The South African Association of Consulting Engineers

Risk Management **Implementation Guideline** for **Consulting** Engineers

June 2007

SAAC

Risk Management Definition

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Risk Management is to reach out to an uncertain future and bring it under control.

As old as humanity it is one of the most audacious advances of mankind and is as much part of life as the air that we breathe. It is the blueprint for survival.

Without uncertainty life would be like a movie whose ending you always knew. Free will, our most precious attribute as humans, would be meaningless.

Uncertainty provides the challenges that make life exciting and is the source of the greatest profits to be earned in business and investing.

To manage risk is to favourably improve the odds of uncertainty by proactive decision making.

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Paraphrase from The Nature of Risk by P L Bernstein in Mastering Risk

James Pickford, Executive Editor, Prentice Hall 2001

Risk and Quality Management

Two Sides of the Same Coin

Quality Management consists of a number of processes that are aimed at improving the effectiveness and efficiency of your business. Quality Management enhances the capacity of your business and assures its robustness against internal and external threats. A Quality Management system consists of documenting the processes as they apply to your business and of regularly controlling, auditing and improving these processes.

Risk Management on the other hand represents a process by which you protect your business against internal and external threats. The process can vary in complexity from a simple set of house rules on business ethics and conduct to an advanced system in which risks are systematically identified, quantified, evaluated, remedied and administered for sustainability.

Risk and quality management are two sides of the same coin that can neither on their own assure the successful outcome of your business.

This distinction will assist you to understand that risk and quality management are separate processes. They are complimentary and inter-dependent and they may even be inter-related. To know that they are separate processes will raise your awareness that they both need to be addressed in a structured manner. This, however, does not mean that you should always separately identify them before dealing with them. The important thing is to systematically manage both risk and quality in order to maximize the success of your business.

Special Note

This is not just another guideline on risk management. It is a guideline detailing the implementation of good risk management procedures in engineering practice. In doing so it mirrors what has been said over the years in various documents on the subject, some of which have been produced by FIDIC and a number of Associations of Consulting Engineers, but goes a step further by illustrating practical methods of implementation.

For the same reason the guideline focuses on traditional consulting engineering practice, because it is only for such practices that risk management guidelines have been prepared. This guideline can be extended to guide the implementation of risk management procedures for other forms of construction procurement once the basic risk management guidelines for such practices have been prepared.

“Risk Management Implementation Guideline”

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SAACE

Contents

Summary: How to Manage Risk in Your Practice

Observe Sound House Rules

1. Place responsibility for risk management in your practice with a specific principal

2. Implement the FIDIC Risk Management Manual, 1997, as house rules on how to conduct business in your practice. The house rules are summarized under the following headings in Section 6 of this Guideline:

   - Professionalism
   - Communications
   - Avoiding and managing disputes
   - Business practices
   - Technical procedures
   - Professional liability insurance
   - Fiscal and corporate liability

3. Implementation of the house rules may be facilitated by observing the standards and procedures given in the SAACE Advisory Notes listed in Appendix 1

4. Maintain the house rules on an ongoing basis

5. Ensure that observation of the house rules becomes a mindset in your practice

6. Implement and retain certification for Quality Management in your practice in terms of ISO 9001:2000 standard for Consulting Engineers

Action Specific Risks

1. Identify & document all risks that affect your business under the following headings:

   - Professional risk
   - Public risk
   - Commercial risk
   - Employer risk
   - Health and safety risk
   - Statutory/legislation risk
   - Legal/contractual risk
   - Financial risk
   - Administrative risk

2. Prioritize all the risks that may have been identified and mitigate them in the following ways:

    - Avoid risk
    - Reduce risk
    - Retain risk
    - Transfer risk

3. Communicate to all role players the actions needed to manage the risks in the practice

4. Continually monitor the effectiveness of actions taken and mitigate further where required

5. Continually scan the environment to identify new risks or any changes in potential severity of already identified risks

Project Risks

1. Prepare a risk management plan for delivering every project as detailed in Appendix 2

Advanced Risk Management

Seek expert assistance on advanced risk management systems when you have exhausted the extent to which good practice can be deployed in your business or when you want to examine specific areas of uncertainty or rank the risks in order of importance or evaluate the effectiveness of risk mitigating measures

Risk Management

1. Introduction

There are many ways in which risks can be managed. These range from simple house rules on good practice to advanced systems involving detailed analysis of all the many individual risks that may assail your business.

The aim of this Guideline is to introduce simple house rules as the starting point on Risk Management for all businesses, big and small. Only when you have exhausted the extent to which good practice can be deployed in your business; or when you want to examine specific areas of uncertainty; or rank the risks in order of importance; or evaluate the effectiveness of risk mitigating measures; would you have the need for advanced Risk Management systems for which you can then seek special assistance.

2. How to Protect Your Practice

The risks in your business are analogous to the loads on a structure and the quality of your business, to the strength of the structure. Strength and load are independent of each other, so are risk and quality. The purpose of Risk Management is to pre-empt the hazards that may impact on your business whilst that of Quality Management is to ensure that your business is sufficiently robust to withstand the hazards when they occur. Risk or Quality Management in isolation of each other cannot assure the successful outcome of your business.

Your business will be best protected by continuously managing both the risks to which it is exposed as well as the quality of its operations.

Quality Management has been actively pursued for some time and has to a large extent become part of modern business practice with the availability of good implementation Guidelines. Risk Management is rapidly gaining recognition and although extensively covered in literature on the subject, very little practical guidance is available to the broad spectrum of Consulting Engineers on how to implement appropriate and sustainable Risk Management Systems in their businesses.

Please note that in order to successfully manage your company's risk you must also manage your Client's risk and third parties risk (other consultants and contractors), otherwise their problems may well become your problem.

3. What is Quality Management?

Before you embark on Risk Management you need to take note of Quality Management as the important counter side of the coin.

Quality management is a way of life. Quality is not guaranteed by inspection on final acceptance of a product. It is the result of a mindset of excellence and efficiency that underlies the entire production process in your business. The establishment of a fully-fledged Quality Management system can take a number of years to implement. The first step toward this is to become acquainted with the concepts of Quality Management.

A Quality Management system consists of a number of interrelated processes that are aimed at improving the effectiveness and efficiency of your business. These processes include business constitution, management responsibility, resource management, product realization and performance monitoring and improvement.

Quality Management consists of identifying and documenting all the business processes at the outset and then regularly controlling and auditing them.

The ultimate aim of a Quality Management system is to obtain and thereafter retain ISO 9001:2000 certification.

ISO (the International Organization for Standardization) is a worldwide Federation of National Standards bodies.

