

Submission to the Economic Regulation Authority for amendments to the Technical Rules

Three phase fault credible contingency

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DM# 13508335

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1 Introduction

This submission to the Economic Regulation Authority (*Authority*) seeks the consideration and approval of the Technical Rules (*Rules*) amendment proposed in this document. This change is requested pursuant to clause 12.50(c) of the Electricity Networks Access Code 2004 (*Access Code*).

The proposed amendment is supported by similar treatments for this type of event in National Electricity Rules (**NER**) jurisdictions and will therefore bring better: 1) transparency, 2) consistency and 3) cost effectiveness, than would be gained from the continued use of the approach taken in the current version of the *Rules*.

Details of the proposed amendment are provided in a table in the next section which is structured as follows:

- outline of the clause(s) of the *Rules* affected by the proposed amendment;
- description of the concern or issue with the existing version of the *Rules* that the proposed amendment is addressing;
- detailed wording of the proposed amendment with a strikethrough where words are deleted and an underline where words are added;
- description of the benefits of the proposed amendment (in alignment with the Access Code objectives);
- discussion relating to the handling equivalent issues in NER jurisdictions;
- assessment of any identifiable risks or costs associated with the proposed amendment; and
- summary of the results of the stakeholder engagement regarding the proposed amendment.

2 Credible contingencies - update treatment of three phase faults

Clause	Section Title	Issue	Comments
Glossary	<i>Credible contingency</i>	Revise the treatment for three phase earth faults.	This amendment would mean that Western Power's technical requirements are better aligned with the national requirements.
Supporting information			
2.1	Clause of the <i>Rules</i> affected	The Glossary to be amended	
2.2	Concern or issue being addressed The issue(s) with the existing <i>Rules</i> that the proposed amendment is addressing	System transfer capability, as determined through power system simulations, is limited according to the definition of <i>credible contingency events</i> which must be considered. The more conservative Western Power definition requires higher levels of investment to achieve a particular transfer limit when compared to other states.	
2.3	Details of the proposed <i>Rule</i> amendment For clarity, the current wording of the <i>Rule</i> is used with a strike through for words that have been deleted and an <u>underline</u> for words that have been added	<p>The definition of <i>credible contingency event</i> in the Glossary amended.</p> <p>A single <i>contingency event</i> of one of the following types:</p> <ul style="list-style-type: none"> (a) <u>for voltages below 66 kV, a three-phase to earth fault cleared by <i>disconnection</i> of the faulted component, with the fastest <i>main protection scheme</i> out of service;</u> (b) <u>for voltages at or above 66 kV, a two-phase or three-phase to earth fault (consistent with good industry practice and based on modes of operation) cleared by <i>disconnection</i> of the faulted component, with the fastest <i>main protection scheme</i> out of service;</u> <p>Renumber b) through e) to c) through to f).</p>	

<p>2.4 Benefits of the proposed <i>Rule</i> amendment</p> <p>How the amendment is bringing Technical Rules in closer alignment with the Access Code objectives</p>	<p>This amendment proposal is aligned with the <i>Access Code</i> objectives as it promotes economically efficient investment in, and operation and use of, the network. The <i>Access Code</i> objectives provide an incentive for Western Power to maximise the utilisation of network assets while lowering the cost.</p> <p>The amendment is expected to deliver the following benefits over time:</p> <ul style="list-style-type: none"> i. The exemption from consideration of three phase faults as a credible contingency reduces the need to restrict power system transfers under certain network outage conditions; ii. In some areas of the network, the reclassification of credible contingency from three phase to two phase to earth would reduce or defer the need to build new or upgrade existing infrastructure, delivering a better network utilisation and lowering the costs, and thereby also removing a barrier to entry/connection in some instances; iii. The consideration of contingency scenarios does not have any impact on the actual fault occurrence frequency or distribution, so it has no material impact on the risk to the system stability or security, and has minimal impact on the existing <i>Users</i>.
<p>2.5 Requirements for NER utilities</p>	<p>The NER are an accepted best practice industry benchmark in Australia and do not include three phase earth faults as a credible contingency below 220 kV, except in specific circumstances. The <i>Rules</i> are more stringent in credible contingency definitions, so this amendment would bring them in closer alignment with the NER.</p>
<p>2.6 Identifiable risks associated with the proposed amendment</p>	<p>The removal of the three phase faults from credible contingency scenarios does not change the likelihood of such a fault occurring, but it could change the amount of power being transferred through the network at the time of any such incidence, as the risk margin that was applied in calculation of power transfer limits would be reduced with this change. Three phase to earth faults are rare and the interlocking design of the circuit breakers and earth switches further minimise the possibility of such a fault occurring. Hence, there is expected to be no adverse impact on supply reliability or safety of the network as a result of this amendment.</p> <p>Western Power notes that the impact on <i>Users</i> is expected to be minimal as the applicable <i>Rules</i> already consider a full range of <i>Users</i> protection requirements, including pole-slip protection relays.</p>

