



Plan

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**DARLINGTON REFURBISHMENT RISK MANAGEMENT PLAN**

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**Darlington Refurbishment Risk  
Management Plan**

**NK38-PLAN-09701-10067-0006-R003**

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## Revision Summary

Revision Number	Date	Comments
R003	2013-01-31	Update to incorporate: Strategic direction on contingency management
R002	2012-01-17	Update to incorporate: <ul style="list-style-type: none"> <li>Change to referencing procedures</li> <li>Include Project Risk Assessment Criteria-Scale</li> </ul>
R001	2012-06-14	Update to incorporate: <ul style="list-style-type: none"> <li>Recommendations from Internal Audit Report (May 2012), and</li> <li>changes in role of corporate Project Risk Management organization.</li> <li>overall plan streamlined.</li> </ul>
R000	2011-10-18	Initial issue.

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## 1.0 PURPOSE

The Darlington Refurbishment Program Risk Management Plan (RMP) defines how Nuclear Refurbishment will manage the risks associated with the Nuclear Refurbishment Program. It establishes a framework for the identification, assessment, control, and response to risks associated with the Nuclear Refurbishment Program and its associated Projects and Departments.

## 2.0 REFURBISHMENT PROGRAM DESCRIPTION

Refer to D-PCH-09701-10000, Darlington Refurbishment Project Charter.

## 3.0 RISK MANAGEMENT PLANS

This plan, the Program RMP, documents the objectives and process to be used to manage the risks associated with the Darlington Refurbishment Program. Critical risk management considerations are based on impact/consequence, probability, and urgency. Applicable company risk policy statements and procedures shall be considered and applied during risk management planning, and where uncertainty around risk assessment exists, SMEs should be consulted to ensure an accurate risk characterization is obtained.

Each project in the Darlington Refurbishment shall prepare a Project RMP, referencing the Program RMP, and documenting any specific project variances to the Program risk management process. If the work for a project will be performed by an Engineer/Procure/Construct (EPC) contractor, the EPC Contractor should submit a Project RMP for their contracted work. Requirements for developing the Project RMP are documented in N-MAN-00120-10001 Sht: RISK, Nuclear Projects Risk Management Process.

### 3.1 Program vs. Project/Departmental Risk Management

Program risks are not simply the sum total of project/departmental risks. There are four sources of risk at the program level:

- Project risks that can affect the overall program.
- Project risks that, when combined with similar or related risks at the project level, combine to create a more significant program-level risk.
- Overall risk of the project, versus distinct to a risk in the project, which may have an impact at program level.
- Risks beyond the scope of the independent project/departmental components.

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Project risks that fit one of the first three above criteria should be identified as program-level risks. Aggregate risks should identify commonalities. Traditional well known risks such as adverse weather, inflation, and minor cost and quantity uncertainty are typically captured in project estimating processes and do not need to be identified through the risk management process.

### **3.2 Roles and Responsibilities**

Risk Management is a team effort and everyone is responsible for identifying risks on an ongoing basis and actively seeking to manage all areas of uncertainty. In order to be effective, risk management personnel must interact regularly with other stakeholders with whom they interface and leverage support and guidance from the NR Project Planning and Controls Risk Team.

Specific roles and accountabilities are documented in N-MAN-00120-10001 Sht: RISK, Nuclear Projects Risk Management Process.

### **3.3 Contractor's Risk Management**

When Engineer, Procure, Construction (EPC) contracts are used, a Risk Management Plan must be prepared by the contractor. The RMP establishes the method on how the contractor effectively manages the risks that they can control and enables transparency of risks to OPG. Additional OPG risks should be recorded and managed in the OPG risk register as per the project and program RMPs.

Risks that apply to the Contractor only will be the responsibility of the Contractor to manage. Oversight will be provided by OPG to ensure an effective RMP is in place.

### **3.4 Refurbishment Risk Oversight Committee**

The Risk Oversight Committee is comprised of RPET members and provides oversight of program and project risk management activities. Meetings will be held every quarter at a minimum, ensuring that oversight is provided at significant phases, such as prior to awarding of large single source contracts or major milestones, to review and challenge identified risks. Attendance at the Risk Oversight Committee meetings will include the following:

- RPET members,
- the invited applicable Project Manager and
- Project Infrastructure Manager and/or Risk Section Manager who will facilitate the meeting.
- Subject Matter Experts within OPG, or outside of OPG as appropriate, will also be invited, when required, to provide a balanced review of the risks.

Terms of reference for the committee will document the objective, scope, membership and meeting frequency.

