

Powerline Bushfire Steering Committee

June 2018

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Agenda

▶ REFCL

1. Tranche 1A commissioning
2. GFN technical issues
3. Program status
4. Tranche 1 roadmap
5. Tranche 1 delivery – steps to achieve compliance
6. Line balancing units
7. Tranche 1 exemption applications
8. REFCL operating regime
9. ESC review of voltage standards

▶ Other bushfire mitigation programs

10. ACR Program
11. Powerline Replacement

1. Tranche 1A commissioning

Woori Yallock, Barnawartha and Rubicon A



› **Woori Yallock (WYK)**

- The REFCLs were taken out of service at the end April 2018
- During May and early June 2018, minor hardware additions and a software update has been underway, primarily to address split bus mode issues
 - Ground Fault Neutraliser (GFN) technical issues have been encountered – refer to the following slide
- Line balancing works now complete on 2 of the 4 feeders. All feeders will be balanced by mid June 2018
- Final preparations are being made for compliance testing during the last week of June 2018 and first week of July 2018 pending satisfactory resolution of key GFN technical issues

› **Barnawartha (BWA)**

- Line balancing works and capacitive balancing complete
- REFCL software update to be completed post WYK compliance testing, pending performance of the WYK REFCLs
- Plans to demonstrate compliance during July 2018 by using mobile generation to supply the two HV customers have been cancelled due to the excessive mobile generation costs (~\$0.5m)
- Replanning currently underway to confirm the revised compliance testing dates. This is most likely to be post the installation of the isolating substations for each HV customer.

› **Rubicon A (RUBA)**

- Minor line balancing works will be completed by end July 2018
- REFCL software updates to be completed late July 2018, subject to satisfactory resolution of key GFN technical issues
- Compliance testing is planned for early August 2018 with the AGL generation assets to be taken out of service

Key Point: Completion of demonstration of compliance at the WYK and RUBA ZSS's by early August 2018 is at risk due to GFN technical issues encountered

2. GFN technical issues



- ▶ **During the upgrade of hardware and software on the two GFNs at Woori Yallock (WYK) to resolve the split bus mode issues, a number of technical issues have been identified**
 - › Refer to the table opposite
- ▶ **The magnitude and nature of the issues encountered has reduced our confidence in the GFN product**
 - › Until the issues are satisfactorily addressed, the GFN is not considered fit for service and all online testing has currently been suspended
- ▶ **The delays encountered in performing the hardware and software upgrade at WYK and the suspension of online testing, is impacting the WYK commissioning schedule**
 - › Unless these issues are resolved quickly, the entire Tranche 1 delivery schedule for 1 May 2019 is at risk