<p>2.7 Summary of the results of the stakeholder engagement</p>	<p>The greatest impact of this decision will potentially be on <i>Users</i> with generating facilities in the Eastern Goldfields, where power transfer limits can affect network operations. However, those <i>Generators</i> may benefit by reviewing suitability of their generator protection systems and associated settings to ensure they remain optimal after this change is made.</p> <p>Accordingly, both Newmont Mining and BHP Nickel West have been contacted and given an explanation of the proposed change in position. This contact included an opportunity to clarify any related queries and to contribute their comments. Neither has raised any objections, but did state that they would not be undertaking any works/studies at the time they were contacted.</p>
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Attachment 1 Glossary of terms

Applicant	A person applying for connection to the Western Power Network
<i>Authority</i>	Economic Regulation Authority
<i>Access Code</i>	Electricity Networks Access Code 2004 ¹
DNSP	Distribution Network Service Provider
NER	National Electricity Rules ²
NSP	Network Service Provider
Technical Rules, <i>Rules</i>	Technical Rules, 23 December 2011 ³ .
SWIN	South West Interconnected Network
SWIS	South West Interconnected System
TNSP	Transmission Network Service Provider
<i>User</i>	Has meaning as defined in the Technical Rules section 1.3(b)(3)
WPN	Western Power Network

¹ See [https://www.erawa.com.au/about-us/legislation/Electricity Networks Access Code 2004](https://www.erawa.com.au/about-us/legislation/Electricity%20Networks%20Access%20Code%202004)

² See <http://www.aemc.gov.au/energy-rules/national-electricity-rules/current-rules>

³ See <https://www.erawa.com.au/cproot/10353/2/20120504%20Western%20Power%20Technical%20Rules.pdf>

Submission to the Economic Regulation Authority for amendments to the Technical Rules

User agreed access connections

Date: 02 March 2016

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1 Introduction

This submission to the Economic Regulation Authority (**Authority**) seeks the consideration and approval of the Technical Rules (**Rules**) amendment proposed in this document. This change is requested pursuant to clause 12.50(c) of the Electricity Networks Access Code 2004 (**Access Code**).

An amendment to the *Rules* N-1 provisions is sought to enable *User* agreed network access by way of negotiated post contingent load shedding and/or negotiated generation run-back connections.

Information supporting the amendment proposal is provided in a table below in the following structure:

- outline of the clause of the *Rules* affected by the proposed amendment;
- description of the concern or issue with the existing version of the *Rules* that the proposed amendment is addressing;
- details of the proposed amendment with current wording of the *Rule* marked up with a ~~strickthrough~~ where words are deleted and an underline of any words being added;
- description of the benefits of the proposed amendment (in alignment with the *Access Code* objectives);
- assessment of any identifiable risks or costs associated with the proposed amendment;
- National Electricity Rules (**NER**) consistency considerations; and
- summary of results of the stakeholder engagement regarding the proposed amendment.

