

21 November 2004

Ms Laura Todd
Environment Manager
Fortescue Metals Group
50 Kings Park Road
West Perth WA 6008

Dear Laura

Cumulative Biological Impacts of the FMG Stage A Proposal

Further to our recent discussions, we provide here a summary assessment of potential cumulative biological impacts associated with the construction of the FMG Stage A proposal and the previously approved Hope Downs port and rail facilities (Hope Downs Management Services 2002). We understand that this is required to address a request from the Environmental Protection Authority (EPA), as it wishes to consider this as part of finalising the assessment of FMG's Stage A PER. This assessment should be read in conjunction with the FMG Stage A PER, Hope Downs Iron Ore Project Rail and Port Facility PER and the associated biological survey reports.

Approach

Cumulative impacts of construction of the Hope Downs railway between Port Hedland and Weeli Wolli Creek and the FMG Stage A railway between Port Hedland and Mindy Mindy were assessed based on 50 m wide impact corridors, centred on the nominal alignments proposed at the time the work was completed. These impact corridors were overlain on the combined vegetation mapping of Biota and Trudgen (2002) and Biota (2004) in ArcView GIS, and areas of direct impact by vegetation types were calculated.

General consideration has been given to the other types of impacts presented by the proposals that are less amenable to quantification (eg. changes to fire regime and dust).

Clearing of Mangroves

A comprehensive assessment of the cumulative loss of mangrove habitat in Port Hedland harbour has already been completed for the EPA as part of meeting the requirements of EPA Guidance Statement No. 29. This has been provided to the EPA Service Unit under separate cover. In summary, the implementation of both proposals will result in the clearing of approximately 99 ha of mangrove units (as defined for the purposes of Benthic Primary Producer Habitat calculations); 82 ha of which arises from the Hope Downs port and rail and 14.8 ha from the FMG port and rail.

Clearing of Terrestrial Vegetation

Construction of both railways will require clearing of an estimated 3,502 ha of terrestrial vegetation (Attachment 1). The majority of the vegetation types will be cleared by less than 10% of the extent mapped for the combined surveys; the four exceptions are shown in Table 1.

Of the vegetation types that will be cleared by more than 10%, only Apt5 was considered to be of high conservation significance (Biota and Trudgen 2002, Biota 2004). Unit Apt5 is a hummock grassland dominated by *Triodia angusta*, which is not a common dominant species in the area.

It should be noted that the vegetation type including Apt5 in Table 1 is a mosaic of this unit and Apt3. The areas of Apt5 that are mapped separately will be cleared by only 4.8%. Hence the amount of clearing of unit Apt5 in particular will be somewhat less than the 10.42% shown in Table 1 for the mosaic unit.

Table 1: Terrestrial vegetation types that will be cleared by more than 10% if both the Hope Downs railway and FMG Stage A railway are constructed*.

Vegetation Code: Description	Total area mapped (ha)	Combined impact area of HD and FMG railways (ha)	Percent of total
Apt3/Apt5: mosaic of <i>Triodia epactia</i> hummock grassland to mid-dense hummock grassland / <i>Triodia angusta</i> mid-dense hummock grassland	15.64	1.63	10.42%
Hc21: <i>Eucalyptus victrix</i> scattered low trees over <i>Eucalyptus xerothermica</i> , <i>Corymbia hamersleyana</i> low open woodland over <i>Pluchea ferdinandi-muelleri</i> low shrubland over <i>Triodia pungens</i> , <i>T. basedowii</i> hummock grassland	28.46	2.98	10.47%
Aps4: <i>Corymbia hamersleyana</i> scattered low trees over <i>Acacia adsurgens</i> high shrubland to open scrub over <i>Triodia epactia</i> mid-dense hummock grassland	23.65	3.58	15.14%
Ac16: <i>Corymbia hamersleyana</i> scattered low trees over <i>Acacia coleii</i> open scrub over <i>A. stellaticeps</i> low open shrubland over <i>Triodia lanigera</i> hummock grassland and <i>Chrysopogon fallax</i> , <i>Eriachne obtusa</i> open tussock grassland	4.27	0.96	22.48%

* Based on the mapping of Biota and Trudgen (2002) and Biota (2004); based on an impact corridor of 50 m width.

