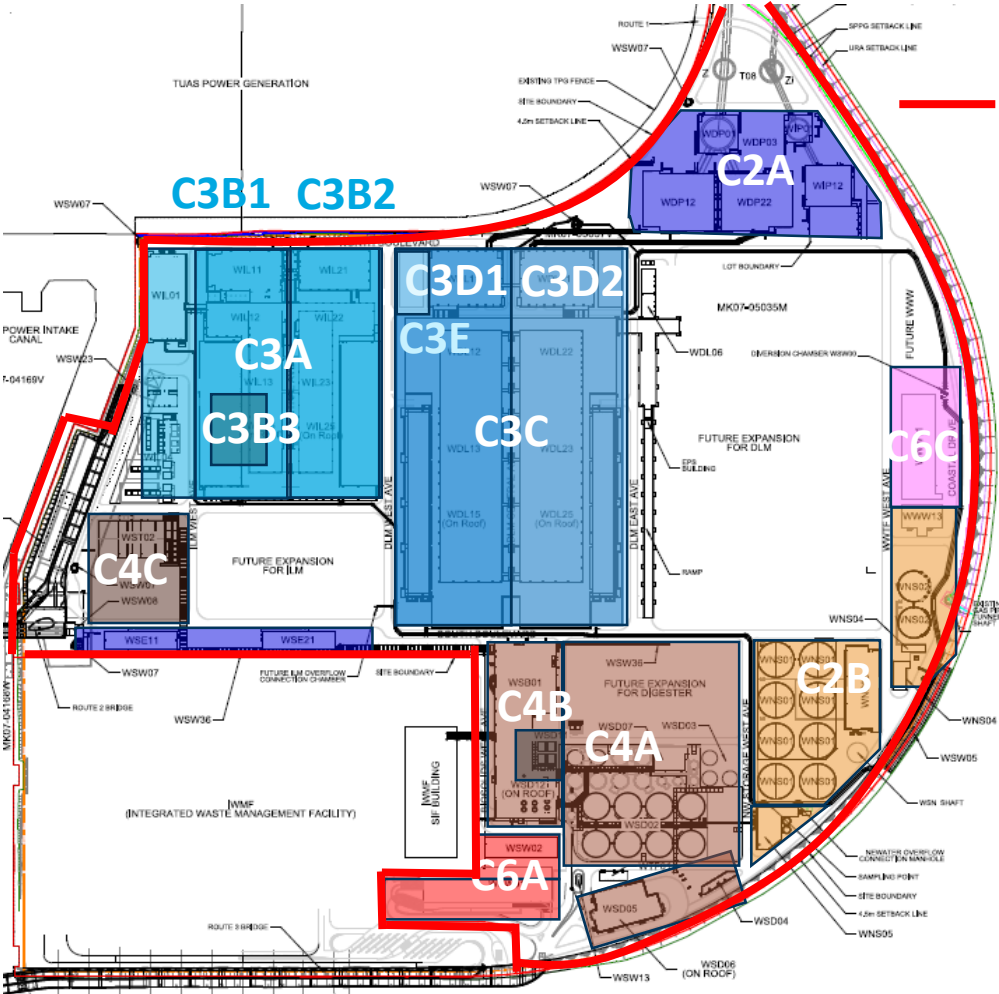
C4B – Digestion Pre-treatment

C4C – Sidestream Nitrogen Removal Facility

C2B – Product Water Storage and Pumping (*change in name only*)

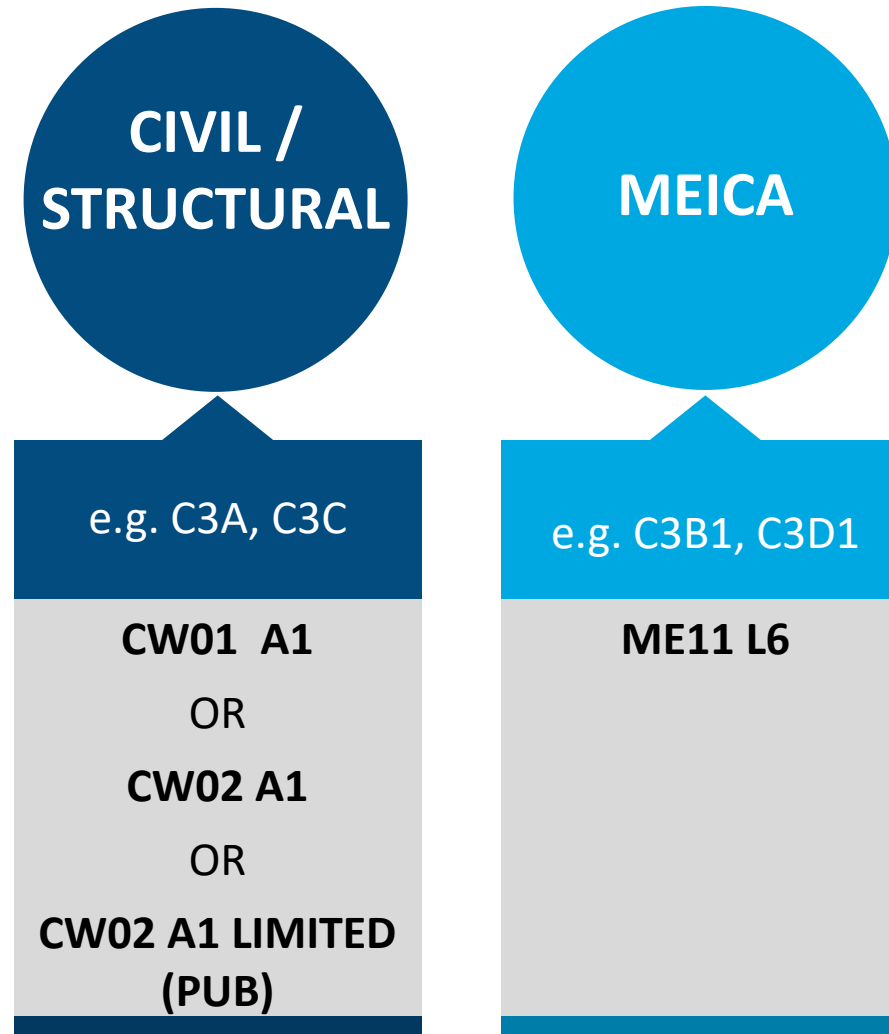
#	Name
C1A	Site Development Works
C2A	Influent Pumping Stations
C2B	Product Water Pumping Facilities
C3A	Industrial Liquids Modules – Civil and Building Services Works
C3B1	Industrial Liquids Module 1 - MEICA
C3B2	Industrial Liquids Module 2 - MEICA
C3B3	Industrial Water Plant
C3C	Domestic Liquids Modules – Civil and Building Services Works
C3D1	Domestic Liquids Module 1 – MEICA & NEWater
C3D2	Domestic Liquids Module 2 – MEICA
C3E	Liquids Modules Odour Control Facilities
C4A	Biosolids and Digesters
C4B	Digestion Pre-treatment
C4C	Sidestream Nitrogen Removal Facility
C5A	Plant Monitoring and Control Systems
C6A	Administration and Operations Buildings
C6B	Site Completion Works
C6C	Wet Weather Treatment Facility