2 Proposed amendment – *User* agreed access connections

Clause	Section Title	Issue	Comments
2.5.2.2(b)	N-1 criterion	To provide 'N-1 post contingent' restricted access via <i>User</i> agreed load shedding and reduced generation connections	Provisions under <i>Access Code/Rules</i> assume unconstrained access for all connections. However, when network augmentation is costly or otherwise prohibitive, the alternative arrangements with this amendment will deliver better efficiency and this can be accessible to the <i>User</i> and the <i>Network Service Provider (NSP)</i> by mutual agreement.
Supporting information			
2.1 Clause of the <i>Rules</i> affected		2.5.2.2(b) N-1 criterion	
2.2 Concern or issue the proposed <i>Rule</i> is addressing Issue with the existing version of the <i>Rules</i> that the proposed amendment is addressing		Voluntary load shedding ('load tripping') and post-contingent ('run-back') generation tripping or output reduction arrangements are not considered under the current clause 2.5.2.2(b), and in many cases, Western Power must obtain an exemption from the <i>Authority</i> in order to implement them. This requirement can create a barrier to the efficient use of the network, as well as adding cost and delays to the implementation of what are otherwise cost effective, safe and reliable capacity management measures.	
2.3 Details of proposed amendment to a particular <i>Rule</i> For clarity, the current wording of the Rule is used with a strikethrough for words that have been deleted and an <u>underline</u> for words that have been added		2.5.2.2 N-1 Criterion (b) For sub-networks designed to the N-1 criterion (excluding a zone substation designed to the 1% risk or NCR criteria in accordance with clause 2.5.4), <i>supply</i> must be maintained and <i>load shedding</i> avoided at any <i>load</i> level and for any <i>generation</i> schedule following an <i>outage</i> of any single <i>transmission element</i> , <u>except where:</u> <u>(1) a zone substation was designed to the 1% risk or NCR criteria in accordance with clause 2.5.4; or</u> <u>(2) operational restrictions have been agreed between the Network Service Provider and a User as per clause 3.1(b).</u>	

	<p>Comments on the drafting</p> <p>The notion that ‘supply must be maintained’ is interpreted to mean both supply to loads and supply from generators. This is due to the particular definition in the <i>Electricity Industry Act 2004</i> that to supply is to “generate, transport through a transmission or distribution system or sell” and therefore the <i>Rule</i> is not solely contemplating a supply of energy to a load to consume but rather it is requiring that the two way delivery mechanism remain open to ensure that supply to <i>Users</i> (including loads and generators) is maintained.</p> <p>Inserting the additional term “involuntary” into the section referring to supply being maintained “and <u>involuntary</u> load shedding avoided” was initially considered, but this has been made redundant by the new section (2). That insertion of “involuntary”, by itself, doesn’t address reductions to any existing “<i>generation</i> schedules”. Hence section (2) is proposed and the approach of using agreed “operational restrictions” is used.</p>
<p>2.4 Benefits of the proposed <i>Rule</i> amendment</p>	<p>Implementing agreed load shedding and or agreed generation ‘run-backs’ allows the NSP to switch off some loads and or generators in response to network needs. For example, in times of high demand a load can be accommodated only if it can be disconnected immediately upon failure of any transmission network element, otherwise there would be a violation of the N-1 planning criterion.</p> <p>As the peak adjusted network transfer capacity diminishes into the future, this arrangement allows the network to be utilised closer to actual capacity more of the time. This approach promotes more efficient network operation in accordance with the <i>Access Code</i> objectives by moderating connections at peak demand and deferring ‘otherwise compliance driven’ investments and network upgrades.</p> <p>This change will:</p> <ol style="list-style-type: none"> 1. improve the efficiency of the transmission network by allowing the connection of customers who will maximise network utilisation in off-peak and shoulder periods; 2. add certainty to the customer application process and reduce its duration by removing the need for Western Power to seek an exemption to clause 2.5.2.2; and 3. enable connection of customers in those areas of the network where peak conditions would otherwise require significant network augmentations. <p>A further benefit of this amendment is that some existing exemptions can be renegotiated and retired.</p>