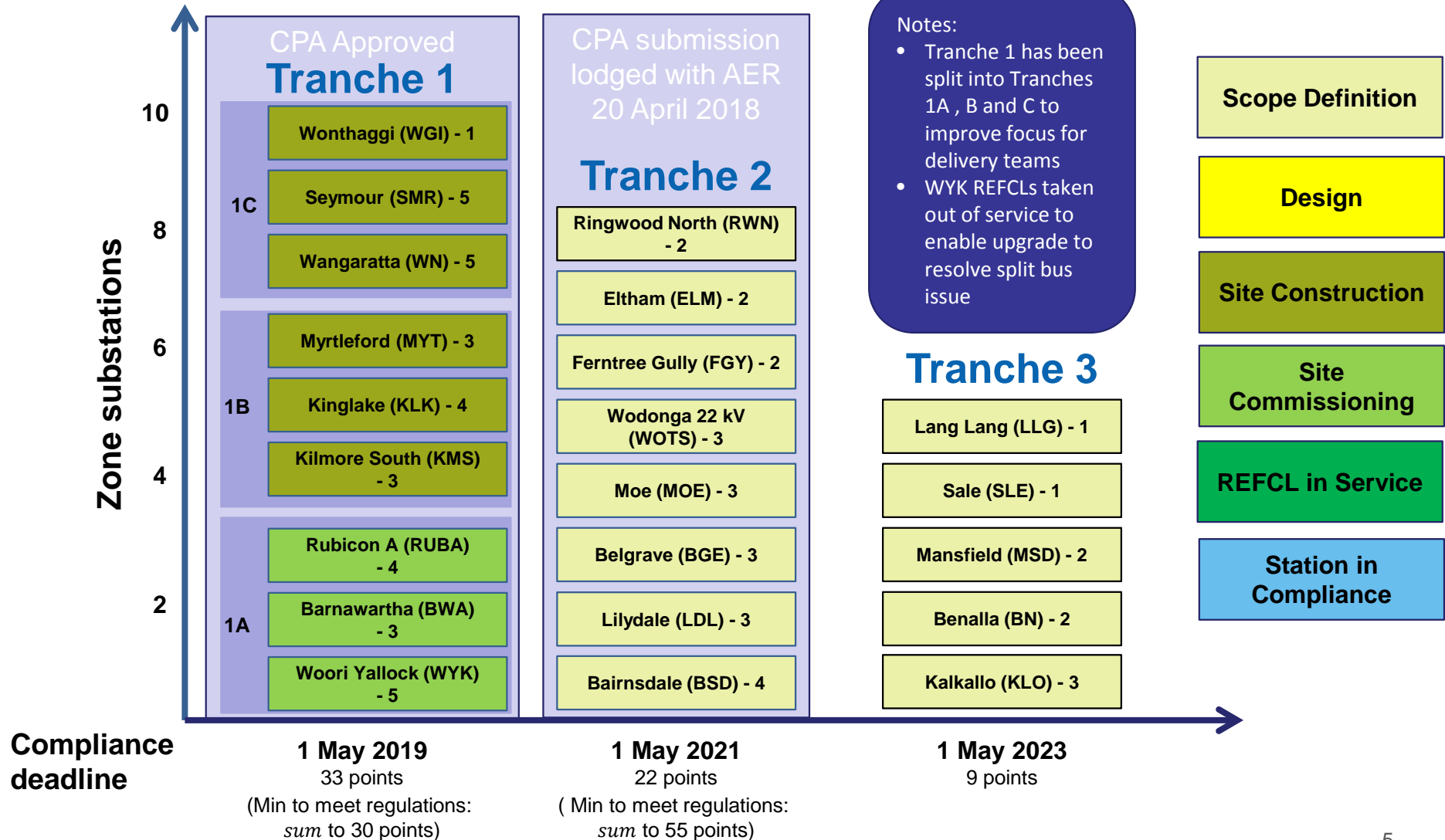
› Key technical issues identified to date

- **Hardware failures**
 - Board/Card failures in GFN control panel
 - Various inverter components
 - Arc Suppression Coil tuning contactor
- **Software bugs**
 - GFN failure to operate/respond to clear faults
 - Inadvertent control of inverter
 - Fault confirmation sequence unreliable
 - Inverter tuning algorithm not working as expected
 - Uploading of settings and configuration unreliable
 - Slow engagement of inverter
- **GFN Human Machine Interface (NMTerm) bugs**
 - Not displaying actual values
 - Randomly crashes and locks up

