APPENDIX O

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APPENDIX 01

Addendum to the risk assessment

BHP Billiton

Olympic Dam Development Study

Addendum to the Risk Assessment

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Contents

1 Introduction

This report is an addendum to the 'Olympic Dam Development Study Risk Assessment' issued by Arup in 2008, and published in the BHP Billiton Olympic Dam Expansion Draft Environmental Impact Statement (Draft EIS) as Appendix C.

The report summarises the results of additional risk assessments undertaken in 2010 in response to specific requests by BHP Billiton.

The changes and additions to the risk assessment summarised in this report are further detailed in 'Arup 2010 - Technical Supplement to the Olympic Dam Development Study – Risk Assessment'. 'Arup 2010' supersedes 'Arup 2008 – Technical Supplement to the Olympic Dam Development Study – Risk Assessment'. As such, all references to 'Arup 2008' in the 'Olympic Dam Development Study Risk Assessment' (Draft EIS Appendix C) should now be replaced with 'Arup 2010'.

1.1 Purpose of the report

This addendum was necessary for two reasons:

- To respond to public submissions regarding the Draft EIS (detailed in section 1.2)
- To update the risk registers to cover changes and revisions to the proposed design (detailed in section 1.3)

This work is not a review of the of the pre-existing risk assessment ('Arup 2008') however, the opportunity was taken to update (where appropriate) the risk registers as a result of increased knowledge or to ensure consistency.

1.2 Public Comments

BHP Billiton received a number of public comments regarding the draft Olympic Dam Draft EIS. The relevant risk assessment comments are summarised in Table 1 below.

Table 1: Summary of Public Comments

Ref.	Desalination plant
a.	The likelihood that the risk profile is different than indicated for the desalination plant, given that the workshops assessed intake and outfall further out in Spencer Gulf than indicated in the EIS.
b.	Comment included with ID 24 [edit: ID 28] indicates that groundwater is not used for human consumption. However groundwater contaminated by leakage from the sludge /evaporations basins could have an impact on the marine environment through migration off-site. This would also need to be considered.
c.	It does not appear that potential impacts of chlorinated water on vegetation and the environment due to pipeline burst have been considered.

	Construction
d.	ID 24 and ID 25, does not include issue related to infiltration to soil and contamination of groundwater as a potential risk.
e.	ID 42 refers to sediment discharge due to excavation/dredging activities being a similar event to sediment from a storm. However the risks due to sediment from earthworks activities are additional to normal events and may result in an increased impact.
f.	ID 228, an additional item should be included to reflect the interim measures for wastewater treatment and associated risks.
	Roxby Downs Township
g.	ID 10-ID13, does not appear to consider the potential impacts of dust on vegetation.
h.	ID 74 does not appear to have considered the potential for groundwater contamination as a result of spills to soil and migration to groundwater.
i.	ID 87-ID 92, no consideration of seepage from wastewater lagoons and impact on groundwater.
	Process - Tailings
j.	ID 25, risk event refers to acid contamination and has not included contamination by heavy metals and radionuclides.
k.	ID 26, and increase in water levels would also increase the driving head and could have an impact on assumed groundwater migration and potential impact time frames.
l.	ID 60, failure of the base liner would result in increased seepage and impact on groundwater which has not been considered a credible risk.
	Process – Balancing ponds
m.	ID62, failure of the base liner would result in increased seepage and impact on groundwater which has not been considered a credible risk.
	Mining
n.	There is no consideration of seismic risks from de-stressing of rock during mining.
o.	ID 83-85. There appears to be no consideration of the risks of acid drainage in the low grade stockpile.
p.	ID 117, the fact that storage facilities are bunded does not necessarily mean that there would be low impacts. Long term leakage from storage tanks at low rates if not detected early can cause contamination of soil and groundwater. This could be an issue where limestone is near the surface, providing a preferential flow path to groundwater.
	Landing facility
q.	ID 14 refers to turbidity impacts on vegetation. In addition there could be impacts on marine fauna due to smothering as the sediment settles on the sea floor.
r.	ID 51 refers to noise levels exceeding pollution levels and medium risk levels. The EIS modelling indicates that noise levels exceed EPA levels, so risk levels perhaps should be high.