Isolation of Fauna Habitat and Restriction of Fauna Movement

After direct clearing of vegetation, the most serious potential impact from construction of both the Hope Downs and FMG Stage A railways is the potential for further isolation of vegetation and fauna habitat. The rail corridors are in close proximity to both the BHP railway and each other for much of their length, and in some locations overlap. Construction of both newly proposed railways would result in the isolation of a greater number of linear sections of habitat between the three rail lines than if only a single additional railway was constructed. Where such areas are narrow, these would have an increased susceptibility to degradation through 'edge effects', for example from increased risk of weed invasion and fire.

Construction of both rail lines would also increase the likelihood of restriction of fauna movement between opposite sides of the rail lines, particularly for small ground fauna. The longer term viability of any populations of such fauna left in these areas would be reduced in proportion to the size of the habitat remnant. With three railways following the same general alignment, there would be a greater frequency of such small habitat isolates and therefore a greater probability of creating isolated populations with limited long term viability. Some isolated locations may include culverting in the rail formations, providing a potential pathway for fauna movement. However, there is little data available to demonstrate that such 'underpasses' are routinely used by many target species.

Fire

Construction and operation of two railways through the area would increase the potential for fires, particularly from track grinding. Introduction of appropriate fire management procedures as part of a Fire Management Plan should be sufficient to manage this risk.

Weed Introduction and Spread

Even with good weed hygiene and control, there still exists a probability that weed species will be introduced during major earthworks. This probability would be doubled by the construction of two new railways along this corridor, rather than a single new line. The risk of weeds being introduced to fluvial environments where they may spread beyond the immediate vicinity of the rail corridor would similarly increase. As noted above, smaller habitat remnants isolated between multiple railways may also have greater likelihood of weed invasion and replacement of native flora with exotics.

Dust

Additional dust impacts would be likely to arise with an additional railway, particularly during construction, but would also continue over the life of the rail given vehicle traffic over the associated access roads. This is considered to be a minor impact that can be managed with standard dust suppression measures.

Summary

The likelihood, frequency and magnitude of general impacts on flora and fauna arising from construction of a railway between Port Hedland and the Weeli Wollie area (see Biota and Trudgen 2002, Biota 2004) would generally be expected to increase if both the Hope Downs and FMG railways are constructed. The most significant issues in this regard are likely to be:

- isolation of fauna habitat and vegetation in strips between the railways (with associated increases in edge effects from fire and other disturbances);
- restriction of fauna population movement and isolation of populations; and
- greater likelihood of weed transport and spread along the general corridor followed by the railways.

Both proponents have made commitments to weed hygiene and control programme, with fire management and fire ecology research initiatives also planned.

No new types of impacts would be expected to be introduced with the construction of both railways, given the similarity in nature of the two proposals. From the available data, it also appears unlikely that the conservation status of any Threatened flora, restricted vegetation types or Schedule fauna species would be affected at regional or subregional scales if both rail corridors were constructed.

Local population level impacts on flora, fauna and vegetation, including Threatened taxa, are likely to be increased as outlined above if both proposals are implemented. It should be noted however, that both FMG and Hope Downs have made commitments to avoiding direct disturbance on significant populations of flora and fauna as part of project final design. With these locations treated as design constraints, the local population level effects on significant flora and fauna should be minimised.

Please contact us should you require any further information in regards to the above.

Yours faithfully,

Biota Environmental Sciences Pty Ltd

Michi Maier
Botanist / Director

Attachment 1 Amount of each terrestrial vegetation type to be cleared for construction of the Hope Downs railway and FMG Stage A railway*.

* Based on a 50m impact corridor; vegetation mapping based on Biota and Trudgen (2002) and Biota (2004).