Updated 18 Contract Packages

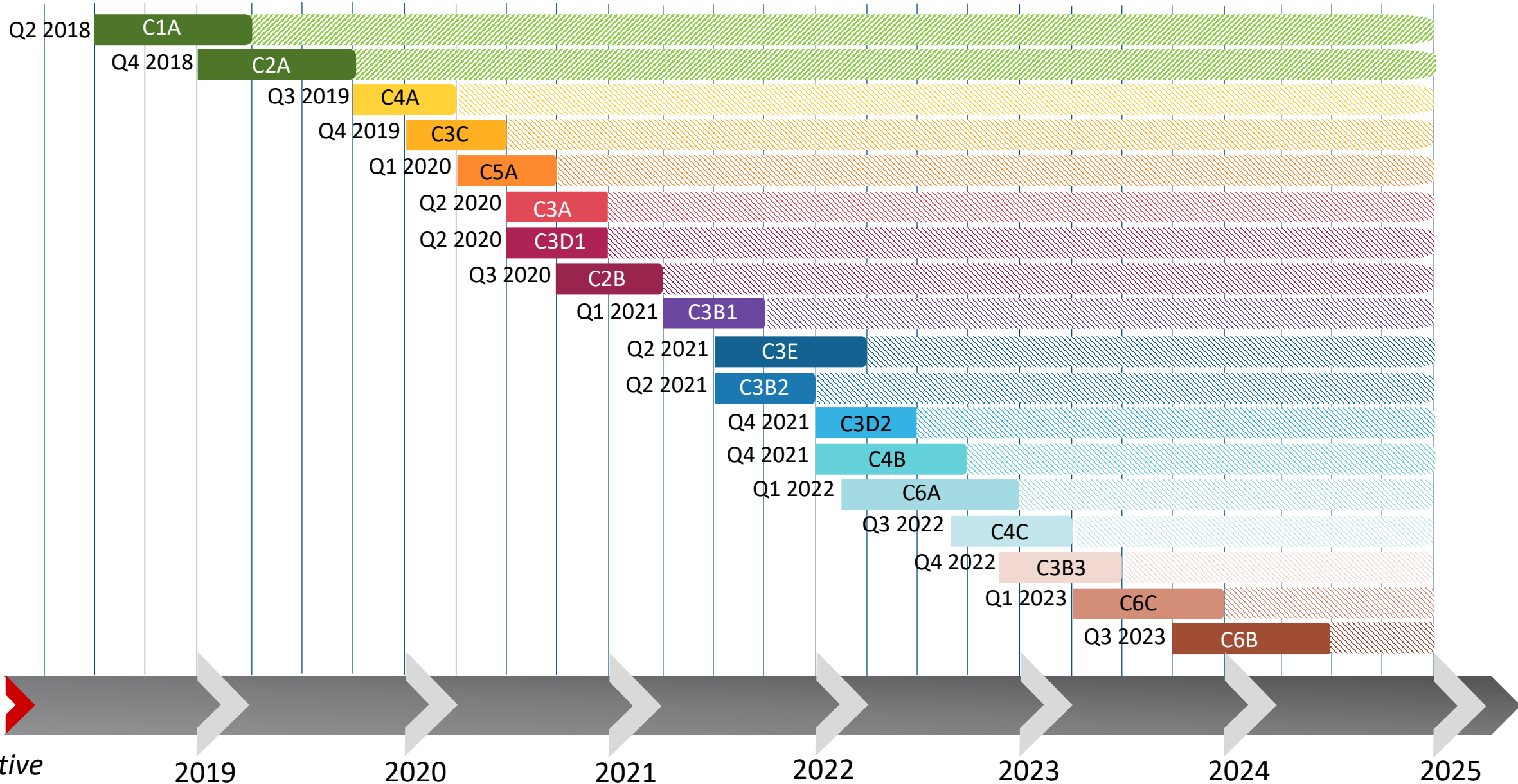


- Site-wide Packages:
- C1A
 - C5A
 - C6B