<p>2.5 Identifiable risks and costs associated with the proposed amendment</p>	<p>The proposed <i>Rule</i> amendment will remove the need for formal exemptions in cases where a more flexible and efficient approach can underpin and support day-to-day network management strategies for dealing with N-1 failures of transmission network elements. As such, it is removing the administrative cost and time of seeking exemptions without introducing new or exacerbating any existing risks on the Western Power Network.</p> <p>Some costs are expected in setting up a suitable protection and SCADA¹ inter trip arrangements, and for coordinating and maintaining existing ones. However, these costs are expected to be lower than the additional revenue resulting from better asset utilisation and lower than network upgrade and/or maintenance work (and are presently required to enable connections for which exemptions are, or would be sought). These costs would be borne by the customers requesting the connection as per the Contribution Policy.</p>
<p>2.6 National Electricity Rules (NER) consistency considerations</p>	<p>The NER and market cater for constrained generation connections, whereas the <i>Access Code</i> in Western Australia, more generally, does not. Under the NER, applications are made in the existing ‘constrained’ network and market environment. In the South West Interconnected Network (SWIN), all requirements are framed with the view that ‘unconstrained’ access is to be available to all connecting <i>Users</i> at all times. This framework means that Western Power must seek <i>Rules</i> exemptions to accommodate ‘part time’ or ‘restricted’ connection applications – to be clear, no such exemptions are required under the NER.</p>
<p>2.7 Summary of stakeholder comments and engagement</p>	<p>A change in the <i>Rules</i> allowing all but ‘involuntary’ load shedding has previously been suggested by the independent technical advisor to the <i>Authority</i>, Geoff Brown & Associates in comments relating to the Geraldton Port Authorities constrained connection (see Attachment 2).</p> <p>This type of connection arrangement has been subject to public review in relation to previous exemptions which have been granted. Three recent examples are listed in Attachment 2.</p>

¹ Supervision Control And Data Acquisition (SCADA) remote control system

Attachment 1 Glossary

Term	Meaning
<i>Access Code</i>	Electricity Networks Access Code 2004 ²
<i>Authority</i>	Economic Regulation Authority
<i>generation</i>	The production of electric power by converting another form of <i>energy</i> into electricity in a <i>generating unit</i> .
<i>load</i>	Either: (a) a <i>connection point</i> at which electric power is made available to a person; or (b) the amount of electric <i>power transfer</i> at a defined instant at a specified, point on the <i>transmission or distribution system</i> as the case requires.
<i>load shedding</i>	Reducing or <i>disconnecting load</i> from the <i>power system</i> .
NER	National Electricity Rules
<i>NSP</i>	Network Service Provider
<i>outage</i>	Any planned or unplanned full or partial unavailability of <i>equipment</i> .
<i>supply</i>	Means the delivery of <i>electricity</i> as defined in the <i>Act</i> *. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>*From the Electricity Industry Act (2004), "supply" means to do any one or more of the following:</p> <ul style="list-style-type: none"> (a) generate; (b) transport through a transmission system; (c) transport through a distribution system; (d) sell; </div>
<i>SWIN</i>	South West Interconnected Network
<i>Technical Rules, Rules</i>	Technical Rules, 23 December 2011
<i>transmission element</i>	A single identifiable major component of a transmission system involving: (a) an individual transmission circuit or a phase of that circuit; (b) a major item of transmission equipment necessary for the functioning of a particular transmission circuit or connection point (such as a transformer or a circuit breaker).
<i>User</i>	Has meaning as defined in the Technical Rules section 1.3(b)(3)
WPN	Western Power Network

² See <https://www.erawa.com.au/about-us/legislation> Electricity Networks Access Code 2004

Attachment 2 Previous exemption decisions

There have been *Rules* exemptions sought and gained in the past for load shedding and generation run-back schemes (see exemptions granted by the Authority³). Three directly related examples are provided below.

