Fire

21.1 Existing Environment

The EAW precinct currently comprises a mix of road / rail infrastructure, open hardstand areas, developed industrial land and mangroves along sections of the coastal boundary. Only isolated pockets of grassed areas remain (refer Figure 21-1).

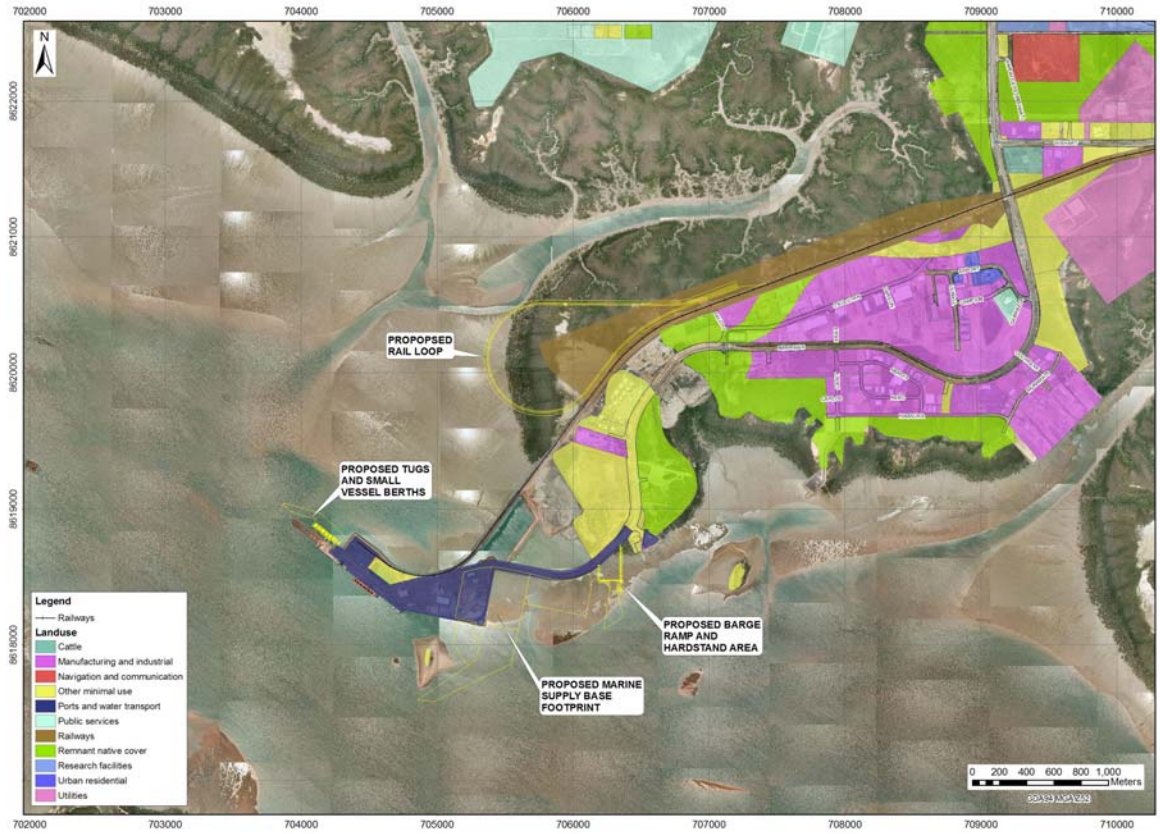


Figure 21-1 Existing EAW Vegetation

The EAW is a heavily modified built environment buffered by mangrove forest and intertidal mudflats. The proposed works will extend the area of existing filled hard standing, with additional backfilling (removing some mangroves) into the harbour either side of the peninsula (AECOM, 2009).

Along the alignment of the AustralAsia Railway Line, the 'core' of the peninsula is relatively flat. Either side of the core the land slopes down through the existing mangroves along both the northern and southern edges. All the existing industrial and commercial land is flat.

The waters of Port Darwin and two creeks define the western, northern and southern boundaries of the EAW peninsula – Bleesers Creek to the north and Hudson Creek to the south. To the north of Bleesers Creek and south of Hudson Creek lie extensive tracts of mangrove communities, zoned Conservation (refer Figure 21-2).

21 Fire

Figure 21-2 Conservation zones adjacent to project site

The existing environment surrounding each specific project component is described below.

Barge Ramp and Hardstand

Vegetation communities and other surroundings in the vicinity of the proposed barge ramp and hardstand are shown in Figure 21-3. The only vegetation directly adjacent to the site is a small patch of *Sonneratia alba* woodland and a patch of mixed species low closed forest / open-forest on the northern tip of the site. An access road lies adjacent and to the north of the site, with existing unvegetated, unpaved, ore stockpile areas on the opposite side of the road.