1.3 Changes to proposed design

The proposed design for the Olympic Dam Expansion has been changed since the issue of the Draft EIS and these are addressed in this section.

1.3.1 Installation of Outfall Pipeline

To avoid marine blasting in the rocky reef habitat, BHP Billiton would install the outfall pipeline for the desalination plant via tunnelling. Additional changes to design were identified in the public submission as seen in Table 1 and are addressed in section 3.1.1 of this report. The locations of the intake and outfall pipes in the current design are depicted in Figure 1 following.

Risk assessments were completed for tunnelling of the intake and outfall pipes, resulting in no intolerable risks. It should be noted that the proposed option in the Supplementary EIS (SEIS) is for tunnelling of the outfall pipe only, with the intake pipe remaining trenched.

Figure 1: Alignment of the intake and outfall pipelines

1.3.2 Access Corridor Alignment

The access corridor from the landing facility to Port Augusta is to be realigned as seen in Figure 2.

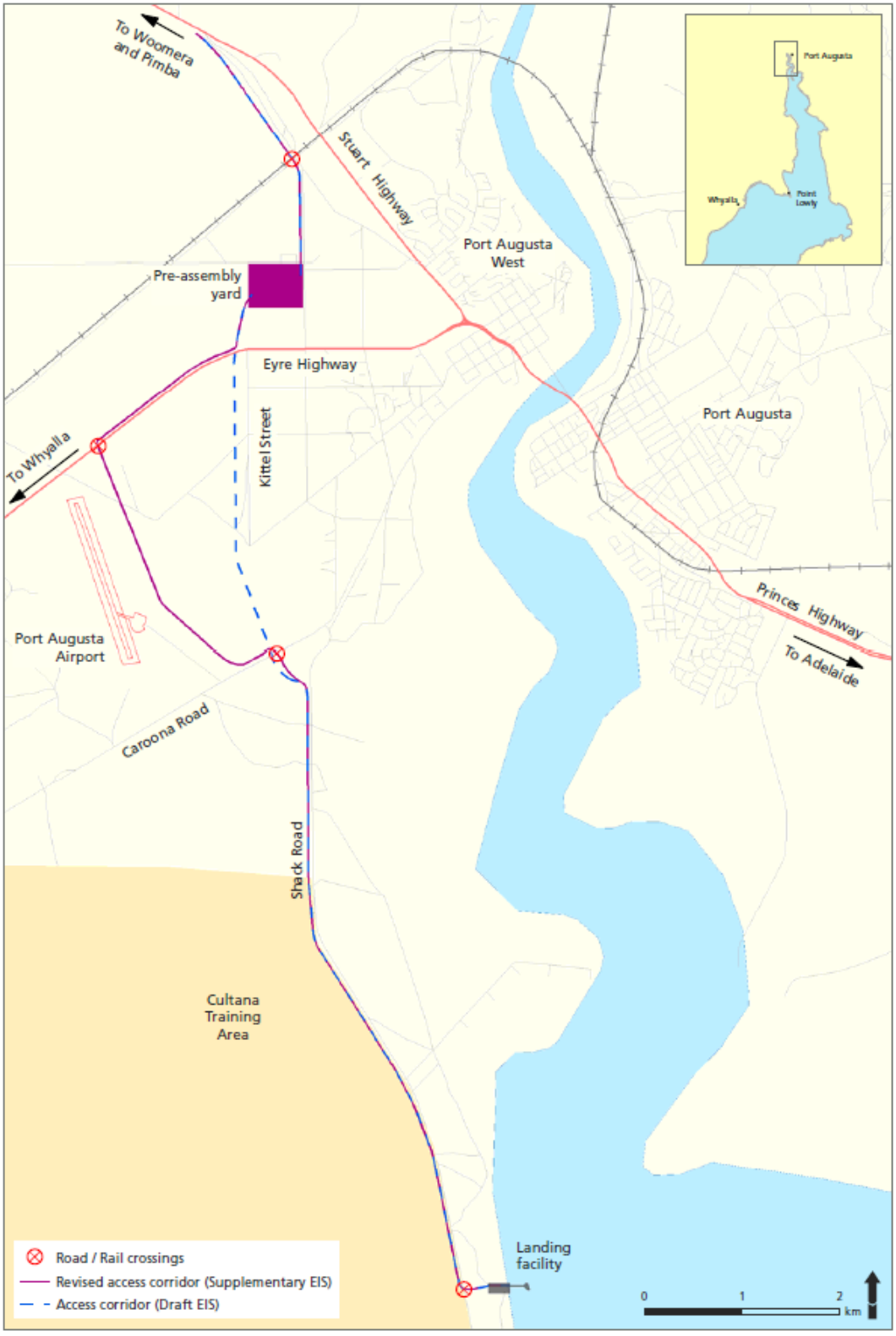

Figure 2: Revised access corridor route

2 Process

The risk assessments were conducted in an identical method as described in Chapter 26 and Appendix C of the Draft EIS.

To address the issues raised by the public comments to the Draft EIS specific sections of the following risk registers were revisited;

- Water Supply
- Construction
- Roxby Downs Township
- Process – Concentration/Tailing/Refining
- Process – Smelting
- Mining
- Landing Facility
- Access Corridor

3 Revised Risk Profiles

A summary of the results for the reviewed risk assessments are outlined below. Further details such as risk registers and various workshop notes are included in 'Arup 2010'.

3.1 Water Supply

This Section (3.1) supplements and updates Section 7.2 in Appendix C of the Draft EIS.

3.1.1 Overview of the Risk Assessment

The original workshop to assess the risks resulting from the supply of the additional water requirements to Olympic Dam to satisfy the needs for the expansion project was held on 3 July 2006.

