



TOWN HALL STATION COMMUNITY REFERENCE GROUP

CROSS YARRA PARTNERSHIP
FRIDAY 9 OCTOBER 2020





TOWN HALL STATION COMMUNITY REFERENCE GROUP

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CYP D&C



Construction partner:



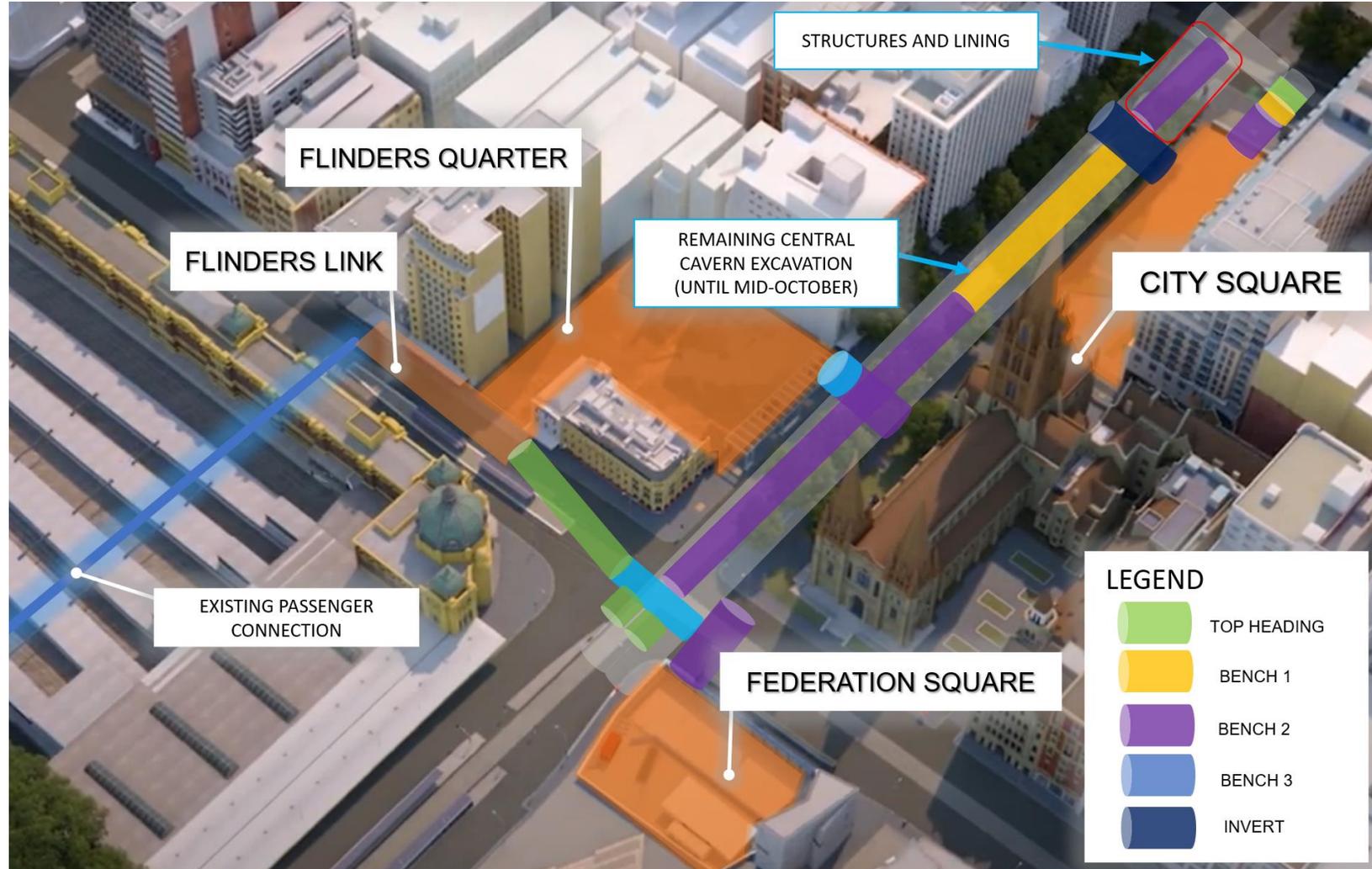
AGENDA

1. Town Hall Station update
2. Lendlease oversite development update
3. TBM tunnelling update

ROADHEADER TUNNELLING



ROADHEADER TUNNELLING UPDATE



TOWN HALL STATION UPDATE





FLINDERS QUARTER

FLINDERS QUARTER

Shaft A – 26 metres deep

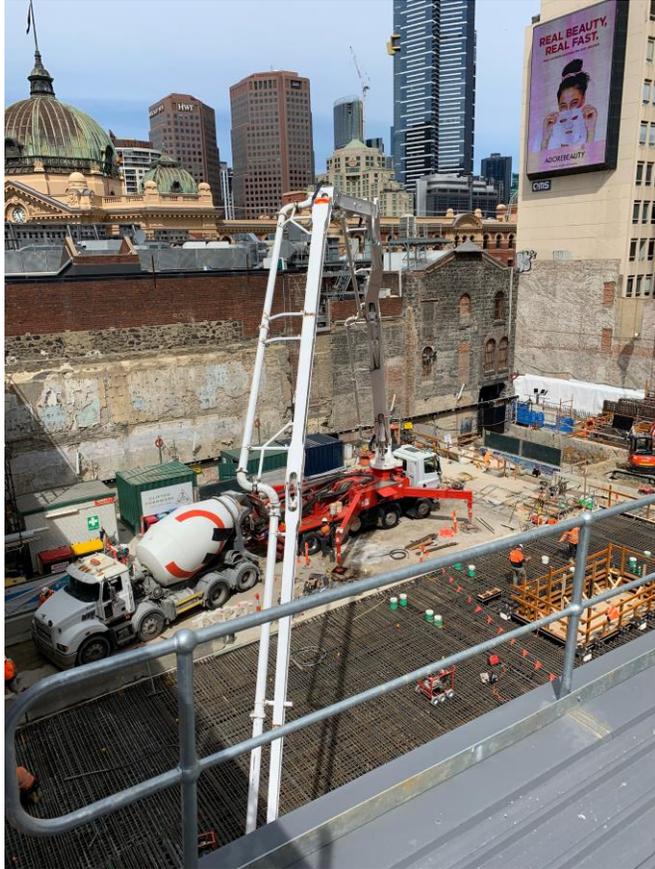


| Activity | Oct | Nov | Dec | Jan | Feb | Mar |
|-----------------------|-----|-----|-----|-----|-----|-----|
| Excavation | | | | | | |
