28 September 2012 Document No. 06623099 793 Rev0

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PASMINCO CONTAMINATED WATER MANAGEMENT PLAN – POTENTIAL IMPACT OF INCITEC FERTILISER LIMITED SITE REMEDIATION ON REQUIRED STORAGE VOLUMES AND PUMP RATES

Dear Wayne

This letter provides interim advice on the likely contaminated water storage requirements at the Pasminco Cockle Creek Smelter (PCCS) site that would arise if the Incitec Fertiliser Limited (IFL) site is added to the PCCS site.

This work has been carried out in accordance with our email proposal dated 10 September 2012 and your instruction to proceed on 13 September 2012.

1.0 INTRODUCTION

The objective of this interim advice is to evaluate the potential impact of the addition of the IFL site to the PCCS site on the calculated required storage volumes for Contaminated Water Management Plan (CWMP) Dams.

No modelling was undertaken at this stage, however, the conceptual plan of remediation for the IFL site was evaluated in context with the current Remediation Action Working Plan (RAWP) staged remediation of the PCCS site. The locations of the RAWP areas are presented in Figure 1.

2.0 BACKGROUND AND CURRENT CONDITIONS

The required water storage capacities and required pump removal rates from various CWMP dams were previously calculated in response to the requirements presented in the Project Approval Conditions (Application No. 06_0184) for the site.

The calculated storages and pump rates, as well as underlying assumptions, are presented in the CWMP prepared by Golder (Golder, 2008), including the addendum prepared by Golder (Golder, 2010). The calculated storages and pump requirements from Golder (2008) are stated in the current Environment Protection License (EPL), No. 5042.

The 2010 addendum updated the calculated storage volumes at the site to reflect the current status of remediation at that time, namely concurrent 'active' remediation of RAWP Stage 4 and Stage 5. The calculated storage requirement during RAWP Stage 5 presented in Golder (2010) was essentially the same as that presented in Golder (2008).

The location of the 2008 CWMP dams is presented in Figure 2. Figure 3 presents the location of active and inactive CWMP catchment areas pertaining to concurrent RAWP Stage 4/5 and Figure 4 presents the

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location of active and inactive catchment areas pertaining to RAWP Stage 5. It is noted that each of these figures have been reproduced from previous reports.

Table 1 presents the Golder 2010 predicted required storage capacity and predicted required pump removal for concurrent RAWP Stage 4/5 and RAWP Stage 5. The predicted capacities and pump rates are dependent on the Effluent Treatment Plant (ETP) processing rate, assumed in the model to be 3,000 m^3/d. The current site discharge limit (EPL) is 3,500 m^3/d.

Table 1: Modelled Storage and Pump Requirement – CWMP Dams (Golder, 2010)

Storage Dam	2010 Capacity (m^3)	Required Capacity (m^3) and Required Pump Removal Rate (m^3/d)	
		Current RAWP Stage 4/5	*Updated RAWP Stage 5*
South West Dam/Dam D/Area 4H Dam	7,187 m^3	7,187 m^3 [c]550 m^3/d	No longer required
Saltwater Dam/Hawkes Dam 1 (HD1)/Hawkes Dam 2 (HD2)/Dam E[d]	18,489 m^3 / 13,312 m^3 / 0 m^3 / 7,000 m^3 = 38,801 m^3	[a]16,200 m^3 [b]3,000 m^3/d	[a]4,500 m^3 [b]3,000 m^3/d

[a]Including freeboard of 1,100 m^3 based on 25 yr ARI 24 hr rainfall event on surface area of remainder of HD1; [b]assuming an ETP capacity of 3,000 m^3/d; [c]transfer rate from South West Dam/Dam D/Area 4H Dam to Saltwater Dam/Hawkes Dam (HD1)/Hawkes Dam 2 (HD2)/Dam E; capacity of Dam E is 7,000 m^3.

At present, remediation is currently still underway in combined RAWP Stage 4/5; however, RAWP Stage 4 area is almost complete. Figure 5 presents the current remediation extent (progressive), as at 24 August 2012. It is understood that RAWP Stage 4 will be completed prior to commencement of remediation at the IFL site.