Vegetation Code	Total area mapped (ha)	Combined impact area of HD and FMG Rail (ha)	% of total
Ac1	819.12	11.47	1.40
Ac1/Ac5	104.25	1.97	1.89
Ac2	445.91	1.17	0.26
Ac3	142.12	2.17	1.53
Ac3/Ac4	286.3	4.64	1.62
Ac3/Cc14	8.04	0.32	3.98
Ac3/Cc3	45.05	2.33	5.17
Ac4	157.09	3.68	2.34
Ac4/Ac8	103.27	1.35	1.31
Ac5	113.43		
Ac5/Ac6	135.53	1.64	1.21
Ac6	747.18	8.81	1.18
Ac6/Ac4/Ac2	184.39	1.27	0.69
Ac6/Cc2	26.05		
Ac7	199.26	2.01	1.01
Ac8	704.17	10.50	1.49
Ac8/Ac1	102.14	2.34	2.29
Ac9	153.75	3.61	2.35
Ac10	6.22		
Ac11	260.57	5.18	1.99
Ac12	26.59	0.97	3.65
Ac13	44.48	1.99	4.47
Ac14	500.51	7.77	1.55
Ac15	566.44		
Ac16	4.27	0.96	22.48
Ac17	123.51	5.08	4.11
Ac18	140.26		
Ac19	52.3	0.83	1.59
Ac20	14.05	0.36	2.56
Ac21	29.73	1.79	6.02
Ac22	242.08	8.35	3.45
Ac23	6.19	0.37	5.98
Ac24	28.94	0.30	1.04
Ac25	51.36	1.41	2.75
Ac26	25.36	0.76	3.00
Ac27	186.37	2.70	1.45
Ac28	323.72	9.27	2.86
Ac29	52.47	1.90	3.62
Ac30	14.31	0.43	3.00
Ac31	361.91	21.06	5.82
Ah1	1864	48.89	2.62
Ah1/Aps1	137.22		
Ah2	124.85	6.44	5.16
Ah2/Aps3	2688.01	73.78	2.74

Vegetation Code	Total area mapped (ha)	Combined impact area of HD and FMG Rail (ha)	% of total
Ah3	91.72	2.70	2.94
Ah4	48.89	1.81	3.70
Ah5	490.46	3.68	0.75
Ah5/Ah2	117.01	2.98	2.55
Ah5a	234.13	5.61	2.40
Ah6	62.14		
Aps1	1785.63	39.50	2.21
Aps1/Aps2	3939.13	82.61	2.10
Aps1/Aps3	290.34	10.50	3.62
Aps2	1462.24	55.04	3.76
Aps2/Aps1	102.83	2.88	2.80
Aps2/Aps3	659.59	10.94	1.66
Aps2/Aps8	494.01	15.14	3.06
Aps3	1427.67	20.30	1.42
Aps4	23.65	3.58	15.14
Aps5	42.79	2.08	4.86
Aps6	488.61	28.77	5.89
Aps7	2461.67	67.22	2.73
Aps8	316.58	12.92	4.08
Aps9	197.42		
Aps10	6.43		
Apt1	1135.75	29.25	2.58
Apt2	40.43		
Apt2/Apt7	994.19	8.73	0.88
Apt3	428.06	2.82	0.66
Apt3/Apt5	15.64	1.63	10.42
Apt4	3491.63	70.50	2.02
Apt4/Apt1	255.32		
Apt5	1152.11	55.26	4.80
Apt6	429.11	10.65	2.48
Apt7	2497.45	54.38	2.18
Apt8	175.26	5.98	3.41
Apt9	2561.65	65.75	2.57
Apt10	1708.64	57.22	3.35
Apt11	1945.23	41.01	2.11
Apt11/Ah5/Ah4	184.94	15.54	8.40
Apt12	6340.29	177.98	2.81
Apt12/Ac17/Apt16	284.35	10.93	3.84
Apt12/Aps1	886.04	13.76	1.55
Apt12/Aps8	816.45	26.37	3.23
Apt12/Apt14	157.29	2.26	1.44
Apt13	11394.38	279.32	2.45
Apt13/Ah1	1851.65	70.73	3.82
Apt13/Ah2	1466.29	44.94	3.06
Apt13/Ah4	64.76	1.54	2.38
Apt13/Ah5	229.91	15.13	6.58
Apt14	582.65	20.33	3.49
Apt15	6368.14	123.06	1.93
Apt15/Aps7	113.93	1.07	0.94
Apt16	2835.29	68.70	2.42