| Top down construction | | | | | | |

Commence excavation beneath suspended slab



FLINDERS QUARTER CONCRETE POURS



FLINDERS QUARTER – OUT OF HOURS WORKS

Deliveries (ongoing)

- Monday to Saturday, 5am to 7am
- Monday to Friday, 6pm to 10pm

Steel fixing, waterproofing and formwork installation (Shaft B)

- Monday to Friday, 7am to 10pm
- Sundays, 8am to 4pm (as required)

Permanent concrete structure installation (Shaft B)

- Monday to Friday, 7am to 12am (concrete pours, as required)
- Monday to Fridays, 6pm to 7am (concrete finishing works, as required)

Tunnelling and concrete deliveries (Shaft A)

- Monday to Sunday, 24 Hours

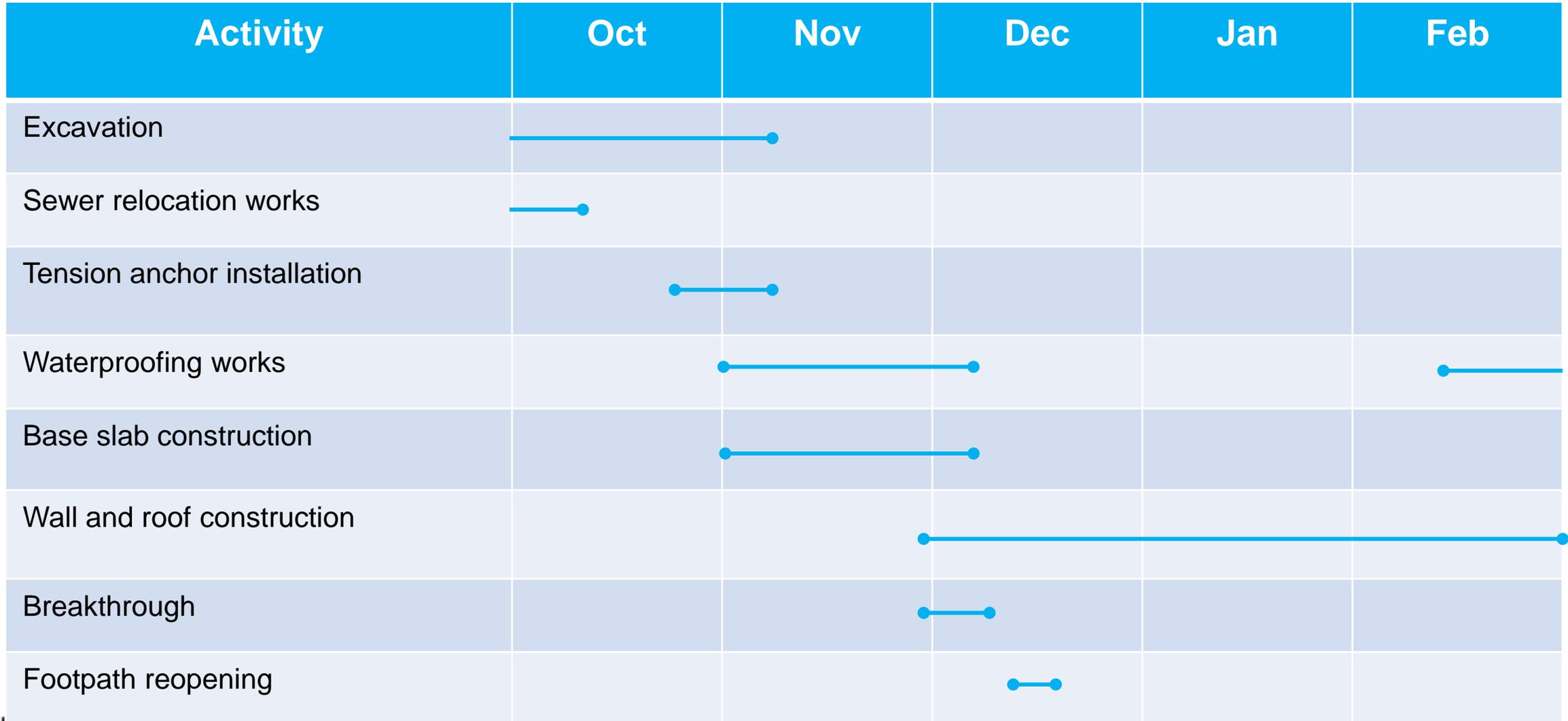
Excavation (Shaft B)

