## Safety in Design Risk Matrix - Façade Engineering

Project:	Metro Martin Place - North Tower
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Client:	LendLease
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			Assessment			Post-Control Risk Assessment		Risk				
Item	Topic	Risk Description	Likelihood	Consequences	Risk Ranking	Risk Mitigation Strategy	Likelihood	Consequence	Ranking Post Control	Action by	Action when (Stage number)	Status
1	Stucture	Structural movement and design of facade system to accommodate them, risk of structural failure or inadequate installation.	3	4	12	Adequade design coordination and documentation. This includes completion of a structural building movement report, contributions of lowances agreed with Li and their contractars. This would be activities into the performance peoplication and the sub-contractors would very through their own calculations and design defailing including shop drawings. Design with relevant redundancy. Awrings over entrance?	1	3	3	LL, Arup, SD, subcontractors	4,5,6	Open
2	Structure	Structural tolerance and design of the facade to accommodate these - risk of structural failure through inadequate design or installation.	3	4	12	Adequate design coordination and documentation. This includes completion of a structural building movement report, construction tolerances agreed with LL and their contractars. This would be collected into the performance specification and the sub-contractors would verify through their own calculations and design detailing including shop drawings. Design with relevant redundancy	1	3	3	LL, Arup, SD, subcontractors	4,5,6	Open
3	Glass breakage	Glass breakage and falling glass from either: Structural overload (wind load) Maintenance accident (dropping tools) Insufficient glass quality such as	3	4	12	Adequate design of giass thickness and strength grades to accommodate any reasonably expected and foreseable loads. Design of giass types and fixing methodology to allow for relention of giass in care giass does fail. Specification to define the allowable edge quarity. Dedining to define adequate detailing so no fixings or similar can damage edges of giass. Relevant QA, fabrication and installation methods required	1	3	3	LL, SD, subcontractors	4,5,6	Closed
4	Wind loads	Wind cladding pressures and impact on framing and glass sizes - risk of reliance on design and structural integrity.	3	4	12	Adequate design coordination and documentation. This includes completion of a cladding pressure wind study and recorded into report. The sub-contractors would verify through their own calculations and design detailing including shop drawings that these loads have been allowed for. Design with adequate redundancy	, 1	3	3	LL, CPP, SD, subcontractors	4,5,6	Closed
5	Mechanical	Mechanical system impact on facade such as louver locations and other services. Including blank out zones, sunshade optimisation, penetrations and exhaust	2	3	6	Adequate coordination and documentation of the requirements. This requires planning and set out of mechanical plant rooms to be determined early and accurately. No hot exhaust. Arup have advised hat exhaust for the North Tower of the roof and 128 Earls (due to generateral), This is a significant Safety in Desgn Risk including for the facade access personel.	2	2	4	LL, Arup, SD, subcontractors	4,5,6	Open
6	Fire	Fire safety engineering and smoke separation between floors, including use of combustible panels.	3	5	15	Adequate documentation and installation including coordination of smoke flashing, spinklers and all to be included into fire engineering report and facade performance specification. No aluminium composite panels or combustible panels are to be used in the facade.	1	1	1	LL, Arup, Surface Design, subcontractors	4,5,6	Open
7	Security	Security requirements to be confirmed, in relation to the facade and entrance.	3	5	15	Security requirements of Metro to be incorporated (currently no blast resistant facades)	3	4	12	LL, Arup, SD, subcontractors	4	Open, awaiting Grimshaw and Arup AEO confirmation
8	Safety	Safety to public at night, lower floor lighting in public spaces	3	3	9	Lighting to public realm	1	1	1	LL, JPW, Arup	4,5,6	Residual risk end user
9	Reflectivity	Reflectivity and glare	3	3	9	Comply with Reflectivity report completed and additional reflectivity studies currently under development	1	1	1	LL, Arup, SD	4,5,6	Closed
10	Falls	Falls from terrace and balustrade design	3	4	12	Adequate documentation and design including structurally adequate and compliant balustrades.	1	1	1	LL, JPW, SD, subcontractors	4,5,6	Residual risk end user
11	Lightening	Lightening protection, electrical shock	3	4	12	Adequate documentation and design including lightening fies and earthing to be documented in electrical engineers report, facade specification and sketch details.	1	1	1	LL, Arup, SD, subcontractors	4,5,6	Closed
12	Falling elements	Risk of falling elements due to use of brittle materials (stone, ceramic, glass) within the soffits and around public spaces	4	4	16	Adequate design of cladding thickness and strength grades to accommodate any reasonably expected and foreseeable loads. Design of cladding types and titing methodology to allow for retention of cladding in case glass does fail. Specification to define the allowed uculity. Detaining to define adequate detailing. Relevant QA, fabrication and installation methods required		2	2	LL, Arup, SD, subcontractors	4,5,6	Closed
13	Structural silicone	Failure of Structural silicone	3	4	12	Design to Australian Standards and regular/relevant required maintenance including regular inspections	1	1	1	LL, SD, subcontractors	4,5,6	Closed
14	Corrosion	Corrosion of framing or fixings	3	3	9	Design to Australian Standards and regular/relevant required maintenance including regular inspections	1	1	1	LL, SD, subcontractors	4,5,6	Closed
15	Weather-proofing	elements due to corrosive Water ingress causing damp	2	3	6	Design and test to Australian Standards and Specification.	1	1	1	LL, SD, subcontractors	4,5,6	Closed
16	Maintenance	and unhealthy environments Maintenance and access strategy, slips, falls or	3	5	15	Risk assessment of access methodology, adequate methodology for maintenance to be developed for each tower and each elements of the facade	1	1	1	LL, SD, subcontractors	4,5,6 and during service	Residual risk end user
17	Maintenance	IRA falling risk	3	3	9	Trained personnel, safe work methods, procedural QA and fall arrest system	1	1	1	LL, SD, subcontractors	4,5,6 and during service	Residual risk end user
18	Maintenance	Use of BMU or façade access	2	3	6	Apply procedure for monitoring weather data and suitable quick descent and rescue points applied to design	1 1	1	1	LL, subcontractors	4,5,6 and during service	Residual risk end user
20	Maintenance	during inclement weather Electrical shock in BMU	2	3	6	Apply maintenance procedures, and suitable design of earthing systems.	1	1	1	LL. subcontractors	4.5.6 and durina service	Residual risk end user
21	Maintenance	Dropping items from BMU	3	3	9	Use of Tethers and relevant SWMS	1	i	1	LL. subcontractors	4.5.6 and durina service	Residual risk end user
22	Maintenance	Injury while in BMU - Rescue strategy for BMU	3	3	9	Documented SWMS and rescue strategy	2	2	4	LL, subcontractors	4,5,6 and during service	Residual risk end user
23	Construction	Construction methods including - Installation of the curtain wall to the concrete core walls on the North Tower, risk of poor install and safety of installers, southern cladding to south tower	2	2	4	Lend Lease to advise construction methodology	2	2	4	LL, subcontractors	5,6	Open
24	Interface to 50MP	Electricution due to lightening or electrical fault and person touching both North Tower elements and the 50MP elements	2	5	10	Provide electrical seperation in all elements including façade, handraits and maintenance systems	1	1	1	LL, Arup, JPW, SD, subcontractors	4,5,6	Open
25												
26	1	1		1	1	1	1	1	1	1	1	1

## Surface Design