LEIGHTON BENNETT RESUMÉ

- **Qualifications**:
  - BSc, MDP diploma.
  - Various SHE courses: NOSA, ILCI, IRCA, DNV, Insurance Institute of America, FPASA
  - FAIS commercial insurance, Asset & Maintenance Management, Enterprise Risk Management courses, etc.
- **Experience:**
  - Engineering Geologist: 8 years
  - NOSA H&S Advisor & Trainer: 2.5 years
  - Loss Control Manager: 11 Years (10 years NOSA 5 Star, 24/7 metal industry, 2000 staff)
  - Insurance Brokers' Risk Consultant: 8 years
  - Benrisk Consulting: SHE & Risk Management Consultant: since 1999
- **Professional Registrations & Affiliations:**
  - ROSProf, AIRMSA, GradIOSHSA, FIOSM
  - Serves on IOSM OSPB, SFA, IOSM Registration Lead Auditor, & has served on ASOSH, MQA (SQCG/SGG)
- **Minister of Labour appointed Safety Specialist:** has served on the Advisory Council on Occupational Health & Safety established under OHSAct Sections 2 to 4, for a 4 year period
- **Author:**
  - 2006 'Risk Assessment – guide to understanding the basics 'booklet published by Safety First Association -
  - Volume 23, DEAT's Environmental Management Information Series, 2006 publication on 'Risk Management'.
- **Specialities:**
  - Occupational Safety, Fire, Engineering, Micro Environmental, Insurance Underwriting Surveys (with fire & machinery breakdown EML's), Inspections, Audits, Legal Compliance, Risk Assessments, Risk Controls, Incident Investigations, Construction Work H&S Specifications , SHE Plans & audits Excavation Safety, etc

Benrisk Consultingcc

BASELINE RISK ASSESSMENTS & Early Project Phases Risk Assessments

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Overview

- The Risk Assessment Requirements
- The Risk Management Process introduction
- The Risk Assessment Process:
  - > Types of Risk Assessments
  - > Risk Identification - using PEPMELF
  - > Risk Analysis
  - > Risk Evaluation
- Risk Responses / Treatment Controls
- Project Management Phases
- Early Project Phase Risk Assessments
- Project Phase Risk Assessment examples

Why are Risk Assessments Important?

- Risk Assessment has become the "BIG" issue term used in **King III**, the new **Company Act** , the **Health & Safety Legislation** & in the **SANS/ISO 31000:2009 Risk Management Std.**
- All project risks that are identified, assessed & mitigated in the early stages of a project should not result in significant incidents & losses during the project execution.
- While everybody is talking about doing Risk Assessments, just what are they doing & how?

RISK ASSESSMENT - Defined

THE IDENTIFICATION OF UNDESIRED EVENTS, THEIR CAUSES &

ANALYSING THEIR LIKELIHOOD & POTENTIAL CONSEQUENCES -

CONSIDERING EXISTING CONTROL MEASURES **- IN ORDER TO**

MAKE AN EVALUATION AS TO THE

RISK EVENT'S ACCEPTABILITY

CR 5: Client Duties

CR 5.1: A client must:

a) Prepare a **Baseline Risk Assessment** for the intended construction work project

b) Prepare a suitable, sufficient documented & coherent site specific **Health & Safety Specification** for the intended construction work based on the baseline assessment contemplated in paragraph (a)

c) Provide the designer with the H&S Specification contemplated in paragraph (b)

d) Ensure the designer takes the prepared **H&S Specification into consideration** during the design stage. *(& CR 6.1.d: the designer to inform the client in writing of any known or anticipated dangers or hazards related to executing the construction design)*

f) Include the **H&S Specification in the tender documents**

The Construction Regulations Risk Assessment Requirement

CR 9.1: A **risk assessment must be performed**, in writing, & be part of the H&S Plan, & must include:

a) the **identification of the risks & hazards** to which persons may be exposed to *(& ergonomics aspects)*

b) An **analysis & evaluation of the risks & hazards** identified based on a documented *(published?)* method

c) A documented ***(H&S)*** plan & applicable safe procedures to mitigate, reduce or control the risks & hazards that have been identified