A supplementary workshop was held on 21 April 2010 in response to public submissions (See Ref a. to c. in Section 1.2) and the changed design (alignment and length) of the outfall and intake pipes to the desalination plant discussed in Section 1.3.1.

Details of the workshop including the list of participants, the assumptions made and the issues addressed are presented in more detail in 'Arup 2010'.

3.1.2 Context and Scope

The context and scope of the water supply risk assessment is unchanged since the original assessment with the exception of the changed length and alignment of the intake and outfall pipes.

3.1.3 Risk Levels

The revised base risk levels associated with the water supply of Olympic Dam, including allowance for existing control and mitigation measures are summarised in Table 2 below.

Table 2: Summary of Revised Water Supply Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	4	0	0	0	0	0	0
H	37	8	3	7	4	15	3
M	15	18	10	12	10	11	3
L	0	22	19	18	14	10	7

The revised residual risk levels allowing for additional control and mitigation measures are summarised in Table 3 below.

Table 3: Summary of Revised Water Supply Residual Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	0	0	0	0	0	0
H	38	8	2	7	4	15	3
M	18	18	10	12	10	11	3
L	0	22	19	18	14	10	7

The summary of changes to or differences between the risk registers as published in the Draft EIS (Appendix C) and 'Arup 2008' and the current as reviewed risk registers are presented in Table 4 below.

Table 4: Summary of the Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	2	2	0	0	0	0	0	0	1	1	0	0
L	0	0	-1	-1	2	2	1	1	1	1	1	1	0	0

There were no new High or Extreme rated risk events identified for the Water Supply Risk Assessment. There were two newly identified risk events resulting from public comments, equating to two new Medium and five new Low risk ratings. One existing Low rated risk event was upgraded to a Medium.

3.1.4 Additional Control and Mitigation Measures

There were no new or upgraded Extreme rated risk events identified, therefore no additional control or mitigation measures beyond what was listed in the original workshop are required.

3.1.5 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid.

3.2 Construction Phase

This Section (3.2) supplements and updates Section 7.4 in Appendix C of the Draft EIS.

