



AURIZON - Long Term Train Support Facility—SAFETY IN DESIGN RISK ASSESSMENT



Notes: *Designs with significant quantities of dangerous goods may require detailed risk assessments under Dangerous Goods or Major Hazard legislation
* Most industrial processes will require an industry specific assessment, e.g. HAZOP and/or Quantitative Risk Assessment for facilities that have chemical or high-pressure processes under Dangerous Goods or Major Hazard legislation.

Design Life Cycle:	Investigation and Design	Setup, Construction and Commissioning	Operation	Maintenance	Disposal
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Job Name: NSW LTTSF - Safetyin Design Register																		Job No: 2216395						Design: GHD			Client: AURIZON						Date: 2013-04-02		
DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments																
									C	L	RR					C	L	RR																	
Building	Combined Maintenance Building	Risk	Safety	Investigation and Design	Interaction between overhead cranes - possible collision.	Working crane collision with other equipment and or personal	Working crane collision with other equipment and or personal	Client workshops and existing standards Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	B	4	Low	Substitution: N/A Isolation: N/A Engineering: Design to include crane height and working envelopes clearances to for any plant and equipment Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate																	
Building	Combined Maintenance Building	Risk	Safety	Investigation and Design	What does wagon work consist of Raised wagon on jacks being knocked over by the forklift.	Forklift collision with in service jacks	Property damage and or personal injury	Client workshops and existing standards Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include clear delineation of work areas for pedestrian and machine movements Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate																	
Building	Combined Maintenance Building	Risk	Safety	Investigation and Design	What does wagon work consist of? Raised wagon on jacks being knocked over by the forklift.	ForkLift collision with in service jacks	Property damage and or personal injury	Client workshops and existing standards Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Above implemented Administrative: N/A Aurizon to develop operation procedures PPE: N/A	Aurizon	15/04/2014	Open	D	2	Moderate	Operational																
Building	Combined Maintenance Building	Risk	Safety	Operation	Interaction between overhead cranes - possible collision.	Working crane collision with other equipment and or personal	Working crane collision with other equipment and or personal	Client workshops and existing standards Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Administrative: Aurizon to develop maintenance & operation procedures for pedestrian and machine usage PPE: N/A	Aurizon	15/04/2014	Open	D	2	Moderate	Operational																
Building	Provisioning Building	Risk	Safety	Investigation and Design	Provisioning of trains - one stationery and one moving.	Impact from moving train	Personal injury	Substitution: N/A Isolation: N/A Engineering: Identify all service points and provide access in design. Aurizon to provide drawing of loco with all services identified with identification of what additional work will be done in provisioning shed ? Administrative: N/A PPE: N/A	D	3	Significant	Substitution: N/A Isolation: N/A Engineering: Provide delineation between tracks - removable handrail. Administrative: Procedures to be implemented by Aurizon. PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate																	

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									C	L	RR								
Building	Combined Maintenance Building	Risk	Safety	Investigation and Design	Interaction with forklift and personnel.	Moving forklifts impact with pedestrians - Personal injury	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include clear delineation for pedestrian and forklift movements Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
Building	Wagon Maintenance Building	Risk	Safety	Operation	Interaction with forklift and personnel.	Moving forklifts impact with pedestrians - Personal injury	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Aurizon to develop operation procedures for pedestrian and personal interface Administrative: N/A PPE: N/A	Aurizon	1/05/2014	Open				Operational
Building	Wagon Maintenance Building	Risk	Safety	Operation	Shunting of wagons into and out of the building.	Wagon impact with other equipment and or personal injury	Property damage and or persons	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: Aurizon to develop operation procedures PPE: N/A	Aurizon	1-May-14	Open				Operational
Building	Provisioning Building	Risk	Safety	Investigation and Design	Diesel fuel spillage / splash.	Fuel spill Fuel spray	Personal injury and environmental damage	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: Design to include emergency cut off and accessible emergency shower Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
Building	Provisioning Building	Risk	Safety	Investigation and Design	Working from heights.	Falling from height, objects dislodging and falling to work areas below resulting in personal injury	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Design for accessibility Administrative: N/A PPE: N/A	D	3	Significant	Substitution: N/A Isolation: N/A Engineering: Design for accessibility. Flooring to be webforge for ventilation & lighting below Administrative: Aurizon to develop operational procedures PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
Building	Combined Maintenance Building	Risk	Safety	Investigation and Design	Confined spaces - low working floor	Confinement during emergency	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Design for accessibility and egress Administrative: N/A PPE: N/A	D	3	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Design to include emergency egress to BCA requirements - stairs at both ends of service trench. Add mechanical ventilation and wall lighting for improved light and ventilation Add extraction fan to drop pit in CMF Administrative: N/A PPE: N/A	GHD	15/03/2013	Open	D	2	Moderate	
Building	Site Access	Risk	Safety	Investigation and Design	Access to and from building across tracks in front of trains.	Impact with train	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design designated crossing of tracks. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	