21 Fire

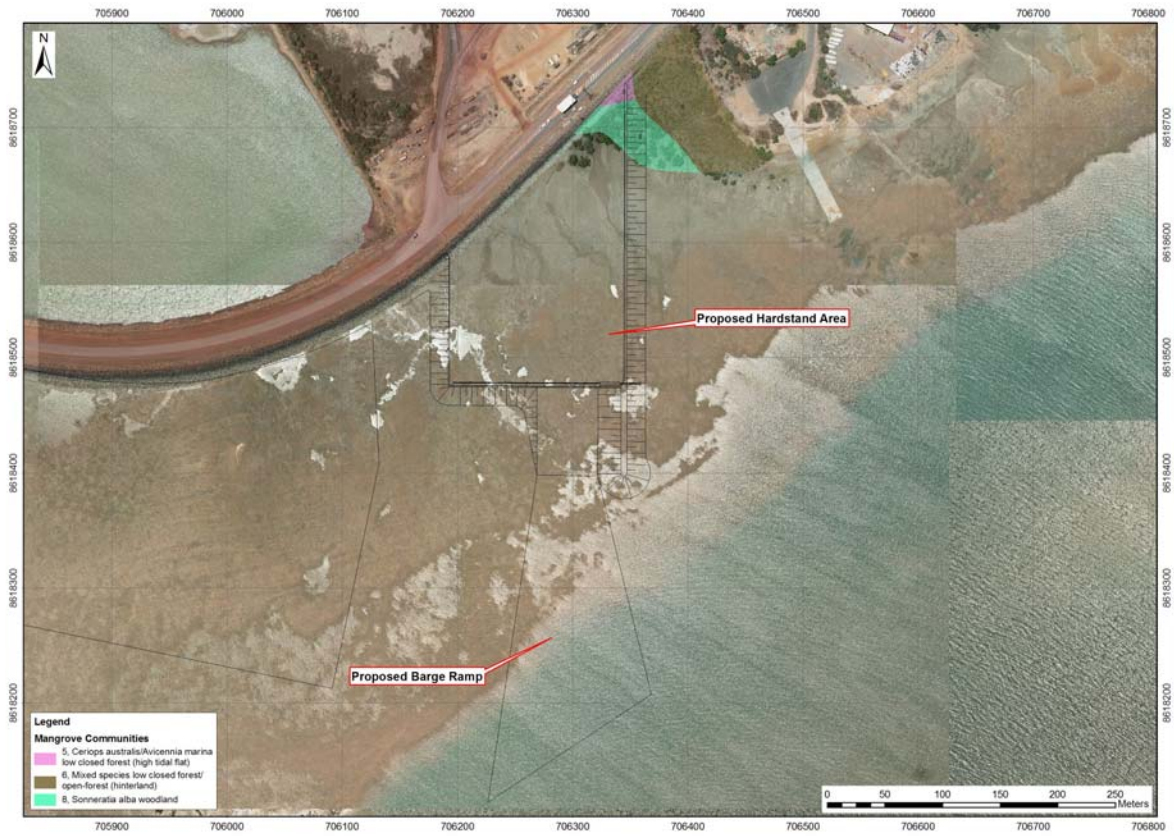


Figure 21-3 Proposed Barge Ramp, Hardstand, and Surrounding Area

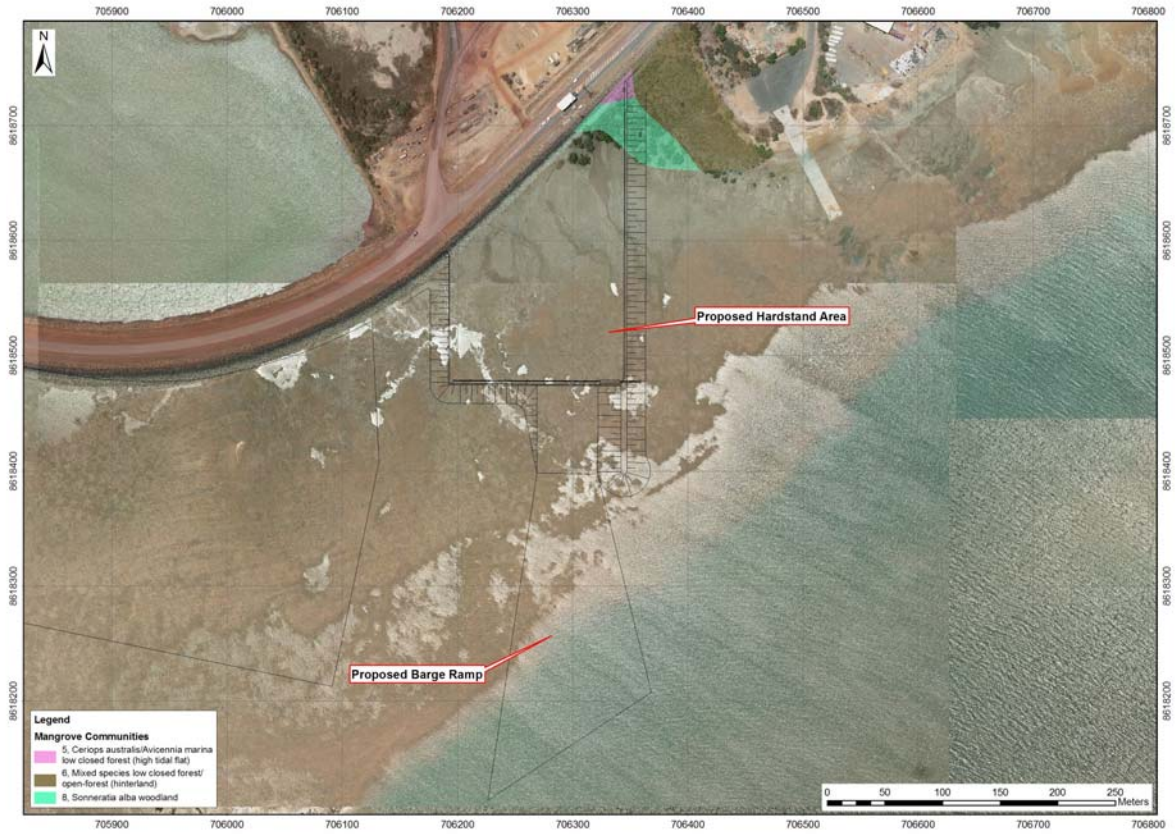
A pond lies on the opposite side of the road to the north-east of the site. Mudflats and the sea lie to the west, south, and east of the site.