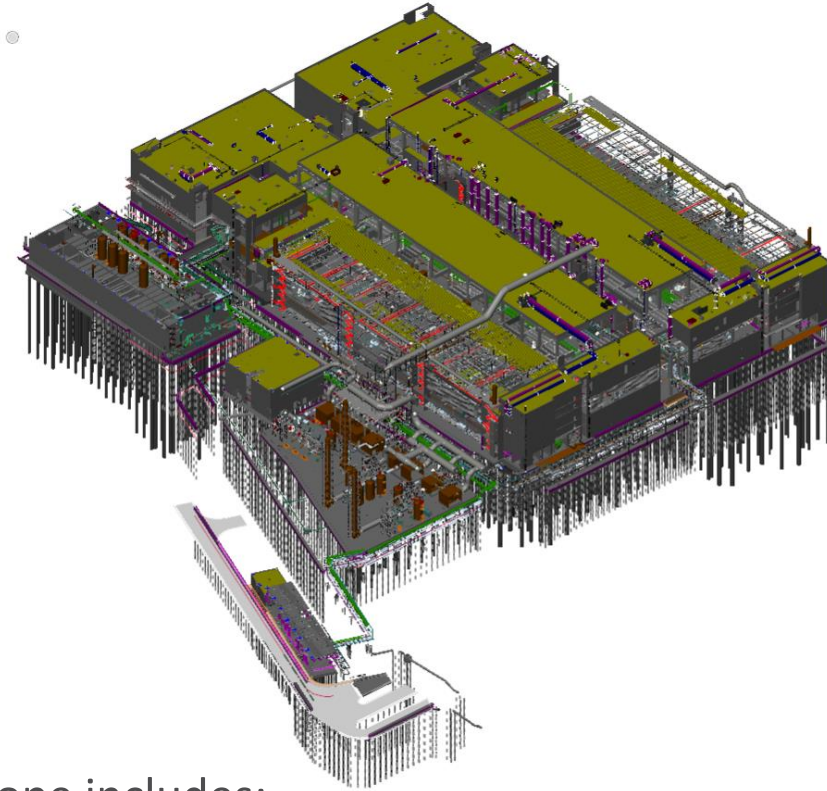
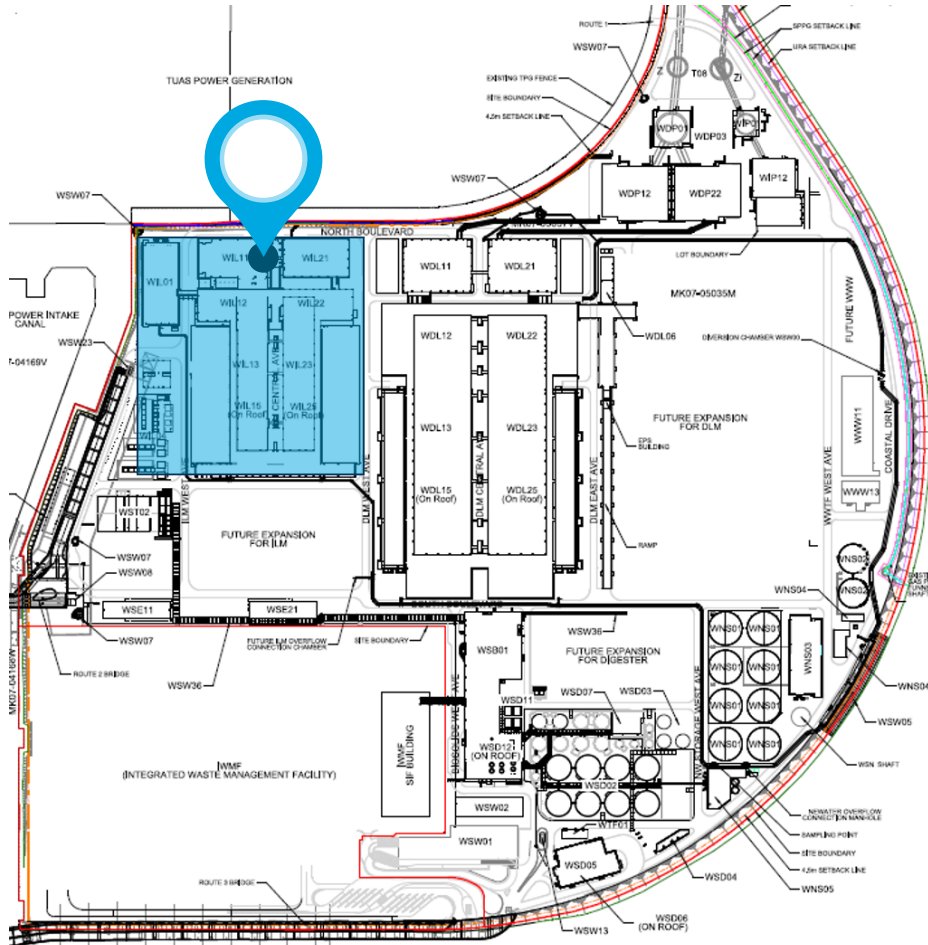
Tenderers' Workhead Requirements