3.0 ADDITION OF IFL SITE TO CWMP

Dams

As RAWP Stage 4 is completed, South West Dam/Dam D/Area 4H Dam (combined capacity of 7,189 m^3) is to be converted into a sedimentation pond and will no longer be available as a CWMP dam. The required capacity in its role as a sedimentation pond is being calculated by others and is presented elsewhere.

As indicated in Table 1, the capacity of Saltwater Dam in 2010 was 18,489 m^3. This capacity will remain available. Dam E and a local extension named Ken's Dam was constructed in excess of the CWMP requirement and is at least 7,000 m^3. This capacity will remain available. It is noted that Hawkes Dam 1 and Hawkes Dam 2 will be fully infilled by Cell construction and will not be available as CWMP dams.

IFL Catchments

When the IFL site becomes 'active' in terms of the PCCS CWMP the run-off from the IFL site, eventuating from average monthly rainfall conditions, will be required to be captured and treated. As noted in Golder (2010), contribution from the IFL site was not included in the PCCS CWMP due to IFL having its own surface water management plan at that time.

Whilst CWMP modelling has not been updated to directly account for the IFL catchment, Figure 3 indicates that the active RAWP Stage 4 catchment (area is 15.8 ha) is essentially equal to the IFL site (area is 16.4 ha). Therefore, it is proposed that the existing RAWP Stage 4 capture capacity and pump rates indicated in Table 1 be reallocated to capture run-off from the IFL site.

IFL Boundary Dams

For the purpose of this assessment, 3 stages of water management for the remediation have been shown in Figures 6, 7 and 8.

The equivalent *IFL remediation* storage capacity (7,187 m^3 with a pump removal rate of 550 m^3/d) is proposed to be installed at the IFL site boundary with the existing IFL dam in the north of the IFL site. The indicative locations of two IFL boundary dams are presented in Figure 6. The distribution of storage and pump capacity between the two boundary dams will be subject to further assessment.

Subsequent stages of remediation and water management at IFL are presented in Figures 7 and 8.

Containment Cell

It is noted that Cell Stages A and B1 in the eastern portion of the Cell are currently capped and are not active CWMP catchments. However, they will be temporarily reactivated as contaminated water regenerating catchments due to required changes to the Cell landform to include IFL material. The activation of Cell Stages A and B1 is likely to occur towards the end of the remediation.

Details of the proposed changes to the Containment Cell design and construction stages are presented elsewhere (Golder 2012).

Whilst the contribution of contaminated run-off from reactivated Cell Stages A and B1 has not been recalculated, it will be shown below that there is 6,500 m^3 excess capacity in downstream dams. This is expected to be more than sufficient since the equivalent contributing area of Cell Stages A and B1 is only 3 ha (catchment area multiplied by volumetric run-off coefficient, as per Golder (2010)).

Containment Cell Dams Freeboard

Contaminated run-off from the Containment Cell is subject to a freeboard requirement on the surface area of downstream storage dams equivalent to the 25 year Average Recurrence Interval (ARI), 24 hour duration design storm event. This equates to the rainfall volume of 216 mm.

Ferrier Hodgson have advised that, due to changes in site topography from the remediation, Saltwater Dam and Dam E/Ken's Dam now receives run-off directly from the Containment Cell and RAWP Stage 5 catchments. In the CWMP and 2010 Addendum, Saltwater Dam was configured as pump-in and pump-out. Hawkes Dam at that time received direct run-off.

Given the above, the freeboard requirement of Saltwater Dam and Dam E/Ken's Dam is 4,200 m^3 (surface area of 19,450 m^2 multiplied by 216 mm). This is a change to the 2010 Addendum freeboard of 1,100 m^3. The previous freeboard was based on the surface area of the remaining parts of Hawkes Dam 1.

Proposed Storage Capacities and Pump Rates

Table 2 presents the required storage capacity and pump rates update for the IFL remediation.

It is noted that the storage capacity and pump rates presented in Table 2 are based on an ETP processing rate of 3,000 m^3/d and calculated freeboard of 4,200 m^3 as indicated above.