Marine Supply Base

The surroundings of the proposed marine supply base (MSB) are shown in Figure 21-4. The MSB is located on reclaimed land. It can be seen that there are no vegetation communities adjacent to the site, apart from some regeneration of weeds and scattered shrubs on the reclaimed land to the west.

21 Fire


704200
704400
704600
704800
705000
705200
705400
705600
705800
706000
N
8618600
8618400
8618200
8618000
8617800
8617600
8617400
Proposed Marine Supply Base Footprint
0 50 100 150 200 250
Meters


705900
706000
706100
706200
706300
706400
706500
706600
706700
706800
N
8618700
8618600
8618500
8618400
8618300
8618200
Proposed Hardstand Area
Proposed Barge Ramp
Legend
Mangrove Communities
5, Ceriops australis/Avicennia marina low closed forest (high tidal flat)
6, Mixed species low closed forest/ open-forest (hinterland)
8, Sonneratia alba woodland
0 50 100 150 200 250
Meters

21 Fire

Figure 21-4 Proposed Marine Supply Base and Surrounding Area

The only solid land surrounding the MSB site is an access road adjacent and to the north, and reclaimed land adjacent and to the west. The reclaimed land is entirely unvegetated, apart from sparse small weeds, and comprises an unpaved stockpile area (which will be incorporated into the MSB), and a paved container storage area with berths and ship loading facilities.

Ponds are located on the opposite side of the access road. Mudflats and the sea are adjacent to the south and east boundaries of the MSB site.

Rail Loop

Vegetation communities and other surroundings in the vicinity of the proposed rail loop are shown in Figure 21-5. Most of the land (perhaps about 80%) on which the rail loop and spur will constructed is currently vegetated on one or both sides, and after construction vegetation will remain on one or both sides of much of the rail loop and spur corridor.

21 Fire


704200
704400
704600
704800
705000
705200
705400
705600
705800
706000
N
8618600
8618400
8618200
8618000
8617800
8617600
8617400
Proposed Marine
Supply Base Footprint
0 50 100 150 200 250
Meters


704200
704400
704600
704800
705000
705200
705400
705600
705800
706000
N
8618600
8618400
8618200
8618000
8617800
8617600
8617400
Proposed Marine
Supply Base Footprint
0 50 100 150 200 250
Meters