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									C	L	RR								
	Combined Maintenance Building	Risk	Safety	Investigation and Design	Fume management - building ventilation	Unacceptable level of air contaminates effecting maintenance crews Sumps and lowered floors accumilating heavy contaminated air	Personal injury/ death	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Design for adequate ventilation - adopt open wall, roof ventilation etc to match operation requirements Administrative: N/A Procedures PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
	Provisioning Building	Risk	Safety	Investigation and Design	Building access for maintenance - e.g. lighting.	Trips slips and falls due to inadequate acces and lighting	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A External lighting Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Design to include clear and designated access paths. pavement infill between tracks. Designated walkways. Adequate lighting has been provided for general pedestrian access around site. Additional lighting for user requirements. Alsynite foof and wall sheeting added to buildings Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
	Provisioning Building	Risk	Safety	Investigation and Design	Fire control	Injury and possible loss of life from fire	Personal injury and loss of life	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Design to include fire protection. As a minimum to BCCA requirements Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
	Combined Maintenance Building - Storeroom	Risk	Safety	Operation	Forklift movements	Forklift movements uncontrolled and uncoordinated with other work activities	Property damage and Personal injury	Substitution: N/A Isolation: N/A Engineering: Uncontrolled forklift activities Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include spacial allowance for forklift movements for planned activities Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
	Provisioning Building	Risk	Safety	Investigation and Design	Constructability	Injury for difficulty in construction	Personal injury and loss of life	Substitution: N/A Isolation: N/A Engineering: N/A Engineering Design to consider constructability Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Consider - site access, proximity to services, soft ground, adjacent to live rail etc Administrative: N/A PPE: N/A	GHD		Closed	D	2	Moderate	
	Provisioning Building	Risk	Safety	Investigation and Design	Provisioning facility work areas abjacent to moving trains	Moving trains adjacent to work areas	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Design for work adjacent to moving trains Provide fencing as delination Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	

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Building	Combined Maintenance Building - Storeroom	Risk	Safety	Investigation and Design	Rack Storage	Stability	Potential crush from falling items / racks	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Check the selected rack system is fit for purpose and labelled appropriately Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed				GHD to confirm loads define on drawings
Building	Combined Maintenance Building - Storeroom	Risk	Safety	Investigation and Design	Access to and from for deliveries	Delivery unloading and movement to store. Unplanned movements in or around other work activities	Personal injury and property damage	Substitution: N/A Isolation: N/A Engineering: Review operational requirements Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Provide delinated loading and unlaoding areas. Identify movements associated with unloading and storage and provide designated areas for these activities Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	add labels top design
Building	Combined Maintenance Building - Storeroom	Risk	Safety	Operation	Access to and from for deliveries	Delivery unloading and movement to store. Unplanned movements in or around other work activities	Personal injury and property damage	Substitution: N/A Isolation: N/A Engineering: Review operational requirements Administrative: N/A Review operational requirements PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: Develop operation procedures for movements associated with unloading and storage and provide designated areas for these activities PPE: N/A	Aurizon	15/04/2014	Open				Aurizon to develop procedures
Building	Combined Maintenance Building - Storeroom	Risk	Safety	Investigation and Design	Hazardous material	Spillage and uncontrolled discharge of hazardous materials	Personal injury and property damage with environmental impact	Substitution: N/A Isolation: N/A Engineering: identify hazardous materials associated with the facility operation Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Design to include adequate storage and handling of hazardous materials Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
Building	Bulk Sanding Facility	Risk	Safety	Investigation and Design	Compressed air, loading and unloading, structural loads, spillages,	Impact with plant equipment during loading / unloading	Property damand or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Review operation requirements Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Design to include spacial allowance for vehicle movement around proposed equipment - air tanks, fuel storage etc Administrative: N/A PPE: N/A	GHD	15/03/2012	Closed	C	2	Low	
Building	Compressed Air	Risk	Safety	Investigation and Design	Standpipes, bulk sanding.	impact with mobile equipment , vehicles	Property damage and interruption to service	Substitution: N/A Isolation: N/A Engineering: N/A Review operational requirements Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: All valves able to be isolated and locked. Engineering: N/A Design equipment to allow for planned vehicle movements - look at gantry elevated services or underground services to reduce risk of damage Administrative: N/A PPE: N/A	GHD	15/03/2012	Closed	C	2	Low	