Tendering/Construction Timeline

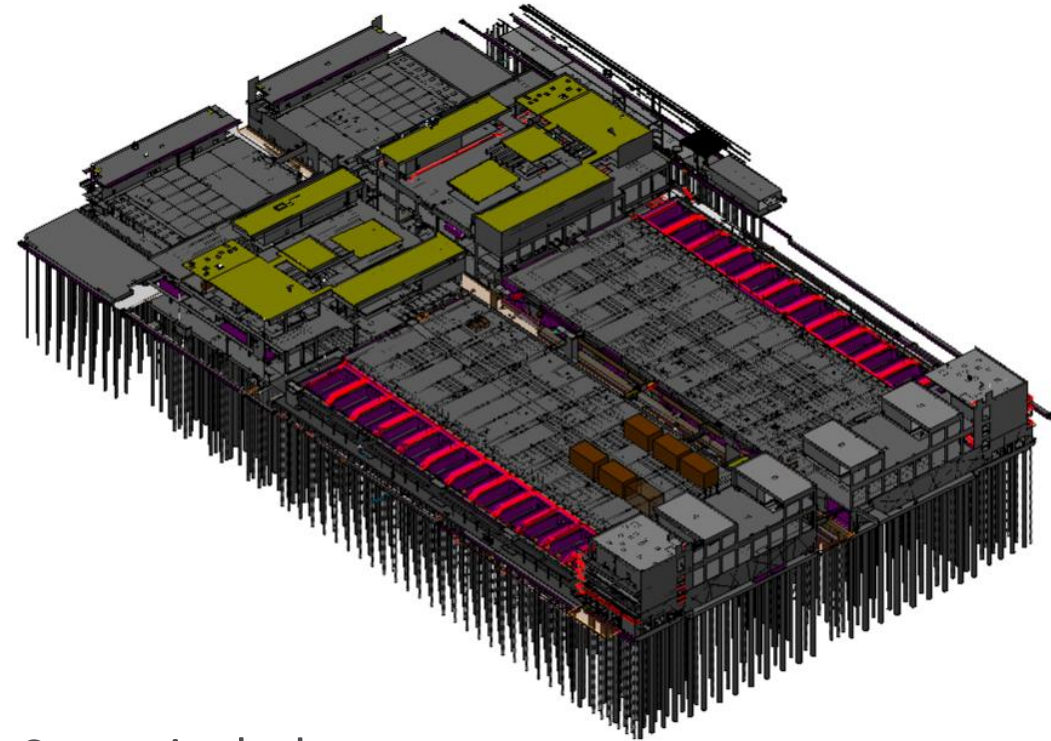
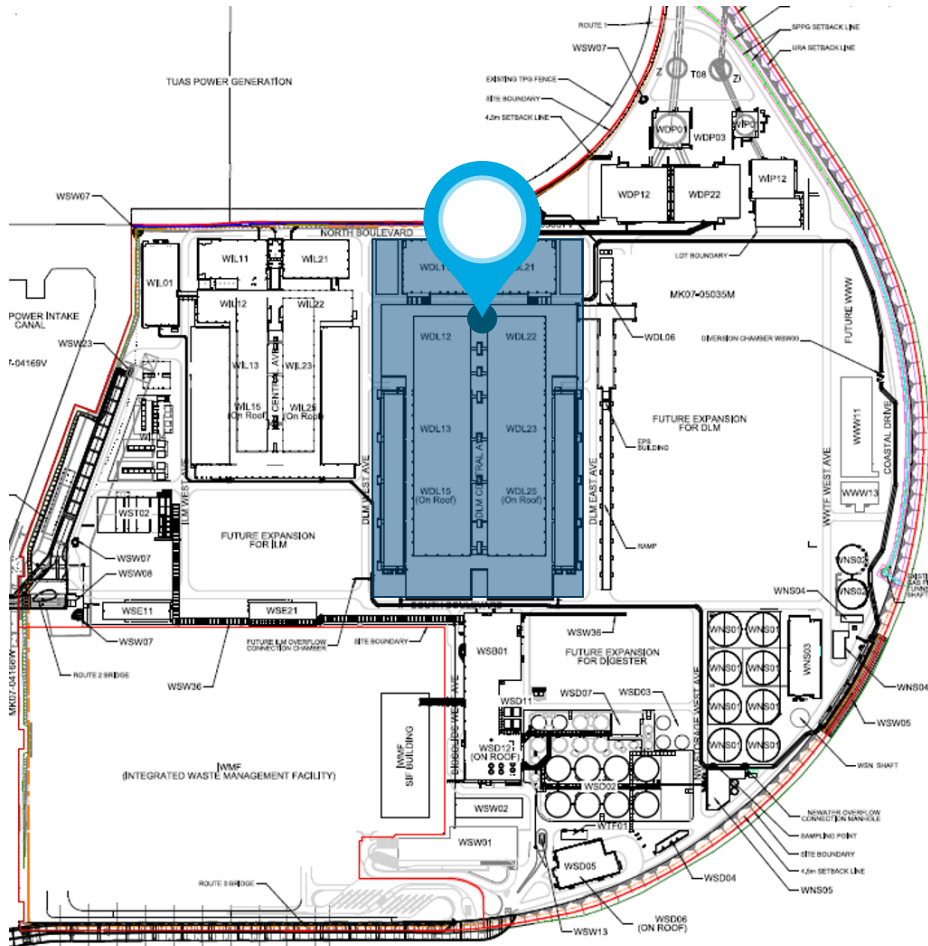


