



(North Western Energy Pty Ltd; Pacific Hydro Group Two Pty Ltd; and Energis Australia Pty Ltd) Ord Hydro Pty Ltd

Ord Hydro Asset Management System Review

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Report Prepared
By: Leigh Jarman
Senior Reliability
Engineer
ARMS Reliability

Report Approved for Issue
By: Kerry Butler
Operations Manager
ARMS Reliability

Report Approved for Release
By: Kate Summers
Regulatory Compliance
Manager

EXECUTIVE SUMMARY

ARMS Reliability Engineers were commissioned by Ord Hydro Pty Ltd (a wholly owned subsidiary of Pacific Hydro Pty Ltd) to complete a review of the Asset Management system that Ord Hydro Pty Ltd applies for its Ord Hydro asset located at Lake Argyle, Western Australia. This review was completed as a requirement of the Integrated Regional Licence issued by the Economic Regulation Authority of Western Australia to North Western Energy Pty Ltd, Pacific Hydro Group Two Pty Ltd and Energis Australia Pty Ltd, referred to throughout this document as Ord Hydro Pty Ltd.

This report details findings of the audit team of the Asset Management System review.

The asset management system established by Pacific Hydro for the management of Ord Hydro asset was found to be effective. This was determined via execution of the audit plan and examination of 12 asset management processes prescribed by the Authority. This is further evident within the service compliance to Ord Hydro Pty Ltd's two customers Argyle Diamond Mine and Horizon Power. To date no claims for damages or non-conformances have been received from these parties.

Although the individual elements of the asset management system appear functional in the management of the asset, there is no formal Asset Management Strategy document in place that outlines the procedures and methods of each of the 12 key asset management processes examined by this audit. The need of such document has been identified by Ord Hydro Pty Ltd, and drafting has commenced. This document would provide a central reference point to the investment, operation and maintenance and disposal of the asset.

It is important to note, throughout this audit the size and resource allocation within this asset was taken into account. The asset is small in nature and staff allocation, hence flooding the company with procedures may prove detrimental and benefit would be diminished.

A summary table of Ord Hydro Pty Ltd's effectiveness rating under each of the 12 key processes is shown below. The full table is included in Appendix B.

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AMS	Not performed	Performed informally	Planned & tracked	Well Defined	Quantitatively controlled	Continuously improving
Process Effective Rating	0	1	2	3	4	5
Asset Planning				X		
Asset creation/acquisition					X	
Asset disposal			X			
Environmental analysis					X	
Asset Operations					X	
Asset Maintenance					X	
Asset Management Information system					X	
Risk Management				X		
Contingency planning					X	
Financial planning					X	
Capital expenditure planning				X		
Review of AMS		X				

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1 INTRODUCTION

1.1 General

In October 2008 ARMS Reliability Engineers were commissioned to complete a review of the Asset Management system that Ord Hydro Pty Ltd applies for its Ord Hydro asset located at Lake Argyle. This review was completed as a requirement of the Integrated Regional Licence issued by the Economic Regulation Authority of Western Australia to North Western Energy Pty Ltd, Pacific Hydro Group Two Pty Ltd and Energis Australia Pty Ltd, referred to throughout this document as Ord Hydro Pty Ltd.

The review was completed against twelve (12) asset management processes prescribed by the Authority.

1.2 Objective and Scope

As per Section 2.1 Clause A of the Integrated Regional Licence document, an Integrated Regional Licence is required to “supply electricity to customers otherwise than through the South West Interconnected System”. Within the license conditions the Licensee must provide for an asset management system in relation to the generating works, distribution system and transmissions systems.

The asset management system is defined in the licence definitions as “the measures that are to be taken by the licensee for the proper maintenance, expansion or reduction of the generating works or distribution system.”

As per Section 24.3 of the Integrated Regional Licence document, the licensee must, unless otherwise notified in writing by the Authority, provide the Authority with a report as to the effectiveness of the asset management system within 24 months after the commencement date, and every 24 months thereafter.

In addition to the above, Section 24.4 of the Integrated Regional Licence document, states that “the licensee must comply, and must require the licensee’s expert to comply, with the Authority’s standard guidelines dealing with the asset management system, including any minimum requirements relating to the appointment of the expert, the scope of the review, the conduct of the review and the reporting of the results of the review”

ARMS Reliability Engineers were engaged to complete the review of the asset management system, in accordance with Section 24.6 of the Integrated Regional Licence document, to complete the review as detailed in Section 24.3. The purpose of the review was to examine the effectiveness of the processes used within the operation and maintenance of the Ord Hydro

assets, along with the information systems, data and knowledge that is utilised for the decision making process.

2 ASSET MANAGEMENT SYSTEM EFFECTIVENESS REVIEW

2.1 Scope of the Asset Management System Review

This review has been established as a requirement of Section 24.3 of the Integrated Regional License. The review was completed as per Ord Hydro Pty Ltd's Asset Management Systems Audit Plan. The audit plan for the asset management system review conducts a risk assessment of the control procedures in place for the effective management of the licensee's assets.

The objective of the asset management review is to assess twelve elements of asset management. It identified, as outlined in the audit guideline document, compliance effectiveness within a 6 point rating scale, within the following 12 assessment areas:

1. Asset Planning
2. Asset creation/acquisition
3. Asset disposal
4. Environmental analysis
5. Asset operations
6. Asset maintenance
7. Asset management information system
8. Risk management
9. Contingency planning
10. Financial planning
11. Capital expenditure planning
12. Review of asset management system

The audit guidelines specified 4 stages for the asset management systems review, as per the following table.