International Standard 9001 "Quality Management Systems – Requirements" was issued in 2000 in its current revision format as ISO 9001:2000.

For those members interested in implementing the ISO 9001:2000 standard, a useful guide to achieve this is the FIDIC publication:- "Guideline to the interpretation and application of the ISO 9001:2000 standard for the Consulting Engineering Industry".

The SAACE has also published an Advisory Note – "Implementing and Maintaining a Quality Management System". The Advisory Note is available on the SAACE website (www.saace.co.za).

4. What is Risk Management?

Risk Management is the process by which you identify the risks that can affect the ability of your business to function and survive if they materialize. It can be as simple as thinking about what could happen and making sure that you have sensible contracts with all your clients for all the work that you do. It can also be formalized by using the internationally accepted process outlined in this section.

Risk Management consists of the following steps as illustrated in Figure 1, page 12.

- Establish context
- Identify risks
- Analyze risks
- Evaluate risks

- Treat risks
- Monitor effectiveness of treatment
- Communicate findings

The adoption of sound house rules as proposed in this Guideline should pre-empt by far the larger proportion of the risks inherent in an Engineering Consultancy without following these steps in explicit detail. However, in exchange for the effort saved you will be required to ensure that the house rules are maintained on an ongoing basis as described below and that you develop a keen awareness of any potential risks before they manifest.

Once you have become aware of potential risks you can manage them in the following ways:

4.1. Avoiding Risk

This means not engaging in any activity that carries a risk. There are, however, very few activities in life and in business that do not involve risk. Should the risks outweigh the potential for reward then such an activity should be avoided.

4.2. Reducing Risk (Mitigation)

This means adopting measures to reduce the risk to such an extent that the activity becomes viable when measured against the potential return associated with the particular activity.

4.3. Retaining Risk

This means that the risks involved in undertaking the activity are acceptable. This particular activity is then undertaken as the potential gain is of such a magnitude that it outweighs the associated risks.

4.4. Transferring Risk

This means transferring the risk to another party. Typically risks are transferred by way of an insurance contract where the insurance underwriter undertakes to indemnify the business against specific risks in return for receiving monetary compensation in the form of an insurance premium. Risks can also be transferred to other parties including Clients, Contractors and various styles of Joint Venture Partners.

Sometimes a combination of the above risk management options may be adopted e.g. a business may retain a portion of the risk (excess or deductible amounts) and transfer the balance of the risk to the insurance company.

Note that risk transfer is a two-way street. Inappropriate transfer of risk to Consulting Engineers by Clients and their legal representatives will magnify the consequences of a risk that does eventuate, both for the Engineer and for

the Client (who very likely will be acting under a false sense of security). Whatever form of risk transfer is pursued, it should always be ensured that the party to whom the risk is transferred is able to finance that risk.

5. Sources of Risk

Although proper Risk Management processes are not explicitly dealt with in this Guideline, it is important to observe that the sources of risk in your business can be dealt with under the following headings:

5.1. Professional risk
5.2. Public risk
5.3. Commercial risk
5.4. Employer risk
5.5. Health and safety risk
5.6. Statutory/legislation risk
5.7. Legal/contractual risk
5.8. Financial risk
5.9. Administrative risk

Dealing with the various sources of risk enables you to address specific areas of uncertainty, rank the risks in order of priority or evaluate the effectiveness of measures that you may have implemented to mitigate the risks.

6. Simple Measures to Pre-empt Professional Practice Risks

Risk Management is not a complicated process. It is most successful when it is carried out by everyone in the organization all the time. The house rules that you should keep in mind to minimize the risks to your business may for day-to-day use be summarized as follows from the FIDIC Risk Management Manual, 1997.

Close scrutiny of these house rules will show that they broadly fall into two categories, namely, to pre-empt and minimize the risks and to assure the quality of your business. The fact that some of these rules are aimed at quality should not unduly concern you in view thereof that risk and quality management are different sides of the same coin and in simple risk management approaches will tend to appear together.

Implementation of the house rules is in many instances facilitated by adhering to the standards and procedures given in the SAACE Advisory Notes listed in Appendix 1. The Advisory Note relevant to the particular risk aspect considered can be identified from the titles and keywords given in the appendix.

6.1. Professionalism

6.1.1. Protect public health, safety and welfare
6.1.2. Uphold standards of the profession
6.1.3. Master business skills and maintain technical competency

6.1.4. Attend to the non-technical aspects of your business
6.1.5. Promote trust between Clients, Professional Advisors, Contractors and own staff
6.1.6. Promote public knowledge of the profession
6.1.7. Follow rules of conduct and codes of ethics of the various professional bodies
6.1.8. Implement the relevant SAACE Advisory Notes on professional standards and procedures given in Appendix 1

6.2. Communication

6.2.1. Avoid breakdown in communication between parties to the construction process
6.2.2. Prepare written communication with the recipient in mind
6.2.3. Avoid extreme words, words of promise, ambiguous words and jargon
6.2.4. All correspondence must be reviewed by a senior staff member
6.2.5. Don't rely on memory, but maintain clear and accurate records
6.2.6. Keep close contact with Clients
6.2.7. Keep lines of communication open and handle problems as they arise
6.2.8. Document and date all relevant discussion and communication
6.2.9. Implement the relevant SAACE Advisory Notes on professional standards and procedures, refer to Appendix 1

6.3. Avoiding and Managing Disputes

6.3.1. Anticipate and avoid potential problems
6.3.2. Value long-term relationships with parties to the construction process
6.3.3. Consider entering into partnerships with Clients or Sub-Contractors to promote quality, productivity and loyalty
6.3.4. Consider project partnering to reduce claims, cost and schedule overruns
6.3.5. Prepare mechanisms to report, address and resolve disputes
6.3.6. Establish in-house crisis management procedures
6.3.7. Avoid claims and settle disputes as quickly as possible at the job site
6.3.8. Consider establishing a dispute review board at the start of a project
6.3.9. Consider making concessions to resolve disputes to everyone's benefit
6.3.10. Avoid litigation and rely on alternative dispute resolution methods
6.3.11. Implement the relevant SAACE Advisory Notes on professional standards and procedures, refer to Appendix 1

6.4. Business Practices

6.4.1. Attend as much to the business of your practice as to its technical excellence
6.4.2. Acquire ability to identify and manage all potential project risks
6.4.3. Assess and allocate risks to the party (or parties) who can best manage/mitigate the various project risks at the outset
6.4.4. Ensure that the party to whom the risk is allocated is able to fund it
6.4.5. Evaluate the risks that clients pose to your business at the outset
6.4.6. Insist on fair recompense for services rendered (fair recompense includes an element of staff training and supervision as well as research and development in addition to profit)
6.4.7. Adopt qualifications-based-selection for procurement of design