3.2.1 Overview of the Risk Assessment

The original workshop schedule consisted of three workshops for the construction phase:

- 9August 2006 – Assessment of the risk profile for the whole of project
- 13 March 2008 – Discussion of threats posed by the upgrade of existing process plant (Brownfields)
- 23 October 2008 – A workshop to discuss issues relating to blasting as method of construction of the desalination plant at Pt Lowly.

Two workshops were conducted during the 2010 risk assessments. The first was conducted on 21 April 2010 to address issues raised through public submissions (See Ref d. to f. in Section 1.2). The second workshop was held 27 May 2010 and focussed solely on the risks associated with the proposed tunnelling method as described in Section 1.3.1.

Details of the workshop including participants, assumptions made and issues addressed are presented in more detail in 'Arup 2010'.

3.2.2 Context and Scope

The scope of this workshop was changed to note the risks associated with a tunnelling method for the construction intake and outfall pipelines for the desalination plant.

3.2.3 Risk Levels

The base risk levels associated with the construction phase allowing for existing control and mitigation measures are summarised in Table 5 below.

Table 5: Summary of the Revised Construction Phase Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	5	0	0	0	0	0	0
H	117	12	10	0	7	5	0
M	88	44	10	16	26	24	1
L	37	66	62	48	25	43	32

The residual risk levels after allowing for additional control and mitigation measures are summarised in Table 6 below:

Table 6: Summary of the Revised Construction Phase Residual Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	0	0	0	0	0	0
H	121	12	10	0	7	5	0
M	89	44	10	16	26	24	1
L	37	66	62	48	25	43	32

The summary of changes to or differences between the risk registers for the construction phase as published in the Appendix C of the Draft EIS and 'Arup 2008' and the current as reviewed risk registers are presented in Table 7 below.

Table 7: Summary of Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.
E	2	0	0	0	0	0	0	0	0	0	0	0	0	0
H	17	18	4	4	1	1	0	0	2	2	1	1	0	0
M	15	16	7	7	2	2	3	3	2	2	5	5	0	0
L	2	2	26	26	10	10	14	14	1	1	15	15	1	1

The 2010 risk assessment found a total of 85 new line items - seven attached to previously identified hazards and 78 entirely new ones relating to tunnelling. This represents 2 Extreme base risk ratings, 25 High, 34 Medium and 69 Low. Additional controls reduced ratings to 26 High, 35 medium and 69 Low.

3.2.4 Additional Control and Mitigation Measures

The following additional actions further to those already identified and noted in Appendix C of the Draft EIS were identified to achieve a tolerable residual risk profile and are presented in Table 8 below.

Table 8: Additional Control and Mitigation Measures

ID No.	Controls and Actions Required
7.4/398	Life vest, secure boat, licensed captain (standard maritime safety measures)
7.4/410	Start surveillance (patrol area) 2 hours before blasting to ensure area clear. Increase number of vessels patrolling safe perimeter to four at time of blast and position additional surveillance vessel up current from blast to cover wider and more distant arc.

3.2.5 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid with the implementation of the new control and mitigation measures.

3.3 Roxby Downs Township

This Section (3.3) supplements and updates Section 7.6 in Appendix C of the Draft EIS.

3.3.1 Overview of the Risk Assessment

The original workshop covering the expansion of the Roxby Downs Township was conducted on 6 September 2006.

A second workshop was conducted on 21 April 2010 to revise the risk profile in response to public submissions (See Ref g. to i. in Section 1.2).

Details of the workshop including participants, assumptions made and issues addressed are presented in more detail in Arup 2010.

3.3.2 Context and Scope

The context and scope of the risk assessment has not changed since the original risk workshop.

3.3.3 Risk Levels

The revised base risk levels associated with the township expansion are summarised in the table below.

Table 9: Summary of Revised Roxby Downs Township Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	0	0	0	0	0	0
H	23	34	5	3	4	1	1
M	19	15	1	2	4	6	11
L	4	19	5	3	4	3	3

As the risk assessment did not identify any unacceptable risk events, there was no requirement to apply additional control and mitigation measures. As such, the residual risk levels are unchanged from the base risk levels.