d) A monitoring plan

e) A review plan

The unpublished 2014 OHSAct Amendment Bill draft

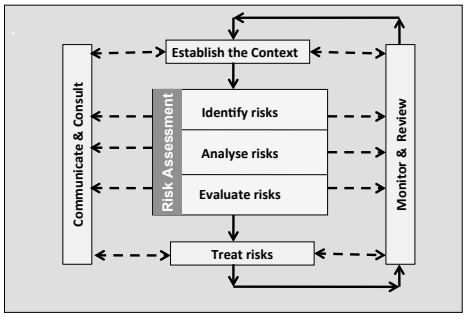
'Risk Assessment' means, the process of evaluating the risks to an employee's health & safety from workplace hazards & is a systematic assessment of all aspects of work that considers:

- a complete hazard identification;
- identification of all who may be affected by the hazard;
- how the person is affected;
- the analysis and evaluation of the risks; and
- prioritisation of risks;

Section 8.2. Every employer's duties shall include :

(a) conducting a workplace specific risk assessment & thereafter developing & implementing a **risk management plan** in writing, in respect of every risk identified;

SANS /ISO 31000 RM Process



What Risk Assessment Context?

- **What is the RA's scope:**
  - Health & Safety only?
  - A Project's risks?
  - Enterprise–wide risks? … etc
- **The Context to include**:
  - Internal aspects only?
  - Both internal & external impact aspects?
- **What type of Risk Assessment?**

What Type of Risk Assessment?

- **BASELINE:** to determine the wide range & current status of risks associated with a company, a business or a project, with a set of risk profiles being obtained
- **ISSUE-BASED**; to distinctly & clearly delineate & quantity risks associated with particular aspects of an activity, a process, a hazard, job-task or an area?
- **CONTINUOUS:** the ongoing assessment or schedule of periodic reviews, by supervision, to verify good practice compliance & to monitor the extent to which the static or dynamic changes of risk, impacts on the workplace conditions, processes or activities.

Any new or changed risk noted is then to be re-assessed

RISK ASSESSMENT EXAMPLES

Assessment Types:	Type Examples:
Baseline	• New plant or construction project • General operation H&S analysis • Project impact on the public
Issue Based	• Machinery safeguards • Operation process change • Working at heights • Chemicals handling & use • Confined space working
Continuous	• Planned inspections • Critical task analysis • Planned job observations or BBS • Toolbox talk compliance

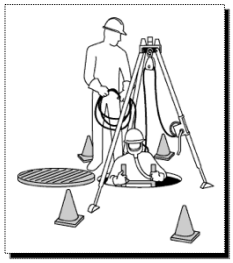
More Advanced Risk Assessments

- Preliminary Hazard or Screening Level Risk Analysis
- HAZOP (hazard & operability analysis)
- FMEA/ FMECA (failure mode & effects criticality analysis)
- What-if Analysis &/or Checklist Analysis
- FTA (fault tree analysis) } **Bowtie Analysis**
- ETA (event tree analysis)
- MORT (management oversight & risk tree), … etc

SANS/ISO 310010:2010 lists some 32 Risk Assessment Techniques

Risk Assessment
Physical vs Brainstormed Situations

Low hanging toilet lighting



Confined space entry

WHAT RESOURCES 'AT RISK'?

P	=	***People***
E	=	***Equipment***
P	=	***Process/ Procedures/ Practices***
M	=	***Materials***
E	=	***Environment - macro & micro***
L	=	**Legal & *Liability***
F	=	***Finances***

Good for risk identification brainstorming

Brainstorm the PEPMELF Risks

Identify the **who, what, where, when, which, why, how** … that could impact on the PEPMELF resources 'at risk'?

- **People**
- **Equipment**
- **Process, Practices, Procedures & Policies**
- **Materials**
- **Environment (macro/micro)**
- **Legal &/or Liability**
- **Finances**

Brainstorm the PEPMELF Risks

The process of IDENTIFYING THE RISKS is related to identifying what can cause harm, injury, damage, loss, etc to any aspect related to PEPMELF?

Such risks can include:

- a near-miss injury to a fatal,
- structural or mechanical failure to total plant outage,
- hazardous exposure to major pollution,
- fire to explosion destruction,
- a non-compliance to prohibition & prosecution

People at Risk?- example

- Employees (permanent &/or casuals)
- Supervision / Management
- Contractors
- Engineer / Designer
- Operators / Drivers
- Service Providers / Suppliers
- Clients / Customers
- Others?…Visitors, Public, ...