Contract 3A: Industrial Liquids Modules – Civil and Building Services Works



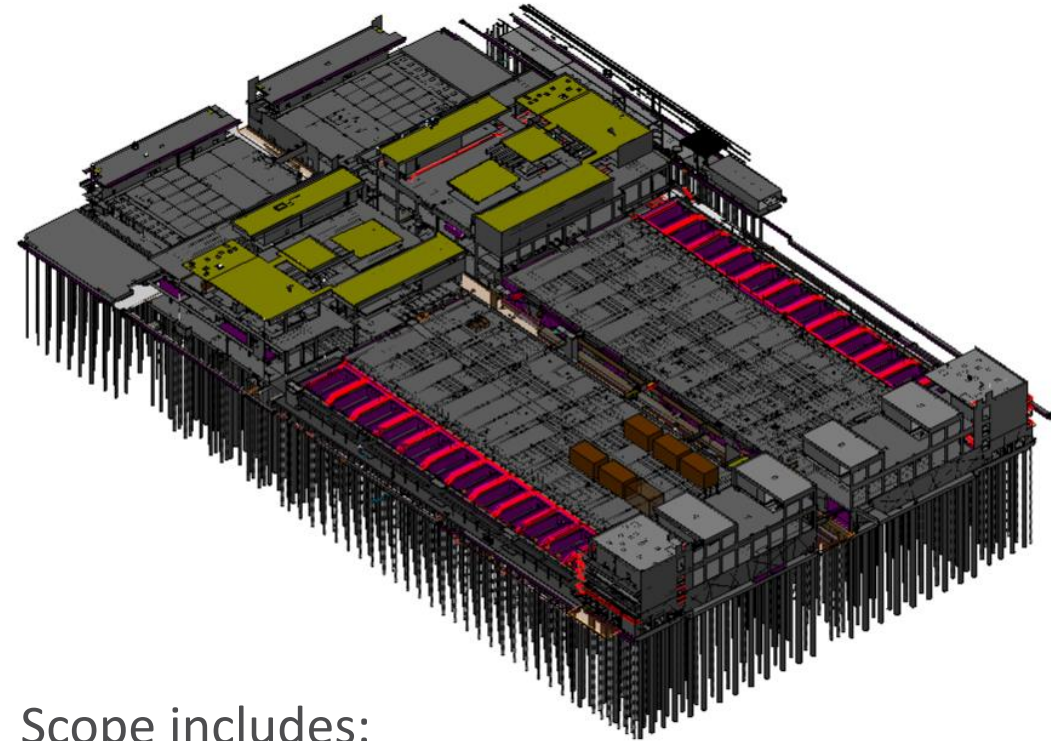
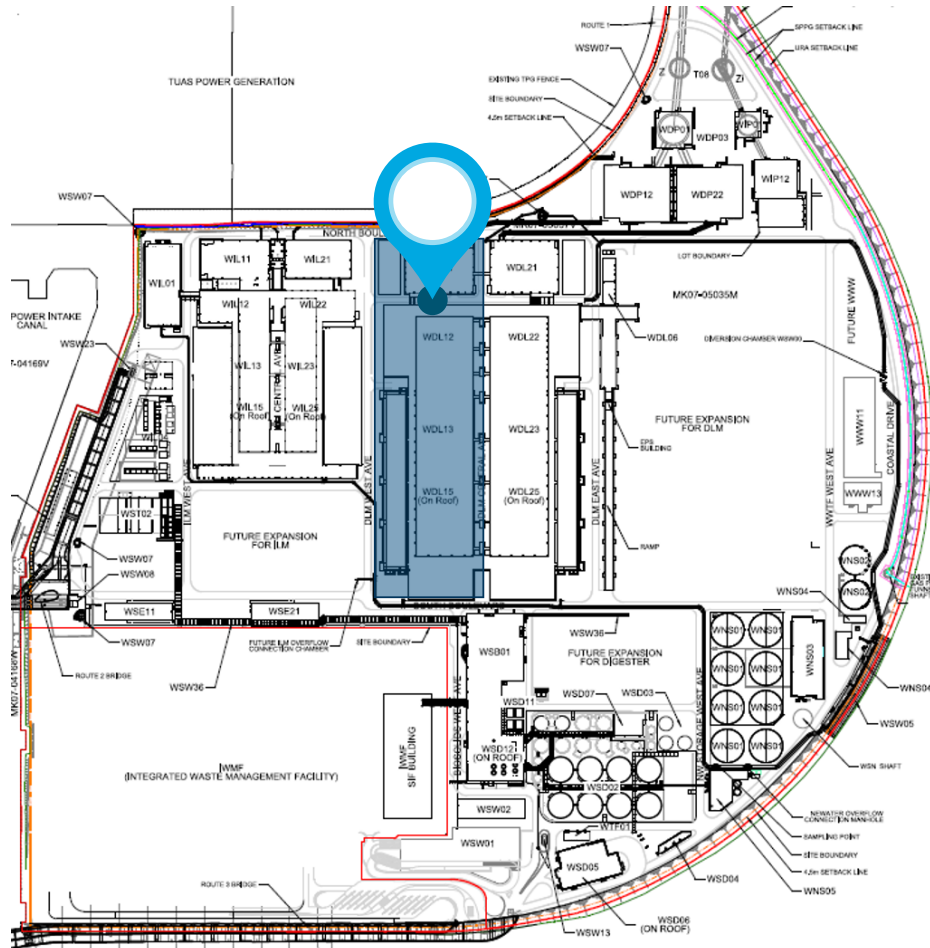
- Scope includes:
 - *Two liquids treatment modules (initial treatment capacity of 150,000m³ per day)*
 - *Headworks, primary treatment tanks, secondary bioreactor and membrane tanks*
 - *Building Services*