The summary of changes to or differences between the risk registers for the expansion if the Roxby Downs Township as published in the Draft EIS (Appendix C) and ‘Arup 2008’ and the current as reviewed risk registers are presented in Table 10 below.

Table 10: Summary of Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.

E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	1	1	3	3	0	0
L	0	0	0	0	2	2	0	0	-1	-1	1	1	0	0

Six new risk events were added in response to public comments, representing three Medium and three Low rated risk events.

3.3.4 Additional Control and Mitigation Measures

As there were no unacceptable risks (neither new or previously identified) there are no required additional control and mitigation measures.

3.3.5 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid.

3.4 Process Plant – Concentration, Tailings and Refining

This Section (3.5) supplements and updates Section 7.8 in Appendix C of the Draft EIS.

3.4.1 Overview of the Risk Assessment

The original schedule of workshops regarding the process plant, including all concentration, tailing and refining activities, is as follows

- 21 September 2006 - Risks resulting from the operation of the concentration, tailing and refining modules of the processing plant at Olympic Dam
- 3 and 23 April 2008 - Mini workshops to discuss threats posed by the tailing storage facilities with respect to wading birds
- 22 May 008 – further workshop to discuss issues and threats pertaining to wading and open water birds

Two workshops for the revised risk assessments were held to review the risk register in response to public submissions (see Ref j. to l. in Section 1.2). The first was held on 22 April 2010 to discuss risks related to the tailings and balancing ponds (see Ref m. in Section 1.2). The second was held on 22 May 2010 to cover the remaining risks related to the process plant.

3.4.2 Context and Scope

The context and scope of the risk assessment has not changed since the original risk workshops.

3.4.3 Risk Levels

The revised base risk profile associated with the process plant are summarised in Table 11 below.

Table 11: Summary for Revised Process Plant Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	5	3	0	2	0	0	1
H	36	24	11	19	6	12	2
M	21	21	16	4	15	7	3
L	16	28	24	31	9	20	2

The revised residual risk profile associated with the process plant is summarised in Table 12 below.

Table 12: Summary for Revised Process Plant Residual Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	2	0	2	0	0	0
H	40	24	10	18	6	12	3
M	22	22	17	5	15	7	3
L	16	28	24	31	9	20	2

The summary of changes to or differences between the risk registers as published in the Draft EIS (Appendix C) and 'Arup 2008' and the current as reviewed risk registers are presented in Table 13 below.

Table 13: Summary of Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0	0	0	2	2	0	0
M	0	0	2	2	0	0	0	0	0	0	1	1	0	0
L	0	0	1	1	0	0	1	1	0	0	3	3	0	0

There were five revised and two new risk events based on public submissions.

This represents the addition of two High rated base risk ratings, three Medium and four Low.

3.4.4 Additional Control and Mitigation Measures

None of the risk events that were new or revised represented an unacceptable risk, therefore no additional control and mitigation measures are required beyond those identified in the additional risk assessment.

3.4.5 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid.

3.5 Mining

This Section (3.6) supplements and updates Section 7.11 in Appendix C of the Draft EIS.

3.5.1 Overview of the Risk Assessment

This workshop assessed the risks posed by the development of an open pit mine at Olympic dam.

The original workshops were held in Adelaide on the 19 October 2006 and 3 March 2008.

A workshop was conducted in Adelaide on 22 April 2010 to update the risk register in light of public submissions (see Ref n. to p. in Section 1.2). Details of this workshop including the list of participants, the assumptions made and the issues addressed are presented in more detail in 'Arup 2010'.

3.5.2 Context and Scope

The context and scope of this risk assessment is unchanged from the original risk assessment.

3.5.3 Risk Levels

The revised base risk levels for the mining process including allowance for existing control and mitigation measures are summarised in Table 14 below.

Table 14: Summary for Revised Mining Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	1	0	0	0	0	0	0
H	32	4	3	4	1	1	4
M	43	9	4	4	3	4	1
L	22	15	7	8	10	6	2

The residual risk levels after allowing for additional control and mitigation measures are summarised in Table 15 below.