Project/Site	Restriction	Comments
Byford solar farm.	Generation run-back	Both these generation run-back exemptions involve <i>Generating equipment</i> is disconnected [to maintain NSP N-1 compliance], post contingent, if network overload constraints occur. A further outcome of this revision is that these (and similar exemptions) can be renegotiated and may be retired. The Byford (p. 4) and Nilgen (p. 7) exemption applications puts the definition of supply this way: Clause 2.5.2.2 of the Technical Rules specifies that any sub-network not otherwise identified as designed to N-0 or N-1-1 criterion) is to be designed to an N-1 planning criterion. The clause is applicable to the sub-network impacted by the Byford PV solar farm connection. The clause states:
Nilgen wind farm.		"For sub-networks designed to the N-1 criterion (excluding a <i>zone substation</i> designed to the 1% risk or NCR criteria in accordance with clause 2.5.4), <i>supply</i> must be maintained and <i>load shedding</i> avoided at any <i>load</i> level and for any <i>generation</i> schedule following an outage of any single <i>transmission element</i> ." By defining <i>supply</i> to include <i>transport of electricity</i> this clause states that a generator must be able to export up to its DSOC value under N-1 for any generation schedule. The proposed connection arrangement for the Byford PV solar farm is not designed to meet this N-1 planning criterion. The post-contingent run-back scheme proposed is designed to mitigate any network risks posed by non-compliance with the N-1 planning criteria.
Geraldton Port Authority	Load shedding	An agreed (voluntary) portion of load can be shed (tripped off) when certain Northern transmission network overload conditions exist. This a post contingent load shed, upon the occurrence of an N-1 event in the transmission network. A suggestion to make a Rule change of this type was made in the Technical Consultants report for the Geraldton Port Authority (GPA) connection (a quote taken from that is included below). The curtailable solution for which the exemption was sought is a form of demand side management that is consistent with good electricity industry practice. It is therefore of concern that Western Power's technical rules are perceived as a barrier to the implementation of such a solution. Had clause 2.5.2.2 of the technical rules been worded <i>...supply must be maintained and involuntary load shedding avoided at any load level and for any generation schedule following an outage of any single transmission element</i> it is doubtful that a technical rules exemption application would be necessary. We suggest that the reference to load shedding in clause 2.5.2.2 was intended to refer only to <i>involuntary</i> load shedding and propose that Western Power be required to clarify this wording when the rules are next revised. We don't think it was ever intended by the Authority that the technical rules be used as a barrier to the implementation of demand management involving voluntary load shedding and suggest that the use of the technical rules in this way is not consistent with the objectives of the Access Code. (see page 5 in the GPA Consultants Technical Report of 18-Dec-12 ⁴)

³ <https://www.erawa.com.au/electricity/electricity-access/western-power-network/technical-rules/era-determinations-on-exemptions-from-the-technical-rules>.

⁴ <https://www.erawa.com.au/cproot/11023/2/20121218%20-%20D100857%20-%20GPA%20Technical%20Advisor%20Report%20031212.pdf>

Submission to the Economic Regulation Authority for amendments to the Technical Rules

Weak infeed on transmission and distribution protection systems

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1 Introduction

This submission to the Economic Regulation Authority (*Authority*) seeks the consideration and approval of the Technical Rules (*Rules*) amendment proposed in this document. This change is requested pursuant to clause 12.50(c) of the Electricity Networks Access Code 2004 (*Access Code*).

This amendment submission concerns establishing *Rules* for assessing and dealing with “*weak infeed fault conditions*”. This is a situation which can result from the connection of embedded generators to the distribution network where, under some circumstances, a connection can cause protection *maximum fault clearance time* violations for the pre-existing elements of the *Network Service Provider’s (NSP)* network. With an increasing uptake of embedded generation energy solutions, the cumulative effect of each new connection needs to be considered, and this presents a scenario not contemplated by the present version of the *Rules*.

The proposed amendment provides a way to balance the cost of protection solutions and to deliver material benefits to embedded generators without creating adverse impact on other *Users* or the Western Power Network (**WPN**).

The amendment proposal supporting information is provided in a table below in the following structure:

- outline of the clause(s) of the *Rules* affected by the proposed amendment;
- description of the concern or issue with the existing version of the *Rules* that the proposed amendment is addressing;
- details of the proposed amendment with current wording of the *Rules* marked up with a ~~strike through~~ where words are deleted and an underline of any words being added;
- description of the benefits of the proposed amendment (in alignment with the *Access Code* objectives);
- a brief outline of equivalent requirements in the National Electricity Rules (**NER**) and of practices of utilities in NER jurisdictions
- assessment of any identifiable risks or costs associated with the proposed amendment; and
- summary of the stakeholder engagement carried out in relation to the proposed changes.