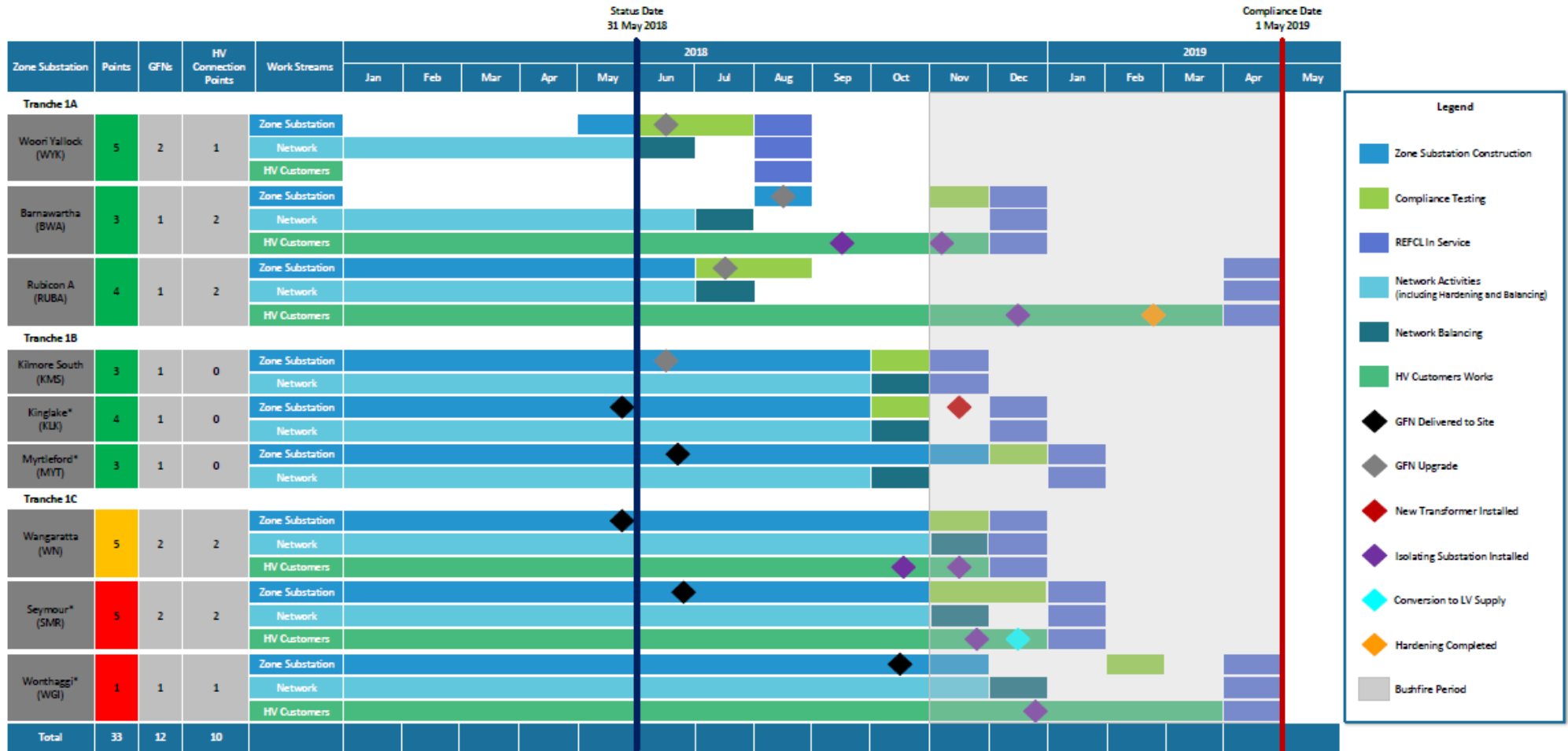
Key Points:

- The accumulation of technical issues and severity of some of the bugs has resulted in reduced confidence in the GFN product
- These Issues have been escalated with Swedish Neutral
- A detailed assessment and plan to resolve issues is underway