21 Fire

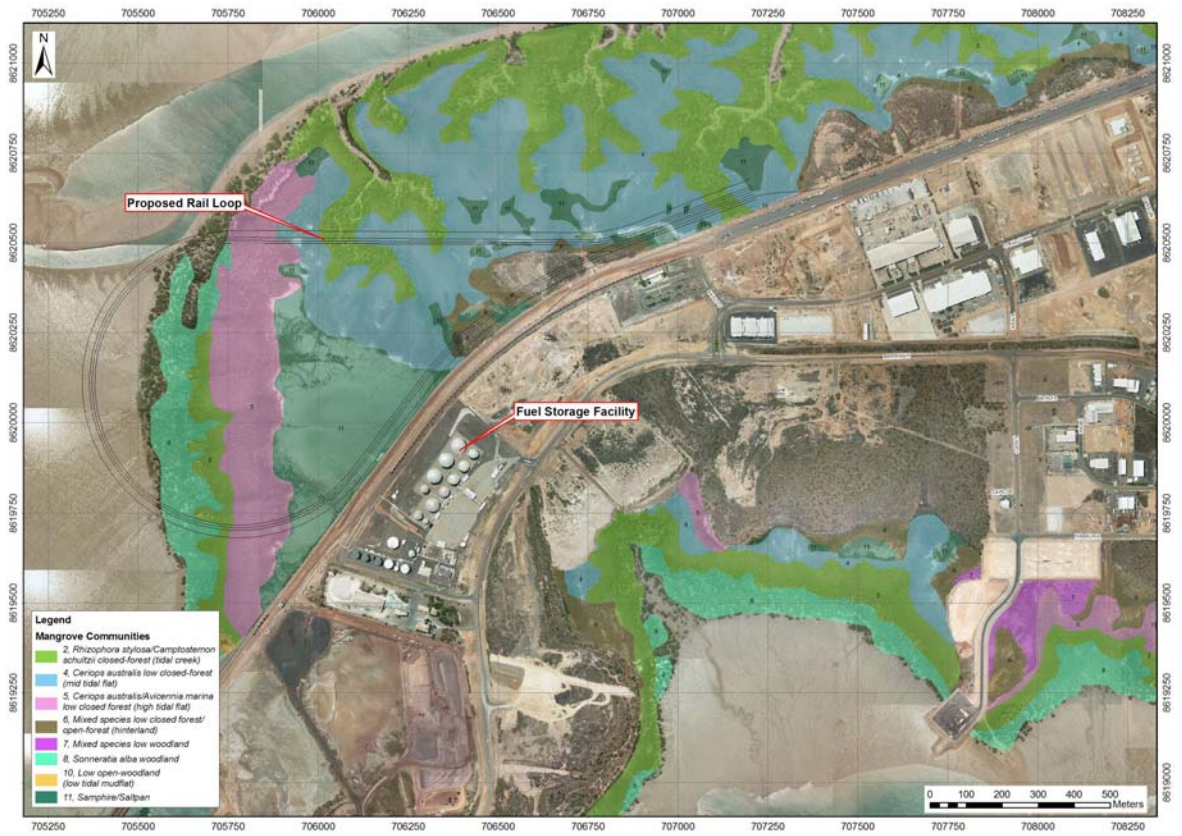


Figure 21-5 Proposed rail Loop, Dredged Spoil Ponds, and Surrounding Area.

Vegetation communities adjacent to the 'loop' include *Sonneratia alba* woodland, *Rhizophora stylosa* / *Camptostemon schultzii* closed forest, *Ceriops australis* low closed forest, *Ceriops australis* / *Avicennia marina* low closed forest, and Samphire. Vegetation communities adjacent to the spur include *Rhizophora stylosa* / *Camptostemon schultzii* closed forest, *Ceriops australis* low closed forest, mixed species low closed forest / open forest, and Samphire.

Adjacent and to the east of the loop section is a combination of industrial land use and bare land. The industrial facilities include a fuel storage facility approximately 250 m from the proposed rail corridor. Industrial and unused vacant areas are also adjacent and to the south of the proposed spur section. Tidal flats and the sea are adjacent and to the west of the proposed loop section.

Bleesers Creek is adjacent to the northern-most section of the proposed spur line, and separates the proposed line from similar vegetation communities on the opposite side of the creek.

Tug and Small Vessel Berths

The surroundings of the proposed tug and small vessel berths at the north-west end of the existing EAW are shown in Figure 21-6. It can be seen that there are no vegetation communities adjacent to the site.

21 Fire

Figure 21-6 Proposed tug and small vessel berths

The only solid land surrounding the site of the proposed berths is reclaimed land adjacent and to the south east. The reclaimed land is entirely unvegetated, apart from sparse small weeds, and comprises a paved container storage area with berths and ship loading facilities.

The sea is adjacent to the proposed tug and small vessel berths in all other directions.

21.2 NT Fire Management Regulatory Framework

In the Northern Territory (NT), the fire prevention and management regulatory framework differentiates between rural / regional and more populous / developed areas. Fire management in the Darwin region, including East Arm, is legislated under the *Fire and Emergency Act 1996* (the Fire and Emergency Act) (NT, 1996a), with legislation for regional NT provided by the *Bushfires Act 1980* (the Bushfires Act) (NT, 1980).

The Fire and Emergency Act legislates the operation of the Northern Territory Fire and Rescue Service (NTFRS) and provides for the creation of Emergency Response Areas (ERA), in which the NTFRS operates. The EAW lies within the Darwin ERA (refer Figure 21-7), so emergency response (including fire fighting) at the EAW is the responsibility of NTFARS (NTFARS, 2010).