Contract 3C: Domestic Liquids Modules – Civil and Building Services Works



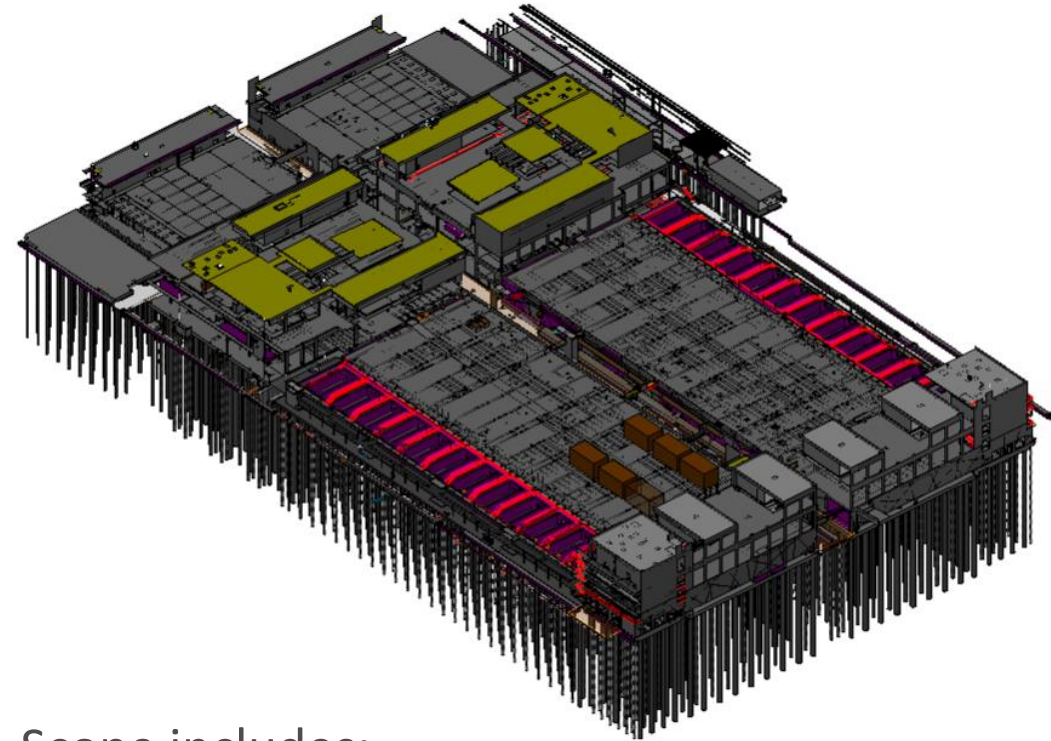
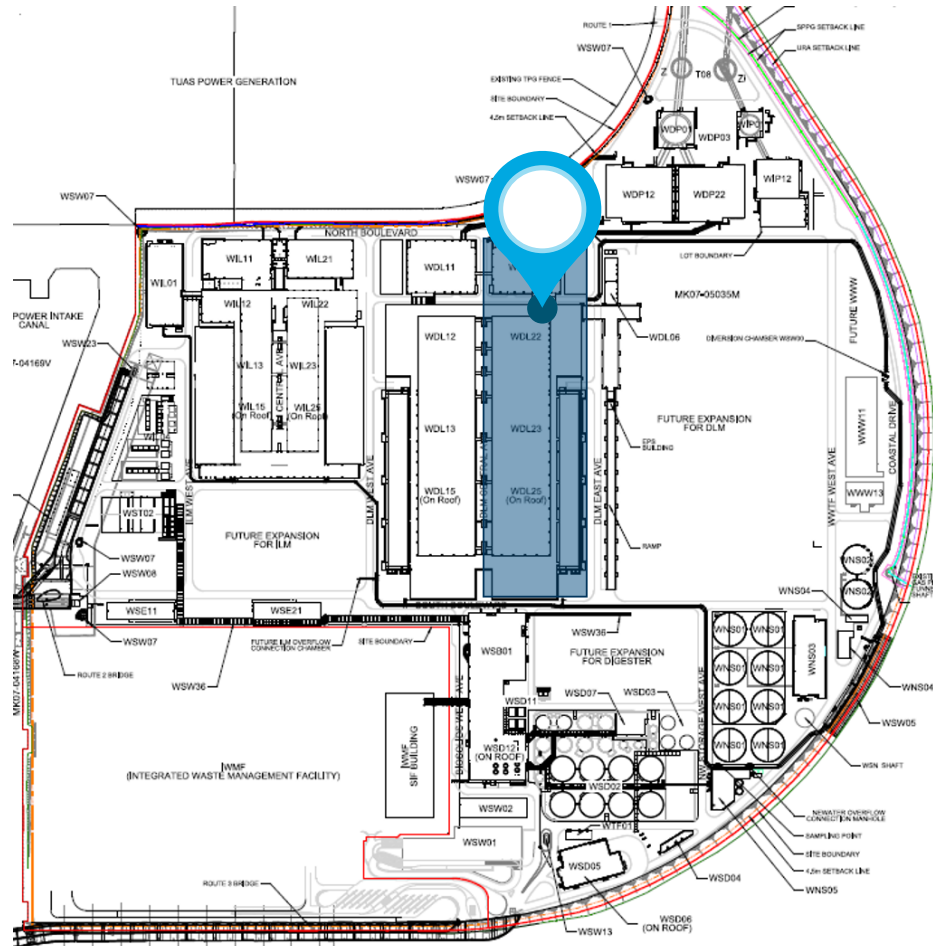
- Scope includes:
 - Two liquids treatment modules (initial treatment capacity of 650,000m³ per day)
 - Headworks, primary treatment tanks, secondary bioreactor and membrane tanks
 - Building services