6.4.8. Ensure that your practice has the capability to provide the services tendered for
6.4.9. Prepare an accurate scope of services with the Client at the outset
6.4.10. Make specific provision that the Consulting Engineer will act as the Client's agent in respect of the Construction Regulations as a separate service and will be separately remunerated. The Client remains ultimately responsible for the implementation and adherence to the regulations
6.4.11. Prepare a succinct, fair and reasonably protective contract for the services offered
6.4.12. Limit obligations to the provision of service using reasonable skill, care and diligence
6.4.13. Include a limitation of liability clause in every contract for services except where this is prohibited by statute
6.4.14. Never contract to any requirement for which you are covered by your PI policy
6.4.15. Contract out of your PI policy exclusions
6.4.16. Stipulate clearly conditions of payment and remedies for non-payment in the services contract
6.4.17. Prepare and maintain realistic work programs
6.4.18. Clearly indicate the purpose, limitations and assumptions on which cost and time estimates are based
6.4.19. Ensure that both Prime and Sub-Consultants carefully evaluate each other before entering into a contract
6.4.20. Carefully select Joint Venture Partners for their professional integrity and financial soundness
6.4.21. Ensure that Joint Venture Agreements are signed where applicable. Such Joint Venture agreements should not conflict with but complement the main services agreement
6.4.22. Select, train and retain good quality personnel
6.4.23. Maintain adequate resources to support commitments
6.4.24. Carefully manage entrepreneurial and/or opportunity risks that the practice engages in to ensure that its resources are not unduly jeopardized
6.4.25. Implement the relevant SAACE Advisory Notes on professional standards and procedures, refer to Appendix 1

6.5. Technical Procedures

6.5.1. Commit to quality at every level of your practice. Do the job right the first time
6.5.2. Provide safety nets to ensure that mistakes are caught and corrected in good time
6.5.3. Don't make decisions that the Client should make, only provide him with the information to do so
6.5.4. Document all design and recommendations that you and others may make
6.5.5. Ensure that designs are reviewed and documented at the appropriate stages of the project
6.5.6. Give special attention to the materials and products specified
6.5.7. Ensure that the Client understands that oversights and errors will occur and will be addressed jointly
6.5.8. Specify mechanisms whereby discovered oversights and errors will be addressed, especially under adversarial conditions

6.5.9. Have in place a procedure for responding to requests for clarification from tenderers
6.5.10. Include construction phase services including construction monitoring in primary scope of services
6.5.11. Ensure that site supervision is performed by qualified and experienced staff. Appropriate monitoring checklists should be used during each site visit and copies must be signed and filed
6.5.12. Have in place schedules and procedures that the Contractor and Consultant are required to follow on construction to give effect to the Consultants obligations
6.5.13. Ensure that the Contractor understands that the Consulting Engineer is only appointed as agent on behalf of the Client in respect of the Construction Regulations
6.5.14. Allow adequate time for testing and commissioning of all project services before occupancy
6.5.15. Maintain an interest in the project and contact with the Client after completion
6.5.16. Implement the relevant SAACE Advisory Notes on professional standards and procedures, refer to Appendix 1

6.6. Professional Liability Insurance

6.6.1. General practitioners are not required to know everything about professional liability insurance, but must approach knowledgeable institutions for assistance on professional liability insurance
6.6.2. Apart from relying on expert insurance brokers for advice, Consulting Engineers should still satisfy themselves on the following aspects:
6.6.3. Find out how professional liability insurance works
6.6.4. Understand basic concepts of professional liability insurance and review your own policy document
6.6.5. Understand the extent and limitation of coverage provided
6.6.6. Understand the policy exclusions
6.6.7. Note the factors that determine the price of professional liability insurance
6.6.8. Ensure that the policy is in force retroactively when the services were rendered and is still in force when the actual claim is made
6.6.9. Notify the insurer immediately a claim is made against the practice or when circumstances may lead to a claim being made
6.6.10. Consider specific project insurance to reduce risks all round as well as potential disputes
6.6.11. Arrange separate insurance cover to meet statutory requirements and business and personal risks
6.6.12. Disclose to the professional indemnity insurer that the practice is appointed as agent of the Client in respect of the Construction Regulations
6.6.13. Ensure that your company’s PI policy covers past and present individual principals and staff
6.6.14. If an engineering company ceases to exist, ensure that run-off cover is maintained
6.6.15. Implement the relevant SAACE Advisory Notes on professional standards and procedures, refer to Appendix 1

6.7. Fiscal and Corporate Liability

A professional practice, irrespective of whether it is constituted as a partnership, close corporation or company, has a legal obligation to comply with a series of acts. The following are the most important of these in the South African context.

6.7.1. Basic Conditions of Employment Act, 1997
6.7.2. Skills Development Act, 1998
6.7.3. Broad-Based Black Economic Empowerment Act, 2003
6.7.4. Construction Sector BEE Charter to BBBEE Act
6.7.5. Preferential Procurement Policy Framework Act, 2000
6.7.6. Employment Equity Act, 1998
6.7.7. The King Commission Report on Corporate Governance
6.7.8. Occupational Health and Safety act, 1993
6.7.9. Construction Regulations to the OHS Act, 2003
6.7.10. Companies Act, 1973
6.7.11. Close Corporations Act, 1981
6.7.12. Income Tax Act, 1962
6.7.13. Value Added Tax Act, 1991
6.7.14. Engineering Profession Act, 2000

It is impossible for professional practices to have intimate knowledge of these acts and it is very important to seek professional advice on these matters.

7. Implementing a Risk Management Plan

Implementing a basic Risk Management Plan involves the following:

7.1. Risk management must be driven from the top down. If the practice is large enough a specific director or partner should be given the responsibility for risk management in the organization. This is often combined with the responsibility for Quality Management.

7.2. Identify and document all the risk factors that have an influence on the business.

7.3. Prioritize the risks and decide how the risks will be managed and mitigated, that is:-

7.3.1. Avoiding the risk
7.3.2. Reducing the risk
7.3.3. Retaining and managing the risk
7.3.4. Transferring the risk

7.4. Communicate to all role players the actions needed to manage the risks in the organization.

7.5. Monitor on an ongoing basis the effectiveness of the actions and take remedial action where necessary. Refer to Appendix 2 for a basic risk management plan for delivering a project.

7.6. Scan the environment on an ongoing basis to identify new risks or any changes in the potential severity of already identified risks.