Table 2: Proposed Storage and Pump Requirements – CWMP Dams with IFL site

Storage Dam	Current Capacity (m^3)	Required Capacity (m^3) and Required Pump Removal Rate (m^3/d)	
		IFL Remediation and RAWP Stage 5	*RAWP Stage 5*
IFL Boundary Dams	N/A	[f]7,187 m^3 [c]550 m^3/d	No longer required
Saltwater Dam/Dam E/Ken's Dam[d]	18,489 m^3 / 7,000 m^3 = 25,489 m^3	[a,e]19,300 m^3/(25,489) m^3 [b]3,000 m^3/d	[a]7,600 m^3 [b]3,000 m^3/d

[a]Including freeboard of 4,200 m^3 based on 25 yr ARI 24 hr rainfall event on surface area of Saltwater Dam/Dam E/Ken's Dam. Freeboard in 2010 Addendum was previously 1,100 m^3, based on surface area of Hawkes Dam only; [b]assuming an ETP capacity of 3,000 m^3/d; [c]transfer rate from IFL Boundary Dams to Saltwater Dam/Dam E/Ken's Dam; [d]current capacity of Dam E/Ken's Dam is 7,000 m^3, Hawkes Dams 1 and 2 no longer available; [e]it is recommended that the current storage capacity of 25,489 m^3 is maintained to provide allowance for run-off from Containment Cell Area A and B1. CWMP required capacity otherwise is 19,300 m^3 including freeboard; [f] IFL boundary dams capacity and pump rate to decrease progressively, as suggested by Figures 6 to 8.

Table 2 shows that 19,300 m^3 of dam capacity at the saltwater dam is required to adequately manage the proposed remediation. However, it is noted that contribution from Containment Cell Areas A and B1 has not been calculated directly; therefore it is recommended that the full currently available storage capacity in Saltwater Dam/Dam E/Ken's Dam of 25,489 m^3 is otherwise maintained in the interim.

4.0 CONCLUSIONS

PCCS propose to incorporate the IFL site into the site wide contaminated water management plan (Golder 2008, 2010). This will be achieved by the use of two contaminated water management dams on or adjacent

to the IFL site as well as by capturing contaminated and clean runoff from the IFL site in existing dams on the PCCS site.

For this purpose, it is proposed to apply current RAWP Stage 4/5 storage capacities and pump rates (formerly used to apply to South West Dam/Dam D/Area 4H Dam) to the dams at the boundary of the IFL site. The new remediation stage, in the CWMP, is referred to as the *IFL Remediation plus RAWP Stage 5*.

This is a reasonable reallocation due to the contributing area of RAWP Stage 4 being approximately equivalent to the IFL sub-catchments. An allowance has also been made to accommodate contribution from 'reactivated' Cell Stages A and B1 to Saltwater Dam/Dam E/Ken's Dam.

In summary, this letter demonstrated a viable approach for managing contaminated water from the IFL site within the CWMP.

5.0 REFERENCES

Golder, 2008. *Pasminco Cockle Creek Smelter – Contaminated Water Management Plan*. Reference No. 06623099_132_Rev2, dated 29 September 2008.

Golder, 2010. *Pasminco Contaminated Water Management Plan – Addendum*. Reference No. 06623099_495_Rev0, dated 20 May 2010.

Golder 2012, *Concept Design Report, Expansion of Pasminco Cockle Creek Smelter Containment Cell,* Reference No. 06623099_780_R_Rev0, September 2012

GOLDER ASSOCIATES PTY LTD

Dr Justin Bell
Senior Environmental Engineer

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Associate

JRB/DD,GRS/jrb

Attachments: Figure 1 – RAWP Areas (from Golder, 2010)
Figure 2 – Location of CWMP Dams (from Golder, 2010)
Figure 3 – Active Sub-Catchments: Combined RAWP Stage 4 and 5 (from Golder, 2010)
Figure 4 – Active Sub-Catchments: RAWP Stage 5 (from Golder, 2010)
Figure 5 – Current Remediation Extent – as at 24 August 2012 (adapted from RCA, 2012)
Figure 6 – Conceptual Water Management Strategy – IFL Remediation Stage 1
Figure 7 – Conceptual Water Management Strategy – IFL Remediation Stage 2
Figure 8 – Conceptual Water Management Strategy – IFL Remediation Stage 3
Limitations