Table 15: Summary for Revised Mining Residual Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	0	0	0	0	0	0
H	32	3	3	4	1	1	4
M	44	9	4	4	3	4	1
L	22	16	7	8	10	6	2

The summary of changes to or differences between the risk registers as published in the Draft EIS (Appendix C) and 'Arup 2008' and the current as reviewed risk registers are presented in Table 16 below.

Table 16: Summary of Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	1	1	1	1	1	1	1	1	0	0	1	1	1	1
M	0	0	0	0	0	0	0	0	1	1	1	1	0	0
L	1	1	1	1	0	0	0	0	0	0	0	0	0	0

Six revised and five new risk events identified as a result of public submissions. Five of the revised risks did not create changes to the risk profile, while one had an upgraded risk rating from Medium to High.

These changes represented no new Extreme rated base risk ratings, six new High risk ratings, three Medium and two Low.

3.5.4 Additional Control and Mitigation Measures

As there were no new Extreme risk events as a result of additional or reviewed risks, there were no required additional control and mitigation measures beyond those identified in the original risk assessment.

3.5.5 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid.

3.6 Landing Facility

This Section (3.7) supplements and updates Section 7.12 in Appendix C of the Draft EIS.

3.6.1 Overview of the Risk Assessment

The original workshop for the assessment of risks relating to the construction, operation and decommission of the landing facility planned for construction south of Port Augusta was conducted in Adelaide on 13 September 2007.

A second workshop to review the risk register in response to public submissions was held on 21 April 2010 (see Ref q to r in Section 1.2). Details of this workshop including the list of participants, the assumptions made and the issues addressed are presented in more detail in 'Arup 2010'.

3.6.2 Context and Scope

The context and scope of this risk assessment has not changed since the initial risk assessment in 2007.

3.6.3 Risk Levels

The revised base risk levels associated with the landing facility, allowing for existing control and mitigation measures are summarised in Table 17 below.

Table 17: Summary of Revised Landing Facility Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	1	0	0	0	0	0
H	4	4	0	0	0	0	0
M	12	9	10	8	2	7	3
L	7	19	14	13	0	6	4

The residual risks after allowing for additional control and mitigation measures are summarised below.

Table 18: Summary of Revised Landing Facility Residual Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	0	0	0	0	0	0
H	4	5	0	0	0	0	0
M	12	9	10	8	2	7	3
L	7	19	14	13	0	6	4

The summary of changes to or differences between the risk registers as published in the Draft EIS (Appendix C) and 'Arup 2008' and the current as reviewed risk registers are presented in Table 19 below.

Table 19: Summary of Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.
E	0	0	1	0	0	0	0	0	0	0	0	0	0	0
H	0	0	1	2	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Following public submission, three new risk events added to the risk register. One of the new risk events was not considered to be a credible risk, one was rated High and one Extreme. After additional control and mitigation both of the new risk events were reduced to a rating of Low.

3.6.4 Additional Control and Mitigation Measures

To achieve a residual risk profile with no unacceptable risk events the following additional actions would be undertaken and included in the delivery of the project.

Table 20: Additional Control and Mitigation Measures

ID	Additional controls and Actions required
7.12/50a	Various measures will be implemented to satisfy affected land owners.

3.6.5 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid with the application of the of the additional control measure.

3.7 Access Corridor

This Section (3.8) supplements and updates Section 7.13 in Appendix C of the Draft EIS.

3.7.1 Overview of the Workshop

The initial risk workshop assessing the construction of a private access corridor between the landing facility and the Port Augusta pre-assembly yard on the outskirts of Port Augusta was held on 13 September 2007.

A second workshop was conducted on 26 May 2010 to revise the risk profile resulting from the realignment of the access corridor (see Section 1.3.2). Details of this workshop including the list of participants, the assumptions made and the issues addressed are presented in more detail in 'Arup 2010'.

3.7.2 Context and Scope

The scope of the risk workshop has been revised due to changes to the alignment the access corridor as outlined in Section 1.3.2.