Vegetation Code	Total area mapped (ha)	Combined impact area of HD and FMG Rail (ha)	% of total
Apt17	23.59	1.51	6.40
Apt18	77.33	6.65	8.60
Ar1	7.81	0.59	7.55
Ar1/Ar2/Ar3/Ar4	1682.81	31.29	1.86
Ar2/Ar8	7.44		
Ar5	37.85		
Ar6	23.03		
Ar7	4.96		
As	644.19	33.47	5.20
Cc1	3.14		
Cc1/Cc12	29.41	0.95	3.23
Cc2	79.24	2.79	3.52
Cc3	20	0.53	2.65
Cc4	11.63	0.25	2.15
Cc5	61.4		
Cc6	3.69	0.17	4.61
Cc7	3.24		
Cc8	1003.26	36.62	3.65
Cc9	67.95	1.44	2.12
Cc10	8.12		
Cc11	2.69	0.01	0.37
Cc13	3.24		
Cc15	3.98		
Cc16	61.17	1.87	3.06
Cc17	9.85	0.21	2.13
Ch1	3992.67	84.16	2.11
Ch1/Ch2	608.09		
Ch1/Ch6	26.76		
Ch1/Ch7	382.52	5.41	1.41
Ch2	190.24	2.19	1.15
Ch2/Apt12	83.54		
Ch2/Ch1	1224.94	29.33	2.39
Ch2/Ch12	1304.17	31.15	2.39
Ch3/Cx2	195.19	5.95	3.05
Ch4	154.94	2.08	1.34
Ch4/Ch8	147.04		
Ch5	30.85	2.48	8.04
Ch6	16.88	0.42	2.49
Ch7	5.36		
Ch8	1408.65	37.34	2.65
Ch8/Ch13	360.1	9.78	2.72
Ch9	2251.11	66.73	2.96
Ch10	228.82	2.66	1.16
Ch11	958.11	16.63	1.74
Ch12	1478.85	39.89	2.70
Ch12/Ch13	238.23		
Ch13	1116.4	29.90	2.68
Cp1	52.75	3.98	7.55
Cx1	375.24	1.52	0.41
Cx2/Cx3	979.5	15.87	1.62

Vegetation Code	Total area mapped (ha)	Combined impact area of HD and FMG Rail (ha)	% of total
Cx3/Ch3	354.5	26.15	7.38
Cx4	2413.99	57.29	2.37
Cx5	598.63	16.23	2.71
Fa1	56.74		
Fa1/Fa3	899.22		
Fa2	288.24	3.52	1.22
Fa3	2615.71	107.29	4.10
Fa4	1318.31	26.11	1.98
Fa4/Fa5	422.91		
Fa5	370.12	11.88	3.21
Fa6	187.77	0.40	0.21
Fa7	357.06	11.52	3.23
Fa8	86.92	2.33	2.68
Fa9	1073.56	1.99	0.19
Fc1	8.82		
Fc2	9.46		
Fc2/Fx5	122.53	0.91	0.74
Fc3	29.37		
Fh1	436.62	3.88	0.89
Fh2	301.1	8.25	2.74
Fh2/Fx7/Fx8	721.23	10.61	1.47
Fh3	1197.35	21.11	1.76
Fh3/Fa7	214.22	6.16	2.88
Fh4	526.65	17.12	3.25
Fx1	166.94	1.76	1.05
Fx2	140.35		
Fx3	803.22	39.56	4.93
Fx4	12.99		
Fx6	260.17	0.92	0.35
Fx9	604.3	3.45	0.57
Hc1	639.13	0.84	0.13
Hc1/Hc2	264.43	0.35	0.13
Hc2	699.06	13.58	1.94
Hc3	27.12	0.44	1.62
Hc4	57.53	1.69	2.94
Hc5	42.7	1.12	2.62
Hc6	6.38		
Hc7	106.01	4.40	4.15
Hc8	43.38	1.13	2.60
Hc9	31.21	0.13	0.42
Hc10	16.44	0.20	1.22
Hc12	30.84	1.29	4.18
Hc16	175.3		
Hc17	1892.04	11.09	0.59
Hc19	386.94	0.07	0.02
Hc20	4.77		
Hc21	28.46	2.98	10.47
Hd1	44.39	1.27	2.86
Hh1	2878.58	137.71	4.78
Hh2	3126.35	96.90	3.10

Vegetation Code	Total area mapped (ha)	Combined impact area of HD and FMG Rail (ha)	% of total
Hh3	4149.7	137.19	3.31
Hh3/Hh10	243.8		
Hh3/Hp5	621.88	10.08	1.62
Hh4	16.09	1.44	8.95
Hh5	16531.13	119.24	0.72
Hh5/Hh6	283.6	7.13	2.51
Hh6	2408.6	21.47	0.89
Hh8	2588.54	13.86	0.54
Hh11	640.7	13.37	2.09
Hh12	0.44		
Hh13	1.64		
Hp3	1944.22	13.88	0.71
Hp4/Hp3	4939.35	6.19	0.13
Hp5	5584.98	51.94	0.93
Hp6	3827.08	43.62	1.14
Total	170076.32	3501.83	