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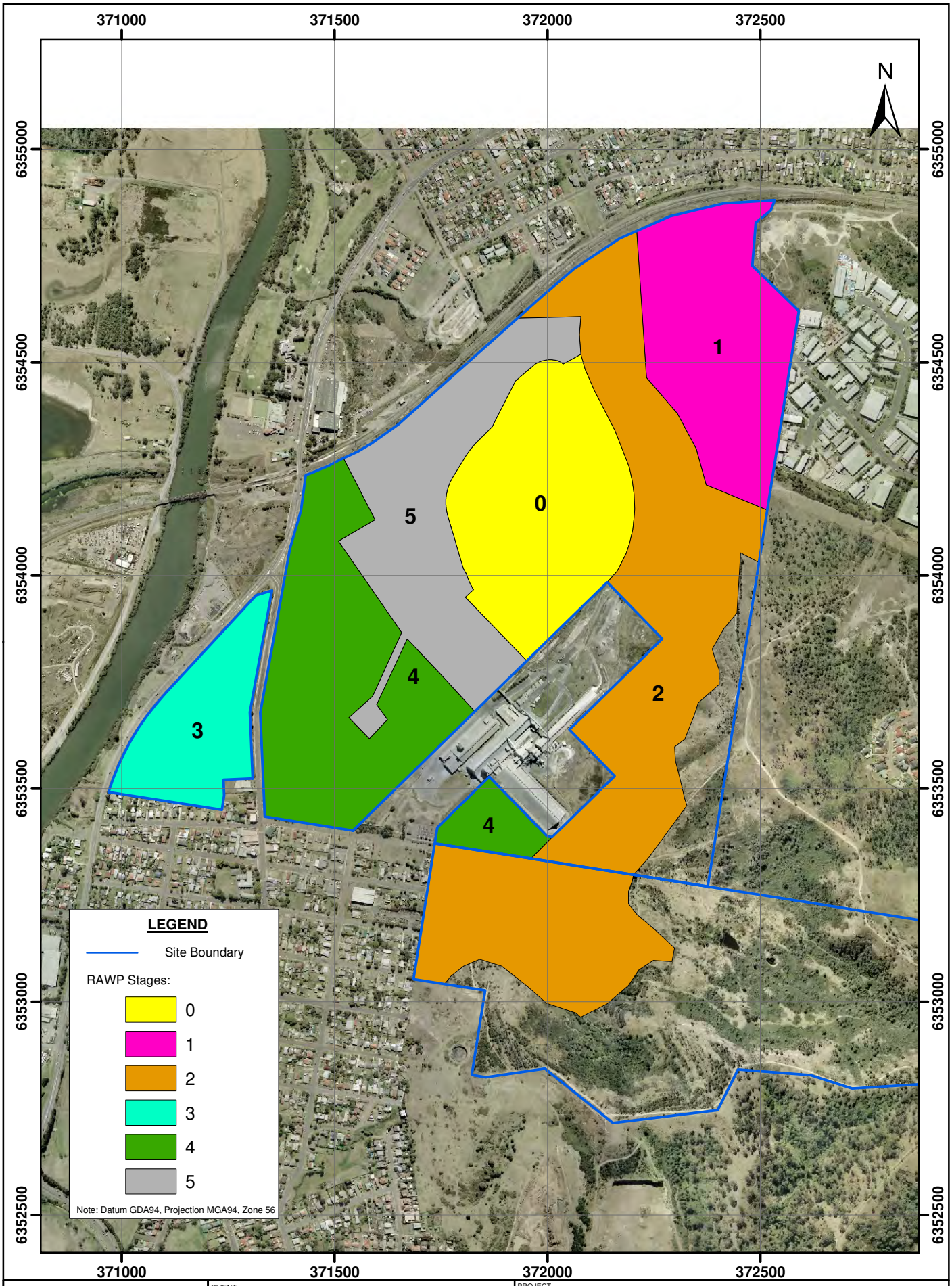

CLIENT: Ferrier Hodgson Pty Ltd		PROJECT: Pasminco Cockle Creek - CWMP Addendum	
DRAWN: JRB	DATE: 04-05-10	TITLE: **RAWP AREAS**	
CHECKED: DD*	DATE: 04-05-10		
SCALE: 1:12,000		PROJECT No: 06623099/495	FIGURE No: 1 / REV No: A / **A4**

File Location:
Note: The * beside the typed initials denotes the original drawing issue was signed or initialled by that respective person.