21 Fire

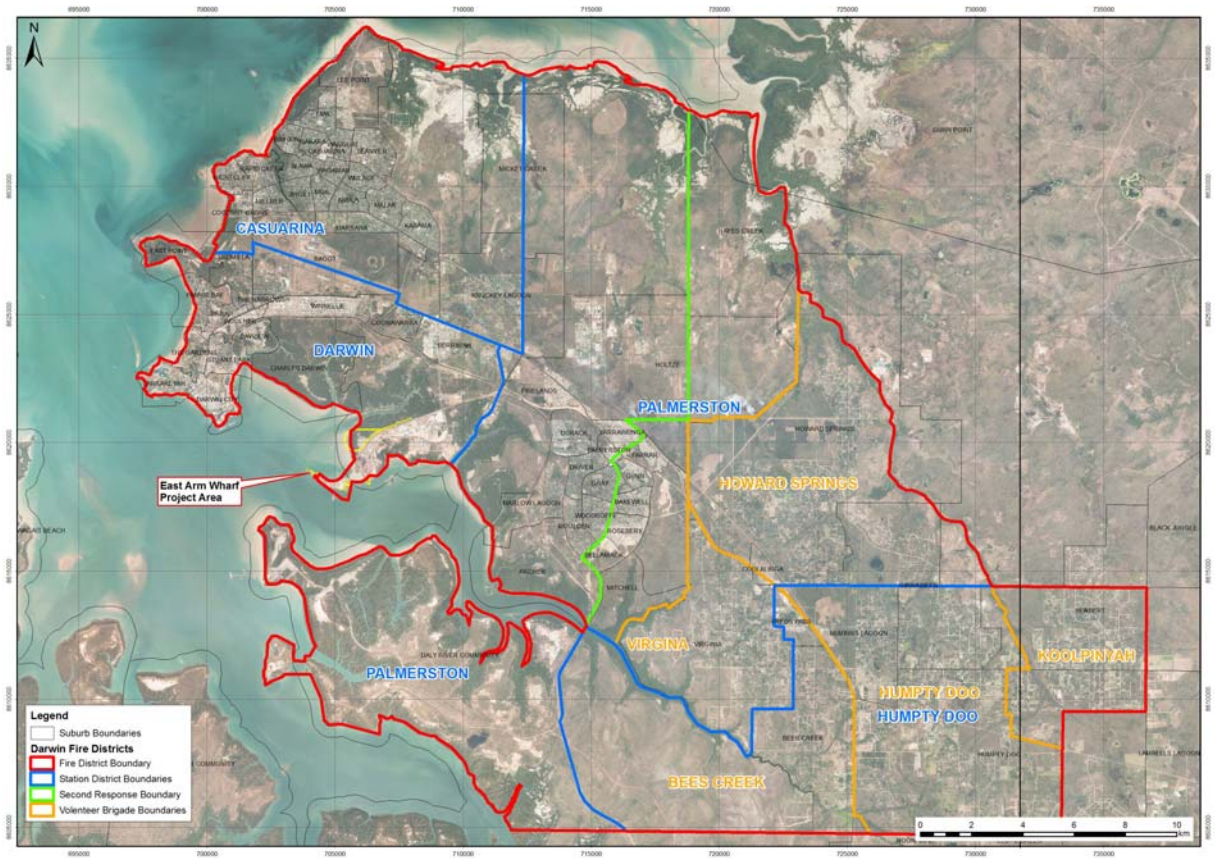


Figure 21-7 Darwin Emergency Response Area

Duties of owners and occupiers of land within an ERA are listed in the Fire and Emergency Regulations 1996 (the Fire and Emergency Regulations) (NT, 1996b). The aspects of fire management and prevention regulated include fire breaks, storage of containers, timer, tyres, oily waste and other combustible materials, and operation of flues and heating / cutting / welding equipment.

21.3 Fire History

A review of the NT NRM InfoNet database (Natural Resource Management Board (NT) et al, 2010) was undertaken to generate a report of any fires at East Arm for the period 1997-2009. The outcomes of the database search are shown in Figure 21-8. .

Figure 21-8 indicates that in 1997 there was a fire in the vicinity of the EAW precinct, approximately 750-1,000 m to the north east of the proposed barge ramp and hardstand. This fire was within the EAW precinct.

The vegetation burnt by the 1997 East Arm fire was likely *Rhizophora stylosa* / *Camptostemon schultzii* closed forest, mixed species low closed forest / open forest, and / or *Sonneratia alba* woodland.