Illness, Injury, Fatal, Unrest, Stress & strain, Poor design, Poor training, From wildlife?

Possible People Hazards & Exposures from:

- Struck by or against something
- Fall from height or on same level
- Caught in, on or by something
- Caught against, between or under something
- Contact with heat, electrical, chemicals, cold, etc
- Subject to noise, dust, vapours, radiation, etc
- Overstressed by overexertion, overload, ergonomics
- Manual stressed by lifting, pulling, pushing, bending
- In an unsafe or unprotected position
- Doing something wrong or unsafe, etc, etc

Equipment at Risk?- example

- Plant
- Machinery
- Equipment – fixed, mobile
- Vehicles
- Tools - manual, powered, etc
- PPE – poor quality, defective, etc
- Falsework, scaffolding, ladders, etc
- Statutory & other inspections, etc
- Other equipment?… hired/leased plant

Breakdown, Failure, Malfunction, Defective, Lack capacity, No use training, Incorrect use, Incident loss, Not available

Possible Plant, Machinery & Equipment Hazards & Exposures from:

- Inadequate or dysfunctional controls
- Poor or inadequate maintenance
- Inadequate lubrication, cooling, ventilation, lighting
- Excessive wear & tear or running to failure
- Defects, wrong application or unfit for purpose
- Operational or sequence malfunction or failures
- Poor design, modification or change management
- Inadequate protection – guards, trips, sensors, reliefs, etc
- Inadequate capacity or output
- Fire, explosion, flood condition or ignition potential
- Spillage, contamination release or high wastage rates

Processes/Procedures at Risk?- eg.

- Design, methods, shapes, capacity, loads, ...
- Batch, sequential, continuous, ...
- Heating, cooling, solidification, curing,...
- Composition, mixing, blending, reactive, ...
- Controls, protection measures, training, ...
- Process timing & sequencing, ...
- Employment & training procedures, ...
- Inspection, audit & follow-up procedures, ...
- Permits: construction, lockout, hot work, confined space entry, elevated work, etc
- No/inadequate standards, SWPs, etc
- Emergency, contingency measures & responses, ...
- Others? .... procurement, maintenance, etc

None, Incorrect, Unused, Inadequate, Defective, Out dated, Wrong

Materials at Risk?-

- Raw & intermediate materials
- Finished goods & products
- Bi-products & defective materials
- Hazardous materials: flammable, toxic, corrosive, explosive, etc
- Packaging materials
- Scrap & wastes : recycle, reuse, rework
- Hazardous wastes
- Spoil, spillage & wastes disposal, etc

Wrong usage, Quality, Blend/mixture Strength. No MSDS, Exposures, Damage, Recalls, etc

Environment at Risk?- eg.

- Macro: air, land, water, fauna, flora
- Micro: noise, temperature, light, ventilation, etc
- Location – site, topography, access, etc
- Exposures – MHI, neighbours, etc
- Layout – access, space, separations, etc
- Workplace – elevated, confined space
- Work station – design, ergonomics, work aids
- Weather – heat, wind, rain, floods, lightning, e
- Archaeology – "sacred" sites, graves, fossils, etc

Emissions, Spillages, Pollution, Destruction Damage, Stresses, Harm

Legal & Liability at Risk?- eg.

- Business permits & registrations
- H&S legal appointments
- Job induction & training
- Work permits & docs proof
- Statutory inspections & maintenance
- Contracts & contract breaches
- Non-Compliance & work stoppages
- Delays, penalties & compensation claims
- Others?: No insurance or PI covers, ... etc

Non–comply, Work delays, Loss Claims, Prosecution, Reputation, Closure

Financial at Risk?- e

- Project funding & resources
- Viable return on investment business
- Revenue to meet obligations,
- Suitable budgets: H&S, maintenance, ...
- Suitable cash flows
- Project creep & changes costs
- Funds to manage incidents /loss
- Suitable risk financing for recovery
- Project, labour &/or materials costs changes
- Hire, damage &/or recall costs/claims, etc