Stage	Auditor	Licensee's Representative	Relevant Audit Standard
1) Risk and Materiality Assessment	John Keramidopoulos Leigh Jarman	George Glab Brian Walter	AUS 302 Planning. AUS 402 Risk Assessment and internal controls. AS/NZS 4360:2004: Risk Management
2) System Analysis	John Keramidopoulos Leigh Jarman	George Glab Brian Walter	As/NZS 9004:2000 Quality Management Systems, Guidelines for performance improvements
3) Fieldwork – Assessment and testing of: The control environment. Information systems. Compliance procedures. Compliance Attitude.	John Keramidopoulos Leigh Jarman	George Glab Brian Walter	AUS 502 Audit Evidence AUS 806 Performance Auditing
4) Reporting	John Keramidopoulos Leigh Jarman	George Glab Brian Walter	AS/NZS ISO 19011:2003 Guidelines for quality and or environmental management systems auditing AUS 806 Performance Auditing
5) Previous Audit Action Review	N/A		Not Applicable – This is the first Audit of this type for Pacific Hydro

Table 2 – Asset Management System Review – Audit Phases

2.2 Audit/Review Period

This is the first Asset Management System Review conducted therefore previous audit report findings are not relevant to the review and hence the content of this report. The review was conducted during October 2008 and included a 2 day site audit, desktop reviews and interview sessions.

2.3 Key Review Personnel

The following lists the personnel involved in the asset management system review

- George Glab Pacific Hydro Pty Ltd - Senior Operations Engineer
- Brian Walter Pacific Hydro Pty Ltd – Site Operations Manager
- Daniel Tejera Pacific Hydro Pty Ltd – Asset Management Engineer
- Leigh Jarman Auditor – ARMS Reliability Engineers
- John Keramidopoulos Auditor - ARMS Reliability Engineers

2.4 Asset Management Review Methodology

The asset management system review was completed as per Appendix 1 and 2 of the Audit Guidelines: Electricity, Gas and Water Licences (February 2006).

A preliminary risk assessment was completed on September 30th 2008, between John Keramidopoulos (ARMS Reliability) and George Glab (Pacific Hydro Pty Ltd), to identify the risks of non-compliance with the license conditions or ineffective management of assets respectively in order to identify higher areas of risk for audit priority.

2.5 Asset Management System Effectiveness Rating

A 6 point rating scale was used as defined in the Audit Guidelines to evaluate the effectiveness of the Asset Management System. These are listed as per the table below;

Asset Management Review Effectiveness Rating Scale		
Rating	Effectiveness	Description
5	Continuously improving	Continuously improving organisation capability and process effectiveness
4	Quantitatively controlled	Measurable performance goals established and monitored
3	Well-defined	Standard processes documented, performed and coordinated
2	Planned and tracked	Performance is planned, supervised, verified and tracked
1	Performed informally	Base practices are performed
0	Not performed	Not performed (indicate if not applicable)

Table 3 - Asset Management Review Effectiveness Rating Scale

A detailed table of the asset management elements indicated in the audit guidelines outlining consequence, likelihood, inherent risk rating, adequacy of controls and audit priority is included in Appendix A.

The below tables provide the guide for the risk and materiality assessment completed September 30th 2008. This assessment has provided an audit priority number for the stage in the audit process as outlined in the guideline document.

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Consequence Rating

Consequence	Financial/Asset/ Infrastructure	Systems and Services	Reputation	Environment*	OH&S	Responsibility
Major	<ul style="list-style-type: none"> Financial impact or opportunity cost / impact is greater than: <ul style="list-style-type: none"> - EBITDA: \$20M; and/or - EV: \$200M Permanent loss of service of major infrastructure. 	<ul style="list-style-type: none"> Failure to achieve all operational goals/KPIs. Significant development / construction interruption or cessation due to non compliance with regulators. Complete loss of service or output. 	<ul style="list-style-type: none"> Irreparable damage to Pacific Hydro reputation Requires CEO & Board attention 	<ul style="list-style-type: none"> Catastrophic irreversible environmental hazard, long term significant legal implications & impact to community Community outrage – potential large-scale class action. 	<ul style="list-style-type: none"> Death of staff member related to work incident 	Board, CEO & GMC &
Moderate	<ul style="list-style-type: none"> Financial impact or opportunity cost / impact is between: <ul style="list-style-type: none"> - EBITDA: \$10M to \$20M; and/or - EV: \$100M to \$200M Temporary loss of service of major infrastructure. 	<ul style="list-style-type: none"> Failure to achieve some development / construction targets/ KPIs. Restriction of business development by regulators. Major construction delays 	<ul style="list-style-type: none"> Significant damage to Pacific Hydro reputation Requires CEO & CFO attention 	<ul style="list-style-type: none"> Major environmental hazard caused – long term recovery, harm or breach of licence conditions or licence obligations, discharges off site High-profile community concerns raised – requiring significant rectification measures. 	<ul style="list-style-type: none"> Permanent injury / disability to staff member Multiple person LTI 	Board, CEO & GMC
	<ul style="list-style-type: none"> Financial impact or opportunity cost / impact is between: <ul style="list-style-type: none"> - EBITDA: \$2M to \$10M; and/or - EV: \$50M to \$100M Major damage to major infrastructure with no loss of service. 	<ul style="list-style-type: none"> Some reduction in development / construction, limited impact on critical path Fines and penalties by regulators. 	<ul style="list-style-type: none"> Moderate damage to Pacific Hydro reputation Requires GMC attention 	<ul style="list-style-type: none"> Measurable environmental harm – medium term recovery, impact external to local area, generally contained on site 	<ul style="list-style-type: none"> LTI or other restrictive work related illness/ injury Multiple person MTI 	CEO & GMC