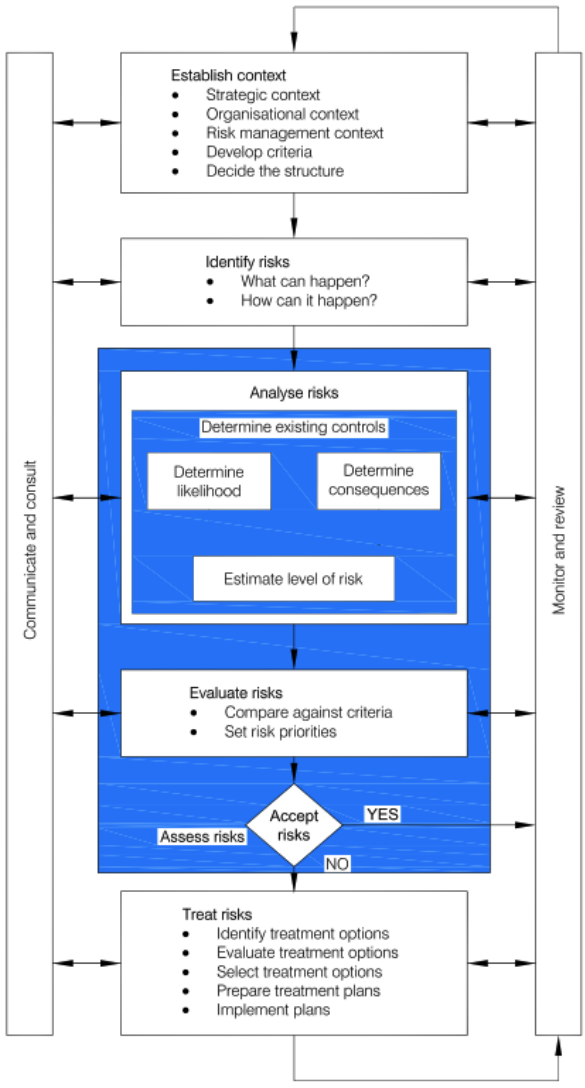

FIGURE 1 - RISK MANAGEMENT PROCESS

MANAGING RISKS DURING PROJECT DELIVERY LIFECYCLE

A Typical project has the following phases:-

1. Feasibility Phase
2. Appointment Phase
3. Conceptual Design Phase
4. Design Phase
5. Contract Award Phase
6. Implementation Phase
7. Commissioning and Post Contract Phase

Detailed below is a brief description of the risks involved during each of the phases and possible remedies. The ideal method of dealing with these project risks is to draw up a standard checklist of the risks and remedies. Each project should be measured against the checklist through the various stages. Ideally the risk management checklist should be completed by the dedicated risk manager or an objective risk auditor. At the end of each project the risk checklists should be reviewed for completeness and compliance with all the risk remedies.

1. Feasibility Phase

The feasibility phase aims to establish the financial, technical and environmental viability of a proposed project.

This phase includes the gathering of all relevant information as well as the production of documentation in sufficient detail and accuracy to enable the Client to establish the viability of a project.

During this phase the Consultant is normally working at risk as it is not immediately certain if a project will be viable.

The major elements of risk during this phase are the following:

(a) Uncertainty regarding the recovery of costs should the project not be feasible
(b) Clarity regarding the scope of the project in order to avoid re-work or duplication
(c) Lack of the necessary skills resulting in incorrect, incomplete or late information
(d) Material assumption and/or design errors that could result in incorrect conclusions regarding the feasibility of a project
(e) Creating the perception that costs and other technical estimates are final and a 100% accurate projection of the final figures
(f) Not interpreting the project scope and specifications correctly resulting in incomplete information

Potential risks and possible remedies during the feasibility phase are detailed in Appendix 2 – Table 1.

2. Appointment Phase

The appointment phase of the project sets the technical, contractual and financial framework within which consulting services are to be provided. It is the foundation on which any successful project is built.

The appointment phase starts with receipt of the initial enquiry from the Client and culminates in the signing of an agreement for consulting services. Essential elements of this phase include ascertaining the Client's requirements, deciding whether or not to participate in the project, defining the scope of services, preparing a proposal including conditions of offer and entering into a contract with the Client. Along the way, you must decide whether you have the necessary skills and resources to carry out the project and whether you wish to work for the Client concerned. You and the Client need to agree on the terms of contract, quantum of the fee and method of payment, limitation of liability, programme of work and all other aspects of the appointment that define obligations and responsibilities of the parties to the agreement.

The main risk during the appointment phase of the project is failure to fully define the terms and conditions of your appointment and on methods of dealing with departures from the conditions on which the proposal was prepared.

Note that this is the moment that risk may well be transferred from the Client to you. Do not accept risk transfer unless you are equipped to handle it. Instead encourage the Client to mitigate the risk in a reasonable manner. For example, a Client may seek to transfer the risk of ground conditions and foundations to the Engineer. More appropriate mitigation may be to carry out more investigations and/or to commission a peer review.

Remember that you are undertaking to do what is in the contract regardless of circumstances. Absolute statements are dangerous unless there is some reasonable way to modify the obligation. For instance agreeing to insure for three years is an absolute commitment that may embarrass you if there is no one to buy the insurance from or if the required insurance is unreasonably expensive.

Also, include in the agreement that the client is responsible for related risks that should be included, but are omitted for one or other reason. In addition, ensure that both overt and covert project scope creep will be addressed in writing and that all variations will be documented and compensated for.

Potential risks and possible remedies during the appointment phase are detailed in Appendix 2 – Table 2.

3. Conceptual Design Phase

The conceptual design phase translates the Client's brief into a project specific schematic design document.

This phase includes the gathering of all relevant information and production of conceptual design documentation for approval by the Client and all other relevant professionals.

Included in this phase is a determination of the firm's capabilities to execute the brief, technical competency and experience of staff, knowledge of any relevant national and international design standards, knowledge of local authority requirements and standards as well as any environmental impact study requirements.

You need to consider the risk at this stage that the project is terminated, and the possibility that the Client continues to rely on the sketch design without further advice from you and then gets into trouble that he then blames you for.

Potential risks and possible remedies during the conceptual design phase are detailed in Appendix 2 – Table 3.

4. Design Phase

The detail design phase translates the conceptual design into detailed design documentation and working drawings.

The detailed design phase starts with the approved schematic design, which is then translated into detailed documentation for use by the Contractor, Quantity Surveyor and other professionals. The documentation should adhere to the required standards of all approved authorities.