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									C	L	RR								
Building	Sewerage Treatment Plant	Risk	Safety	Investigation and Design	Sewage farm - Level of treatment spray area and hazard to operation working areas	Workers inundated with airborne effluent	personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: coordinate location of drip area, water quality and operational requirements Administrative: N/A Identify operation requirements PPE: N/A	GHD	15/03/2013	Closed	C	1	Low	
Building / Rail	Bulk Fuel - Proximity to Rail	Risk	Safety	Investigation and Design	Non hazardous area been classification as a hazardous area. Low speed derailment of jackknife of trains.	Derailment and impact with fuel storage.	Damage to bulk fuel infrastructure and equipment / personal injury	Substitution: N/A Isolation: N/A Engineering: Adopt 12m spacing between track and tanks Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Limit speed in this area 15kph 12m spacing between nearest rail and fuel storage. Additional protection between track and fuel farm. Adopt gravel runoff pit with barrier delineation for vehicles Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
Building	Diesel Storage	Risk	Safety	Investigation and Design	Potential for diesel vapours to be vented from diesel storage tanks, under certain conditions, and ignite causing fire.	Fire	Property damage or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	3	Significant	Substitution: N/A Isolation: N/A Engineering: Classification of the vents, dipping point, and tank internals as hazardous area zones. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	1	Moderate	
Building	Provisioning Building	Risk	Safety	Operation	Heavy gases expelled from the locomotives during the provisioning of the locomotives within the provisioning facility	Workers/Operators exposed to contaminated air	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: Design modified to reduce depth of sunken floor. Isolation: N/A Engineering: Natural flow of air through building. Roller doors to be open at all times during provisioning. Exhaust fans installed to draw out fumes. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
Building	Locomotive Provisioning	Risk	Safety	Investigation and Design	Failure of a Diesel or Oil hose/nozzle during provisioning.	Diesel/Oil spill	Property damage or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Manual shutoff Valve and E Stop located within close proximity to the dispensing hoses/nozzles. Emergency showers designed to be located adjacent to fuel points Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	1	Low	
Building	Locomotive Provisioning	Risk	Safety	Investigation and Design	Diesel hose/nozzle not connected properly to locomotive causing spray and/or uncontrolled nozzle movement during fueling.	Diesel spray. Struck by nozzle	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Operating floor designed at suitable working height for easy connection. Dry break coupling. Administrative: Emergency showers installed at each fuelling point PPE: N/A	GHD	15/03/2013	Closed	C	1	Low	

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								C	L	RR					C	L	RR	
Locomotive Provisioning	Risk	Safety	Operation	Locomotive departing provisioning facility with diesel bowser connected to locomotive	Diesel Spill, Equipment damage	Property damage or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: Engineering: Electronic warning system installed to alert driver that indicates a browser is not returned to its storage location. Micro switch interlock to signalling system/ indicator to be installed. Shear break connection designed as part of the fuel system. Administrative: Procedures in place ensuring bowzers are returned to there storage location. PPE: N/A	GHD Aurizon	15/03/2013	Closed	C	1	Low	
Bulk Fuel Facility - Tanker Unloading	Risk	Safety	Investigation and Design	Diesel/Oil Spill During Unloading from Tankers	Diesel/Oil spill	Personal injury or environmental damage	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	2	Low	Substitution: N/A Isolation: N/A Engineering: Dry break couplings, safety shower, local spill kits close by, unloading area to be bunded. E Stop part of system. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	1	Low	
Locomotive Provisioning	Risk	Safety	Investigation and Design	Diesel/Oil dispensed to locomotives, during the connection procedure there is a chance that a minor spill may occur.	Diesel/Oil spill	Personal injury or environmental damage	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	2	Low	Substitution: N/A Isolation: N/A Engineering: Dry break coupling for diesel only, safety shower, local drip trays and spill kits close by Administrative: Aurizon local processes and procedures PPE: N/A	GHD	15/03/2013	Closed	C	1	Low	
Bulk Fuel Facility - Tanker Unloading	Risk	Safety	Investigation and Design	Unloading Diesel/Oil Tanker storage compartment/equipment failure	Large Diesel/Oil spill	Personal injury or environmental damage	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	2	Moderate	Substitution: N/A Isolation: N/A Engineering: Work area floor grate to isolate personel from spill. Bund system to provide protection to the environment during tanker unloading. Bund system shall be large enough to store a spill from a specified tankers largest compartment size. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	1	Moderate	
Locomotive Provisioning	Risk	Safety	Investigation and Design	The quick shutoff of the refuelling lines when operating at high flow rates, can potentially create a hammering affect within the pipeline.	Damage to equipment, pipe, valves and supporting structure.	Property damage or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Design and install and shock absorbing accumulator at each dispensing location Administrative: N/A PPE: N/A	GHD	16/03/2013	Closed	C	1	Low	