- Monday to Friday, 7am to 8pm
- Saturdays, 7am to 5pm
- Low noise works will continue between 8pm and 10pm (Monday to Saturdays)



FLINDERS LINK

FLINDERS LINK WORKS UPDATE



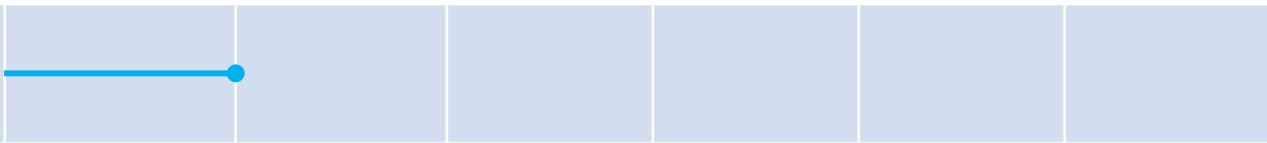
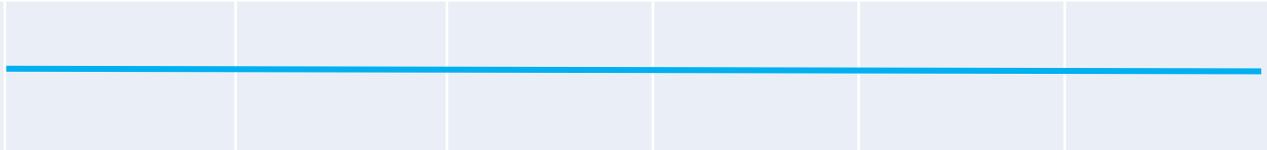


FEDERATION SQUARE

FEDERATION SQUARE WORKS UPDATE

Federation Square tunnelling and excavation

- 24 hours, Monday to Sunday

| Activity | Oct | Nov | Dec | Jan | Feb | Mar |
|-----------------------|---|-----|-----|-----|-----|-----|
| Shaft excavation |  | | | | | |
| Roadheader tunnelling |  | | | | | |

FEDERATION SQUARE ACOUSTIC SHED



Sonic Curtain in a concertina style



CITY SQUARE

CITY SQUARE WORKS UPDATE

City Square tunnelling and excavation

- 24 hours, Monday to Sunday

| Activity | Oct | Nov | Dec | Jan | Feb | Mar |
|----------------------------|--------|---------|-----|--------|-----|-----|
| Shaft excavation | —————● | | | | | |
| Site shed installation | | ●—————● | | | | |
| Slab and wall construction | | | | ●————— | | |
| Roadheader Tunnelling | ————— | | | | | |

← Currently 28 metres deep

QUESTIONS



TUNNELLING

TUNNELLING TO DATE

- In mid-2019, two tunnel boring machines (TBMs) were assembled at the Arden Station site
- The TBMs commenced tunnelling towards Kensington in 2019 and have now completed both sections of tunnel between the Arden Station site and the western tunnel entrance at Kensington
- The larger TBM components were disassembled and transported back to site in North Melbourne. The back up (gantry) sections were returned to site via the completed sections of tunnel
- TBM 1:
 - - commenced tunnelling towards the Parkville Station site on 13 May
 - - Arrived at Parkville Station on 27 August 2020
- TBM 2:
 - - commenced tunnelling towards the Parkville Station site on 2 June
 - - Arrived at Parkville Station on 19 September 2020

ARDEN TO PARKVILLE

- The section of the Metro Tunnel between the Arden Station and Parkville Station sites:
 - Eastbound tunnel
 - 1449m long
 - 852 rings
 - Westbound tunnel
 - 1447m long
 - 851 rings
- Tunnel depth:
 - Arden Station box (Laurens Street end) – approx. 18m
 - Dryburgh Street – approx. 15m
 - O'Shanassy Street/Errol Street – approx. 14m
 - Parkville Station box (Royal Parade end) – approx. 17m