2 Proposed Weak infeed fault conditions Technical Rules amendment

Clause	Section Title	Issue	Comments
2.9.4	Maximum total fault clearance time	Weak infeed fault conditions violating protection maximum clearance times for existing elements of the network.	Electricity industry best practice suggests that small embedded generation connections should be assessed on their own merits and within their individual environment, rather than against generic clauses that do not specify limits, or detail an approach for dealing with specific weak infeed fault conditions.
Details			
2.1	Clause of the <i>Rules</i> affected by the proposed amendment		<p>cl. 2.9.4 – Maximum Total Fault Clearance Times</p> <p>Addition of new clause (j) after existing clause (i).</p> <p>Addition of definition of “<i>weak infeed fault conditions</i>” to the <i>Rules glossary</i>.</p>
2.2	Concern or issue being addressed		<p>Clause 2.9.4 of the <i>Rules</i> applies to zero impedance short circuit faults of any type of primary equipment at nominal system voltage. Together with Tables 2.10 and 2.11 this clause sets out the maximum fault clearance times, or how quickly any particular protection relay (and associated circuit breaker) must clear a fault.</p> <p>Distribution connected (embedded) generators rated at less than 10MVA, have small fault current contributions that is commensurate with their size. Under certain fault conditions this can result in slow or no protection operation at the transmission level, violating the maximum fault clearance times set out in <i>Rules</i> Tables 2.10 and 2.11, and thereby triggering the need for significant transmission line protection upgrades.</p> <p>If the risk profile of such an event is low, as may be the case with ‘weak infeed fault condition’, enforcing compliance is not aligned with prudent and economic use and operation of the network, and may contravene the objectives of the <i>Access Code</i>.</p>
	The issue with the existing Rule that the proposed amendment is addressing		

<p>2.3 Details of proposed amendment to a particular <i>Rule</i></p> <p>For clarity, the current wording of the Rule is used with a strike through for words that have been deleted and an <u>underline</u> for words that have been added.</p>	<p>Add the following clause (j) to clause 2.9.4 after current clause (i).</p> <p>(j) <u>Notwithstanding any other provision contained in this Rule 2.9.4, for <i>weak infeed fault conditions</i> resulting from the connection of <i>embedded generating units</i>, the <i>total fault clearance time</i> of one of the protection schemes shall meet the remote end <i>total fault clearance time</i> of table 2.11. The <i>total fault clearance time</i> of the other <i>protection scheme</i> shall be as deemed necessary by the <i>Network Service Provider</i> to prevent damage to the <i>transmission or distribution system</i> and to meet <i>power system stability</i> requirements.</u></p> <p>Addition to the <i>Rules</i> Glossary:</p> <table border="1" data-bbox="779 581 1944 740"> <tr> <td data-bbox="779 581 1167 740"><u><i>Weak infeed fault conditions</i></u></td> <td data-bbox="1167 581 1944 740"><u>occur when a <i>distribution connected embedded generating unit</i> supplies a fault current which is significantly below normal <i>load</i> current of the installed <i>transmission protection scheme</i>.</u></td> </tr> </table>	<u><i>Weak infeed fault conditions</i></u>	<u>occur when a <i>distribution connected embedded generating unit</i> supplies a fault current which is significantly below normal <i>load</i> current of the installed <i>transmission protection scheme</i>.</u>
<u><i>Weak infeed fault conditions</i></u>	<u>occur when a <i>distribution connected embedded generating unit</i> supplies a fault current which is significantly below normal <i>load</i> current of the installed <i>transmission protection scheme</i>.</u>		
<p>2.4 Benefits of the proposed amendment</p> <p>Gaining better alignment with <i>Access Code</i> and <i>Rules</i> objectives</p>	<p>The proposed <i>Rule</i> amendment will ensure distribution connected generators whose fault contribution under credible network conditions is potentially below normal operating current (i.e. load current) of an existing transmission system protection relay can be connected, subject to risk assessment outcome, without triggering the need for protection upgrades and/or <i>Rules</i> exemption.</p> <p>Depending on the risk assessment outcome, the agreed protection risk mitigation treatment or further network augmentation could remain a pre-condition of connection. Additional requirements (including protection clearance times) will be recorded in the <i>User's</i> connection agreement as per clause 3.1(b) of the <i>Rules</i>.</p> <p>By including these provisions in the <i>Rules</i>, the process is expected to be clearer and deliver a closer alignment with present electricity industry best practice (as per NER section 5.1a8), while supporting better economic outcomes in accordance with the <i>Access Code</i> objectives. This will deliver significant benefits to a majority of small, distribution connected, embedded generators, while safeguarding the WPN and other <i>Users</i>.</p>		