Cash flow, Losses, Escalations, Penalties, Claims, Prosecution, Corruption, Theft, Fraud, Strikes, Bankrupt

Risk Analysis

Risk Analysis is the
process of analysing
the FREQUENCIES (& EXPOSURES)
&
CONSEQUENCES
of risk occurrences
of a hazardous nature, activity or exposure

ANALYSING THE RISKS

Decide the Risk Analysis format categories:

eg: **Parameter Levels:**

- Very Low, Low, Medium, High, Very High, (1 to 5)
- Low (1), Medium (2), High (3), etc
- Probability of occurrence is from 0.0 to 1.0 only

Parameters:

- Risk = Frequency x Consequence (3x3 = 9)
- Risk = Frequency x Severity, (5x5 = 25)
- Risk = Likelihood x Exposure x Consequence (3x3x3 =27)
- Risk = Likelihood x Exposure x Consequence (5x5x5 =125)
- Risk = Probability x Exposure x Consequence (1x3x3= 9), ..etc

>> Yielding 1 to 9, 1 to 25, 1 to 27, 1 to 125 RR ranges

RISK MATRIX (2 element, 5x5 format)

SEVERITY or CONSEQUENCE						
5 EXTREME	5	10	15	20	25
4 VERY SEVERE	4	8	12	16	20
3 SEVERE	3	6	9	12	15
2 MODERATE	2	4	6	8	10
1 MINOR	1	2	3	4	5
	1 RARE/UNLIKELY 0 – 0.2	2 SELDOM 0.2 - 0.4	3 OCCASSIONALY 0.4 – 0.6	4 FREQUENTLY 0.6 – 0.8	5 OFTEN/ DAILY 0.8 – 1.0

FREQUENCY or PROBABILITY

Risk Levels Matrix (3 elements, 5x5x5 format)

Risk level		Likelihood/ Frequency	Exposure	Consequence/ Severity
1	VL	Very Unlikely / > yearly	Rare/ per 6 months plus	Minor/ first aid/ <R2k
2	L	Unlikely / annually	Seldom/ per month	Moderate/ reportable/ R2-20k
3	M	Possible / monthly	Occasionally/ per week	Severe/ DI/ R20-200k
4	H	Likely / weekly	Frequently/ per daily	Very Severe/ multi DI/ R0.2m-2m
5	VH	Very Likely/ Often/daily	Continuously/ per hour	Catastrophic/ fatal/ >R2m

The 3 Element 3 Risk Level Assessment Worksheet (3x3x3 format)

BASIC RISK ASSESSMENT WORK SHEET: Identifying Existing & Potential Risks

(Note: A 3 risk element, likelihood, exposure & consequence risk assesment formatted worksheet, with low = 1, medium = 2 & high = 3 category risk evaluation levels)

Location/site/dept: Date:

Job-Task/ Process/ Equipment/ Group Assessed: Assessed by:

Item No.	Job-task, process, observation or brainstorm step	Potential hazard or exposure Likelihood description	Likelihood L 1-3	Likelihood E 1-3	Potential consequences or severity description	Consequence C 1-3	Risk Rating Total =L+E+C	Risk Rating Rank order	Existing or new risk control comments or suggestions
1	Man working on roof	Man could fall off roof	2	3	Man seriously injured, fatal	3	18	1	Use safety belt & roof edge guards
2	Man working on roof, etc	Tools or items could fall off roof, etc.	2	3	No or damaged item or tool	1	6	2	Use catch net along roof edge

Where risk score 1 to 5 * = low risk requiring minimal action, 6 to 12 * = medium risk requiring corrective action within a month, 13 to 20 * = high risk requiring action within a week & 21-27 * = extreme risk with immediate risk reduction or even risk termination action

Risk Rating Examples (5x5x5)

Situation	Likeli-hood	Expos-ure	Conse-quence	Risk rating value & remedial measures
Fall from roof	**3** *occas*	**4** *freq*	**5** *fatal*	**60 – High Risk**: immediate correction needed – **establish a fall protection plan**
Trip, arm break	**3** *occas*	**4** *freq*	**3** *DI*	**45 – Medium Risk :** correction needed – **housekeeping clean up needed**
Knife slip, cut	**4** *freq*	**3** *occas*	**2** *report*	**24 – Low Risk:** need attention - **Use gloves**
Sling breaks, load falls	**4** freq	**5** *often*	**5** *catast*	**100- Very High Risk**: Stop until risk controlled - **intro sling inspections & correct rigging**
Trench <1m deep collapse	**2** *seldom*	**3** *occas*	**2** *report*	**12 - Very Low Risk**: Consider monitor if risk perhaps not acceptable – **trench inspections & use warning barriers**