THE TBMS AND SUPPORT NETWORK

TUNNEL LINING SEGMENTS



Concrete lining segments



Multi-service vehicle (MSV) carrying lining segments

TBMS



Multi-service vehicle (MSV) carrying lining segments



TBM Meg tunnelling – Arden to Western Portal

SLURRY TREATMENT PLANT



TUNNELS



Westbound tunnel – Arden to Western Portal



Westbound and eastbound tunnels – Arden to Western Portal

TBM RETRIEVAL AND REASSEMBLY

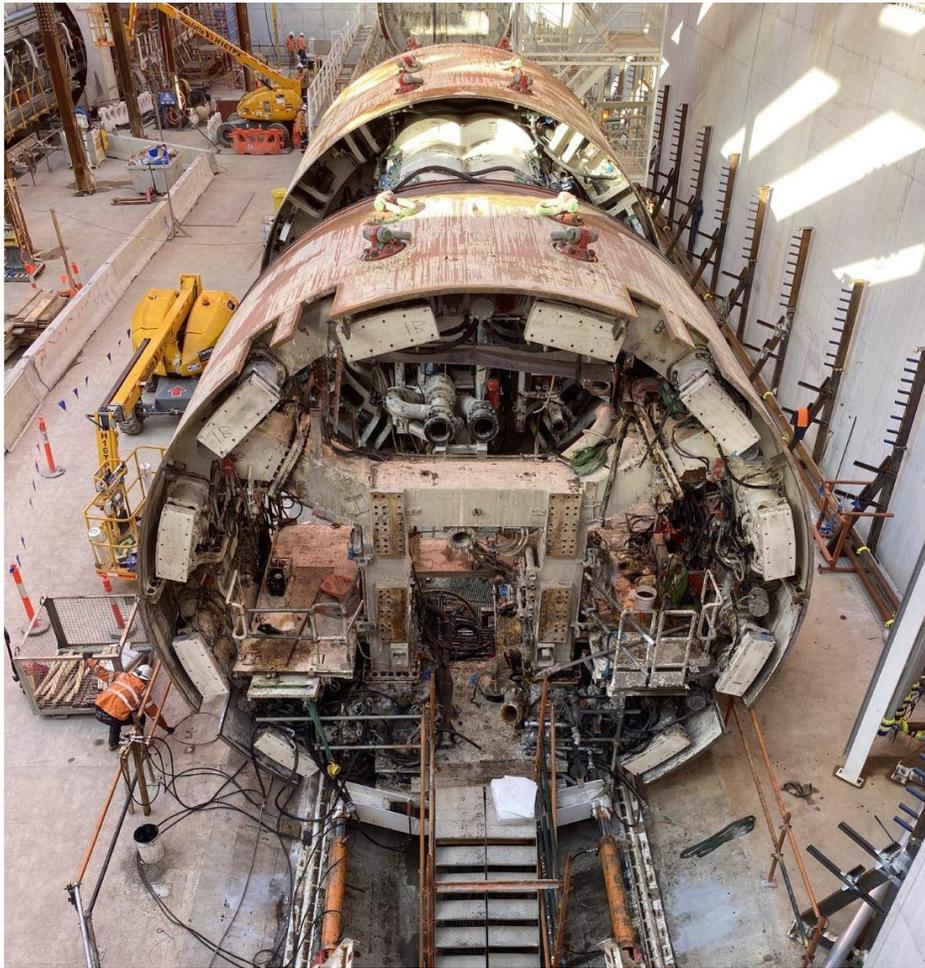


TBM gantry retrieval rotational device



Steel bell

TBM REASSEMBLY AND RELAUNCH



TBM Meg being reassembled at Arden



TBM Joan being relaunched from Arden to Parkville

PARKVILLE TBM BREAKTHROUGHS

- TBMs mill slowly through the fibreglass 'soft eye' of the station box
- The 'soft eye' is designed to minimise impacts of the breakthrough
- Reduced confinement pressure to maintain slurry flow and ensure maximum amount of spoil/debris is pumped back to the Arden Station site slurry treatment plant (STP)
- Process to contain slurry in the station box after breakthrough

PARKVILLE TBM BREAKTHROUGH (TBM JOAN)



Breakthrough process ongoing



Breakthrough complete



Monitoring TBM operations remotely

PARKVILLE TBM BREAKTHROUGH (TBM MEG)



Breakthrough process ongoing



Breakthrough complete



Communicating with the crew

MANAGING NOISE AND VIBRATION

MODELLING PROCESS

TBM Ground-borne Noise and Vibration Model Process:

1. Model for potential noise and vibration exceedances
2. Validate with attended monitoring
3. Update model with attended monitoring data

Consultation will be progressively undertaken with potentially affected residents and stakeholders prior to TBM arrival

TBM NOISE AND VIBRATION EPRS

NV8 – Vibration Guideline Targets for Structures (PPV)

External vibration targets for infrastructure to ensure the integrity is not affected by construction generated vibration

NV11 – Vibration Dose Values (VDVs) Human Comfort

Vibration dose values that are appropriate for the protection of personal amenity