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									C	L	RR								
Building	BulkFuel Facility- Fuel Storage	Risk	Safety	Investigation and Design	Diesel/Oil Storage Tank, Overfilling	Damage to Tank, potential for diesel/oil spill	Property damage, personal injury and/or Environmental Damage	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	3	Significant	Substitution: N/A Isolation: N/A Engineering: Visual indicator for tanker operator of tank level, with warnings at safe fill level. Back up high high sensor to shut power to unloading pump and isolate valve to tank. Administrative: N/A PPE: N/A	GHD	17/03/2013	Closed	D	1	Moderate	
Building	BulkFuel Facility- Fuel Storage	Risk	Environmental	Investigation and Design	Tank Structural Failure	Diesel/Oil spill into the environment	Environmental Damage	Substitution: N/A Isolation: N/A Engineering: N/A options considered Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: All Oil and Diesel Tanks to be self bunded and designed to Aust Standards Engineering: N/A Administrative: N/A PPE: N/A	GHD	18/03/2013	Closed	C	1	Low	
Building / client	Provisioning Building	Risk	Safety	Operation	Access to and from building across tracks in front of trains.	Impact with train	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Above implemented Administrative: N/A Procedures to be implemented by Aurizon PPE: N/A	Aurizon	15/04/2014	Open	D	2	Moderate	
Building / client	Provisioning Building	Risk	Safety	Operation	Fire control	Injury and possible loss of life from fire	Personal injury and loss of life	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	E	5	Extreme	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: Fire emergency procedures to be developed and implemented for operational requirements PPE: N/A	Aurizon	16/04/2014	Open	E	1	Moderate	Operational
Building / client	Provisioning Building	Risk	Safety	Operation	Provisioning facility work areas abjacent to moving trains	Moving trains adjacent to work areas	Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Above implemented Administrative: Aurizon to deelop work procedures to install / remove delination work barriers for work activities PPE: N/A	Aurizon	15/04/2014	Open	D	2	Moderate	
Building / client	Storeroom - Wagon and locos	Risk	Business	Operation	Storeroom-- Fit for purpose / Spillage management / Location.	Storeroom / control room cannot fit in enough people to conduct tasks	Potential personal injury and slips on spillage	Substitution: N/A Isolation: N/A Engineering: Aurizon workshop input to design Administrative: N/A PPE: N/A				Substitution: N/A Isolation: N/A Engineering: N/A Acess and operations defined in the Basis of design report Administrative: Aurizon to develop work procedures PPE: N/A	Aurizon	15/04/2014	Open	A	1	Negligible	

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									C	L	RR								
Drainage / Client	Site Drainage	Risk	Safety	Investigation and Design	Ponding of water due to poor drainage Surface runoff concentrated and creating hazardous flow	Reduced serviceability of facility due to ponding water or excessive surface runoff	Swamp/Disease/Bugs from ponding water	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	B	5	Moderate	Substitution: N/A Isolation: N/A Engineering: Design stormwater channels for controlled flows Design surface runoff for velocity / depth requirements Design surface drainage to minimise ponding Define work areas around hazards Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	B	3	Low	
	Site Flooding	Risk	Safety	Investigation and Design	Flood event where Buildings - Workshops and Administration to be tolerance for events 20ARI, 50ARI, 100ARI How is water being managed on the site as a whole?	Overland Flow / Floods	Property damage / Inundation of buildings / Potential drownings	Substitution: N/A Isolation: N/A Engineering: N/A Flood warnings will be available through media Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: Admin portion of buildings 100ARI level with freeboard 250-500mm for safety. – CMF storage facility above 50ARI level – Start at 3.2m same as ARTC (this is above 50ARI level of 2.2m). Buildings will have concrete up turns to keep the flood immunity to at least the top of rail levels Engineering: All electrical low voltage systems be designed above the 50ARI where possible. Substations and high voltage connections to be above 100ARI Administrative: PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
Flooding																			
Electrical	Power Supply	Risk	Business	Investigation and Design	Power supply 11kw overhead	Power interruption to site	Train delays	Substitution: N/A Isolation: N/A Engineering: Ausgrid will tap in and out meter box. Ausgrid point of connection-a) to boundary b) to substaining the site Administrative: N/A PPE: N/A				Substitution: N/A Isolation: N/A Engineering: N/A Reliability will be dependant on permanent power supply Review options available with Ausgrid to provide the preferred supply Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed				
	Site Drainage	Risk	Safety	Investigation and Design	Local drainage of site	Water accumulation / Failure in flood protection / inadequate drainage	Property damage / Inundation of buildings / Slips, trips and falls / Potential Drownings / Potential ponding of water	Substitution: N/A Isolation: N/A Engineering: Design to include 1:100 ARI Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: Design include water collection and drainage away from working areas Design to include for reasonable administrative controls to minimise hazards Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
Flooding & Drainage																			
Flooding & Drainage	Site Drainage	Risk	Environment	Investigation and Design	Stormwater runoff from site	Pollution of groundwater / catchment area	Polluted water flow into drainage / catchment. Batter/slopes/fencing.	Substitution: N/A Isolation: N/A Engineering: Design to include for pollution and contamination Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: Wetlands may be used to polish run off water to an extent prior to release Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	3	Moderate	

DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
									C	L	RR								
Flooding & Drainage	Site Drainage	Risk	Safety	Operation	Ponding of water due to poor drainage Surface runoff concentrarted and creating hazadous flow	Reduced serviceability of facility due to ponding water or excessive surface runoff	Swamp/Disease/Bugs from ponding water	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	B	5	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: Operation procedures to consider hazards ie open channel, designated work areas PPE: N/A	Aurizon	9/04/2014	Open	B	3	Low	
	Site Flooding	Risk	Safety	Operation	Flood event where Buildings - Workshops and Administration to be tolerance for events 20ARI, 50ARI, 100ARI How is water being managed on the site as a whole?	Overland Flow/ Floods	Property damage / Inundation of buildings/ Potential drownings	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A Flood warnings will be available through media PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: Aurizon to develop flood evacuation plan. All persons eneeing the site need to refer to Aurizon Flood Evacuation Plan PPE: N/A	Aurizon	15/03/2014	Open	C	2	Low	Aurizon to delevop a Flood Evacuation Plan as part of the Facility Operation
Flooding / Client	Site Flooding	Risk	Safety	Investigation and Design	Flooding of adjoining properties due to overtopping of Hunter River under Hexham Bridge and overland flow restricted by track formation Options considered - a) flood barriers at River Bank b) tracklowered to not restrict overland flow c) use existing design and assess increased flood damage	Overland flow restriction and raised flood level	Flooding to adjoining properties - identified in WBM flood study	Substitution: N/A Isolation: N/A Engineering: N/A Adopt current design Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Lower track level and not restrict overland flow adopted Administrative: N/A PPE: N/A	GHD	4/04/2013	Closed	C	1	Low	
Flooding & Drainage	Site Flooding	Risk	Safety	Operation	Flooding of adjoining properties due to overtopping of Hunter River under Hexham Bridge and overland flow restricted by track formation Options considered - a) flood barriers at River Bank b) tracklowered to not restrict overland flow c) use existing design and assess increased flood damage	Overland flow restriction and raised flood level	Flooding to adjoining properties - identified in WBM flood study	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A Aurizon to develop flood evacustion plans and flood recovery plans PPE: N/A	Aurizon	4/04/2014	Open	C	1	Low	
Flooding & Drainage	Site building Foundation	Risk	Safety	Investigation and Design	Building settlement as a result of poor foundation material – deep soft soils, not conventional foundation	Settlement-- inappropriate design and foundation support	Structure deformation and settlement and misalignment of inground services.	Substitution: N/A Isolation: N/A Engineering: Existing Geotechnical information. Administrative: N/A PPE: N/A	B	4	Low	Substitution: N/A Isolation: N/A Engineering: Undertake additional Geotechnical investigation and appropriate design to mitigate risk Include settlement predictions in structural and services design An upper limit settlement of 50 mm was specified and design a ground improvement solution to achieve that settlement. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	B	1	Negligible	Report issued
Geotechnical	Track Formation	Risk	Safety	Investigation and Design	Track settlement and bearing capacity failure - possible derailment	Derailment	Personal injury and property damage	Substitution: N/A Isolation: N/A Engineering: Prior to Geotechnical investigation and appropriate design to mitigate risk Administrative: N/A PPE: N/A	E	3	Extreme	Substitution: N/A Isolation: N/A Engineering: Undertake additional Geotechnical investigation and appropriate bearing capacity design to mitigate risk Administrative: PPE: N/A	GHD	15/03/2013	Closed	A	1	Negligible	Assessment completed bearing capacity failure designed out. Risk eliminated
Geotechnical																			

DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	By When	Decision / Status	Residual Risk Rating			Comments
									C	L	RR								
Geotechnical	Inground Third Party Services (excluding Jemina Gasmain)	Risk	Safety	Investigation and Design	Ground settlement and deformation of inground services	Loss of servcability and personal injury.	Loss of servcability and delays in operations and personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Prior to Geotechnical investigation and appropriate design to mitigate risk Administrative: N/A PPE: N/A	B	4	Low	Substitution: N/A Isolation: N/A Engineering: Identify existing services and provide protection or adequate engineering solution. Field investigations completed. Administrative: . PPE: N/A	GHD	15/03/2012	Closed	B	2	Negligible	
Geotechnical	Geotechnical	Risk	Safety	Investigation and Design	Ground settlement and deformation of inground gas main	Loss of servcability and personal injury / fatality.	Loss of servcability, delays in operations and personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Prior to work commencing undertake Geotechnical investigation and appropriate design to mitigate risk Administrative: N/A PPE: N/A	E	4	Extreme	Substitution: N/A Isolation: N/A Engineering: Identify existing services by site investigation, document and design protection or adequate engineering solution. Administrative: PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	Design of protection structures over the Gas main
Geotechnical	Inground Services - New	Risk	Safety	Investigation and Design	Ground settlement and deformation of new inground services	Loss of servcability and personal injury.	Loss of servcability, delays in operations and personal injury	Substitution: N/A Isolation: N/A Engineering: Use of existing Geotechnical investigation and appropriate design to mitigate risk Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Additional Geotech investigation to increase reliability of settlement determination. Design services appropriately. Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	4	Moderate	Services to be designed for predicted settlements identified in Geotechnical Design
Geotechnical	Geotechnical	Risk	Environmental	Investigation and Design	Lowered track option excavation into acid sulphate soil	generation of acidic runoff water from exposing acid sulphate soil	Damage to the environment from acidic water	Substitution: N/A Isolation: N/A Engineering: N/A Identify areas from existing information Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Prepare report on investigation results for implementation in construction activities Administrative: N/A PPE: N/A	GHD	4/04/2013	Closed	C	1	Low	
Geotechnical	Site Flooding	Risk	safety	Investigation and Design	lowered track option - differential settlement between rigid elements and flexible track resulting in track out of alignment	Derailment and or injury	Property damage or injury	Substitution: N/A Isolation: N/A Engineering: N/A Use existing analysis - interpolate to predicted settlement - possible inaccurate predictions Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Option for additional analysis Administrative: N/A PPE: N/A	GHD	4/04/2013	Closed	C	1	Low	Design confirmed
Geotechnical / client	Track Formation	Risk	Safety	Operation	Track settlement and bearing capacity failure - possible derailment	Derailment	Personal injury and property damage	Substitution: N/A Isolation: N/A Engineering: Prior to Geotechnical investigation and appropriate design to mitigate risk Administrative: N/A PPE: N/A	E	3	Extreme	Substitution: N/A Isolation: N/A Engineering: Administrative: Controls include regular alignment survey and maintenance programme. PPE: N/A	Aurizon	1/05/2014	Open	E	1	Moderate	

DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
									C	L	RR								
Geotechnical /client	Inground Jemena Gas Pipeline during construction	Risk	Safety	Operation	Ground settlement and deformation of inground gas main	Loss of servcability and personal injury / fatality.	Loss of servcability, delays in operations and personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Prior to work commencing undertake Geotechnical investigation and appropriate design to mitigate risk Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Conctruction contractor to be made aware of requirements around pipe in GHD documentation PPE: N/A	GHD/Aurizon	1/05/2013	Open	C	2	Low	Identify in Contract documents for construction
	Jemena Gas Main	Risk	Safety	Investigation and Design	Damage to pipeline during construction	Damage to pipeline from construction equipment interrupting service. Possible exploding and personal injury of fatality	Property damage, personal injury or fatality	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	E	4	Extreme	Refer Jemena risk assessment Substitution: N/A Isolation: N/A Engineering: Identify existing services by NDT, document and provide protection or adequate engineering solution. Administrative: Include identification signage, Define requirements for monitoring of structures over pipeline duiring and after construction PPE: N/A	GHD	15/03/2013	Closed	E	1	Moderate	
	Jemena Gas Main	Risk	Safety	Investigation and Design	Settlement during the life of the facility	damage to pipeline and service interpution	Property damage personal injury or fatality	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Design assesment to include the effects of settlement - construct bridging structures for protection of pipeline Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
Jemena																			
Jemena																			
Lighting	Site Lighting	Risk	Safety	Investigation and Design	Adequate lighting for facility operation - UTMs	Not enough lighting safety and security caused by outage of electricity	People injury or mis- operation caused by unclear sight	Substitution: N/A Isolation: N/A Engineering: Design lighting for access requirement Is the lighting level sufficient for operations? Administrative: N/A PPE: N/A	C	2	Low	Substitution: N/A Isolation: N/A Engineering: N/A Design lighting for access requirement and adopt additional requirement for inspection in design Adopt lessons learned by maintenance for existing facilities in lighting requirement design Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	1	Low	
	Site Lighting	Risk	Safety	Investigation and Design	Light poles leaning excessively due to ground settlement	Failing clearances and stability	People injury and disruption to operation	Substitution: N/A Isolation: N/A Engineering: Design pole connections with allowances for releveling. Administrative: N/A PPE: N/A	C	2	Low	Substitution: N/A Isolation: N/A Engineering: N/A Develop detailing and foundation in conjunction with geotechnical team Administrative: N/A PPE: N/A	GHD		Closed	C	1	Low	
Lighting																			

DISCIPLINE
FILTER

Lighting

Rail

Rail

Rail

Rail

DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
									C	L	RR								
	Site Lighting	Risk	Safety	Investigation and Design	Adequate lighting for facility operation - for general pedestrian access and shunting movements.	Interruption to supply of utility cause outage of electricity	People injury or mis- operation caused by unclear sight	Substitution: N/A Isolation: N/A Engineering: N/A Design without backup power Administrative: N/A PPE: N/A	C	4	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Design to include low level pedestrian lighting and provide backup power supply for building emergency Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
	Track Design	Risk	Safety	Investigation and Design	Train entry speed from the main line into the facility	Derailment	Damage to train and property/ Personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include adequate stopping destination and turnout design t suit exit speed Administrative: Refer Aurizon Risk Assessment "TTSF Risk Assessment on Track Centres on Entry/Exit Speed" 250912 PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
	Combined Maintenance Building	Risk	Safety	Investigation and Design	Shunting of wagons into and out of the building. Tracks arriving at workshop not straight. Visual sighting.	collision with other wagons, property and or persons	property damage and or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to maximise the sighting distance Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
	Operation - Train control	Risk	Safety	Investigation and Design	Procedure for control for movement of train. within the facility	Uncontrolled movement	Personal injury / damage to property	Substitution: N/A Isolation: N/A Engineering: N/A Train operation and signalling cordination Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Adequate overlap distances and/or Catch points/derailers to be implemented as part of design Administrative: N/A Operational Procedures to be developed and implemented PPE: N/A	Aurizonn / Ansaldo	Engineering complete Administrative by 01/05/2014	Open	D	2	Moderate	
	Operation - Train control	Risk	Safety	Investigation and Design	Procedure for control for movement of train. on and off main line	Uncontrolled movement	Personal injury / damage to property	Linked to ARTC network control or local control Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Catch points to be implemented Administrative: N/A PPE: N/A	Ansaldo	15/03/2013	Closed	D	2	Moderate	GHD include in design
	Turntable	Risk	Safety	Investigation and Design	People trapped -uncontrolled loco movement.	Restricted access to or from areas for maintenance with trains parked across tracks leading to unplanned access movements and impact with trains should they move	Property damage or personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Review maintenance operation - identify train movement requirement for operations Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include secondary access between trains for access and egress to inspection and work areas Access roads between tracks to be included for full length of facility Administrative: Procedures to be developed to align with designed access paths PPE: N/A	GHD	15/03/2013	Closed	D	1	Moderate	Turntable not part of current scope