<p>2.5 Requirements for NER utilities</p> <p>Discussion relating to processes in the NER(s) and in equivalent utilities in NER jurisdictions</p>	<p>The NER clauses S5.1.2, S5.1.3, S5.1a8 and S5.1.9 are comparable areas which specify transmission (and sub-transmission) protection requirements.</p> <p>When there is a potential impact on other protection systems in the network, NER utilities would expect to assess the impact and may require applicants to:</p> <ol style="list-style-type: none"> 1) install an intertrip or other measure to ensure disconnection under unacceptable network conditions; or 2) offer the connection conditional on network or protection systems augmentation to be provided at the applicant's cost.
<p>2.6 Identifiable risks and costs associated with the proposed <i>Rule</i> amendment</p>	<p>The proposed <i>Rules</i> amendment is not expected to introduce additional risk over and above that already existing on the network. A weak infeed assessment is included in the network impact 'planning study' which is performed by the <i>NSP</i> to quantify and better understand issues such as: 1) the potential impact on the network, 2) on other network <i>Users</i>, 3) any foreseeable change in risk levels and 4) any other compliance issues that may result as a consequence of the proposed generation connection.</p> <p>If '<i>weak infeed fault condition</i>' is identified as a potential problem, the assessment includes determination of the appropriate treatment in accordance with the proposed <i>Rule</i> 2.9.4(f) amendment. Costs for additional work and '<i>weak infeed fault condition</i>' reviews or assessments will be met by the <i>Applicant</i>.</p>
<p>2.7 Stakeholder engagement in support of the proposed amendment</p>	<p>In December 2015, Western Power engaged with protection subject matter experts in other electrical utilities in Australia to gain a better understanding of industry practices with regards to the treatment of weak infeed fault condition scenarios. Findings included:</p> <ul style="list-style-type: none"> • Distribution Network Service Providers (DNSP) carry out case by case assessments for connection applications (but no exemption process was found); • Where necessary, additional protection issues are addressed; • The assessment includes determination of an appropriate good electricity industry practice treatment i.e., "as necessary to prevent plant damage and to meet stability requirements".

3 National Electricity Rules requirements

This section of the submission considers the applicable fault clearance time requirements which are included in the NER Table S5.1a.2.

Table S5.1a.2

Nominal voltage at fault location(kV)	Time(millisecond)			
	Column 1	Column 2	Column 3	Column 4
400kV and above	80	100	175	
at least 250kV but less than 400kV	100	120	250	
more than 100kV but less than 250kV	120	220	430	
less than or equal 100 kV	As necessary to prevent plant damage and meet stability requirements			

from p. 517 of NER v78

NER Table S5.1a.2 sets out the equivalent requirements (for distribution connected PPGs this is with nominal voltage at fault location typically of less than or equal to 100 kV) to be achieved.

Under this amendment to the *Rules*, it is proposed to maintain Western Power’s practice of carrying out an assessment for each case to determine the impact of an Applicant’s connection. Then decisions about what must be done to prevent plant damage and to meet stability requirements can be made without the obligatory recourse to seeking an exemption for Western Power’s network protection scheme. In instances, where the risks associated with a proposed connection are significant, the need to include a network and/or protection system augmentation treatment can be identified early and factored into the Applicant’s project to ensure that *weak infeed fault condition(s)* are adequately addressed.

Attachment 1 Glossary of terms

Applicant	A person applying for connection to the Western Power Network
<i>Authority</i>	Economic Regulation Authority
<i>Access Code</i>	Electricity Networks Access Code 2004 ¹
DNSP	Distribution Network Service Provider
NER	National Electricity Rules ²
NSP	Network Service Provider
PPG	Private Parallel Generator
Technical Rules, <i>Rules</i>	Technical Rules, 23 December 2011 ³ .
SWIN	South West Interconnected Network
<i>User</i>	Has meaning as defined in the <i>Rules</i> section 1.3(b)(3)
WPN	Western Power Network (within the SWIN)

¹ See https://www.erawa.com.au/about-us/legislation/Electricity_Networks_Access_Code_2004

² See <http://www.aemc.gov.au/energy-rules/national-electricity-rules/current-rules>

³ See <https://www.erawa.com.au/cproot/10353/2/20120504%20Western%20Power%20Technical%20Rules.pdf>