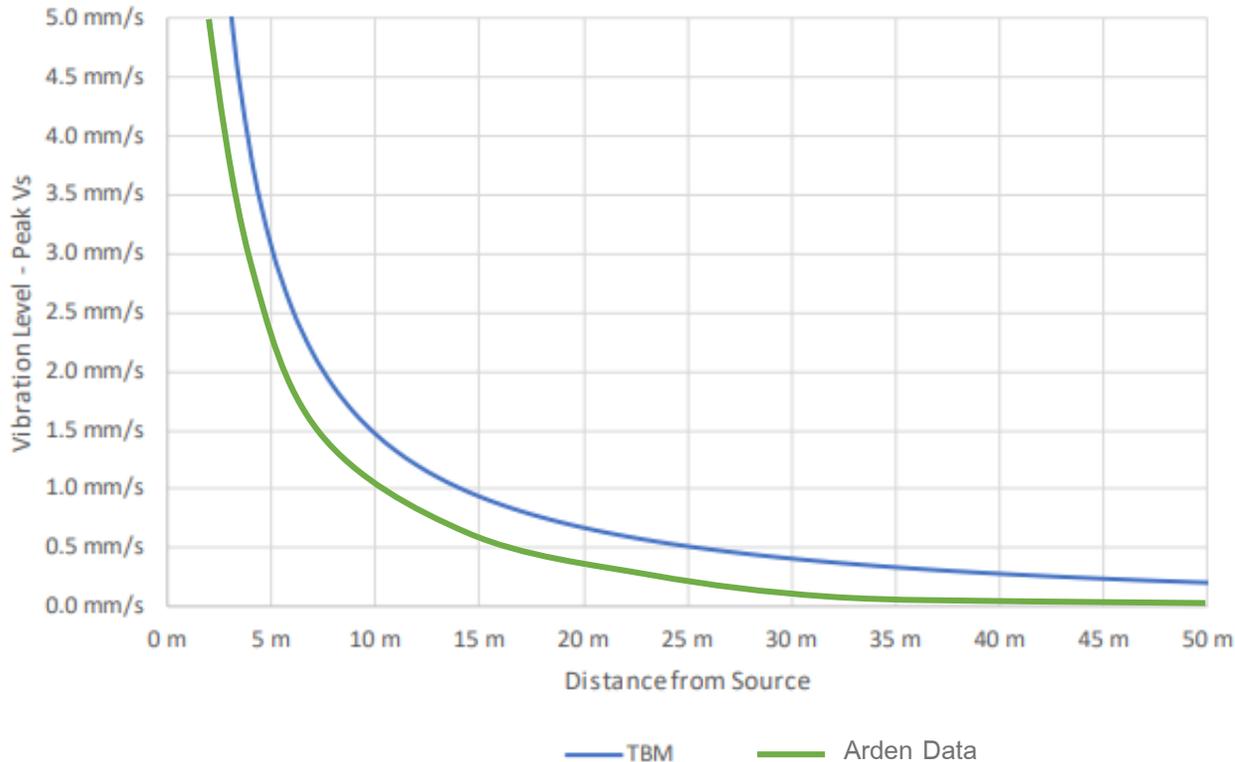
NV12 – Sensitive Equipment Guideline Targets

Vibration levels on sensitive equipment through PKV and CBD North

NV13 - Ground-borne (Internal) Noise Guidelines for Amenity

Regenerated noise, or ground-borne noise, is an associated effect of the small vibration related displacement that occurs on hard surfaces within buildings

TBM MODELLING – NV8 VIBRATION (STRUCTURES)



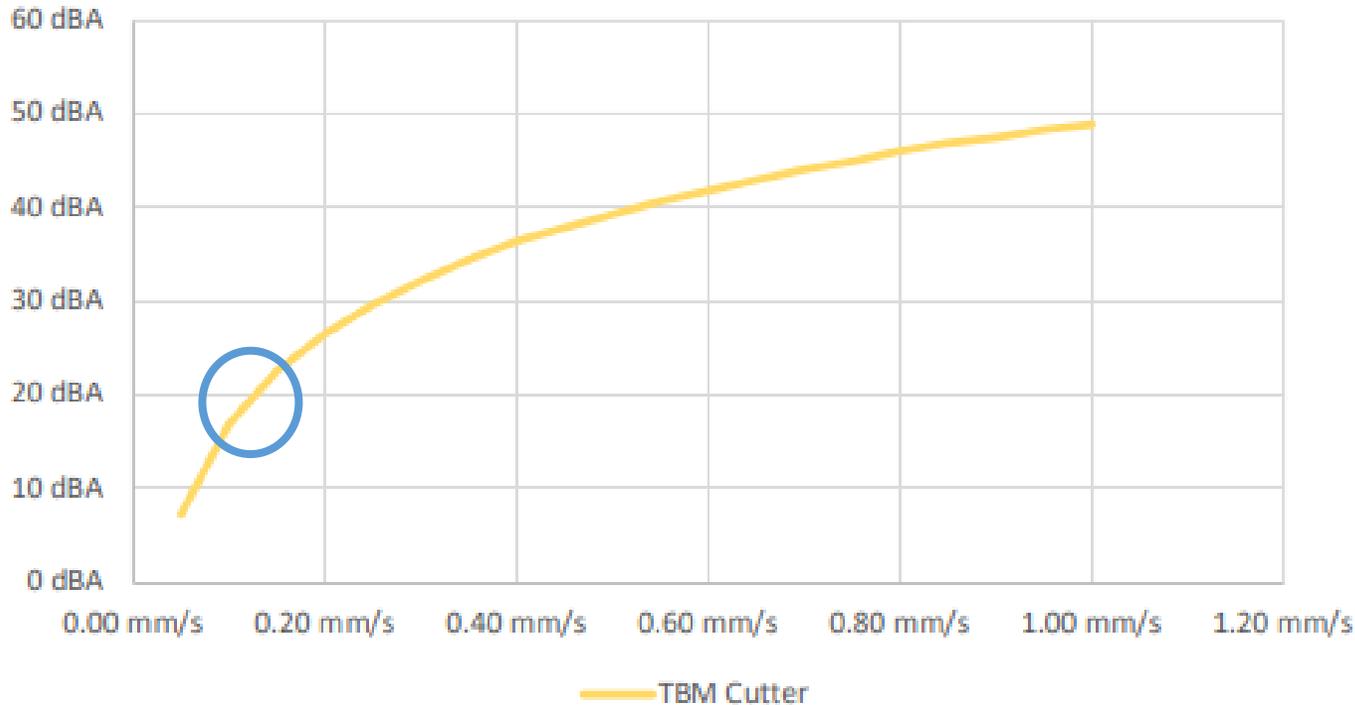
Estimated level of vibration as a function of distance from the TBM cutter head