371000 371500 372000 372500

6355000 6354500 6354000 6353500 6353000

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DamA
DamB
DamE
Hawkes Dam 1
Hawkes Dam 2
Salt Water Dams
ETP
IPL Dam
DamD
South West Dam
DamC
Freshwater Dam
DamG
DamF

LEGEND

Unremediated Infrastructure & Areas

- Sub-Catchment
- Proposed Dam
- Existing Dam

Remediated Infrastructure & Areas

- Sub-Catchment
- Clean Dam

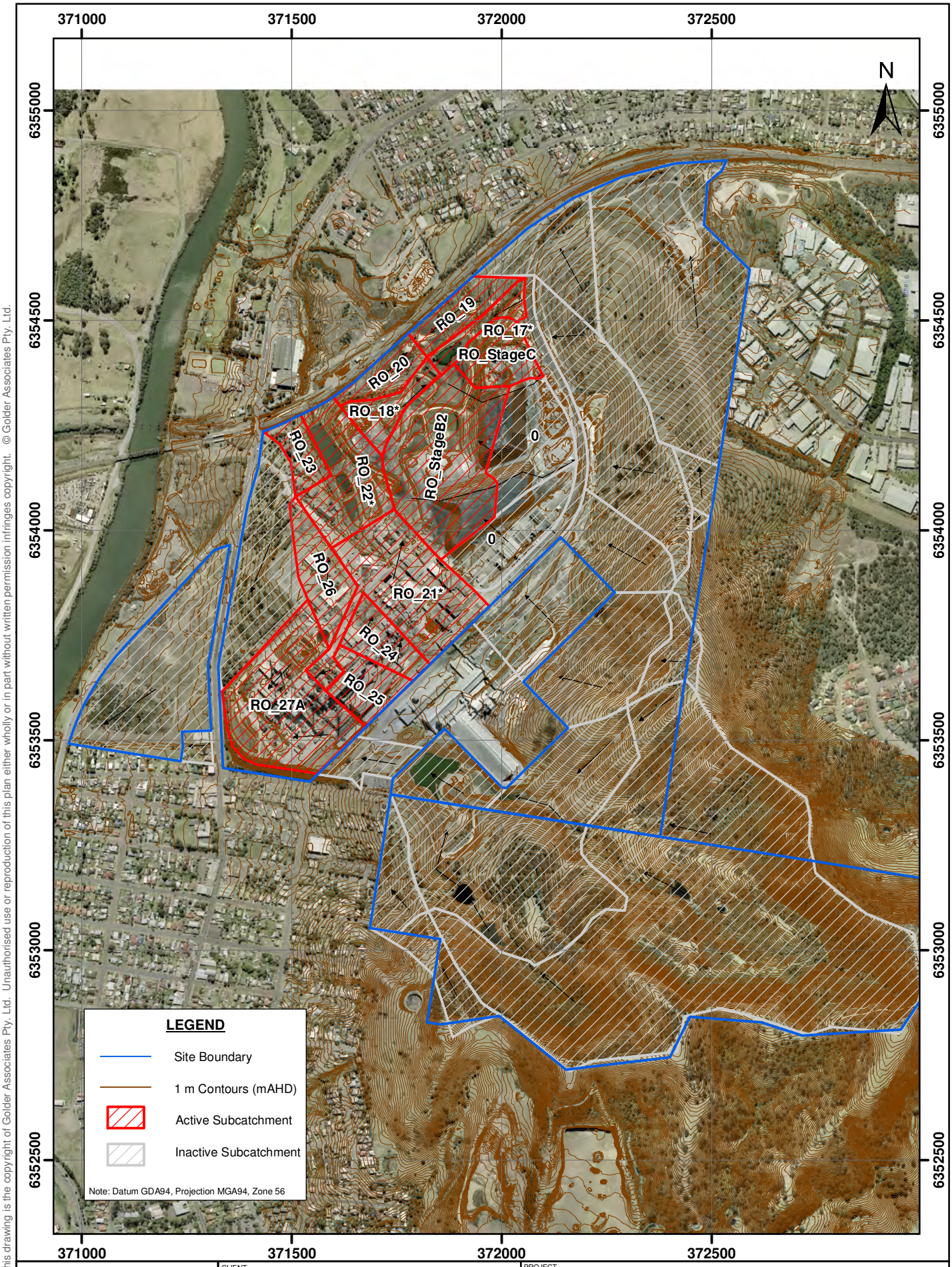
Note: Datum GDA94, Projection MGA94, Zone 56