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Consequence	Financial/Asset/ Infrastructure	Systems and Services	Reputation	Environment*	OH&S	Responsibility
Minor	<ul style="list-style-type: none"> Financial impact or opportunity cost / impact is between: <ul style="list-style-type: none"> - EBITDA: \$1M to \$2M; and/or - EV: \$10M to \$50M Abnormal repairs required to infrastructure. 	<ul style="list-style-type: none"> Minor development / construction delays. Censure by regulators. Reduced efficiency or disruption to agency working. 	<ul style="list-style-type: none"> Low level of damage to Pacific Hydro reputation Requires senior management attention 	<ul style="list-style-type: none"> Medium term immaterial effect on environment/ community – minimal impact outside the local area Offsite release contained without outside assistance Community complaints received, rectification measures required, may attract media attention 	<ul style="list-style-type: none"> Medical treatment injury 	GMC & Senior Management
	<ul style="list-style-type: none"> Financial impact or opportunity cost / impact is less than: <ul style="list-style-type: none"> - EBITDA: \$1M; and/or - EV: \$10M Normal repairs to assets 	<ul style="list-style-type: none"> Negligible operational impact. No loss of service. 	<ul style="list-style-type: none"> Reputation intact, internal knowledge only, limited mgt attention 	<ul style="list-style-type: none"> Short term transient environmental or community impact – minor breach in procedure, negligible action required. 	<ul style="list-style-type: none"> No injury or review required. 	Senior Mgt & Staff

Table 4 – Ord Hydro Pty Ltd Consequence Ratings

Likelihood Rating

Level		Criteria
A	Likely	Non-compliance is expected to occur at least once or twice a year
B	Probable	Non-compliance is expected to occur once every three years
C	Unlikely	Non-compliance is expected to occur once every 10 years or longer

Table 5 – Audit Risk Assessment - Likelihood Ratings

Inherent Risk Rating

Likelihood	Consequence		
	1. Minor	2. Moderate	3. Major
A. Likely	Medium	High	High
B. Probable	Low	Medium	High
C. Unlikely	Low	Medium	High

Table 6 – Audit Risk Assessment - Inherent Risk Ratings

Adequacy of controls

Level	Description	
3	Strong	Strong controls that are sufficient for the identified risks
2	Moderate	Moderate controls that cover significant risks; improvement possible
1	Weak	Controls are weak or non-existent and have minimal impact on the risks

Table 7 – Audit Risk Assessment - Adequacy of Controls

3 ASSET MANAGEMENT SYSTEM REVIEW RESULTS

Throughout the asset management system review, the size of the Ord Hydro power station and personnel numbers were taken into account. This asset is small in nature, with 2 person operational crew on alternating 3 week shifts, i.e. one Operations Manager per shift. Maintenance works are completed utilising contract labour. There are 4 turbines driving 2 generators sharing the 30 MW load equally, no level of redundancy available. It is with this in mind that when allocating effectiveness ratings, the ability for continuous improvement and the level of additional tasks allocated to the minimum personnel numbers were considered.

The risk ranking and the additional benefits for implementation of some improvement systems versus the input required were considered. Therefore the effectiveness ratings are listed in the table contained within Appendix B.

The following table outlines improvement recommendations following the audit outcomes listed in Appendix B.

Ref Item No	Audit Requirement	Issue	Recommendation	Responsible Person	Target Date
1.7	Likelihood and consequences of asset failure are predicted	Risk assessments are completed at high asset level. Risk of component failure and link to maintenance strategy less defined.	Review risk assessment of asset failure to component level. Investigate Failure Mode and Effect (FMEA) analysis in relation to maintenance strategy.	George Glab	30/11/2009
3.1	Under-utilised and under-performing assets are indentified as part of a regular systematic review process	Nature of redundancy presents underperforming assets although reviews completed adhoc. Availability tracked at high level.	Develop asset performance review procedure to form documented basis of systematic reviews.	George Glab	30/06/2009
3.4	There is a replacement strategy for assets.	No disposal plans in place, presently no plan for replacement or upgrades, asset to remain as designed.	Long term: require documented asset disposal plan detailing strategy and estimated costs for dismantling, removal and rehabilitation.	George Glab	30/06/2009

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Ref Item No	Audit Requirement	Issue	Recommendation	Responsible Person	Target Date
5.1	Operational policies and procedures are documented and linked to service levels required.	Operational procedures are as per OEM recommendations with equipment manuals. No formal review process present.	Develop operational procedure review process to determine procedure's relevance and accuracy.	Brian Walter	30/06/2009
6.1	Maintenance policies and procedures are documented and linked to service levels required.	Maintenance procedures are as per OEM recommendations with equipment manuals. No formal review process present.	Develop maintenance procedure review process to determine procedure's relevance and accuracy.	George Glab	30/06/2009
11.3	The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan.	As a formal asset management plan is yet to be produced, refer 12.1, the capital plan is not directly linked to the asset management plan	Develop asset management strategy plan detailing identification and justification for application of capital expenditure in correlation of asset life.	George Glab	30/06/2009
12.1	A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current.	An internal review has identified that the requirement for a formal Asset Management Strategy document is present. Although each individual element that would be within the AMS plan is functional, there is a lack of an overall strategy document. The drafting of this document has commenced.	Develop Asset Management Plan strategy document.	George Glab	30/06/2009
12.2	Independent reviews (eg. Internal audit) are performed of the asset management system				

Table 8 – Asset Management System Audit Recommendations

4 FUTURE AUDIT PROCESS

4.1 Future Audit Plan

This is the first Performance Audit conducted since the issue of the licence and as such previous audit report findings are not relevant to the content of the report. Review of actions taken in response to recommendations will form part of subsequent audit plans as this is the initial audit/review.

