

# Safety Critical Elements Impact Assessment

Safety critical elements (SCEs) are those systems and components (e.g. hardware, software, procedures etc.) that are designed to prevent, control, mitigate or respond to a major accident event (MAE) that could lead to injury or death.

The process starts with identification of the safety critical elements covered by the project.

The impacted SCEs will be identified in FEED and will include actions required to be completed to ensure compliance with the SCE performance standards.

These include, for example, Topsides structural integrity, ESD system, Explosion protection wall, Evacuation systems etc.

Please refer to the following list detailing safety critical elements and their impact assessment for an actual ALQ brownfield project, noting that the specific requirements for each project will be different.

| SCE Description               | Impacted Y/N | Nature of Impact   |
|-------------------------------|--------------|--|
| Layout                        | Y            | Segregation from hazardous areas   |
| Jacket Structural Integrity   | Y            | Additional weight of the ALQ. Global check to be undertaken by structural integrity model holder   |
| Topsides Structural Integrity | Y            | Additional weight of the ALQ. Requirement as per existing facilities. Review main deck permissible loading. Global check to be undertaken by structural integrity model holder |

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|--|---|---|
| Dropped Object Protection                  | Y | Lifting over accommodation limited to essential maintenance only and mitigated by case specific risk assessment. Crane usage controlled by offshore control procedures                  |
| ESD  | Y | New F&G panel to interface with existing ESD system   |
| Explosion Protection Wall                  | Y | ALQ designed to withstand 0.2bar overpressure   |
| Passive Fire Protection                    | Y | H60 Fire rated walls & roof on new facility   |
| Emergency Power                            | Y | Additions to existing system. Confirm adequacy.   |
| Emergency Lighting                         | Y | Additions to existing system. Confirm adequacy  |
| Active Fire Protection (Fire water system) | Y | No Sprinkler system for new ALQ. Provided hose reel and portable fire extinguishers. Firewater ring main as per existing PS. Contractor will identify non-provision of sprinkler in ALQ |
| GPA  | Y | Public announcement throughout ALQ  |
| HVAC Systems                               | Y | Supply of fresh air, heating, air-conditioning to new facility  |
| External Hazard Protection                 | Y | ALQ / PLQ (TR) interface - confirm H120 rating of PLQ is maintained with respect to adjoining corridor  |
| Egress Route System                        | Y | Access from ALQ to TR   |
| Control of Ignition                        | Y | ATEX compliance - Equipment located in areas where the release of hazardous gas could occur is designed and certified for use in hazardous areas  |

|                                   |   |   |
|-----------------------------------|---|---|
| Evacuation Systems                | Y | 150% of Persons on Board (PoB) to include "Big persons in lifeboat" impact assessment   |
| Escape Equipment                  | Y | Inflatable 25 man life rafts - No new escape equipment has been introduced as a result of ALQ installation or increased POB however confirm adequacy of existing facilities.                      |
| Personnel Protective Equipment    | Y | Increased number of immersion suits, life jackets, grab bags, survival suits.   |
| Fire & Gas System                 | Y | Confirm existing F&G philosophy is maintained and tie-in of local F&G panel to existing F&G system  |
| ER Personnel                      | Y | Platform to review EER provisions for ALQ. Confirm adequacy of existing facilities.   |
| Third Party & Temporary Equipment | Y | Applicable equipment is potentially the padear removal equipment and other specialist tools brought on board  |
| Lifting Appliance Integrity       | Y | No impact on PS as a result of the ALQ. It is assumed that the crane and lifting equipment is used within its verified limits.  |
| Rescue and Recovery Equipment     | N | Upon review of PS it is assumed that the ALQ will not affect the rescue and recovery equipment since the max POB limit is maintained and therefore no verification activities are deemed required |
| Emergency Communication           | N | Upon review of PS it is assumed that the ALQ will not affect the ability to contact emergency services and therefore no verification activities are deemed required                               |

|                            |   |  |
|----------------------------|---|--|
| Internal Hazard Protection | N | Upon review of PS it is assumed that the ALQ will not affect the existing TR facilities and therefore no verification activities are deemed required |
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Table 1

Table 1 above shows 25 identified safety critical elements for a brownfield ALQ project. Of these 25, 21 are affected and require actions including engineering scope to ensure compliance with the performance standards

Part of the assurance process that will be provided by the IVB is that for each identified impacted safety critical element they will formally verify that each impacted safety critical element post engineering and construction/commissioning complies with the performance standards