DISCIPLINE
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Roads

Site access

Site access

Site Access

Site access

DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
									C	L	RR								
	Access	Risk	Safety	Investigation and Design	ARTC access between facilities.	Uncoordinated vehicle movements by ARTC to access work areas - potential for property damage and personal injury	Property damage and personal injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include coordination design review meetings fortnightly. Design to include for dsignated and separate access to each facility Designated roads and rail crossings included in design for crossing through facilities Additional risk assessment has determined appropriate level of level crossing protection Administrative: Signage to be incorporated at designated locations PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	Gsignage to be included in design drawings for IFC
	Pedestrian Access	Risk	Safety	Investigation and Design	Staff access between carpark and work areas, including in and around buildings	Impact and personal injury from moving vehicles, trains and machinery	Personal injury and or fatality	Substitution: N/A Isolation: N/A Engineering: Identify moving equipment, vehicles and trains Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Design to include designated walkways, clear delineation for vehicle and pedestrian movements, designated carparking, designated track crossings Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	1	Moderate	
	Pedestrian Access	Risk	Safety	Investigation and Design	Public Pedestrians walking in prohibited areas	Pedestrains walk in prohibited areas	Injury from moving rolling stock	Substitution: N/A Isolation: N/A Engineering: Delineation of walkways in design Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Pedestrian access required main road side restrict access to public with delineation fencing Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	
	Track Level crossings	Risk	Safety	Investigation and Design	Level Crossings locations	Impact of vehicle with rolling stock	Damage and injury caused by rolling stock	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Adopt standards for level crossing Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	D	1	Moderate	
	Access Roads	Risk	Safety	Investigation and Design	Location with facility operaiton	Impact with maintenance equipmant and moving trains	Property damage or personal injury / fatality	Substitution: N/A Isolation: N/A Engineering: N/A Review operational requirement Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Design to include designated access roads and track crossing to allow safe passage for planned maintainance operations Administrative: Site signage to be installed at designated locations. PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	

DISCIPLINE FILTER	Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
									C	L	RR								
Site access	wetlands	risk	Safety	Investigation and Design	Persons Accessing Wetlands	Falling/Tripping into waterbody/wetland	Personal Injury Drowning	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	E	2	Significant	Substitution: N/A Isolation: N/A Engineering: Fence surrounding basins and waterways to prevent access from public and cattle Administrative: Maintenance Works to be carried out with more than one person. One person to be clear of the waterbody at all times. Signage to be installed. PPE: Lifebouy Rescue Rings located in each wetland	GHD	41348	Open	C	1	Low	GHD to included signage for water detention areas
Rail	Track Design	Risk	Safety	Investigation and Design	Presuming track design outbound speed is 55km/h	Derailment / Property damage	Property damage / Personal Injury	Substitution: N/A Isolation: tunout design to suit exit speed Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Presuming track design outbound speed is 55km/h, turnouts are rated to 60km/h? Administrative: Refer Aurizon Risk Assessment "TTSF Risk Assessment on Track Centres on Entry/Exit Speed" 250912 PPE: N/A	GHD	15/03/2013	Closed	D	2	Moderate	
Rail	Track Design	Risk	Safety	Operation	Track speed through the Provisioning building	Struck by moving train	Personal Injury and death	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	D	4	Significant	Substitution: N/A Isolation: N/A Engineering: Above implemented Administrative: Aurizon risk assessment speed limited to 45kph PPE: N/A	Aurizon		Closed	D	2	Moderate	Aurizon Risk assessment adopted by GHD
Rail	Track Design - Spacing	Risk	Safety	Operation	Yard maintenance to parked Trains, track centres. GHD require dimensions. UTMs tracks will require 11m track centres (3m from centre line of each track plus work space)?	Moving trains adjacent to maintenance areas (adjacent track)	Personal Injury	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A Workshop to assess train maintenance requirements. UTMs use road 3 (access dependant), if not available, then use road 2 (emergency only) PPE: N/A	C	5	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A Aurizon operation risk assessment undertaken (output issued to GHD and included in final design) PPE: N/A	Aurizon	15/03/2013	Closed	C	2	Low	Aurizon workshop completed
Rail	Track Design - Spacing	Risk	Safety	Investigation and Design	Yard maintenance to parked Trains, track centres. GHD require dimensions. UTMs tracks will require 11m track centres (3m from centre line of each track plus work space)?	Moving trains adjacent to maintenance areas (adjacent track)	Personal Injury	Substitution: N/A Isolation: N/A Engineering: N/A Workshop to assess train maintenance requirements. UTMs use road 3 (access dependant), if not available, then use road 2 (emergency only) Administrative: N/A PPE: N/A	C	5	Significant	Substitution: N/A Isolation: N/A Engineering: N/A Aurizon operation risk assessment to be undertaken and output included in design Administrative: N/A PPE: N/A	GHD	15/03/2013	Closed	C	2	Low	

