Key on-site mitigation measures and residual impact to key assets and matters of NES

Environmental assets	On-site impact mitigation				Residual Impact
	Avoid	Minimise	Rectify	Reduce	
Terrestrial Flora/ Vegetation 5 recorded Priority flora	Planned clearing boundaries are to be adjusted where practicable to avoid clearing of Priority flora. Surveyed over 800km^2, inclusive of priority flora.	Key infrastructure, such as stockyards, rail loop, infrastructure corridor and transfer station, has been located in or adjacent to previously disturbed areas. Areas used for construction laydown will be located in previously disturbed areas where practicable. Unnecessary disturbance of Priority flora will be minimised through surveying and pegging of nearby Priority flora locations and restricting vehicle and equipment movements to within project footprint. Management measures outlined in the Significant Terrestrial Species Management Plan will be implemented.	Rehabilitation of areas cleared during construction and not permanently required to support operations. Where possible Priority flora species will be utilised in rehabilitation activities.	There is little potential to reduce the residual impact on flora and vegetation over time as the development comprises permanent structures.	Permanent clearing of up to approximately 940 ha of vegetation. The Proposal will result in the direct impact on five Priority flora species recorded within the proposed disturbance envelope. Further priority flora survey work recently completed identifies these species outside the proposed disturbance envelope.
Fauna 3 Threatened and Priority species recorded	The disturbance envelope for landside infrastructure and construction activities for the proposed Development is approximately 4270 ha and has been developed to allow for flexibility in locating infrastructure during detailed design. Along the rail spur avoid uncommon features including Cooliarin Pool, limestone hills, quartz outcrops and rockpiles are to be avoided where practicable in locating the rail spur within the disturbance envelope.	Clearing will be staged to maximise potential for mobile fauna species to move to adjoining areas. Speed limits will be implemented with appropriate signage to reduce vehicular collisions with fauna. Windrows on sides of tracks and roads will be retained where practicable to deter fauna from accessing these areas. Lighting required during construction and for security purposes will be minimised where possible. Surface water will be diverted and collected to minimise impacts on fauna habitat. Management measures outlined in the Significant Terrestrial Species Management Plan will be implemented.	Rehabilitation of areas cleared during construction and not permanently required to support operations.	There is little potential to reduce the residual impact on fauna and habitat over time as the development comprises permanent structures.	Permanent clearing of up to approximately 940 ha of vegetation. Risks to threatened and priority fauna are not considered significant as all species have very broad distributions and no critical breeding or foraging resources are associated with the development area.
Marine environment - Subtidal BPPH	Spoil grounds are located in large sandy substrate areas away from limestone ridge lines where BPPH communities were mapped.	Jetty length reduced from 6 km to 4 km and located to reduce impacts on the marine environment. The proposed wharf and channel alignment designed adjacent to the existing Port Hedland shipping channel. Design and placement of turning basins (deeper water closer to Finucane Island) and marine infrastructure to minimise the dredging volumes. Optimisation of the dredging volumes through design of turning basins, and operation of the wharf.		Hard corals may be indirectly (non-permanently) affected by turbidity sedimentation during dredging and spoil ground activities. These areas are likely to become recolonised by hard coral recruits from outside these affected areas once dredging activity ceases.	The lack of substantial areas of BPPH and the low densities of benthic primary producers on the available substrate within the project footprint suggest the direct losses due to removal of seabed and smothering will not significantly affect ecosystem function where these losses will occur. Potential to permanently impact 274Ha of BPPH.
Marine environment - Intertidal BPPH (Mangroves)	Proposed corridor deviates from current alignment to reduce clearing of closed canopy mangroves.	West Creek crossing designed such that impact to tidal/drainage patterns is minimised (includes culverts to maintain tidal flows). Where the proposed conveyor corridor traverses existing channels within the mangrove habitat, culverts will be installed to maintain tidal flows to the area. Infrastructure corridor width has been minimised through sensitive mangrove areas to reduce direct impact to mangroves. Construction is proposed to be end to end, to minimise construction footprint to that of the infrastructure footprint. Access road is in the centre of the corridor.	Rehabilitation of areas cleared during construction and not permanently required to support operations.		29.5 ha of mangrove habitat will be permanently removed as a result of the development.
Avifauna – migratory species	Project footprint on Finucane Island is located adjacent to existing infrastructure, minimising disturbance on west end of Finucane Island where potential habitat has been identified.	The stockpiles are located at Boodarie, further away from coastal areas and potential habitat. Minimised footprint through design and construction methodology through the “mangrove” areas (potential avifauna habitat) located on Finucane Island.			Migratory species are not associated with or dependant on the terrestrial habitats of the development area.

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Marine fauna - turtles, sawfish humpback whales	The proposed channel does not cross known migratory pathways for species of marine mammal. Before commencement of dredging, the monitoring zone will be inspected for marine fauna present for ten minutes and will commence if fauna has not been sighted within a 1000 m radius for twenty minutes. Modifying activities in the event of an observation of whales or dugongs in close proximity to the dredging operations. All seagrasses (potential dugong foraging habitat) will be avoided (any seagrasses present in the Port Hedland area are not considered adequate to support permanent populations of dugong). No recognised feeding or breeding habitat for whales will be affected by the Proposal. Known turtle nesting areas will be avoided.	Impacts on marine fauna will be managed primarily through measures and controls as detailed in the Marine Turtle Management Plan, Marine Mammal Management Plan, and the Invasive Marine Species Management Plan. The management strategies proposed in these management plans will be consistent with the objectives of relevant legislation, policies, and action plans. Key management measures proposed within these plans include: - extensive management measures for the protection of marine fauna during construction and operation activities of the proposed Outer Harbour Development including trained fauna observers present on construction vessels; soft-start to activities that generate noise; reduced vessel speeds; and - implementation of a number of marine quarantine measures, including inspections (IMS inspections) and ballast controls as per ANZECC (1997) and AQIS (2008), has been proposed to reduce the likelihood of the introduction of non-indigenous marine species. - Prior to commencement of construction, selected crew will be trained as Marine Fauna Observers, and trained to observe for marine fauna, record sightings and the actions to be taken in event of sightings, injury or mortality. - Suitable dredging devices and procedures will be utilised to reduce risk of fauna contact. - The water intake at the top of the draghead will be covered to prevent entrainment of smaller marine fauna. - Where possible the dredge pumps will be turned off as soon as practicable from the draghead clearing the bottom on completion of a dredging cycle, and will only be turned on again after the draghead has returned to the seabed. - Lighting required during construction and for security purposes will be minimised.		Impacts on marine fauna from noise and light spill will reduce on completion of the construction phase when piling and dredging will cease.	The development area contains some significant marine fauna including endangered and vulnerable species, but these species are either distributed widely throughout the entire region or they occur in, or utilise, areas which do not lie near Port Hedland. The exception is the presence within the area of populations of turtles. Turtles are considered to be the most sensitive marine fauna as they use localised and distinct habitats in the Port Hedland area for foraging and nesting.