Potential risks and possible remedies during the design phase are detailed in Appendix 2 – Table 4.

5. Contract Award Phase

During this phase the consultant is required to assist in preparing detailed tender documentation, bills of quantities, adjudication of tenders and awarding of contracts.

Potential risks and possible remedies during the contract award phase are detailed in Appendix 2 – Table 5. The risks in the tables are that you fail to follow the prescribed procedures and that you are then sued by an unsuccessful Tenderer or that you appoint an incompetent or financially inadequate Contractor. It is particularly important that the Consulting Engineer puts his reservations in writing if the client appoints a Contractor that he did not recommend.

6. Implementation Phase

The implementation phase involves the site handover to the Client, monitoring the construction activities on site and certification of progress payments to Contractors.

During this phase the Consultant must ensure that the Contractor adheres to the design specifications while construction is in progress. The Consultant must be available to answer questions from the Contractors, issue site instructions where necessary or revise design documentation where applicable.

One of the major risks during this phase is the prevention of accidents during the construction period. The incomplete documentation of change or of the field design of modification is a significant risk and the primary cause of PI incidents in many instances.

Potential risks and possible remedies during the implementation phase are given in Appendix 2 – Table 6.

7. Commissioning and Post Contract Phase

This phase includes the final snagging of the structure, commissioning of all equipment and systems and issuing of final acceptance certificates.

The Consultant must also arrange for the production and distribution of record drawings and operating/maintenance manuals.

Potential risks and possible remedies during the commissioning and post contract phase are detailed in Appendix 2 – Table 7.

APPENDIX 1: SAACE ADVISORY NOTES ON PROFESSIONAL PRACTICE

Item	Note No	Aspect	Title	Keywords
1	91/2	Business Practice	General Guidance on Publicity	Publicity, Public Relations, Marketing, Advertizing
2	81/4		Guideline For Consulting Engineers and their Clients on the correct procedures for Implementing Complex Multi-disciplinary Projects	Project Management, Multi-Disciplinary Projects, Cost Estimates & Control Procedures
3	85/8		Guideline for the Reviewing of Another Consulting Engineer's work	Peer, Review, Reviewing Engineer
4	80/11		Guidelines for New Practices Established by Consulting Engineers	Professional Service, Fee Competition, Preferential Procurement, Transformation
5	92/3		How to Prepare Effective Tax Invoices and Statements of Account	Invoices, Fees, VAT, Interest, Accounts
6	03/3		Implementing and Maintaining a Quality Management System	Quality Management System ISO 9001, 2000, Accreditation, Certification, Annual Declaration, Self Assessment
7	89/3		Nomenclature on Letterheads	Nomenclature, Letterhead, Partnership, Company, Close Corporation, Corporate Structure
8	98/5		Rendering of Invoices and Recommended Action When Accounts Are Not Paid	Accounts, Invoices, Statements, Non-payment, Interest, Fees
9	87/4		Responsibility for Alternative Designs for Civil Engineering Works	Alternative Design, Design Responsibility, Standard Form of Agreement
10	99/5		Retired Principals	Office Bearers, Registered Principals, Professional Indemnity Insurance, Dispute Resolution
11	00/8		Software Licences	Software Licence, Legal Right, Software Programme, Piracy, Client Access Licence, Copyright Act
12	97/1		South African Companies and International Competitiveness - The International Business Development Section of SAACE	International Business, IBDS, Competitiveness
13	02/7		Sustainable Development in the Consulting Engineering Industry	Sustainable Development, Sustainability, FIDIC Task Form, Agenda 21
14	85/18		The Essence of the Client-Consulting Engineering Relationship	Consulting Engineer, Practice, Client, Transformation, Selection, Evaluation Criteria, Pricing
15	81/1		The Marketing of Professional Services	Professional Service, Marketing, Client/Consultant Relationship, Value Added
16	83/3	Client Agreements and Interface	Certificates Beyond Those Required by Conditions of Appointment	Certificates, Absolute Obligations, Contractual Liability, Delictual Liability, Risk, Negligence
17	01/7		Certificates of Occupancy for Building work	Certificate of Occupancy, National Building Regulations, SABS 0400 (1990), Engineer's Certificate, Electrical Compliance Certificate, Risk, Safety
18	04/DPW		The Department of Public Works Form D - Indemnification Requirements	Indemnification of the Department by Firms with Limited Liability, Companies with Limited Liability, Close Corporation, Professional Indemnity Insurance, Members, Directors, Personal Capacit
19	00/6		The National Home Builders Registration Council: Appointment of a Competent Person	NHBRC, Competent Person, Risk, Agreement
20	01/4		Unsolicited Proposals	Unsolicited Proposals, SANRAL, Fees, Success Fee, Value Engineering Bonus, Risk, PI Insurance, Engineering Joint Venture