3. Program status



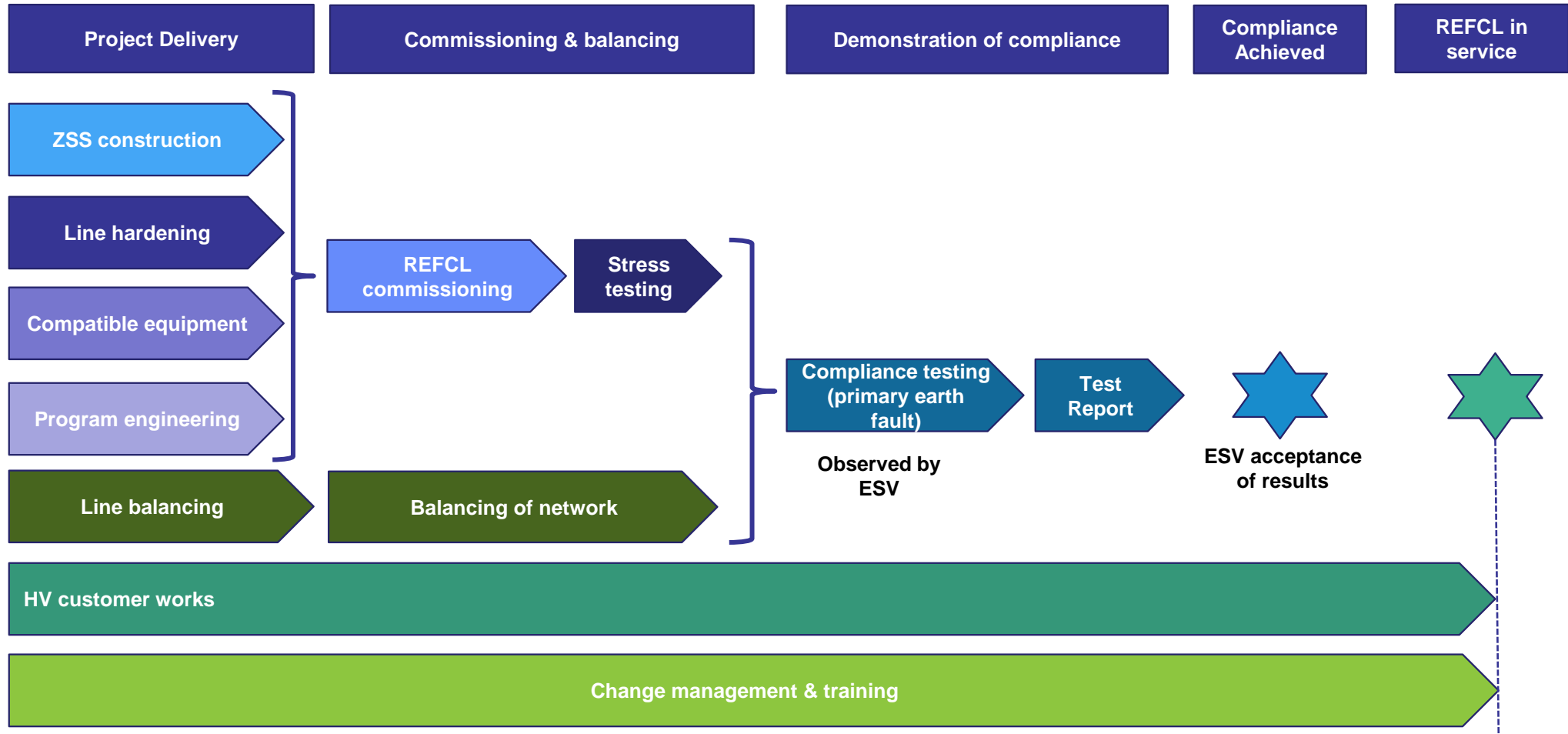
4. Tranche 1 roadmap



* Associated rebuild activities not included

5. Tranche 1 delivery

Steps to achieve compliance



Note: No linkage between compliance testing and completion of customer works

6. Line balancing units



- › **3 phase capacitor balancing units being installed on each section of each feeder**
- › **Purpose is to provide fine tuning of capacitive balance once other balancing works are complete**
- › **Can be adjusted remotely**
- › **AusNet Services working on active balancing system so that small dynamic changes in capacitance can be compensated for**

7. Tranche 1 exemption applications

- ▶ Six exemptions re-submitted following comments from ESV
- ▶ Puckapunyal being modified to reflect wider reasons for exemption
 - › Capacitive load from Defence network ~70A
 - › Hardening would be challenging due to extensive Defence network
 - › Capacitive balancing difficult to achieve and maintain as no obligation on Defence to manage