Table NV8-1: Short-term vibration on structures

| Type of structure | Vibration at the foundation, mm/s (Peak Component Particle Velocity) | | | Vibration at horizontal plane of highest floor at all frequencies |
|--|--|------------|--------------------------|---|
| | 1 - 10 Hz | 10 - 50 Hz | 50 - 100 Hz ¹ | mm/s (Peak Component Particle Velocity) |
| Type 1: Buildings used for commercial purposes, industrial buildings and buildings of similar design | 20 | 20 - 40 | 40 - 50 | 40 |
| Type 2: Dwellings and buildings of similar design and/or occupancy | 5 | 5 - 15 | 15 - 20 | 15 |
| Type 3: Structures that have a particular sensitivity to vibration e.g. heritage buildings | 3 | 3 - 8 | 8 - 10 | 8 |

EPR NV8 Criteria

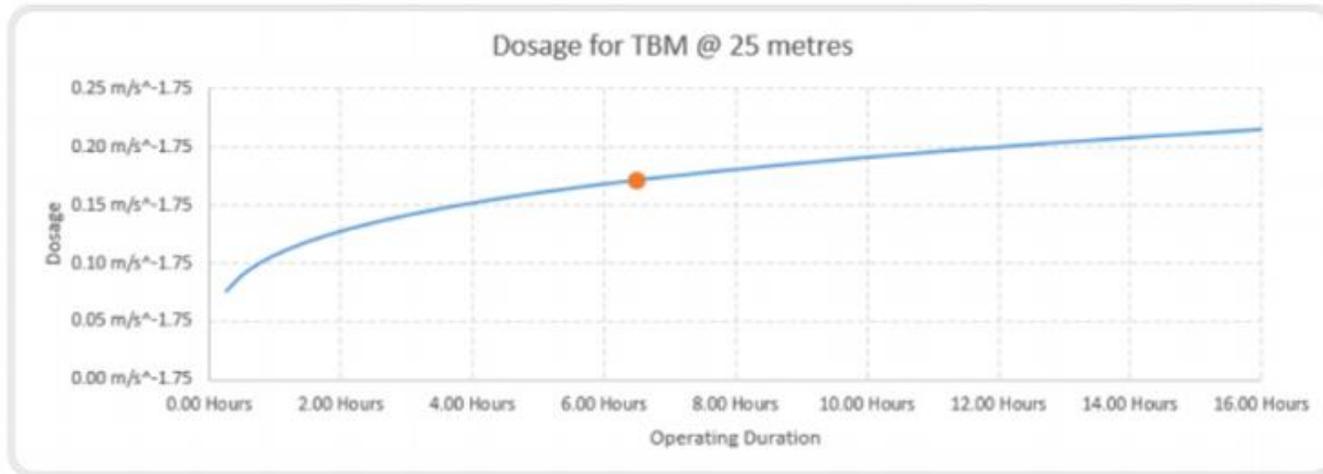
TBM MODELLING – NV13 GROUNDBORNE NOISE



| Time Period | Internal $L_{Aeq,15min}$, dB |
|----------------------|-------------------------------|
| Evening, 6pm to 10pm | 40 |
| Night, 10pm to 7am | 35 |

EPR NV13 Criteria

TBM MODELLING – NV11 HUMAN COMFORT (VDV)



Example of the dosage calculations for estimating dosage based upon the peak vibration level in mm/s and the TBM operating schedule