CLIENT: Ferrier Hodgson Pty Ltd		PROJECT: Pasminco Cockle Creek - CWMP Addendum	
DRAWN: JRB	DATE: 04-05-10	TITLE: **LOCATION OF CWMP DAMS**	
CHECKED: GRS*	DATE: 04-05-10		
SCALE: 1:7,500		PROJECT No: 06623099/495	FIGURE No: 2 / REV No: A / **A3**

Golder Associates

File Location:

Note: The * beside the typed initials denotes the original drawing issue was signed or initialled by that respective person.



CLIENT: Ferrier Hodgson Pty Ltd		PROJECT: Pasminco Cockle Creek - CWMP Addendum	
DRAWN: JRB	DATE: 04-05-10	TITLE: **HYDROLOGIC SUBCATCHMENTS: CURRENT STATUS MODEL**	
CHECKED: DD*	DATE: 04-05-10		
SCALE: 1:12,000		PROJECT No: 06623099/495	FIGURE No: 3 / REV No: A / **A4**

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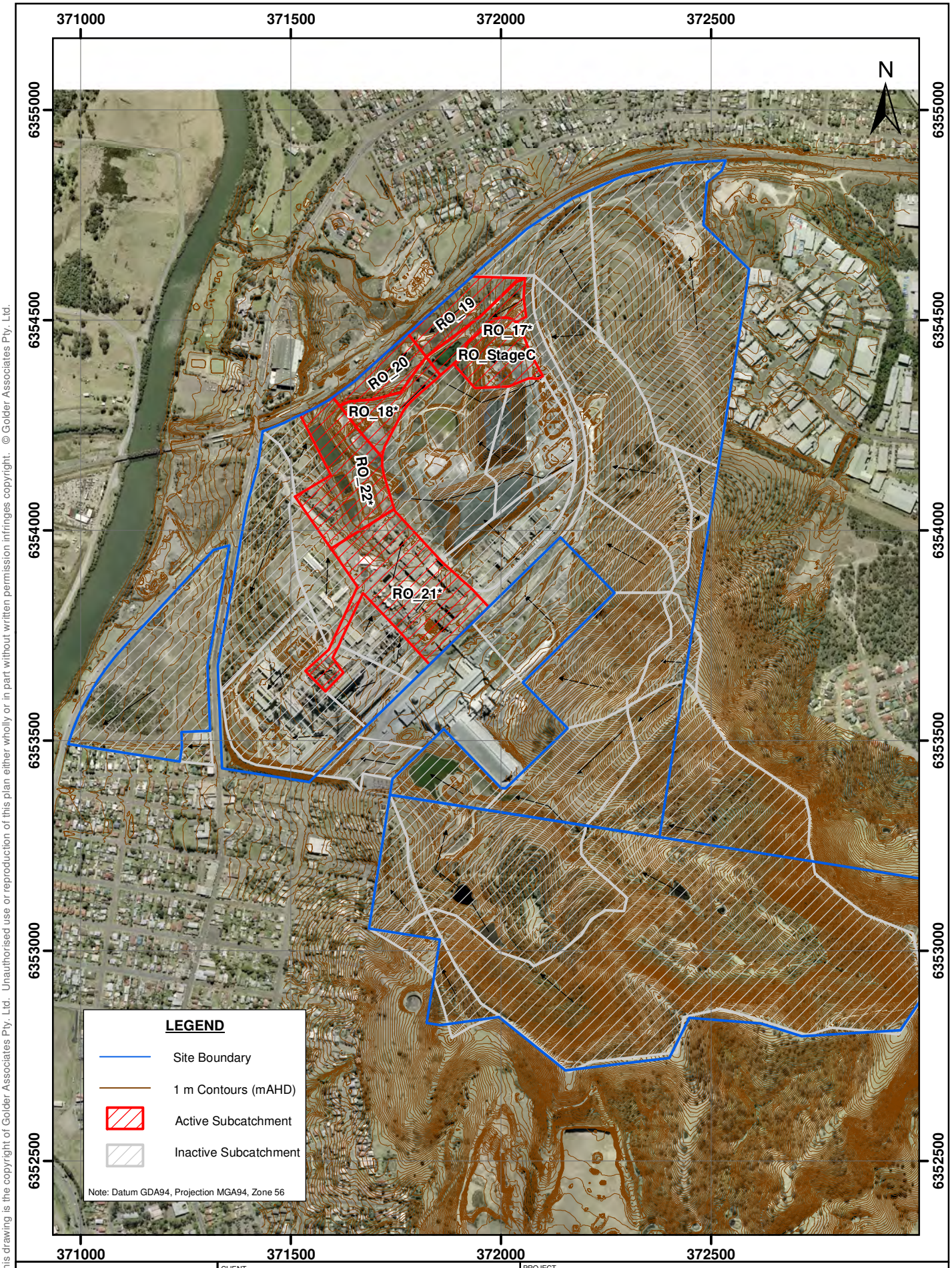
Note: The * beside the typed initials denotes the original drawing issue was signed or initialled by that respective person.