APPENDIX 1: SAACE ADVISORY NOTES ON PROFESSIONAL PRACTICE

Item	Note No	Aspect	Title	Keywords
21	85/10	Contract Administration	Aspects of Good Contract Administration	Engineer, Conditions of Contract, Contract Documentation, Project Management
22	80/1		Guideline Notes on Site Inspections arranged by the Engineer for Tenderers on Civil Engineering works	Site Inspections, Engineer, Tender Documents, Notice to Tenderers, Addendum, GCC 1990, Standard General Conditions
23	93/12		Guideline to Engineers for Dealing with Contractors' Claims on Civil Engineering Contracts Under General Conditions of Contract 1990	Contracts, Claims, GCC 1990, Disputes, Engineer, Engineer's Representative, Mediation, Arbitration
24	80/9		Guidelines for Resident Engineers/Engineer's Representatives on Engineering Projects	Engineer, Resident Engineer, Engineer's Representative, Engineer's Office
25	81/3		Guidelines for the Preparation of a "Good" Contract Document for Civil Engineering Works	Tender Documents, Contract Documents, Special Conditions, GCC 1990, Specification, Schedules of Quantities, Plans, Drawings
26	02/8		Payment Certificates	Payment Certificate, Liquid Document, Acknowledgement of Indebtedness
27	80/2		Recommended Form of Contract Completion	Certificate of Completion, Contract Completion, GCC 1990
28	86/7		Some Notes on What to Watch Out For When Preparing Construction Contracts	Documents, Contracts, Engineer's Powers
29	01/9	Insurance and Legislation	A Comparison Between Professional Indemnity Insurance and Performance Bonds	PI Insurance, Performance Bonds, Breach of Professional Duty, Contractual Obligations, Default, Guarantor, Written Guarantee
30	84/5		Advance Payment for Unused Materials : Use of a Surety Bond as a Guarantee under Engineering Contracts	Materials on Site, Ownership, Payment, Third Party Surety, Insurance, Surety Bond
31	85/12		Guidelines for Insurance of Construction Contracts	Contract Works, GCC 90, Specific Contract Policy, Annual Blanket Policy, Public Liability
32	02/3		Potential Insurance Risks When Working in Joint Ventures	Joint Ventures, Nominated Third Party, Partnership, Joint Venture Agreement, Joint and Several Liability, Culpable Joint Venture Partner, Professional Risks, Contractor's Risks, PI Insurance
33	85/13		Principal Controlled Insurance	Principal Controlled Insurance, Contractors All Risk Insurance, Claims Experience, Supplementary Cover, Gaps in Insurance Cover, Payment of Excess
34	97/7	Integrity Management	A Guideline on Disciplinary Procedures	Disciplinary Procedures, Compliance, Code of Conduct, Constitution and By Laws, Disciplinary Tribunal
35	03/04		Corruption - The Roles of Leadership and Management	Corruption, Code of Conduct, Leadership, Management, Practice, Ethics, Business Integrity
36	82/6		Guideline for Directors of Members Serving on Boards of Private Sector Organisations	Public Directorships, Commercial Directorships, Contracting, Manufacturing, Conflict of Interest
37	82/5		Guideline for Members' Staff Who Become Public Representatives	Public Representation, Conduct
38	99/4		Stand Against Corruption	Corruption, Bribery, Gratification, Disclosure, Business Integrity, Code of Conduct, Code of Ethics
39	05/1	Legal	Public Sector Procurement : A Brief Guide	Procurement, Good Governance, Supply Chain Management Policies, PFMA, MFMA, PAJA, PPPFA, BBBEE, BEE, PPP, Procurement Exemptions, Unsoliticited Bids, Best Practice

APPENDIX 1: SAACE ADVISORY NOTES ON PROFESSIONAL PRACTICE

Item	Note No	Aspect	Title	Keywords
40	85/11	Legal, Arbitration, Mediation	An Engineer's Liability for Negligence	Negligence, Contract, Duty of Care, Remoteness of Damage, Immunity from Claims, Prescription, Concurrence of Actions
41	99/1		Consulting Engineers' Responsibility and Liability for Pollution and Environmental Damage	Liability for Pollution, Liability for Environmental Damage, Sustainable Development, Environmental Impact Assessment, PI Insurance
42	93/4		Copyright	Copyright, Liability, Cession of Copyright
43	99/2		Employment Equity Act	Employment Equity, Designated Employer, Duties of Employer, Affirmative Action, Employment Equity Policy, Income Differentials
44	84/2		Guidelines for Consulting Engineers as Expert Witnesses	Professional Ethics, Expert Witness
45	93/8		Guidelines for the Use of Mediators and Parties Concerned with Mediation	General Conditions of Contract, Mediation Procedure, General Principles, Written Representations, Oral Representation, Settlement
46	90/4		Legal Documents	Signatories, Contractual Documents, Confidential Information
47	04/2		Occupational Health and Safety Act, 1993 Construction Regulations, 2003	Occupational Health and Safety, OHS Act, Consultant as Agent, Consultant as Designer, Construction Regulations, Health and Safety Plan
48	97/6		Prescription of Claims Arising Out of the Appointment of the Consulting Engineer	Prescription Act, Contract, Delict, Debt, Interruption of Prescription, Liability
49	91/3		Retention of Drawings and Records	Document Retention, Storage, Microfilming
50	00/3		Risk Alert : Injuries on Duty or in the Workplace	Occupational Injuries, Compensation Commissioner, COID Act
51	96/1		Second Opinions and Expert Witness in Relation to Claims for Damages	Second Opinion, Expert Witness, Ethical Standards, Insurance, Claims, Damages
52	00/7		Skills Development Act and Associated Acts	Skills Development Act, Skills Development Levies Act, SA Qualifications Authority Act, Skills Development Facilitator
53	93/1		Tariff of Allowances : Witnesses in Civil Cases	Subpoenaed, Compensation, Financial Loss
54	99/3	Mechanical & Electrical Matters	Cost of the Works for Building Projects	Cost of Works, Fees, Building Projects
55	98/8		Guidelines for Post Graduate Training for Registration of Mechanical and Electrical Engineers	Mechanical Engineers, Electrical Engineers, Post Graduate Training, Registration, ECSA, Engineer in Training, Mentor
56	83/6		Mechanical and Electrical Engineering Installations Related to Civil Engineering Projects	Mechanical and Electrical Installations, Design & Supply, Practice, Consulting Engineer, Risk
57	00/5		Payment for Uninstalled Material on Site	Materials on Site, Uninstalled, Contracts, Payment, Mechanical Works, Electrical Works, Direct Contract, JBCC Contract
58	94/1		Professional Fees on Mechanical, Electrical and Electronic Engineering Works	Mechanical Works, Electrical Works, Electronic Works, Fee Guidelines, ECSA Fee Scales

APPENDIX 1: SAACE ADVISORY NOTES ON PROFESSIONAL PRACTICE

Item	Note No	Aspect	Title	Keywords
59	86/11	Remuneration - Technical Aspects	Advance Notification of Estimated Fees	Fees, Estimates
60	90/3		Cancellation Fees	Cancellation, Suspension, Termination
61	03/5		Determining Fees When Working At Risk	Fees, Risk, Work at Risk, Pricing, Success Fee
62	01/1		Fees for Targeted Procurement	Targeted Procurement, Participation, Compliance Auditing, Category Factor, Fees
63	93/5		Provision of Additional Staff for Construction Monitoring	Construction Monitoring, Site Staff, Additional Service, Additional Staff
64	00/4	Risk, Responsibility, Liability	Concerning Risk	Partnerships, Incorporated Companies, Private Companies, Close Corporations, Associations, Fiduciary Duties, Joint Ventures
65	81/6		Consulting Engineers' Responsibilities in Delict When Undertaking Design Checks	Delictual Liability, Contractual Liability, Errors and Omissions, Negligence, Design Check
66	97/5		Guideline on Reduced Standards in Civil Engineering : Potential for PI Claims	Effective Cost Reduction, Adequate Cover, Increased Risk, Disclaimers, Indemnities
67	82/1		How to avoid and deal with Professional Indemnity Claims	Claims, Professional Negligence, Correspondence, Engineering Judgment, Financial Resources, Professional Fees, Mistakes, Reporting Claims
68	85/20		How to Reduce the Consulting Engineer's Risks and Exposure to Claims	Risk, Claims, Exposure
69	95/2		Legal Risk management : The Most Important Points	Risk Management, Professional Liability, Contract Documentation
70	97/2		Legal Risk Management Service (lrms)	Legal Risk Management, Education, Advice, Assistance
71	03/2		Limitation of Liability : SAACE Standard Form of Agreement	Limitation of Liability, Quantum, Duration, SAACE Agreement
72	97/3		Minimum Professional Indemnity Insurance Cover	Risk Management Service, Limits of Indemnity
73	86/5		Responsibility and Performance	Practice, Supervision, Inspection, Certificates, Contractual Liability, Delictual Liability, Negligence, Responsibility, Performance
74	01/02		Risk Management - Public Private Partnerships	Work at Risk, Professional Liability, Liability, Risk Management
75	86/9		Some Thoughts on the Engineer's Obligations and Responsibilities	Responsibility, Liability, Practice
76	87/3		Structural Failures in Buildings - Their Cause and Prevention	Structural Failure, Buildings, Design Process, Construction Process, Risk, Safety, Insurance
77	01/05		Supervision - Monitoring	Supervision, Monitoring, Liability, Negligence
78	85/15		Turnkey Projects and Professional Liability	Increased Liability, Under Design, Performance Guarantees, Supervision, Monitoring, Repudiation of Cover, Fitness for Purpose, Turnkey
79	00/2		Working at Risk	Work at Risk, Professional Liability, Liability, Agreement