Risk Rating Scores (5x5x5 format)

Risk = Likelihood x Exposure x Consequence	
Risk rating value	**Suggested Risk Measures**
< 15	**Very Low Risk**: perhaps acceptable
15 to 30	**Low Risk**: attention needed
30 to 60	**Medium Risk**: correction needed
60 to 100	**High Risk**: Immediate correction needed
100 to 125	**Very High Risk**: Consider stopping until risk suitably controlled or risk transferred

Project/ Job-task/ Process, etc assessed: **Abnormal load transporting** — Ranked RA worksheet

Item No.	PEPMELF based risk identification	Potential hazard or exposure Likelihood description	Likelihood/ Exposure L 1 - 5	Likelihood/ Exposure E 1 - 5	Potential consequences or severity description	Consequence C 1 - 5	Risk Rating Total = LxExC	Risk Rating Rank order	Existing or new risk control comments or suggestions
50	Road route - port - medupi	public roads use, site access	4	3	accidents, no site access	5	60	1	BCS procedures
62	subbie transport legal liability	not in place	4	3	no cover	5	60	1	BCS procedures
63	public liabaility	not in place	4	3	no cover	5	60	1	BCS procedures
51	Route layboyes	weather, security, fatigue	4	3	stuck trucks, theft	4	48	2	BCS procedures
56	Contractor H&S Plan	No Plan	4	3	limited contractor compliance management	4	48	2	customs inspection & BCS procedures
61	subbie goods in transit cover	not in place	4	3	no cover	4	48	2	medupi equipment duty free
16	Abnormal transport	inexperience, non-compliance	3	3	incident & damage, fatal	5	45	3	overseas check at ship loading
18	Rigger	on vehicle to laydown to vehicle rigging management	3	3	load drop, damage	5	45	3	check info on arrival inspection
8	safcor project admin	no/wrong transport drawing to transporter	3	3	incorrect vehicle allocated	4	36	4	extremeties of largest load ID & cleared. HPA provide info to SaPA
14	Abnormal transport	contractor selection delay	4	3	process not followed	3	36	4	safcor has no control of process, advise only - port responsible
15	Abnormal transport	client influence on selection	3	3	co not professional to SaPA stds, incident risk	4	36	4	safcor has no control of process, advise only - port responsible
19	Traffic officials (RTI)	no available	4	3	delay	3	36	4	safcor no liability/ advisory only
20	Traffic officials (RTI)	escort competence	3	3	accident	4	36	4	eskom / 3rd party insurance claim, no safcor liability advisory
25	equipment operators	crane/ forklift competent	4	3	load loss,accident	3	36	4	basic Medupi transport signed note
45	wooden cases	item not secured in case	3	3	load shift , damage, loss	4	36	4	secure case to reduce movement
48	fuels - diesel, oils	fuels - oil - leaks	4	3	environmental damage	3	36	4	reputable & experienced co
49	hydraulics leaks	forklifts	4	3	environmental damage	3	36	4	correct information, & timeous notification

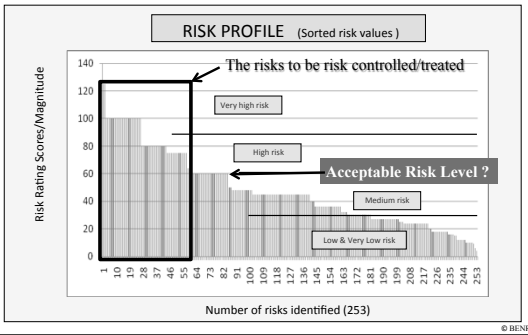
RISK EVALUATION

Risk Evaluation is the decision if the risk ranking value is an acceptable level of risk in terms of the:

- **Operation's Risk Appetite or Loss Bearing Capacity,**
- **Legal or liability,**
- **Social,**
- **Moral,**
- **Environmental,**
- **Sustainability,**
- **Reputational &/or**
- **Financial criteria, etc**

& King III: triple bottom line requirements?