As per Section 24.3 of the Integrated Regional Licence document, the licensee must, unless otherwise notified in writing by the Authority, provide the Authority with a report as to the effectiveness of the asset management system within 24 months after the commencement date, and every 24 months thereafter. This is then required by October 2010.



APPENDIX A

AMS PRE-AUDIT RISK ASSESSMENT

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Asset Management System Key Processes – Audit Priority Assessment

Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
1. Asset planning Asset planning strategies are focused on meeting customer needs in the most effective and efficient manner (delivering the right service at the right price).	Integration of asset strategies into operational or business plans will establish a framework for existing and new assets to be effectively utilised and their service potential optimised.	▪ Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning	2	A	H	M	2	<ul style="list-style-type: none"> Assess the adequacy of the asset planning process Assess the adequacy of the asset management plan Assess whether the asset management plan is up-to-date and implemented in practice Assess whether the plan clearly assigns responsibilities and whether these have been applied in practice
		▪ Service levels are defined	3	C	H	M	2	
		▪ Non-asset options (e.g. demand management) are considered	3	C	H	M	2	
		▪ Lifecycle costs of owning and operating assets are assessed	1	C	L	M	5	
		▪ Funding options are evaluated	1	C	L	M	5	
		▪ Costs are justified and cost drivers identified	1	C	L	M	5	
		▪ Likelihood and consequences of asset failure are predicted	2	C	M	M	4	
		▪ Plans are regularly reviewed and updated	1	C	L	M	5	
2. Asset creation and acquisition Asset creation/acquisition means the provision or improvement of an asset where the outlay can be expected to provide benefits beyond the year of outlay.	A more economic, efficient and cost-effective asset acquisition framework which will reduce demand for new assets, lower service costs and improve service delivery.	▪ Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions	1	C	L	S	5	<ul style="list-style-type: none"> Assess the adequacy of policies and procedures covering the creation and acquisition of assets Select a sample of creations/acquisitions over the review period and confirm that adequate procedures have been followed and actual costs are as predicted
		▪ Evaluations include all life-cycle costs	1	C	L	S	5	
		▪ Projects reflect sound engineering and business decisions	1	C	L	S	5	
		▪ Commissioning tests are documented and completed	1	C	L	S	5	
		▪ Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood	1	C	L	S	5	

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Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
3. Asset Disposal Effective asset disposal frameworks incorporate consideration of alternatives for the disposal of surplus, obsolete, under-performing or unserviceable assets. Alternatives are evaluated in cost-benefit terms.	Effective management of the disposal process will minimise holdings of surplus and under-performing assets and will lower service costs	▪ Under-utilised and under-performing assets are identified as part of a regular systematic review process	2	C	M	M	4	<ul style="list-style-type: none"> ▪ Assess the adequacy of policies and procedures covering the identification of under-performing assets, disposal of assets and replacement strategy ▪ Determine whether a regular review of the usefulness of assets is performed ▪ Select a sample of disposals over the review period and confirm that adequate procedures have been followed
		▪ The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken	2	C	M	M	4	
		▪ Disposal alternatives are evaluated	1	C	L	M	4	
		▪ There is a replacement strategy for assets	2	C	L	M	4	
4. Environmental Analysis Environmental analysis examines the asset system environment and assesses all external factors affecting the asset system.	The asset management system regularly assesses external opportunities and threats and takes corrective action to maintain performance requirements.	▪ Opportunities and threats in the system environment are assessed	2	B	L	M	5	<ul style="list-style-type: none"> ▪ Review achievement of performance and service standards over the audit period ▪ Investigate any breaches and assess corrective action taken ▪ Review the adequacy of reporting and monitoring tools
		▪ Performance standards (availability of service, capacity, continuity, emergency response, etc) are measured and achieved	1	B	L	M	5	
		▪ Compliance with statutory and regulatory requirements	2	B	M	W	3	
		▪ Achievement of customer service levels	2	B	M	M	4	

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Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
5. Asset Operations Operations functions relate to the day-to-day running of assets and directly affect service levels and costs.	Operations plans adequately document the processes and knowledge of staff in the operation of assets so that service levels can be consistently achieved.	Operational policies and procedures are documented and linked to service levels required	2	B	M	M	4	<ul style="list-style-type: none"> Assess the adequacy of policies and procedures covering operations functions Assess the adequacy of staff resourcing and training Confirm the policies and procedures have been followed during the review period by testing of asset register, observation of operational procedures, analysis of costs, etc Assess the significance of exceptions identified and whether adequate corrective action has been taken
		Risk management is applied to prioritise operations tasks	2	A	H	M	2	
		Assets are documented in an Asset Register including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data	1	A	M	W	3	
		Operational costs are measured and monitored	1	C	L	M	5	
		Staff receive training commensurate with their responsibilities	3	C	H	S	2	
6. Asset Maintenance Maintenance functions relate to the upkeep of assets and directly affect service levels and costs.	Maintenance plans cover the scheduling and resourcing of the maintenance tasks so that work can be done on time and on cost.	Maintenance policies and procedures are documented and linked to service levels required	3	C	H	S	2	<ul style="list-style-type: none"> Assess the adequacy of policies and procedures covering maintenance functions Confirm the policies and procedures have been followed during the review period by testing of maintenance schedules, analysis of costs, etc Assess the significance of exceptions identified and whether adequate corrective action has been taken
		Regular inspections are undertaken of asset performance and condition	3	C	H	S	2	
		Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule	3	B	H	M	2	
		Failures are analysed and operational/maintenance plans adjusted where necessary	2	C	M	W	3	
		Risk management is applied to prioritise maintenance tasks	3	C	H	W	1	
		Maintenance costs are measured and monitored	1	C	L	M	5	