DISCIPLINE
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Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
								C	L	RR					C	L	RR	
Site works generally	Risk	safety	Operation	Works inundated with stormwater . The track lowered option has underside of pavement below the water table	Water inundation of the construction work site	Property Damage	Substitution: N/A Isolation: N/A Engineering: Design final construction solution for site drainage Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: Construction procedures to include for dewatering and suitable machinery for soft soil PPE: N/A	Aurizon	15/03/2014	Open	C	1	Low	
			Operation	Working withing recognised areas containing acid sulphate soils	Acid sulphate soil runoff to work areas and environmental	Personal injury from contact with acid sulphate runoff water and environmental damage	Substitution: N/A Isolation: N/A Engineering: N/A Areas of acid sulphate soil to be identified Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A Soil management plan to include for treatment of acid sulphate soils PPE: N/A	Aurizon	1/07/2013	Open	C	1	Low	
Pipeline Drains	Risk	Environmental	Investigation and Design	Pipework drain pipe leaking or unauthorised opening of valve.	Uncontrolled Spill	Environmental Damage - Diesel,Oil or Coolant could be spilled into the surrounding enviroment.	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	B	3	Low	Substitution: N/A Isolation: All drain points are to be contained within a bunded ara. Engineering: N/A Administrative: N/A PPE: N/A	GHD	9/04/2013	Closed	B	1	Negligible	
Banlaw coupling - diesel dispensing	Risk	Environmental	Operation	Banlaw coupling Fails	Uncontrolled Spill	Environmental Damage, Fuel spill Damage to overfill components inside the locomotives fuel tank Locomotive downtime	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: Aurizon is to consider a an operational procedure for filling. Administrative: N/A PPE: N/A	Aurizon	1/05/2014	Open	C	2	Low	Noted in HAZOP - Bulk Fuel on the 27.03.2013
Jemena approval to be obtained prior to construction	Risk	Project	Setup, Construction and Commissioning	Jemena does not accept current design and delays project	Delay to gas line protection works	Delay to project	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A	A	1	Negligible	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A	Engenicom	1/07/2013	Open	C			
Site Storage during flood events	Risk			Diesel storage tanks dislodged during flood event	Storage tanks moving from storage area	Personal injury. Damage to infrastructure	Substitution: N/A Isolation: N/A Engineering: N/A Storage tanks bolted down to Substitution: N/A	A	1	Negligible	Substitution: N/A Isolation: N/A Engineering: N/A Storage tanks bolted down to concrete Substitution: N/A	GHD	9/04/2013	Closed	A	1	Negligible	
		Environmental		Storage vessels rupturing during flood event	Diesel spillage	Environmental harm	Isolation: N/A Engineering: Self bunded storage vessels form part of design Advanced notice from agencies/media regarding	A	2	Negligible	Isolation: N/A Engineering: Self bunded storage vessels form part of design Advanced notice from agencies/media regarding significant events	GHD	9/04/2013	Closed	A	2	Negligible	
		Environmental		Local storage of minor quantities of provisioning cleansers and fuel during flood events	Hazardous material spills and personal injury	Harm to environment	Substitution: N/A Isolation: N/A Engineering: Designated storage locations above 1:100	A	1	Negligible	Substitution: N/A Isolation: N/A Engineering: Designated storage locations above 1:100	GHD	9/04/2013	Closed	A	1	Negligible	

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Design Reference	Risk, Issue or Opportunity	Type of Risk	Design Life Cycle Stage	Scenario	Hazards	Risk	Existing Control Measures	Initial Risk Rating			Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	ByW hen	Decision / Status	Residual Risk Rating			Comments
								C	L	RR					C	L	RR	
Rail - SignallingCatchpoints/Derail er	Risks	Safety	Investigation and Design	Safe shunting of trains and catchpoints adopted as safety to avoid collosion of trains. Train derailed at catchpoints or derailer	Derailed moving train	Personnel injury and loss of life. Damage to infrastructure	Substitution: N/A Isolation: N/A Engineering: Catch points installed Runoff areas identified in design Ballasted run-off area at CPT-2. Administrative: N/A No existing control measure PPE: N/A	E	2	Significant	Substitution: N/A Isolation: N/A Engineering: Adequate overlap distances. Administrative: Operational Procedures to be developed and implemented PPE: N/A	Aurizon/Ansaldo	6/07/1905	Open	E	1	Moderate	
							Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A				C	1	Low	
							Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A	C	3	Moderate	Substitution: N/A Isolation: N/A Engineering: N/A Administrative: N/A PPE: N/A				C	1	Low	