APPENDIX 2 – TABLE 1: POTENTIAL RISKS IN FEASIBILITY PHASE			
Potential risks	**Possible remedies**	**Item checked**	**Action taken/Comment**
1. Disputed communications	1. Keep records of all telephone conversations, meetings, etc 2. Confirm all communication in writing		
2. Insufficient / incorrect external information	1. Ensure that up-to-date information is obtained from experienced professionals regarding geotechnical information; site surveys, specifications from third party equipment supplier, etc.		
3. Incorrect design	1. Ensure that all design assumptions are documented 2. Ensure that the design is performed by suitably qualified staff 3. Ensure that design software used is properly checked for accuracy of output. Manual calculation checks should be done to verify the output 4. Ensure that the design assumptions and actual designs are reviewed by an independent qualified staff member and that this review is documented, dated and signed 5. Ensure that all Joint Venture Partners are using the same design assumptions and do an independent review of the Joint Venture Partner's design		
4. Design not "fit for purpose" or too expensive	1. Ensure that the Client's expectations, specifications and time frames are documented. Clear up any ambiguities before commencing the design 2. Investigate alternative designs and materials that can be incorporated in the design. Ensure that the alternatives are based on reliable and proven information.		
5. Incorrect or incomplete documentation.	1. Ensure that the design documentation is in accordance with the design assumptions and the Client's brief 2. Ensure that final documentation has been checked for completeness and correctness 3. Ensure that documentation is distributed to the relevant parties in time to enable them to comment or provide additional information 4. Ensure that estimates prepared on the basis of your design includes adequate contingency amounts and that the assumptions on which the designs are based are documented		
6. Confirmation of fees	1. Reach agreement on the recoverability or otherwise of cost in the event that the project is not feasible or postponed 2. Ensure that provision is made in the fee agreement for additional fees in case of scope changes		

APPENDIX 2 – TABLE 2: POTENTIAL RISKS IN APPOINTMENT PHASE			
Potential risks	**Possible remedies**	**Item checked**	**Action taken/Comment**
1. Disputed communications	1. Keep records of all telephone conversations, meetings, etc 2. Confirm all communication in writing		
2. Failure to fulfill Client expectations	1. Confirm brief in writing and clarify any areas of uncertainty 2. Provide a clear scope and programme of work in the proposal 3. List all items excluded from the scope of work 4. List any liability exclusion, eg asbestos 5. Provide a list of contract deliverables and estimated delivery dates 6. List all items, information, services or permissions to be provided by the Client 7. Confirm any limitations imposed by the Client (financial, programme, etc) on the scope of services in writing 8. Clearly establish the Client's requirements for the project with regard to quality, life expectancy, proposed use, performance, specification, capacity, etc		
3. Consultant unable to deliver	1. Ensure that you have the necessary skills and resources to carry out the project 2. Do not accept any unrealistic conditions that reduce your ability to perform such as programme or financial constraints. Avoid discounting your fee 3. Ensure provision is made for adjustment of delivery dates in the event of delays in the award of the contract or in the provision of items to be supplied by the Client		
4. Client unable to fulfill obligations	1. Make sure you know with whom you will be contracting particularly when the project is being run by a third party 2. Make enquiries about the track record and financial status of any new Clients especially when the Client has a history of switching consultants or failed projects 3. Ensure that the Client's representative is duly authorized to effect the transaction 4. Ensure that the Client has adequate funding in place		
5. Adequacy of P.I. Insurance	1. Ensure that your firm has adequate PI Insurance to cover the project 2. Ensure that your PI liability is limited in respect of duration and amount		
6. Joint Venture agreements	1. Assure that Joint Venture Agreements are in place where applicable 2. Ensure that the Joint Venture Agreements complement the main Client		

	Agreement and that there are no conflicts		
7. Confirmation of fees	1. Calculation of the fee should be included in the agreement including recovery of disbursements 2. Ensure that provision is made in the fee calculation for additional fees in case of scope changes, etc		
8. Occupational Health and Safety Act – Construction Regulations	1. Ensure that the Client is aware of his duties in respect of the OHS Act and regulations (Construction Regulations) 2. Should the Client wish to appoint the Consultant as his agent, ensure that the appointment is in writing and adequate fees are payable for these duties 3. Ensure that you have the necessary skills and experience to accept the appointment as agent for the Client		

APPENDIX 2 – TABLE 3: POTENTIAL RISKS IN CONCEPTUAL DESIGN PHASE			
Potential risk	**Possible remedies**	**Item checked**	**Action taken/Comments**
1. Disputed communication	1. Keep record of all telephone conversations, meetings, etc 2. Confirm all communication in writing		
2. Insufficient / incorrect external information	1. Ensure that up-to-date information is obtained from experienced professionals regarding geotechnical information, site surveys, etc		
3. Incorrect conceptual design	1. Ensure that all design assumptions are documented 2. Ensure that the design is performed by suitably qualified staff 3. Ensure that design software used is properly checked for accuracy of output. Manual calculation checks should be done to verify the output 4. Ensure that the design is reviewed by an independent qualified staff member and that this review is documented, dated and signed 5. Ensure that all Joint Venture Partners are using the same design assumptions and do an independent review of the Joint Venture Partner's design		
4. Design not "fit for purpose" or too expensive	1. Ensure that a value engineering exercise is performed at the appropriate stages of the design cycle		
5. Incorrect or incomplete documentation	1. Ensure that the design output documentation is in accordance with the design assumptions 2. Ensure that documentation leaving your office has been checked for completeness and correctness 3. Ensure that schematic documentation is distributed to the relevant parties in time to enable them to make comments 4. Ensure that any estimate prepared on the basis of your design includes adequate contingency		