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Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
7. Asset Management Information System (MIS) An asset management information system is a combination of processes, data and software that support the asset management functions.	The asset management information system provides authorised, complete and accurate information for the day-to-date running of the asset management system. The focus of the review is the accuracy of performance information used by the licensee to monitor and report on service standards.	<ul style="list-style-type: none"> Adequate system documentation for users and IT operators 	1	B	L	M	5	<ul style="list-style-type: none"> Assess the adequacy of policies and procedures covering the general control and security of the computer systems used to provide management information on service standards/licence obligations Confirm that management reports on service standards/licence obligations are being reviewed and significant exceptions to service standards are promptly followed up and actioned
		<ul style="list-style-type: none"> Input controls include appropriate verification and validation of data entered into the system 	1	B	L	W	5	
		<ul style="list-style-type: none"> Logical security access controls appear adequate, such as passwords 	2	C	M	S	4	
		<ul style="list-style-type: none"> Physical security access controls appear adequate 	2	C	M	S	4	
		<ul style="list-style-type: none"> Data backup procedures appear adequate 	2	C	M	M	4	
		<ul style="list-style-type: none"> Key computations related to licensee performance reporting are materially accurate 	2	C	M	M	4	
		<ul style="list-style-type: none"> Management reports appear adequate for the licensee to monitor licence obligations 	2	C	M	M	4	
8. Risk management Risk management involves the identification of risks and their management within an acceptable level of risk.	An effective risk management framework is applied to manage risks related to the maintenance of service standards	<ul style="list-style-type: none"> Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system 	2	B	M	M	4	<ul style="list-style-type: none"> Assess the adequacy of policies and procedures covering risk management and contingency planning Assess whether the risk management policies and procedures have been applied in practice Assess the adequacy of staff understanding and training on risk management
		<ul style="list-style-type: none"> Risks are documented in a risk register and treatment plans are actioned and monitored 	1	B	M	M	4	
		<ul style="list-style-type: none"> The probability and consequences of asset failure are regularly assessed 	2	C	M	S	4	
9. Contingency planning Contingency plans document the steps to deal with the unexpected failure of an asset.	Contingency plans have been developed and tested to minimise any significant disruptions to service standards.	<ul style="list-style-type: none"> Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks 	3	C	H	M	2	<ul style="list-style-type: none"> Determine whether contingency plans have been developed and are current Determine whether contingency plans have been tested. If so, review the results to confirm that any improvements identified have been actioned.

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Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
10. Financial planning The financial planning component of the asset management plan brings together the financial elements of the service delivery to ensure its financial viability over the long term.	A financial plan that is reliable and provides for the long-term financial viability of the services.	The financial plan states the financial objectives and strategies and actions to achieve the objectives	2	C	M	S	4	<ul style="list-style-type: none"> ▪ Obtain an understanding of the financial planning, budgeting and reporting process and assess its effectiveness ▪ Obtain a copy of the current financial plan (including budget/actual) and assess whether the process is being followed
		The financial plan identifies the source of funds for capital expenditure and recurrent costs	2	C	M	S	4	
		The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)	1	C	L	S	5	
		The financial plan provide firm predictions on income for the next five years and reasonable indicative predictions beyond this period	1	A	M	W	2	
		The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services	1	C	L	W	5	
		Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary	2	C	M	M	4	

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Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
11. Capital expenditure planning The capital expenditure plan provides a schedule of new works, rehabilitation and replacement works, together with estimated annual expenditure on each over the next five or more years. Since capital investments tend to be large and lumpy, projections would normally be expected to cover at least 10 years, preferably longer. Projections over the next five years would usually be based on firm estimates.	A capital expenditure plan that provides reliable forward estimates of capital expenditure and asset disposal income, supported by documentation of the reasons for the decisions and evaluation of alternatives and options.	There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates	1	C	L	M	5	<ul style="list-style-type: none"> Obtain an understanding of the capital expenditure planning process and assess its effectiveness Obtain a copy of the capital expenditure plan for the current year and assess whether the process is being followed
		The plan provide reasons for capital expenditure and timing of expenditure	1	B	L	W	5	
		The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan	2	C	M	M	4	
		There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned	2	C	M	S	4	

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Key process	Outcome	Effectiveness criteria	Cons.	Likelihood	Inherent Risk Rating	Adequacy of Controls	Audit Priority	Audit Testing/Notes
12. Review of AMS The asset management system is regularly reviewed and updated.	Review of the Asset Management System to ensure the effectiveness of the integration of its components and their currency.	<ul style="list-style-type: none"> A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current 	1	A	M	W	3	<ul style="list-style-type: none"> Determine when the asset management plan was last updated and assess whether any significant changes have occurred Determine whether any independent reviews have been performed. If so, review results and action taken Consider the need to update the asset management plan based on the results of this review
		<ul style="list-style-type: none"> Independent reviews (eg internal audit) are performed of the asset management system 	1	A	M	W	3	

Table 9 – Asset Management System Risk Assessment



APPENDIX B

ASSET MANAGEMENT SYSTEM EFFECTIVENESS REVIEW

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
1.0 ASSET PLANNING – Integration of asset strategies into operational or business plans will establish a framework for existing and new assets to be effectively utilised and their service potential optimised.			
1.1	Planning processes and objectives reflect the needs of all stakeholders and is integrated with business planning.	Ord Hydro has two customers being Horizon Power and Argyle Diamond Mine. Supply of electricity is per Power Purchase Agreements, which stipulate the amount of scheduled downtime allowed and procedures for notification of unplanned downtime. Planning of maintenance tasks are completed around customer usage requirements, unplanned maintenance or maintenance with short notification periods require written notification to both customers of the outage to revert to contingency plans (refer 9.1 for contingency plan). Evidence: - Power Purchase Agreements for both customers sighted. - Written notification of downtime periods to customers sighted.	4
1.2	Service levels are defined	As per 1.1, supply of electricity is as per the Power Purchase Agreements. These defined required availability, load and reporting requirements. Evidence: - Power Purchase Agreement contracts for both customers sighted.	4
1.3	Non-assets options (eg. Demand management) are considered	Maintenance plans are scheduled around demand levels for both clients. In addition, planning includes provisions for environmental factors such as loading due to wet/dry seasons and heat and humidity factors. Argyle Diamond mine (planned and unplanned) load reductions allow for unit outages for co-ordinated maintenance of the asset. Evidence: - Power Purchase Agreement contracts for both customers sighted. - Interview discussions	3