3.7.3 Risk Levels

The base risk levels associated with the Haul Corridor allowing for existing control and mitigation measures are summarised in Table 21 below.

Table 21: Summary of Revised Haul Corridor Base Risk Levels

Number of Risk Events for Each Risk Level							
	OHS	Social	Flora	Fauna	Physical	Water	Air
E	0	0	0	0	0	0	0
H	6	2	0	0	1	0	0
M	5	5	4	2	1	0	0
L	6	15	3	6	2	1	2

As the risk assessment did not identify any unacceptable risks, there was no requirement to apply additional control and mitigation measures and the residual risk profile is unchanged from the base risk profile.

The summary of changes to or differences between the risk registers as published in the EIS (Appendix C) and 'Arup 2008' and the current as reviewed risk registers are presented in Table 22 below.

Table 22: Summary of Changed Risk Levels

	OHS		Social		Flora		Fauna		Physical		Water		Air	
	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.	Base	Res.
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	2	2	0	0	0	0	0	0	0	0	0	0	0	0
M	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0
L	-1	-1	2	2	0	0	0	0	0	0	0	0	0	0

There were six newly identified risk events and two revised risk events as a result of public submissions. This represents to two risk events upgraded to High and two new Low rated risk events.

3.8 Additional Control and Mitigation Measures

As there were no unacceptable risk events for the alignment of the access corridor (neither new or previously identified) there are no required additional control and mitigation measures.

3.8.1 Conclusion

The original conclusion as detailed in Appendix C of the Draft EIS remains valid.

4 Conclusion

4.1 Additional Control and Mitigation Measures

The risk assessment process identified some events that presented an unacceptable risk. Various mitigation measures, designed to reduce the potential risk exposure were investigated and a preferred mitigation measure (or measures) identified. For completeness, a list of all the required control and mitigation measures identified through the whole risk assessment are listed below. Items highlighted in pink were identified during the 2010 risk assessments; all other items were identified during the original schedule of workshops. A residual risk ranking was developed assuming the successful implementation of the mitigation measures.

Table 23: Complete Summary of Additional Control and Mitigation Measures

App.	Risk ID[1]	Additional Control and Mitigation Measures
Transport	7.1/07	The rail level crossings to either be signalled or preferably avoided by the construction of overpasses
	7.1/472	BHP Billiton to seek permission for PAMs requiring road closure to travel at night along the Stuart Highway between Port Augusta and Pimba
	7.1/472 7.1/475 7.1/476 7.1/478	The traffic management plan will ensure that all over dimensional loads will use passing bays and/or other alternative means to minimise delays to other users of the road system, by allowing the vehicles to overtake safely. A comprehensive communications program which will include media advertising, signage and on-line information, will be implemented to inform road users of the proposed timing of all over-dimensional load movements.
Water Supply	7.2/11 7.2/52 7.2/89	All structures in the ocean associated with the intake or outfall pipe work at the desalination plant must be below the surface or designed such that access is not possible without special physical aids.
	7.2/25	The intake and outfall pipeline must not be located within the Santos site (if desalination plant is located at Point Lowly) and must be a reasonable or safe distance (to achieve vapour separation distance) from the Santos boundaries. The discharge pipe must not be located on Santos Jetty.
Construction	7.4/308 7.4/309	Provide exclusion zones and effective barriers; provide adequate coordination between activities. Undertake risk assessments. The construction process is fully implemented and detailed work planning is undertaken before the commencement of work. Undertake constructability reviews and workshops, construction modules. Consider extended shutdowns to achieve separation.
	7.4/324 7.4/410	Start surveillance (patrol area) 2 hours before blasting to ensure area clear. Increase number of vessels patrolling safe perimeter to four at time of blast and position additional surveillance vessel up current from blast to cover wider and more distant arc.
	7.4/398	Life vest, secure boat, licensed captain (standard maritime safety measures)