CLIENT: Ferrier Hodgson Pty Ltd		PROJECT: Pasminco Cockle Creek - CWMP Addendum	
DRAWN: JRB	DATE: 04-05-10	TITLE: **HYDROLOGIC SUBCATCHMENTS: UPDATED RAWP STAGE 5 MODEL**	
CHECKED: DD*	DATE: 04-05-10		
SCALE: 1:12,000		PROJECT No: 06623099/495	FIGURE No: 4 / REV No: A / **A4**

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CWMP - IFL REMEDIATION
PASMINCO COCKLE CREEK
SMELTER SITE,
BOOLAROO, NSW

FERRIER HODGSON

CURRENT REMEDIATION EXTENT - PCCS SITE

LEGEND

Remediated Areas

- Angophora Reserve
- Cardiff West Estate
- Parcel 2
- Parcel 3
- Parcel 4
- Parcel 5

NOTES

1. Remediated areas are sourced from RCA 2012 "Remediation and Validation Status August 2012, PCCS, Boolaroo (ref: 5542m-413/1 Rev3, dated 24/08/12)

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0 50 100 200 300 400 metres

SCALE (at A3) 1:7,500

DATUM GDA 94, PROJECTION MGA Zone 56

PROJECT: **06623099**
DATE: **18 SEP 2012**
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FIGURE 5

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CWMP - IFL REMEDIATION
PASMINCO COCKLE CREEK SMELTER SITE,
BOOLAROO, NSW

FERRIER HODGSON

SURFACE WATER MANAGEMENT STRATEGY - IFL REMEDIATION STAGE 1

LEGEND

- 'Clean' Stormwater Flow
- Contaminated Stormwater Flow
- 'Clean' Stormwater Pond
- Contaminated Stormwater Pond
- Remediated Area (IFL Site)

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0 50 100 200 300 400 metres

SCALE (at A3) **1:7,500**

DATUM GDA 94, PROJECTION MGA Zone 56

PROJECT: **06623099**
DATE: **18 SEP 2012**
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FIGURE 6

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CWMP - IFL REMEDIATION
PASMINCO COCKLE CREEK SMELTER SITE,
BOOLAROO, NSW

FERRIER HODGSON

SURFACE WATER MANAGEMENT STRATEGY - IFL REMEDIATION STAGE 2

LEGEND

- 'Clean' Stormwater Flow
- Contaminated Stormwater Flow
- 'Clean' Stormwater Pond
- Contaminated Stormwater Pond
- Remediated Area (IFL Site)

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0 50 100 200 300 400 metres

SCALE (at A3) **1:7,500**

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FIGURE 7

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CWMP - IFL REMEDIATION
PASMINCO COCKLE CREEK
SMELTER SITE,
BOOLAROO, NSW

FERRIER HODGSON

SURFACE WATER MANAGEMENT STRATEGY - IFL REMEDIATION STAGE 3

LEGEND

- 'Clean' Stormwater Flow
- Contaminated Stormwater Flow
- 'Clean' Stormwater Pond
- Contaminated Stormwater Pond
- Remediated Area (IFL Site)

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0 50 100 200 300 400 metres

SCALE (at A3) 1:7,500

DATUM GDA 94, PROJECTION MGA Zone 56

PROJECT: 06623099
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FIGURE 8

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