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
1.4	Lifecycle costs of owning and operating assets are assessed.	<p>Main asset acquisition required life cycle costing analysis completed. Capital improvement projects undergo life cycle costing exercises. As asset has no planned expansion opportunity for LCC analysis limited.</p> <p>Evidence: - Interview discussions - Annual Planning and Operation Budget sighted</p>	3
1.5	Funding options are evaluated	<p>Source of funding is provided by revenue generated by the two Power Purchase Agreements. Funding is provided by Pacific Hydro head office in Melbourne. Funding is delivered by annual operating budgets reviewed monthly, and a 5 year capital budget reviewed annually.</p> <p>Evidence: - Operating budget sighted - Capital budget sighted.</p>	4
1.6	Costs are justified and cost drivers indentified	<p>Invoices are reviewed and approved by site and sent to head office. Operating budget is reviewed monthly and variance analysed within Pacific Hydro head office. Monthly review meeting completed with sites. Information was being sent to site direct but now posted on company intranet.</p> <p>Evidence: - Operating budget spreadsheets sighted. -Intranet reports sighted.</p>	3
1.7	Likelihood and consequences of asset failure are predicted	<p>High level risk assessment of failure completed and compiled with Risk Register. Risk assessment completed by insurer.</p> <p>Evidence: - Risk register sighted - Insurer's Risk Assessment report sighted.</p>	3

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
2.0 ASSET CREATION AND ACQUISITION – A more economic, efficient and cost-effective asset acquisition framework which will reduce demand for new assets, lower service costs and improve service delivery.			
2.1	Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions	Ord Hydro Pty Ltd does not undertake new investments or have an asset acquisition framework. Investment opportunities are assessed by Pacific Hydro as the parent company, on a case by case basis using standard investment models.	0 (N/A)
2.2	Evaluations include all life cycle costs	Every year Pacific Hydro assesses the life cycle costs and revenues related to each of its projects annually. Ord Hydro is one of the main projects.	0 (N/A)
2.3	Projects reflect sound engineering and business decisions.	Supply of assets must be as per functional system control document, which stipulates the functionality that the new asset must satisfy. Evidence: - Functional system control document sighted - Scada upgrade completed as per functionality document and preferred control system supplier. - Interview discussions.	4
2.4	Commissioning tests are documented and completed.	Ord Hydro Plant commissioning records are present on site and within the Kununurra office. Commissioning completed as per OEM requirements. No opportunity present for continuous improvement. Evidence: - Commissioning record files sighted (5 vols)	4

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
2.5	Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood.	Regular environmental inspections are being completed on the plant site. HV permitting system is functional and utilised. Site inspection completed – adequate signage present. Hazardous work procedures (eg, Confined space procedures) exist from Pacific Hydro. Evidence: - Environmental Legal Compliance Review and Audit May 2008 sighted. - Environmental Inspection Report May 2007 sighted. - HV permits completed and signed off sighted. - Hazardous work procedures sighted.	4
3.0 ASSET DISPOSAL – Effective management of the disposal process will minimise holdings of surplus and under-performing assets and will lower service costs.			
3.1	Under-utilised and under-performing assets are indentified as part of a regular systematic review process	Nature of the asset has no in built redundancy. 4 turbines drive 2 generators both suppling equal 15 MW to deliver plant output of 30MW. Nature of under performance is immediately evident. Monthly reviews of availability is completed and reported. There has been no notification of underperformance or claim for damages from customers.	3
3.2	The reasons for under-utilisation or poor performance are critically examined are corrective action or disposal undertaken.	Root cause analysis was competed for failure experienced and procedures put in place to prevent re-occurrence. These were added to the Risk Register. Regular condition monitoring is completed and sample frequencies adjusted to suite. Maintenance work notification entered into CMMS and scheduled for next outage. Evidence: - Flood incident 2006. - Interview discussions.	4
3.3	Disposal alternatives are evaluated.	To date no disposal plans are in place for the asset. The asset has been recently built and will remain as commissioned. Other than some alternate spares due to availability may be required, and disposal of consumables are only applicable. Evidence; - Interview discussions	0 (N/A)

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
3.4	There is a replacement strategy for assets.	Refer comments Item No 3.3. No replacement strategy exists as there is currently no reason to replace asset. Asset will remain as per designed. Replacement of some spares being superseded. This has been completed as the functional system control document. Evidence: - Interview discussions	2
4.0 Environmental Analysis – The asset management system regularly assesses external opportunities and threats and takes corrective action to maintain performance requirements.			
4.1	Opportunities and threats in the system environment are assessed.	Risk assessment completed by the insurer examined risks to the system environment. Review of forecast demand and system capability. Engineering studies completed on effect of stored water capacity on output. Evidence: - Power Purchase Agreements sighted - Insurer's Risk Assessment sighted	4
4.2	Performance standards (availability of service, capacity, continuity, emergency response etc) are measured and achieved.	Monthly reports are produced by Scada of consumption and availability of service. These are verified from manual meter readings and internal Scada calculations. An Annual Reconciliation report is produced by Horizon Power to compare consumptions against Scada. No penalties or non-conformances of service received to date. Evidence: - Scada output reports sighted - Horizon Power Annual Reconciliation report sighted	4