Decommission and Rehabilitation	7.5/45	If habitat that may have established around the intake/outfall pipeline of the desalination plant is considered important or significant, then the sub-surface structures are to be made safe and to remain in place and as such the risk is completely eliminated.
	7.5/162	Use rail to remove Roxby Downs township and Camp 5 (prior to the removal of the rail track)
	7.5/246	Remove process plant, equipment and materials by rail.
Smelting	7.7/66	Improved design of the ventilation system. Control the amount of recycle dust and electric furnace revert charge rate
Concentration Tailings and Refining	7.8/01	Install dust suppression and/or water spraying capability on the ore stockpile
	7.8/46	Install barriers along perimeter roads of balancing ponds (prevent the vehicles from leaving the road). Provide tether points with harnesses for operators working in the area. Provide permanent acid resistant ropes into the pond at several points around the pond edges
	7.8/66	Install barriers along the access road to prevent the vehicles leaving the road (falling into decant area). Provide tether points with harnesses for operators working in the area. Provide permanent ropes into the pond at several points around the pond edges
	7.8/92	Install barriers along perimeter roads of evaporation ponds (prevent the vehicles from leaving the road). Provide tether points with harnesses for operators working in the area. Provide permanent ropes into the pond at several points around the pond edges
	7.8/114	Install barriers along the access road to prevent the vehicles leaving the road (falling into decant area). Provide tether points with harnesses for operators working in the area. Provide permanent ropes into the pond at several points around the pond edges
	7.8/127	Install barriers along perimeter roads of evaporation ponds (prevent the vehicles from leaving the road). Provide tether points with harnesses for operators working in the area. Provide permanent ropes into the pond at several points around the pond edges
Energy	7.10/75-78 and 7.10/80-84	Electricity demand to be confirmed by 2009. Prior to that, an EIO will be released. Contracts to be in place in 2009, based on the commissioning of the new processing plant by 2014.
Mining	7.11/52	Camp 1 to be closed prior to mineralised rock being placed closed enough to cause an issue. Radiation levels to be monitored in this area.
	7.11 / 71	Monitoring wells to be installed to ensure water loss from aquifer into pit not excessive (ie does not result in impact to Yarrawurta Springs.
Landing facility	7.12/50a	Various measures will be implemented to satisfy affected land owners.

Gas Pipeline	7.15/01	Review and update detailed mapping of the mound spring area and update as required information onto the proposed pipe route. Implement peer review strategies. Implement inspection strategies.
	7.15/53	Construct in manner that does not attract attention to corridor, fence or other to prevent easy access to pipeline access road and provide signage to warn of dangers and advise of trespassing, etc.

4.2 Unacceptable Risk Events

Despite the application of additional controls and mitigation measures producing the residual risk levels, two remaining risk events are deemed to be unacceptable and as such would suggest that the associated activity should not be undertaken. These are summarised in Table 24 below.

Table 24: Summary of Unacceptable Risk Events

Risk Assessment	ID	Hazard/ Threat	Fault/ Failure/ Cause	Risk Event/ Impacts	Unacceptable Activity
Process: Concentration/ Tailings/ Refining	7.8/128	Acidic liquor (Evaporation Ponds Option)	Visitation by fauna	Fatality rate of listed species exceeds current death rate	Inclusion of the evaporation ponds option in the design of the tailing storage facility
	7.8/129	Acidic liquor (Evaporation Ponds Option)	Visitation by fauna	Fatality rate of general species exceeds current death rate	Inclusion of the evaporation ponds option in the design of the tailing storage facility

It is noted that these hazards and threats are not being proposed as part of the project.

5 SUMMARY

Based on the analysis of the updated risk assessments for the proposed expansion of the Olympic Dam Development it is reasonable to conclude that the project does not pose any unacceptable risks to the environment, community, public or employees.

This conclusion is based on the following:

- The project is built to a size, scale, capacity, location etc as listed on the various assessments
- That existing identified control and mitigation measures are properly and fully implemented
- That additional control and mitigation measures (as described in section 4) are properly and fully implemented
- That those activities that have been identified as posing an unacceptable risks are not undertaken
- That the principles of ALARP are applied during the detailed design phase to those risk events with a High or Moderate risk level