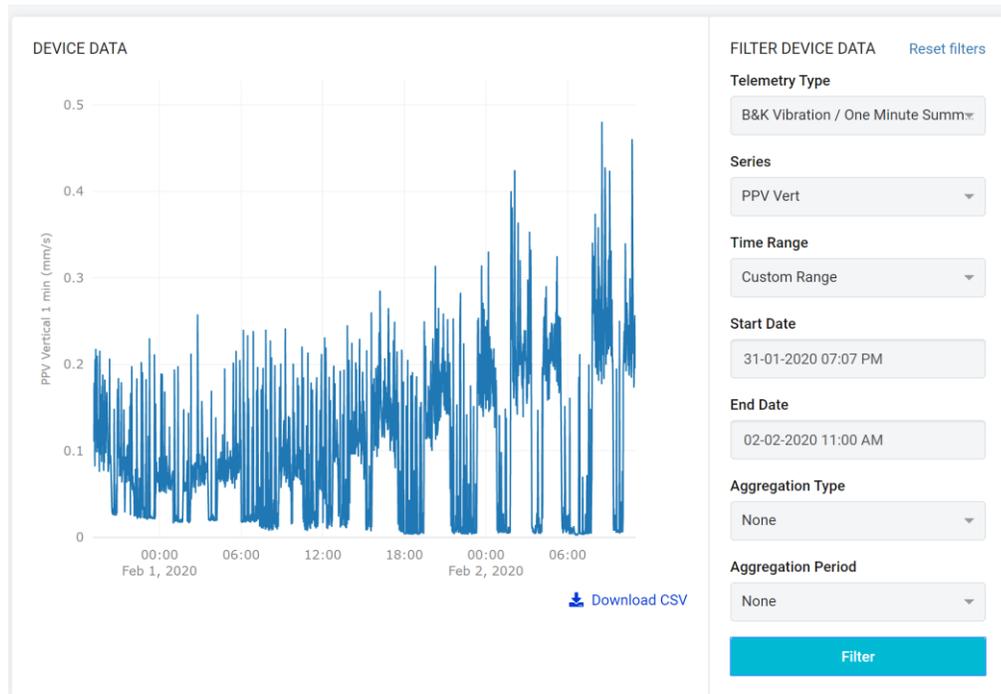
| Location | VDV (m/s ^{1.75}) | | | |
|---|----------------------------|---------------|----------------------------|---------------|
| | Day 7:00am to 10:00pm | | Night 10:00pm to 7:00am | |
| | Preferred Value | Maximum Value | Preferred Value | Maximum Value |
| Residences | 0.20 | 0.40 | 0.10 | 0.20 |
| Offices, schools, educational institutions, places of worship | 0.40 | 0.80 | 0.40 | 0.80 |
| Workshops | 0.80 | 1.60 | 0.80 | 1.60 |

EPR NV11 Criteria

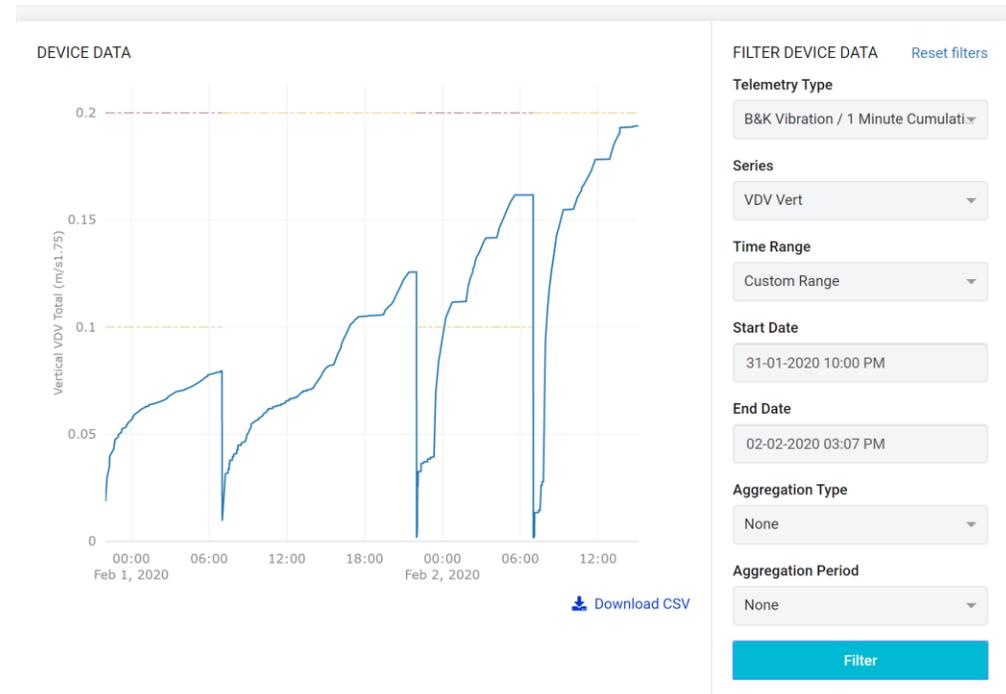
TBM MONITORING

- Attended monitoring to be completed during the launch of both TBMs
- Unattended real time monitoring will be installed along the alignment as the TBMs progress