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
4.3	Compliance with statutory and regulatory requirements.	<p>HV permitting system is being adhered to. Safe working procedures are present for identified hazardous tasks. No improvement notices or non-conformances received from regulatory body to date. No reporting required self regulating requirements.</p> <p>Evidence:</p> <ul style="list-style-type: none"> - Safe working procedures sighted - HV permit sheets sighted - Interview discussions 	4
4.4	Achievement of customer service levels.	Refer comments Item No 4.3.	4
5.0 ASSET OPERATIONS – Operational plans adequately document the processes and knowledge of staff in the operation of assets so that service levels can be consistently achieved.			
5.1	Operational policies and procedures are documented and linked to service levels required.	<p>Operational policies and procedures followed are as per OEM procedures contained within the asset manuals. Operation of the asset is as per those procedures. Informal reviews of policies and procedures completed.</p> <p>Evidence:</p> <ul style="list-style-type: none"> - OEM operational manuals sighted. - Interview discussions 	3
5.2	Risk management is applied to prioritise operational tasks.	No opportunity exists for prioritisation of operational tasks. The small nature of the operation, no level of redundancy, and the single personnel present for the operation of the asset means should multiple operational tasks present then duration of resultant downtime would be the total time to complete all tasks. To date no occurrence of multiple tasks, that would indicate requirement of risk assessment and management, has occurred.	0 (N/A)

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
5.3	Assets are documented in an Asset Register including asset type, location, materials, plans of components, and an assessment of the assets physical/structural condition and accounting data.	Assets are documented in an Asset Register. Information contained within the register is basic equipment information, Item, location, manufacturer, models, serial numbers where required. Information containing equipment condition present within MEX and condition monitoring databases managed by CM contractor. All databases are continuously updated. Evidence: - MEX database sighted - Asset Register sighted - Interview discussions	4
5.4	Operational costs are measured and monitored	Refer comments in Item 1.6	4
5.5	Staff receives training commensurate with their responsibilities.	Each staff member has a Personal Development Plan which is reviewed annually and training received and required is reviewed. Personnel performance review completed annually. Progress reviews are completed 6 monthly. Evidence: - Personal Development plan sighted - Interview discussions	5
6.0 ASSET MAINTENANCE – Maintenance plans cover the scheduling and resourcing of the maintenance tasks so that work can be done on time and on cost.			
6.1	Maintenance policies and procedures are documented and linked to service levels required.	Maintenance policies and procedures followed are as per OEM procedures contained within the asset manuals. Maintenance of the asset is as per those procedures. Informal reviews of policies and procedures completed. Evidence: - OEM operational manuals sighted. - Interview discussions	3

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
6.2	Regular inspections are undertaken of asset performance and condition.	Regular OEM defined visual inspections are completed of the asset as per planned maintenance tasks within MEX (Essential Maintenance Management software). Results of inspections are entered into MEX under work order history. Additional regular "walk-around" inspection completed. Condition monitoring is completed, consisting of oil sampling and on-line vibration monitoring. Evidence: - Oil analysis reports sighted - PM tasks within MEX sighted. - Interview discussions.	4
6.3	Maintenance plans (emergency, corrective, and preventative) are documented and completed on schedule.	Maintenance plans are developed using planned maintenance task schedules within MEX. These are planned within shutdown periods stipulated within the Power Purchase Agreements. Emergency works are completed, work order and history entered into MEX. Evidence: - MEX workorders sighted - Next scheduled Maintenance plan sighted - Interview discussions	3
6.4	Failures are analysed and operational/maintenance plans are adjusted where necessary.	Failures to date have been analysed and the operational procedures were adjusted accordingly. The results of the flood incident and investigation outcomes were updated within the Risk Register. Condition monitoring frequencies are adjusted where increased readings were recorded. Evidence: - Flooding incident September 2006. - Risk Register sighted.	4

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
6.5	Risk management is applied to prioritise maintenance tasks.	Maintenance tasks requiring unplanned outages are conducted and the customers notified as per the Power Purchase Agreements. The small nature of the operation, no level of redundancy, and the single personnel present for the operation of the asset means should multiple emergent maintenance tasks present then duration of resultant downtime would be the total time to complete all tasks. All other tasks are planned into next scheduled outage.	3
6.6	Maintenance costs are measured and monitored.	Refer comments in Item 1.6	4
7.0 ASSET MANAGEMENT INFORMATION SYSTEMS – The asset management information system provides authorised, complete and accurate information for the day-to-date running of the asset management system. The focus of the review is the accuracy of performance information used by the licensee to monitor and report on service standards.			
7.1	Adequate system documentation for users and IT operators	System documentation exists in the form of OEM manuals for IT systems. Training requirements identified within Personal Development Plan. Evidence: - MEX manual sighted - Scada manual sighted.	4
7.2	Input controls include appropriate verification and validation of data entered into the system.	Inputs are verified through the Annual Reconciliation report completed by Horizon Power. Manual readings verify calculations and records from Scada. Costs (invoicing) are reviewed on site prior to head office receipt, further monthly reviews completed. Evidence: - Interview discussions.	4
7.3	Logical security access controls appear adequate, such as passwords.	IT systems protected by passwords. Login timeouts are also present. Permission levels are also present on individual log in, (read and read/write access).	4
7.4	Physical security access controls appear adequate.	Site security contains fencing around site compound, padlocked gates, sensors on building doors, logged entry. Site is remote, benefit from further alarming minimal due to lack of surrounding infrastructure and transit time. Town office is alarmed and CCTV present.	4