Contract 3D1: Domestic Liquids Module 1 – MEICA & NEWater



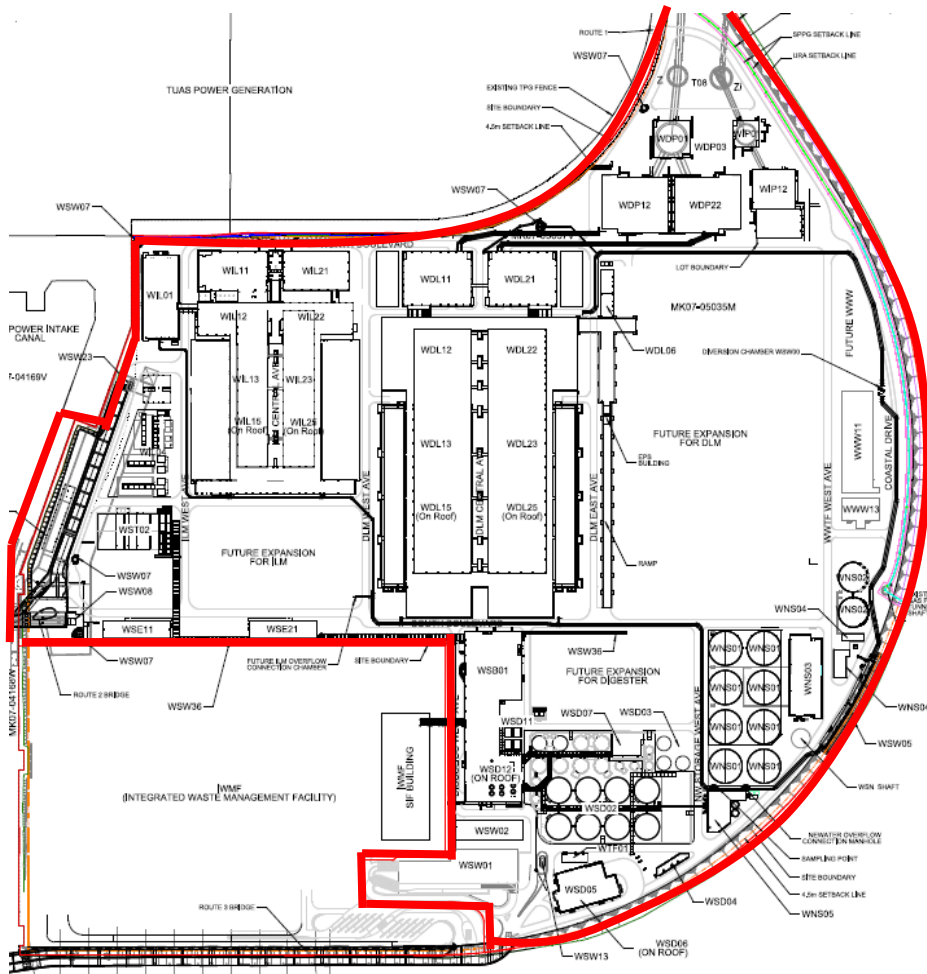
- Scope includes:
 - One liquids treatment modules
 - Equipment supply and installation for headworks, primary treatment, secondary bioreactor and membrane tanks
 - Polymeric MBR membranes
 - NEWater production

Contract 3D2: Domestic Liquids Module 2 – MEICA



- Scope includes:
 - *One liquids treatment modules*
 - *Equipment supply and installation for Headworks, primary treatment, secondary bioreactor and membrane tanks*
 - *Polymeric MBR membranes*

Contract 5A: Plant Monitoring and Control System



- Scope includes:

Process systems

- *Site-wide process control system*
- *PLC hardware for whole site (free-issued to other contracts where required)*
- *SCADA platform*
- *Fibre-optic backbone*
- *Advanced process control*
- *Cyber-security*