Example of live data from Kensington



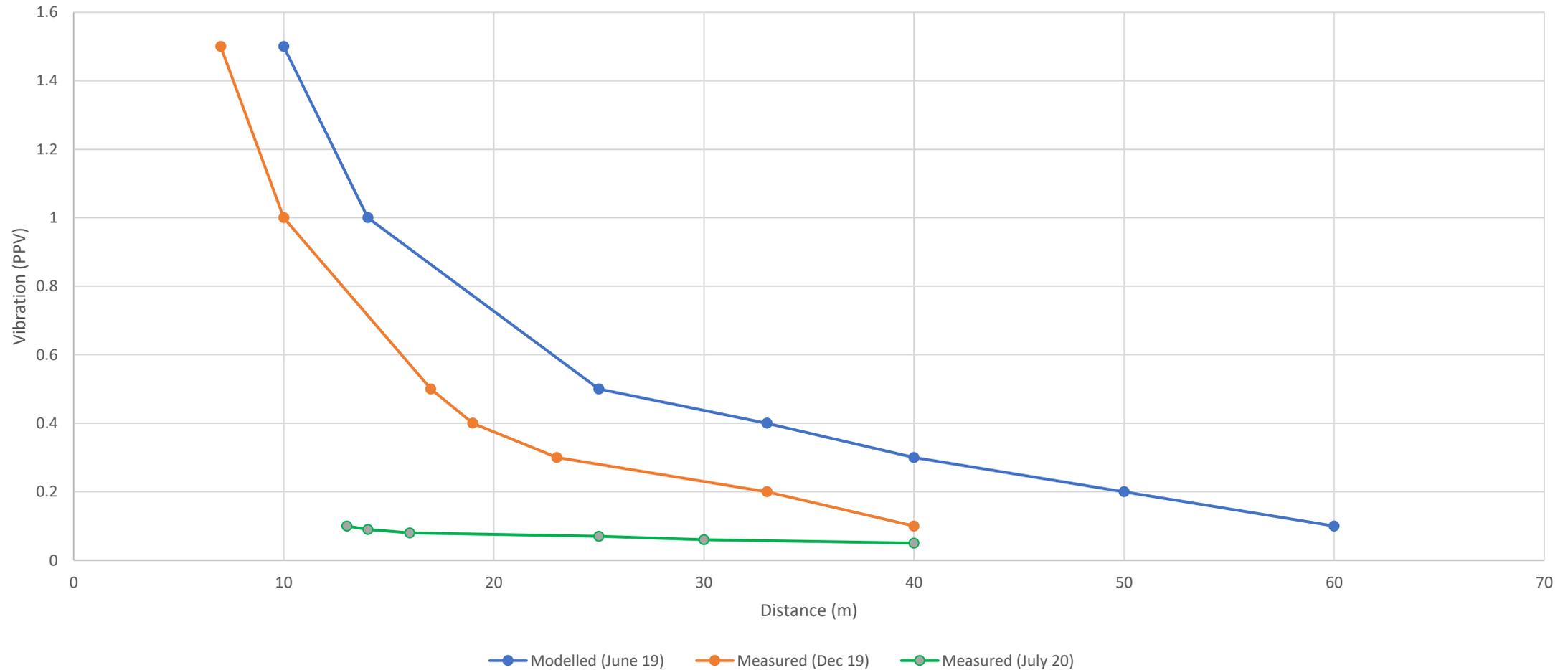
Vibration (PPV)



Vibration Dose Value

TBM MONITORING – WESTERN PORTAL TO PARKVILLE

Vibration (PPV) as a Function of Distance



PROPERTY CONDITION SURVEYS

- Pre-condition survey invitation letters will be distributed in stages
- Letters will be sent to the registered property owner/s or their nominated representative (e.g. managing agent)
- All survey bookings to be made directly between the property owner and the independent provider
- In response to Coronavirus (COVID-19) the Project has put in place new procedures for undertaking property condition surveys, consistent with best practice health and safety guidelines
- Property condition surveys will be undertaken by an independent specialist who will be in good health and:
 - - will be wearing gloves and a mask for the duration of the appointment
 - - will maintain a distance of 1.5 metres where possible
 - - will not touch or move any belongings
- Dates for booking of appointments will be based on Government health advice
- A copy of the property condition survey report, including photographs, will be provided to the property owner or their nominated representative (e.g. managing agent).



COMMUNICATIONS AND ENGAGEMENT

COMMUNICATIONS AND ENGAGEMENT

- **Communications to potentially impacted properties**
- TBM arrival four week out letter
 - Provision of 'noise and vibration from TBM tunnelling' fact sheet; tunnel depth and alignment map
- TBM 1 arrival letter (includes approx. dates TBM is expected to pass a specific property)
- TBM 2 arrival letter (includes approx. dates TBM is expected to pass a specific property)
- Information sessions, as required
 - *sessions being held online due to COVID-19 restrictions*
- One-on-one phone calls/video briefings, as required
- Project Information Line (1800 105 105) and CYP@metrotunnelcyp-dc.com.au
- Regular updates to Metro Tunnel website and social media



QUESTIONS?