APPENDIX 2 – TABLE 4: POTENTIAL RISKS IN DESIGN PHASE			
Potential risks	**Possible remedies**	**Item checked**	**Action taken/Comments**
1. Disputed communications	1. Keep records of all telephone conversations, meetings, etc 2. Confirm all communication in writing		
2. Incorrect design documentation	1. Ensure that the detail design is based on the approved conceptual design documents 2. Ensure that the design assumptions are documented 3. Ensure that the documentation is prepared by suitably qualified staff 4. Ensure that design software used is properly checked for accuracy of output. Manual calculation checks should be done to verify the output 5. Ensure that documentation is only issued after being checked and signed by a qualified professional staff member 6. Ensure that all authorizing authority requirements are met before documentation is issued 7. Ensure that Joint Venture Partners documentation adheres to all the requirements and are reviewed independently		
3. Incomplete design verification	1. Ensure that the design documentation provides sufficient detail to satisfy the following requirements 1.1. Build-ability issues 1.2. OHS Act requirements 1.3. Environmental requirements 2. Ensure that the final documentation conforms to the original design intent and project specification		
4. Control of documentation	1. Ensure that records are kept of all documentation issued as well as subsequent revisions 2. Ensure that copies, both hard copy and electronically, are filed in such a way that it is easily accessible to all interested persons		
5. Inexperienced external service providers	1. Should external service providers be used for the detailed design and documentation, ensure that: 1.1. The service provider is qualified and experienced to perform the work 1.2. His design assumptions are documented and checked 1.3. The service provider carries sufficient PI Insurance to cover his commitments under the project 1.4. Appoint the service provider on a back-to-back basis wherever		

	possible		
6. Inexperienced internal staff	1. Ensure that junior and/or inexperienced staff are supervised 2. Undertake comprehensive design checks of all staff, especially junior and/or inexperienced staff		
7. Scope creep	1. Systematically and in detail document covert scope creep as it occurs 2. Notify the Client in terms of your agreement of such scope creep and timely submit claim for compensation		

APPENDIX 2 – TABLE 5: POTENTIAL RISKS IN CONTRACT AWARD PHASE			
Potential risks	**Possible remedies**	**Item checked**	**Action taken/Comments**
1. Adjudicating tenders based on incomplete or incorrect information	1. Ensure that all tender documents received comply to the prerequisite standards 2. Ensure that tender documents are collected and opened in an open and transparent forum 3. Ensure that decisions regarding tender awards are properly documented including reasons for accepting or rejecting tenders 4. Ensure that tenders are adjudicated on an unbiased and unprejudiced basis 5. Ensure that any Contractor initiated alternatives are fully evaluated and that re-design responsibility is clear		
2. Appointing inexperienced Contractors	1. Ensure that Contractors have the necessary experience, financial capability and management before a contract is awarded		
3. Not complying with any legal requirements in appointed contracts	1. Ensure that the provisions of the Preferential Procurement Policy Framework Act, 2000, the National Treasury legislation pertaining to Supply Chain Management and the prescripts of the Construction Industry Development Board are adhered to, where applicable		
4. Legal requirements for appointing contractors	1. Ensure that approved Contractors are appointed in writing making use of the appropriate documentation approved by the Construction Industry Development Board		

APPENDIX 2 – TABLE 6: POTENTIAL RISKS IN IMPLEMENTATION PHASE			
Potential risks	**Possible remedies**	**Item checked**	**Action taken/Comments**
1. Disputed communications	1. Keep records of all telephone conversations, meetings, etc 2. Confirm all communications in writing		
2. Delays, cost escalations or accidents due to improper site supervision	1. Ensure that site supervision is carried out by suitably qualified and experienced staff 2. Ensure that site supervision is carried out in accordance with the agreed scope of service 3. Ensure that site staff are in possession of site monitoring checklist forms and that the forms include sufficient detail of items to be checked 4. A site monitoring check list should be completed during each site visit. A copy should be handed to the site representative of the Contractor and the original copy (signed by the Contractor) should be filed by the Consultant 5. Ensure that all site instructions are issued in writing and that the Contractors acknowledge receipt of on-site instructions in writing 6. Ensure that all site instructions are properly filed and followed up until completion		
3. Prevention of accidents during construction	1. Although a potentially dangerous situation may exist outside the Consultants area of responsibility all potential hazardous situations must be recorded in writing and brought to the attention of the relevant responsible persons 2. Avoid giving professional advice outside the staff members field of experience and training		
4. Certification of progress payments without assessing work performed	1. Ensure that progress payments are only made once a qualified person has inspected, measured and certified the work done		
5. Uncoordinated revision of design documentation	1. Ensure that documentation revisions are only done after careful consideration of all the implications of such a revision 2. Ensure that revised documentation is issued to all relevant parties in time 3. Ensure that revised documentation is filed in such a way that it is accessible to all interested persons		

APPENDIX 2 – TABLE 7: POTENTIAL RISKS IN COMMISSIONING AND POST CONTRACT PHASE			
Potential risks	**Possible remedies**	**Item checked**	**Action taken/Comment**
1. Incomplete commissioning of systems	1. Ensure that adequate time is allowed for commissioning and testing of equipment and systems 2. Document the results of all final testing and commissioning procedures 3. Prepare final snag lists and ensure that all items are followed up, corrected and signed off 4. Ensure that snagging and commissioning procedures are performed by suitably experienced staff		
2. Incomplete information provided to Client	1. Prepare, check and issue final record drawings to the client 2. Provide Client with up-to-date operating manuals and maintenance specifications 3. Provide the Client and all interested parties with a final list of names and contact details. Included in the list should be all the members of the professional team, Contractors and Subcontractors		
3. Client perception of performance	1. Obtain feedback from the Client and other professional team members regarding their perception of the following: 1.1. The alignment between the original scope of the project and the final delivered project 1.2. The Consultant's contribution towards adding value to the project 1.3. The Consultant's ability and quality of resources to undertake projects of a similar nature 1.4. The quality, accuracy and on-time production of documentation 2. Analyze the feedback received in 1 above to ensure that corrective action is taken in respect of areas of under-performance.		