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Item No	Criteria	Comments	Effectiveness
7.5	Data backup procedures appear adequate	Scada data backups are completed monthly. If Scada system failure results in data loss then manual meter readings acceptable. Continual network backups are completed using propitiatory software. Evidence: - Network backup sighted - Interview discussions – laptop back up incident	5
7.6	Key computations related to licensee performance reporting are materially accurate.	Horizon Power Reconciliation report produced annually. Refer comments 7.2.	4
7.7	Management reports appear adequate for the licensee to monitor licence obligations	Licence performance report completed in Pacific Hydro head office. An Annual Reconciliation report is produced by Horizon Power, in addition to monthly availability and usage tracking reports completed on site.	3
8.0 RISK MANAGEMENT – An effective risk management framework is applied to manage risks related to the maintenance of service standards.			
8.1	Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system.	Risks indentified and logged within Risk Register. Actions put in place and residual risk ranking logged within Risk Register. Risk assessment of asset completed by the insurer. Evidence: - Insurer’s Risk Assessment Report sighted - Risk register sighted.	3
8.2	Risks are documented in a risk register and treatment plans are actioned and monitored.	Risks indentified and logged within Risk Register. Actions put in place and residual risk ranking logged within Risk Register. Risk register is updated following flooding incidence and actions and new procedures logged. Evidence: - Risk Register sighted	4
8.3	The probability and consequence of asset failure are regularly assessed.	Refer comments in Item 1.7.	3

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Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
9.0 CONTINGENCY PLANNING – Contingency plans have been developed and tested to minimise any significant disruptions to service standards.			
9.1	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks	Contingency plans stipulated within the Power Purchase Agreements. Customer owned backup generators and they are responsible for testing and operation of those assets. Nature of asset, no level of redundancy hence limited Pacific Hydro contingency. No non-conformance reports received to date, level of contingency effective. Evidence: - Power purchase agreement sighted.	4
10.0 FINANCIAL PLANNING – A financial plan that is reliable and provides for the long-term financial viability of the services.			
10.1	The financial plan states the financial objectives and strategies and actions to achieve the objectives	Annual budget states the financial objective and amounts to be allocated within each cost code. There is a 5 year capital plan, reviewed annually, which states projects/actions to achieve supply. Whole of life forecasting is completed by accounting annually. Evidence: - Operating and capital budget sighted - Detailed Annual Financial Review of operations, expenditure and projections sighted. - Financial statements (Profit/loss sheets) sighted.	4
10.2	The financial plan identifies the source of funds for capital expenditure and recurrent costs	Source of funds is as per the Power Purchase Agreement contracts with the two customers. Long term demand predictions are supplied by Argyle Diamond Mine and Horizon Power. The revenue generated by these contracts is the source of funding from Pacific Hydro Melbourne office to Ord Hydro. Evidence: - Forward usage predictions sighted.	4
10.3	The financial plan provides projections of operating statements (profit and loss) and statements of financial position	Refer comments Item 10.1 and 10.2. Costs are monitored through operating statements (profit and loss) which are reviewed monthly within the Pacific Hydro Head office.	4

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Item No	Criteria	Comments	Effectiveness
10.4	The financial plan provides firm predictions on income for the next five years and reasonable indicative predictions beyond this period	Refer comments Item 10.2.	5
10.5	The financial plan provides for the operation and maintenance, administration, and capital expenditure requirements of the services.	Annual operational budget provides for operation and maintenance of the asset. 5 year capital budget establishes the capital expenditure requirements. This is reviewed annually. Evidence: - Operating and capital budget sighted	4
10.6	Significant variances in actual/budget income and expences are identified and corrective action taken where necessary.	Expenditure (invoicing) reviewed by site and forwarded to Pacific Hydro head office. Expenditure is reviewed monthly within the operational cost reports where variances are identified and discussed if warranted with site personnel. Evidence: - Budget variance reports sighted.	4
11.0 CAPITAL EXPENDITURE PLANNING – A capital expenditure plan that provides reliable forward estimates of capital expenditure and asset disposal income, supported by documentation of the reasons for the decisions and evaluation of alternatives and options.			
11.1	There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates.	There is a 5 year projected capital plan, reviewed annually, that outlays projects/issues to be addressed, predicted dates. Responsibility for actioning relies on site Operations Manager. Evidence: - Capital budget sighted. - Interview discussions.	4
11.2	The plan provides reasons for capital expenditure and timing of expenditure.	The capital plan provides reasons for capital expenditure which are initiated through the annual budget review where recommendations for capital expenditure are considered. The 5 year capital plan assigns timing of expenditure. Unexpected capital expenditure can be authorised by delegated authorities depending on size of expenditure. Evidence: - Capital budget sighted.	3

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11.3	The capital expenditure plan is consistent with the asset life and condition indentified in the asset management plan.	Capital expenditure is consistent with the asset life and condition. Areas for capital expenditure are raised for consideration through the annual capital budget process, delegated authority approval, annual life forecasting review by accounting. . As a formal asset management plan is yet to be produced, refer 12.1, the capital plan is not directly linked to the asset management plan	2
Asset Management System Effectiveness Review			
Item No	Criteria	Comments	Effectiveness
11.4	There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned.	Refer comments 11.1 and 11.2.	4
12.0 REVIEW OF ASSET MANAGEMENT SYSTEM – Review of the asset management system to ensure the effectiveness of the integration of its components and their currency.			
12.1	A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current.	An internal review has indentified that a formal Asset Management Strategy document is required. Although each individual element that would consist the AMS plan is functional, there is a lack of an overall strategy document. The drafting of this document has commenced.	1
12.2	Independent reviews (eg. Internal audit) are performed of the asset management system	Refer comments 12.1	1

Table 10 – Asset Management System Effectiveness Rating