What level of risk is acceptable?



Risk Terms (SANS/ISO 31000)

Risk Appetite: the amount & type of risk that an organisation is willing to pursue or retain

Risk Treatment: a process to modify risk by:
- removing the risk source/s,
- changing/reducing the likelihood,
- changing/reducing the consequences
- reducing the exposure/s

Risk Tolerance: the readiness to bear the risk, after risk treatment, in order to achieve the organisation's objectives

Residual Risk: the risk remaining after risk treatment

Risk Control Definition

Risk Control is the provision of

appropriate levels & standards of protection

for people, assets and earnings to

avoid or minimise the pure risks,

which have been identified and evaluated

in an organisation

IRMSA

Risk Response Techniques (4T's & E)

- **Risk Avoidance - Terminate - Decline**
  Taking action so as to not incur the risk in the first place
- **Risk Elimination - Tolerate - Accept**
  Doing away with or changing the risks to an acceptable level
- **Risk Transfer - Transfer - Transfer**
  Non-insurance contractual transfer of the consequence of risk
- **Risk Reduction - Treat - Mitigate**
  Reducing the risk by controlling its frequency & severity
- **Risk or Opportunity Exploitation**
  Decision to exploit the risk or opportunity to achieve some desired advantage

RISK RESPONSES

RISK	Rating	Suggested Action
Tolerate	<15	Accept the risk
Tolerate - Treat	15 - 30	Accept the risk, but monitor
Treat	30 - 60	Apply the 8E's: evaluate, engineering, educate, emplacement, example, enthusiasm, enforcement, evaluate risk again
Transfer	60 – 90	Outsource risk &/or Insure
Terminate	> 90	Stop doing unacceptable risk
EXPLOIT	1 - 125	Decision to exploit an opportunity or a risk for some desired advantage

Risk Control Treatments (8E's)

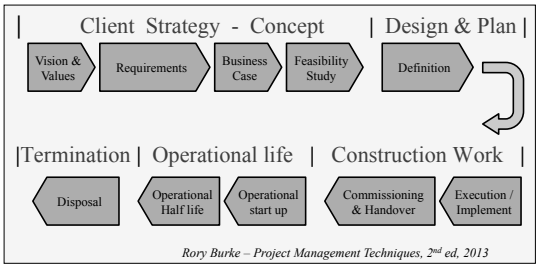
- Evaluating procedures (practices & standards)
- Engineering redesign or improvements
- Education and training (induction & job)
- Employment practices (selection, placement)
- Example setting (leadership & motivation)
- Enthusiasm (encouragement & acknowledgement)
- Enforcement (warning, counseling, discipline)
- Establish a further risk assessment (ID more risks)

Project Management Phases

It has become common practice to manage projects in phases as follows:

- Project Initiation (concept & feasibility)
- Design Development (& planning)
- Project Execution (construction work)
- Project commissioning & handover (closeout)
- Facility/structure operation until life-end disposal (operational to termination)

Project Lifecycle Phases



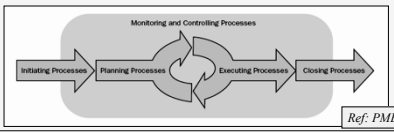
Rory Burke – Project Management Techniques, 2nd ed, 2013

Project Management Phase Processes

It has become common practice to apply the following processes during each Project Management Phase:

- Initiation Process
- Planning Process
- Execution Process
- Closeout process

} Monitoring & Controlling Processes



Ref: PMBOK 5th ed

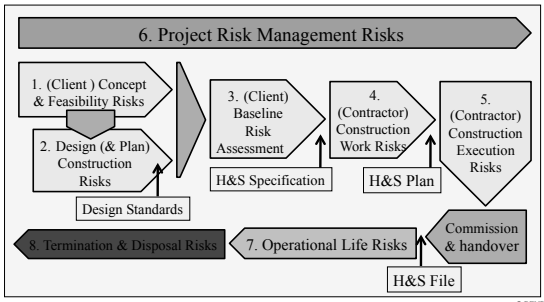
Early Project Risk Assessments

1. The client's initial risk assessment covering the overview of the desired H&S culture & the anticipated project risks, involves the project strategy envisaged **Concept & Feasibility Risks (CFR)**
2. The designer risk assessment, where possible risks are designed out & the remaining specific design related risks are reported as the **Design Construction Risks (DCR)** to clients
3. The Client's **Baseline Risk Assessment (BRA)** (ex OHSAct CR 5.1.a) should be the client's combined risk assessment of the two previous risk assessments (CFR & DCR) to form a site specific baseline risk assessment of the intended construction work, which must be included in the H&S Specification & provided in the project tender documents

Early Project Risk Assessments

4. The **Construction Work Risks (CWR)** assessment is the contractor's RA & response to the work risks & requirements in the Client's H&S Specification, & this RA must be included in the contractor's construction work H&S Plan (CR 9.1)
5. The contractor's CWR must be updated by the contractor to include the **Construction Execution Risks (CER)** which reflects the new & changed risks during such construction work
6. The **Project Risk Assessment (PRA), management & review** of all the project aspects that should be monitored by the project's portfolio &/or project manager from project start up until project closeout & handover to the client
7-8 The post project risks include the **Operational Life Risks (OR)** until **Termination & Disposal Risks (TDR)** decommissioning

Project Risk Assessments



Project Risk Assessment Categories

KEY	RISK CATEGORY
RR	**REPUTATION RISK** – This includes risks that would affect SANRAL's reputation, credibility among investors and other stakeholders and will question SANRAL's ability to deliver on mandate
BSR	**BUSINESS SUSTAINABILITY RISK** – This includes risks relating to the political environment, source of supply, reputation, Strategic objectives and any other risks as it relates to the core business objective, binding constraints and leadership interventions.
APR	**ASSET PRESERVATION RISK** – This includes risks relating to overloading, design and construction as well as research and development and other risks as it relates to the core business objective.
OR	**OPERATIONAL RISK** – This includes risks relating to road safety and routine road maintenance and other risks as it relates to the core business objective.
GR	**GOVERNANCE RISK** – This includes risks relating to the corporate management, administrative management, legal environment and other risks relating to the corporate management objective.
FR	**FINANCING RISK** - This includes risks related to funding, loans, guarantees and budgets as well as any other risks relating to the financing objective ("E" above).
HRR	**HUMAN RESOURCE RISK** – This includes risks relating to all aspects of human resources.
ITR	**INFORMATION TECHNOLOGY RISK** – This includes risks relating to internal and external information technology processes such as SAP, Toll Plazas, AVCs (Automatic Vehicle Classifier), MIS, IT IS (Intelligent Transport Information Systems) etc.
SEDR	**SOCIO ECONOMIC DEVELOPMENT RISK** - This includes risks relating to black economic empowerment, procurement policy and developing human capital (not own staff).
ER	**ENVIRONMENTAL RISK** - This includes risks relating to SANRAL's environmental policy, generic Environmental Management Plan and other environmental objectives
CFR	**CONCEPT & FEASIBILITY RISKS** - Project idea or concept must be possible & realistic to achieve & also fulfils the corporate vision (objectives), values (risk level, governance), requirements (quality, continuous improvement) & business case (cost benefit, risk analysis, ROI)
DCR	**DESIGN RELATED CONSTRUCTION RISKS** - Safety, health & environmental risks introduced by the construction work required to achieve the design requirements
CWR	**CONSTRUCTION WORK RISK** – Safety, Health & Environmental risks anticipated to occur during the construction work phase of the project -

Ref SANRAL

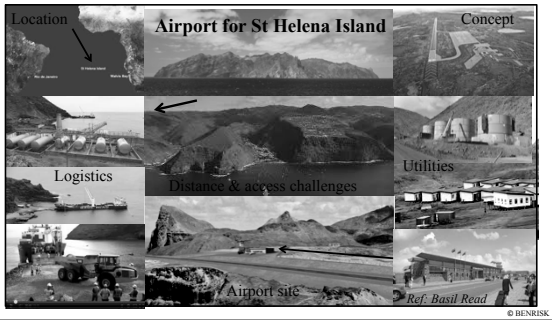
Concept & Feasibility Risk (CFR)