Non-process systems

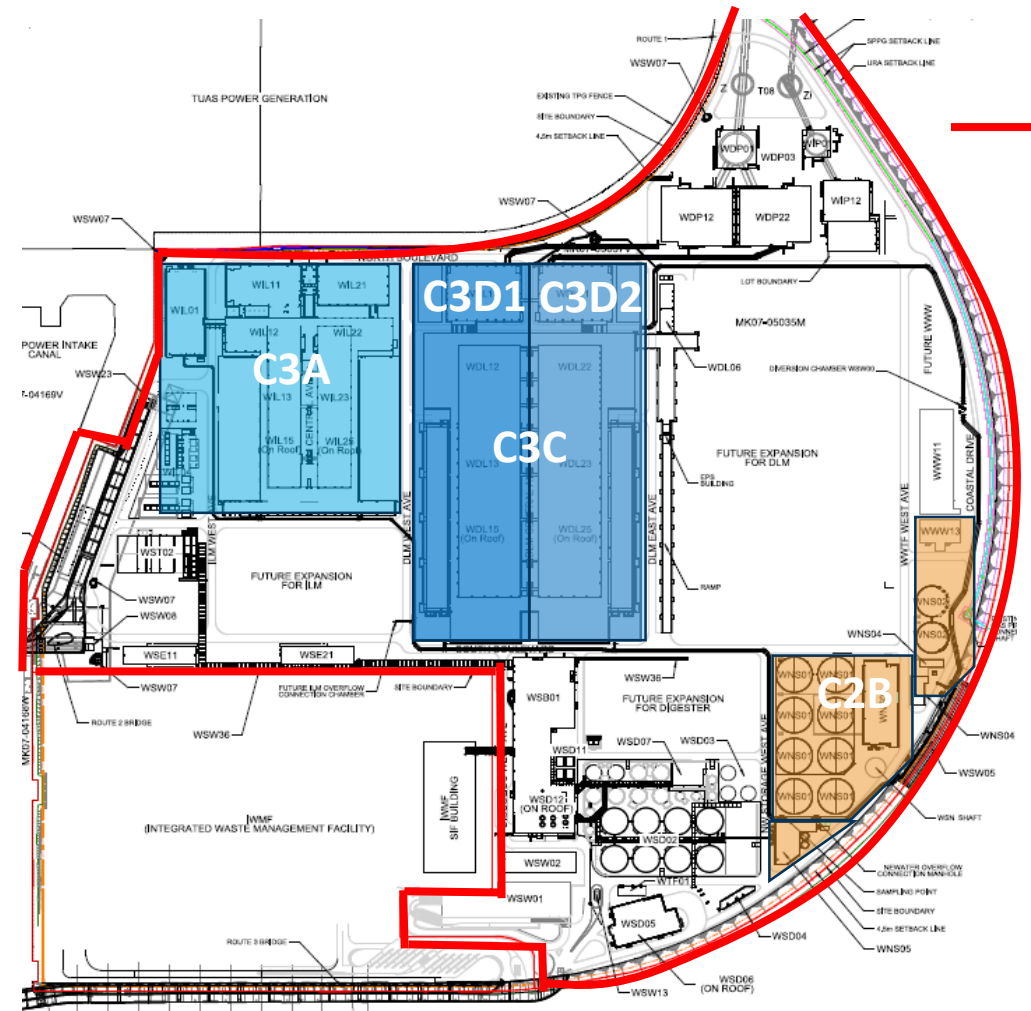
- *Fibre-optic backbone (for plant CCTV, security & fire)*
- *UPS systems*
- *Sitewide WLAN*
- *Power monitoring system*
- *BMS server and SCADA*

Process Performance Guarantees

- Aim of the contract document is to provide efficient equipment and overall plant which meet the water quality requirements.
- PUB and Jacobs are responsible for the overall process while the contractor is responsible for specific equipment, packages and sub-systems (e.g. energy efficiency of the blowers & aeration system).
- These performance guarantees must be demonstrated in the performance tests prior to the completion of the Works.

Upcoming Major Tenders

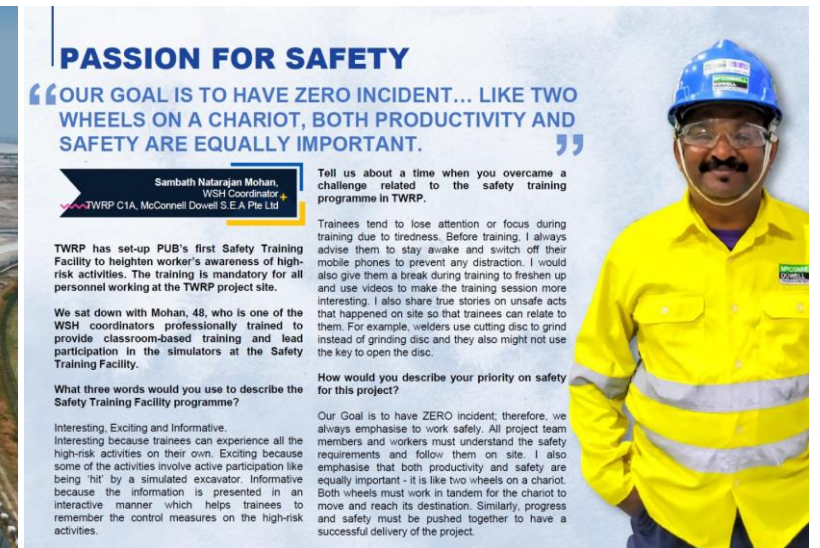
- **Contract 3C: Domestic Liquids Modules – Civil and Building Services Works – End Nov 2019**
- **Contract 5A: Plant Monitoring and Control System – Q1 2020**
- **Contract 3A: Industrial Liquids Modules – Civil and Building Services Works – Q2 2020**
- **Contract 3D1: Domestic Liquids Module 1 – MEICA & NEWater – Q2 2020**
- **Contract 2B: Product Water Pumping Facilities – Q3 2020**
- **Contract 3D2: Domestic Liquids Module 2 – MEICA – Q1 2021**



Site-wide Package:
• **C5A**

DTSS 2 Resources

- Visit <https://www.pub.gov.sg/dtss/phase2/resources> for more information related to DTSS 2 projects





Thank You

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NATIONAL
WATER AGENCY

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