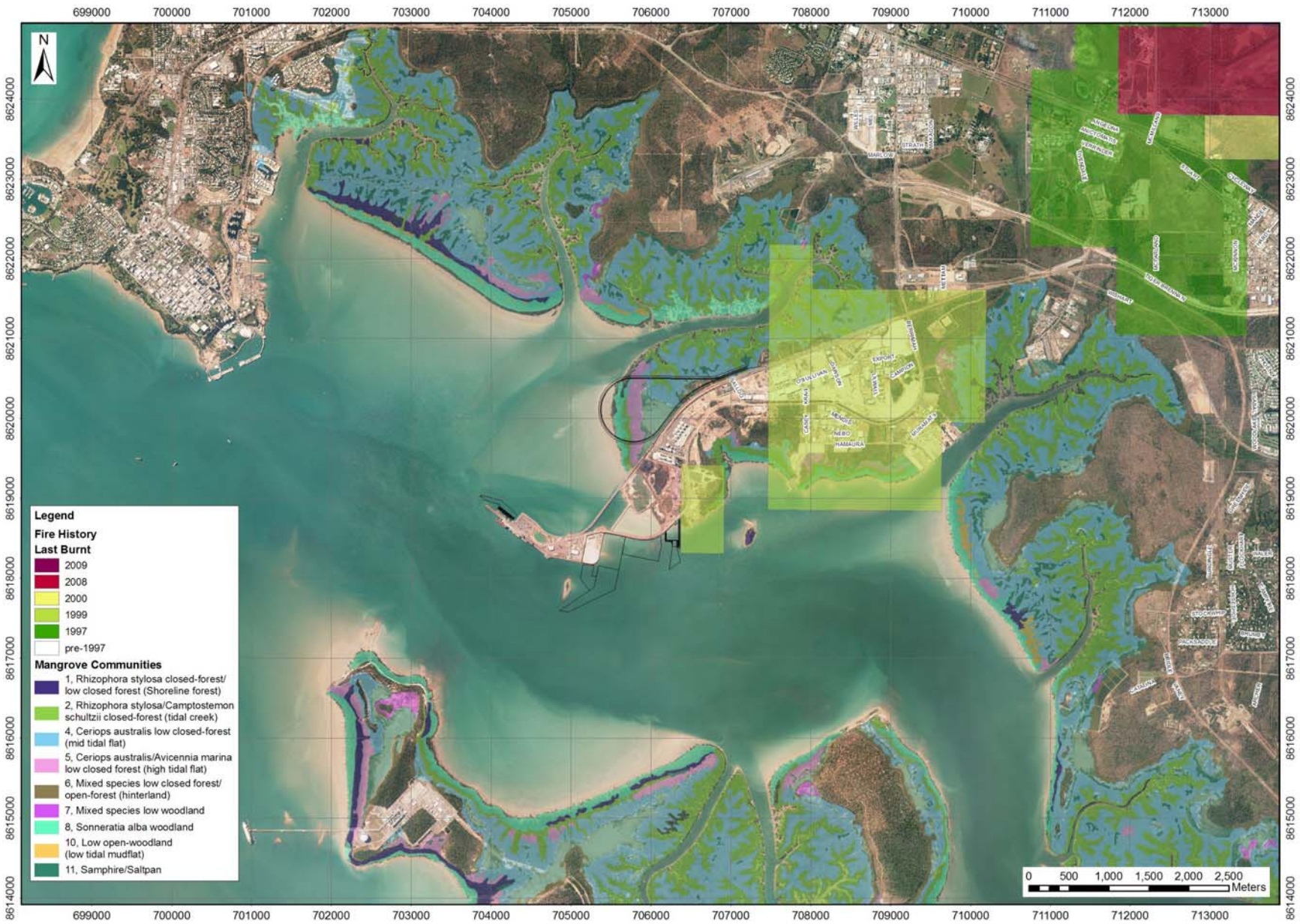


Figure 21-8 Fire history at East Arm: 1997-2009

21.4 Potential Impacts

In general, bushfires have the potential for devastating and significant impacts on the environment, including the built environment. The degree and severity of impact is dependent on a range of factors including the extent, type, and density of plant communities, topography, and human or animal habitats present. The potential impacts of a bushfire on the environment could include the following:

- Impacts to the terrestrial ecology, fauna and flora
- Damage to existing infrastructure, built environment or structures (especially the fuel line to the wharf and the East Arm fuel storage facility)
- Threats to the general public and workforce.

In the event of a bushfire initiated in EAW, there is potential to spread into areas outside of the site, although the adjacent land has also been modified with the exception of some areas of mangroves and other vegetation to the east of Berrimah and south of Wilshart Roads.

21.5 Fire Risk

At present, the NTFRS consider that the EAW has an extremely low risk factor for bushfires (NTFRS pers. comm.). The Service has identified that the existing site is primarily devoid of grasses and vegetation that would provide high fuel loads.

It is recognised by the NTFRS that colonies of various weeds (including Mission and Gamba grasses) are present at the site. These weeds can potentially provide fuel for a fire, and any risk of fire ignition and spread is therefore heightened by poor management allowing uncontrolled growth of weeds.

The NTFRS has not commented adversely on the potential for a fire ignited within the EAW precinct to spread to surrounding areas.

21.6 Impacts of the Proposal

21.6.1 Changes to the Fire Regime

The construction phase of the EAW expansion works will include further reclamation and the clearance of any existing weeds and other vegetation. After the site has been cleared, there will be little vegetation remaining and a continued extremely low risk factor for Bush Fires, unless poor management allows for the growth of invasive weed species and shrubs. This is confirmed by NTFRS who in correspondence dated October 2010 stated that *"Given that most of the occupied area and the new development is and will be gained from filling reclaimed areas, danger from wild fire will be a management dysfunction caused by allowing the uncontrolled growth of invasive weed grasses"* (**Appendix P**

Likewise, the bushfire risk will remain extremely low when the EAW is fully operational because of the large area of cleared land, new built development, greater extent of sealed surfaces, additional fire fighting equipment and FMPs.