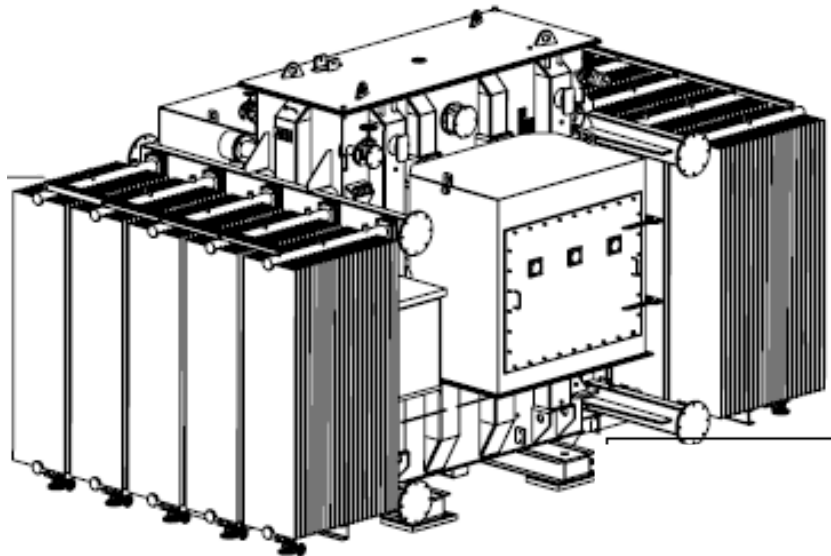


ABB Isolating Transformer

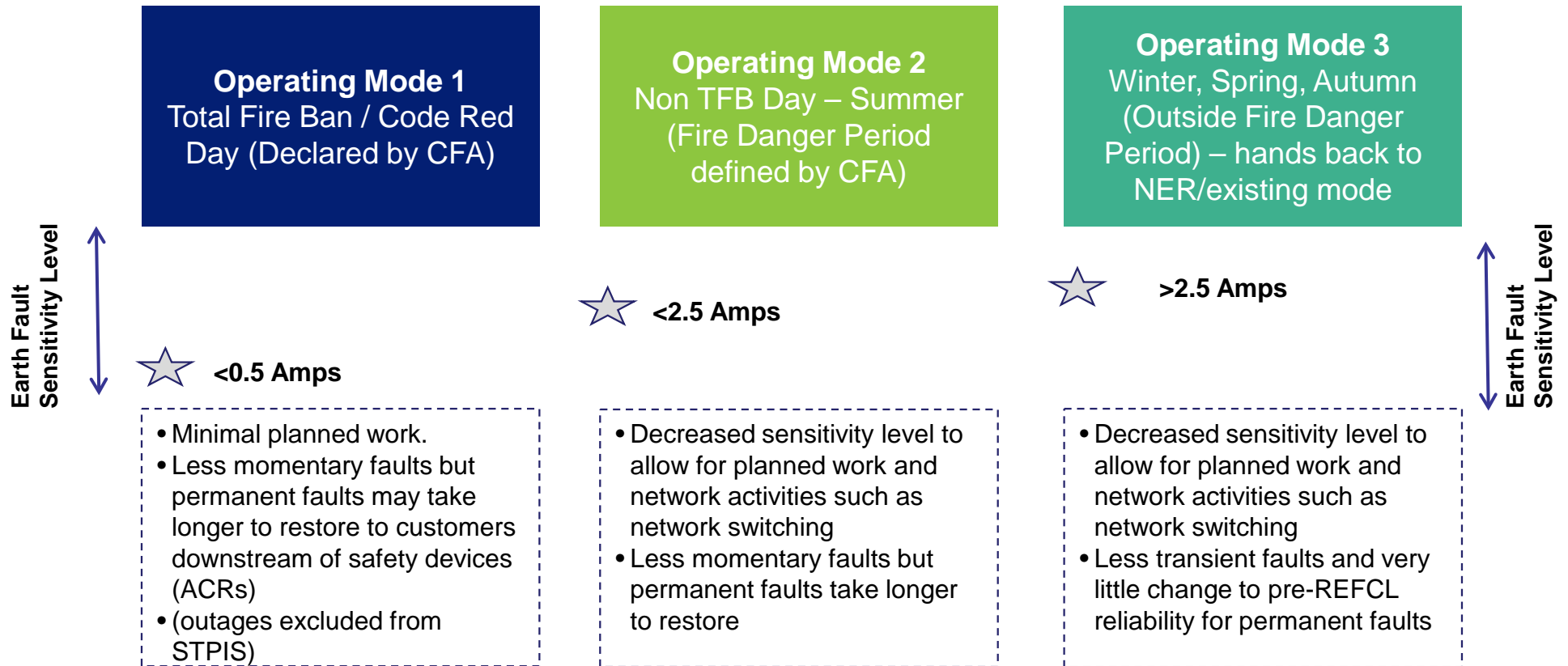
| ZSS | HV Customer | Date submitted / re-submitted to ESV | Approval status |
|------|------------------------------------|--------------------------------------|----------------------|
| BWA | Woolworths | 29 May 2018 | Application with ESV |
| BWA | Uncle Tobys | 29 May 2018 | Application with ESV |
| RUBA | Pacific Hydro, Eildon Pondage | 29 May 2018 | Application with ESV |
| WN | Pacific Hydro, Williams Hovell | 29 May 2018 | Application with ESV |
| WN | Australian Textiles Mills | 29 May 2018 | Application with ESV |
| SMR | Department of Defence, Puckapunyal | 23 March 2018 | On hold |
| WGI | Wonthaggi Wind Farm | 29 May 2018 | Application with ESV |