Concept: build a 737 sized airport on an island

Feasibility: possible if labour, equipment & materials logistics managed, & need improved harbour access & access road to plateau

Risks: Shipping, harbour access (barge & 14t crane), import labour (health risks to locals), import most construction materials & all heavy machinery, provide housing, feeding & all utilities (fuel, power, water, sanitation)

Concept & Feasibility Risk (CFR)



Design Construction Risks (DCR)

Design: Construct & rehab existing main road to 120km/hr dual-carriage freeway

Design Construction: Road horizontal & vertical alignments, road pavement design, design bridges, agric passes, farm access roads & intersections

Design risks: traffic accommodation, adjacent new 2 lane road design, ground (heaving) conditions, flood capacities, live rail, road/river bridge design risks, move o/ug cables, demolition, blasting, construction materials quantity & quality, public access, heavy cast sections lifts, road rehab design, farm accesses

Design Construction Risks (DCR)

Ref: SMEC

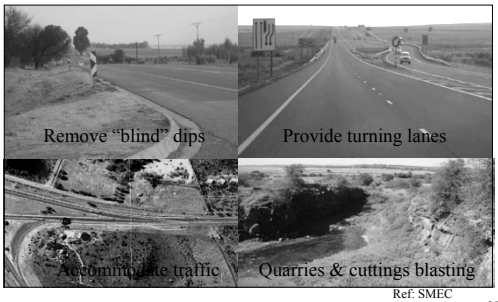
Client H&S Specification

- **H&S Specification** means a site, activity or project specific document prepared by the client pertaining to all H&S requirements related to construction work
- Construction work H&S specifications usually reflect the OHSAct requirements plus the client's extra H&S requirements to be applied to achieve H&S compliance
- This client H&S Specification should be updated to include any dangers or hazards related to the design construction risks before being included in the project tender documents

Construction Work Risks (CWR)

- **Construction:** Construct & rehab existing main road to a 120km/hr dual-carriage freeway
- **Construction work & risks:** traffic accommodation, cuts & fills, old bridges demolition, explosives use, heaving soils removal, piers & cast bridge slab section lifts, work at heights & near/over water, cables moving, falsework, earthworks, storm water drainage, rehab & compacted road layer work, surface paving & marking work, slope & median landscaping, sun heat, noise, dust, rain storms & lightning, public access & theft risks, long haulage risk of quality/quantities of layer materials, new farm access service roads & intersections

Construction Work Risks (CWR)



Ref: SMEC

Generic Hazard Categories & Hazard Identification Types

Hazard Categories	Hazard ID Types
• Fire & explosions	• Entanglement
• Mechanical breakdown	• Crushing
• Electrical	• Cutting, stabbing & puncturing
• Gas or liquid release	• Shearing
• Weather factors	• Friction or sparks
• Design or construction fault	• Striking, contacts, impacts
• Structural failure	• High pressure gasses or fluids
• Quality assurance failure	• Electrical - contact
• Radiation exposure	• Explosion – rupture, ignition
• Moving machinery & parts	• Slipping, tripping & falling (heights)
• Ergonomics	• Suffocation or engulfment
• Environment - fauna, flora, etc	• Temperature extremes or fire
• Safety, health &/or illness	• Manual handling
• Security & unrest/strikes	• Physical, chemical & other stresses
• Financial limitations, losses	• Ergonomic factors
• Others: fraud, corruption	• Environmental - spillage & wastes

Presentation Recap

- **The Risk Assessment Requirements**
- **The Risk Management Process**
- **The Risk Assessment Process:**
  - > Types of Risk Assessments – baseline, etc
  - > Risk Identification - using PEPMELF
  - > Risk Analysis - risk rating scoring
  - > Risk Evaluation - risk profile acceptable?
- **Risk Responses / Treatment Controls:**
  - > 4T's or Exploit risk opportunity advantage
- **Project Management Phases**
- **Early Project Phase Risk Assessments:**
  - > CFR, DCR, BRA & CWR, …….
- **Project Phase Risk Assessment examples**

I trust you now have some clear
PRACTICAL INSIGHTS
on
BASELINE RISK ASSESSMENTS
& Early Project Phases Risk Assessments

Any questions ?

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