For the construction and operation phases, the fire and weed management strategies need to be closely linked, noting that some facilities will be operational while others are under construction or awaiting development.

21.6.2 Flammable Materials

The EAW has bulk liquid and hazardous materials infrastructure including pipelines and storage vessels and storage sheds. Additional fuel storage (and minor storage of other flammable materials, such as lubricants) will be present at the MSB. There is potential for fire to be caused by a variety of ignition sources, which could lead to human and environmental harm.

The risk of ignition and fire at all project components will be reduced through compliance with the EAW EMP (Coffey Environments, 2010) and the implementation of a Fire Management Plan (FMP). Many of the activities and much of the infrastructure involving hydrocarbons and hazardous materials is not under the direct control of the DPC. Management strategies that the DPC have in place require environmental management plans from port users to cover their activities, including the management of fire risk.

21.6.3 Sources of Ignition

The EAW operates as a wharf facility along with industrial, commercial, transport and other activities. Notwithstanding the low bushfire risk, potential ignition sources throughout construction and operation phases include:

- 'Hot work' activities such as grinding and welding
- Faulty electrical equipment
- Machinery and vehicles
- Human behaviour including careless disposal of cigarette butts
- Controlled burning practices
- Uncontrolled events such as lighting strikes and arson

21.7 Fire Management and Mitigation Measures

21.7.1 General Measures

Bushfire prevention mitigation measures have been compiled for the Project. These measures will guide the approach to bushfire management during the construction and operation of the EAW expansion works. The recommended measures recognise the limited bushfire risk and advice received from the NTFRS.

Key management and mitigation measures are:

- Control of grassy vegetation and exotic weeds provides the main opportunity to limit fuel loads in the EAW. Methods are likely to include slashing or spraying.
- Mulched vegetation from clearing operations, which is stored on site (likely to be only limited), will be stockpiled in designated areas away from potential ignition sources.
- Stockpiled vegetation from clearing activities will not be burnt, but will be reused where possible or disposed of off site.
- Appropriate fire fighting equipment will be available on site at all times (e.g. fire hoses and hydrants).
- Safe designated smoking areas will be established and receptacles for cigarette butts will be provided at all times.
- Use of firebreaks and emergency fire access tracks.

- Compilation and implementation of ongoing updated FMPs as the EAW precinct develops, including updates of emergency procedures and muster points as individual facilities are developed.

The construction and operation of the expansion works will seek to address bushfire prevention management through ongoing plans and procedures primarily concentrating on weed and plant management control.

21.7.2 Management Measures

Construction

- Stockpiled vegetation from clearing activities will not be burnt, but will be reused where possible or disposed of off site.
- After clearing operations, mulched vegetation stored on site will be stockpiled in a number of designated areas, away from potential ignition sources.
- Vehicles and equipment used for clearing vegetation will be regularly cleaned to remove accumulated combustible material, and maintained to ensure against release of exhaust sparks.
- Adequate water storage facilities will be made available to meet construction fire prevention requirements.
- Suitable fire breaks and emergency fire access tracks will be developed and maintained.
- A suitable means of raising the alarm in the event of a fire or other emergency will be established.
- Construction activities in the vicinity of existing flammable materials and other fire risks, such as the East Arm fuel storage facility, will be undertaken in accordance with the fire / Emergency / Environment management plans specific to those facilities
- An updated FMP for the EAW precinct will be prepared, which would be periodically updated as the precinct develops, including review of fire management infrastructure and defined muster points
- Use of training and induction schedules, and periodic emergency evacuation and response exercises.
- A ‘Fire Risk’ board will be maintained to communicate the risk of fire on any given day.
- Only clean fill will be imported (to reduce the spread of weeds.

Operation

- Control of grassy vegetation and exotic weeds provides the main opportunity to limit fuel loads in the EAW. Methods are likely to include slashing or spraying. NTFRS advises that fill used in the reclamation of land has historically led to high weed and grass growth, and therefore reinforces to need for control to ensure fuel loads are kept to a minimum.
- All operators will be required to equip site vehicles with a compatible and appropriately sized fire extinguisher.
- All operators will be required to store flammable or combustible liquids in accordance with Australian Standards.
- Fire breaks and emergency fire access tracks will be maintained.
- Periodic review of the EAW precinct FMP, including fire management infrastructure and muster points.
- Use of training and induction schedules, and periodic emergency evacuation and response exercises.

The key bushfire prevention mentioned sought by NTFRS is weed management control. Weeds will be managed by clearing or slashing, and treatment with herbicides and also direct removal where appropriate. Weed management is the responsibility of DPC in communal areas, and the various tenants, lessees, and other site users will be responsible for weed management within their specific sites. Monitoring of compliance with the EAW FMP is the responsibility of DPC.