8. REFCL operating regime

Three REFCL operating modes



▶ When the GFN is in service, the control room can select one of three operating modes



The REFCL operating modes define the different earth fault current sensitivity levels that the REFCL is monitoring for

9. ESC Review of Voltage Standards

Draft decision



- ▶ **The draft Electricity Distribution Code (EDC) decision was released by the Essential Services Commission (ESC) on 22 May 2018 with final decision to be released in August 2018**
 - › The draft changes to the EDC remove the conflict between the Bushfire Mitigation Regulation obligations and the EDC obligations regarding the operation of REFCL's
 - › In addition, the draft decision clarifies the responsibility for being compliant with REFCL voltage levels with the HV customers
- ▶ **AusNet Services supports the ESC's draft decision because it:**
 - › Provides the appropriate flexibility to meet our obligations;
 - › Sets clear accountabilities for compatibility with resonant earthed network operation, for equipment at and beyond the point of connection;
 - › Provides clarification for the AER's revenue setting process; and
 - › Provides a customer information process in the event of future plans to implement resonant earthing.
- ▶ **Key issues:**
 - › The obligation to use best endeavours to minimise the period where we operate REFCLs appears to conflict with our bushfire mitigation obligations
 - › The definition of REFCLs is restrictive and should use resonant earthing instead
 - › What constitutes a reasonable period for HV Customers to comply is not clear or what steps would be taken if they don't comply in the reasonable period

Key Point: There is a risk of potential delays to operating REFCLs should Tranche 2 & 3 HV customers not carry out their obligations on a timely basis

10. ACR Program



➤ **Completed December 2015**

| Fire Consequence Level | # Devices Highest Risk Areas | # Devices Remaining Risk Areas |
|------------------------|------------------------------|--------------------------------|
| TFB/Code Red | 165 | 900 |

11. Powerline Replacement

Powerline Replacement Fund

- 1,680km in 'codified' areas
- 115km replaced; cost \$56M
- 74km in progress; cost \$30.3M
- Scheduled completion Jul 2019

AusNet Services' Program

- Conductor condition good
- Risk Based Modelling
 - Vegetation
 - Reliability
- No contingent projects identified
- Approx \$500-600M investment