Monitoring

Appropriate monitoring will be undertaken as part of the operation of the expanded EAW, during both the construction and operational phases, recognising that some facilities will be operational while others are under construction or awaiting development. Monitoring will include:

- All operators will be required to identify all fire incidents on a incident reporting database.
- All operators will be required to work cooperatively with each other and undertake emergency response drills and exercises to ensure that individual site FMPs are compatible with each other and the overall EAW precinct FMP, and that there is no deficiency or conflict in approach.
- All operators will be required to undertake workplace 'housekeeping' to ensure no accumulation of debris or combustible material in work environs.
- Invasive grasses and weed spread will be checked regularly to ensure limited growth and systematic control
- Fire breaks and emergency fire access tracks will be checked regularly.

Supporting Documents - Environmental Management Plan

The EAW Expansion works will be supported by a range of plans, procedures and processes designed to ensure that the project meets all relevant environmental requirements. This includes:

- Existing EAW EMP
- EMP(s) for expansion activities – Construction
- EMP(s) for expansion activities – Operation

The EMP(s) for the proposed development will incorporate a FMP.

21.8 Emergency Preparedness, Response and Recovery

The EAW EMP provides a framework for the management of environmental impacts associated with emergency incidents, including fires. To comply with the EMP, all documents describing emergency preparedness, response and recovery procedures must incorporate an environmental component where an emergency situation may result in an environmental impact.

In accordance with the EAW EMP, the FMP will:

- Detail requirements for co-ordination of resources to ensure effective control and clean-up after fires.
- Establish a framework to be used for the co-ordination of DPC personnel, Government Departments and other appropriate organisations during and after an emergency situation.
- Provide defined processes and accountabilities for DPC's emergency response.
- Provide a review process that incorporates periodic testing, revision and improvement of the FMP
- Includes specific response plans for defined situations that may occur at the various sites in the EAW precinct

- Include update of the EAW FMP as the precinct develops, including review of fire management infrastructure and defined muster points
- Includes training and induction schedules, and periodic emergency evacuation and response exercises.

The General Manager Landside Operations is accountable for ensuring that an appropriate FMP is developed, implemented, tested, reviewed and improved (Coffey Environments, 2010).

21.9 Residual Risk

The current fire risk at the EAW is considered extremely low, as confirmed by NTFRS (**Appendix P**). After the implementation of controls such as weed management, and construction in accordance with existing management plans as described above, the risk of fire associated with EAW expansion activities (construction and operation) is considered to be 'very low'.

21.10 Commitments

- *An updated FMP for the EAW precinct will be prepared prior to construction commencing.*
- *Managing onsite vegetation and waste to limit fuel loads.*
- *Fire fighting equipment will be available on site at all times, in accordance with relevant regulations.*
- *Cigarette butt receptacles will be provided at designated smoking areas.*
- *Adequate water storage facilities (at least 54,000 L) will be made available to meet fire prevention requirements (where main water supply is not available).*
- *Emergency alarms will be installed in accordance with the relevant regulations.*
- *Inductions will include emergency preparedness and response, and periodic emergency evacuation and response exercises will be undertaken.*
- *All site vehicles will be equipped with a compatible and appropriately sized fire extinguisher.*
- *All operators will to store all flammable or combustible liquids in accordance with Australian Standards.*
- *Fire breaks and emergency fire access tracks will be maintained.*
- *Review of the EAW FMP annually.*
- *A site-specific FMP will be prepared for each project component. Each FMP will include monitoring and reporting requirements.*

References

AECOM, 2009, *Notice of Intent for the Proposed Expansion Works at East Arm*, prepared for the Northern Territory Department of Planning and Infrastructure.

Coffey Environments, 2010, *East Arm Wharf Environmental Management Plan*, prepared for DPC, accessed 19 January 2011 at (http://www.darwinport.nt.gov.au/sites/default/files/documents/enviro/dpc_enviro_managment_plan_eaw_122010.pdf)

Natural Resource Management Board (NT), Charles Darwin University and NTG, 2010, NT NRM InfoNet, accessed 18 January 2011 at (http://www.ntinfonet.org.au/reports)

NT, 1980, *Bushfires Act*, accessed 17 January 2011 at (http://notes.nt.gov.au/dcm/legislat/legislat.nsf/d989974724db65b1482561cf0017cbd2/79e42bcbe63571df69257623007a3d35/$FILE/Repb004.pdf).

NT, 1996a, *Fire and Emergency Act*, accessed 17 January 2011 at (http://notes.nt.gov.au/dcm/legislat/legislat.nsf/64117dddb0f0b89f482561cf0017e56f/f125dac581f79ac1692576d4007d8a29/$FILE/Repf030.pdf).

NT, 1996b, *Fire and Emergency Regulations*, accessed 17 January 2011 at (http://notes.nt.gov.au/dcm/legislat/legislat.nsf/64117dddb0f0b89f482561cf0017e56f/ff2fe58d94f68283692576d4007dc81e/$FILE/Repf030R1.pdf)

NTFARS, 2010, *Darwin*, accessed 17 January 2011 at (http://www.nt.gov.au/pfes/index.cfm?fuseaction=page&p=243)