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### 3.5 Risk Management Processes, Procedures, Templates

Additional information on the risk management processes utilized by the Refurbishment Program can be found within the Project Management E-Manual (N-MAN-001210-10001 Sht: RISK, Nuclear Projects Risk Management Process). These processes are based on the Project Management Standard (N-STD-AS-0028).

The following procedures and forms supplement the risk management process for Nuclear Refurbishment.

- N-MAN-00120-10001 Sht: RISK-03, Task Instructions – Closing Risk.
- N-MAN-00120-10001 Sht: RISK-05, Nuclear Refurbishment - Contingency Development And Management
- N-MAN-00120-10001 Sht: RISK-06, Darlington Refurbishment Lessons Learned And OPEX Management
- N-MAN-00120-10001 Sht: RISK-07, Nuclear Refurbishment Assumptions, Issues, and Decisions Management
- N-FORM-11306, Program Risk Identification Form
- N-FORM-11394 – Key Assumption/Issue Identification Form
- N-FORM-11390 – Decision Record and Analysis Form
- OPG-STD-0062, Project Risk Management Standard
- OPG-MAN-08708-00001, Guide to the Project Risk Management Standard

Darlington Refurbishment uses the Risk Assessment Database and Register (“RADAR”) to record and manage its risks. All risks are to be recorded in RADAR.

### 3.6 Program Risk Management Planning

Refurbishment Program and Project Risk Management Planning will be carried out in accordance with the processes listed in Section 3.5.

### 3.7 Risk Categories or Risk Breakdown Structure (RBS)

In order to maintain consistency there are defined risk categories in RADAR to choose from (i.e. Execution, Regulatory, Business, etc.). A Risk Breakdown Structure, with alignment with the project’s Work Breakdown Structure, may be used to identify high level risks and any risks spun off from or cascading down from that high level risk event.

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### 3.8 Risk Reporting Formats

RADAR is used to report on the status of program and project level risks. RADAR has a number of functionalities to facilitate filtering, sorting, and consolidation of desired data (i.e. by Risk Owner, Functional Group, Risk Level) to prepare customized reports as needed.

### 3.9 Probability and Impact Matrix

Refer to Appendix B: Risk Assessment Criteria Scale – Program, Appendix C: Risk Assessment Criteria Scale – Project, and Appendix D: Program Heat Map.

### 3.10 Risk Mitigation Strategies

Risk items shall be allocated response strategies in order to specify actions and clarify ownership. The following list provides some guidance in relation to how risks may be managed, and will be useful to the risk owner during the development of risk treatment plans.

Risk Strategy	Possible Actions
<b><i>Avoid</i></b>	<ul style="list-style-type: none"> <li>Clarify the project requirements or objectives;</li> <li>Obtain information or expertise;</li> <li>Undertake research or trials;</li> <li>Modify the approach to minimise/eliminate uncertainty;</li> <li>Adopt a different approach to planning/ execution;</li> <li>Undertake a Value Engineering Study;</li> <li>The fall back plan to <b><i>Avoid</i></b> is <b><i>Transfer</i></b>.</li> </ul>
<b><i>Transfer</i></b>	<ul style="list-style-type: none"> <li>Contractual Means or subcontracts, joint ventures etc.;</li> <li>Financial Means (i.e. insurance, warranties, Liquidated Damages)</li> <li>The fall back plan to <b><i>Transfer</i></b> will depend on alternate strategy.</li> </ul>
<b><i>Mitigate</i></b>	<ul style="list-style-type: none"> <li>Take mitigating actions to reduce or eliminate the likelihood and/or consequence of the risk</li> <li>Risk reduction actions must give a cost benefit (i.e. the cost of the risk reduction must be less than the expected cost of the risk);</li> <li>The fall back plan to <b><i>Mitigate</i></b> is <b><i>Accept</i></b>.</li> </ul>
<b><i>Accept</i></b>	<ul style="list-style-type: none"> <li>Accept risk and add project contingency;</li> <li>Implement rigorous risk monitoring and review protocol;</li> <li>Pro-actively Risk Manage to minimize impact and increase awareness/certainty surrounding the risk.</li> </ul>



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## 3.11 Program Stakeholder Risk Tolerances

Objective	Measure	Target	Tolerance
Safety	Consistent with station targets	No critical injuries or fatalities No high MRPH incidents ASR ≤ station target  No MOL charges or fines against either OPG or Contractor	No fatalities  ≤ <u>Under development</u> high MRPH/yr ASR ≤ station threshold  ≤ <u>Under development</u> MOL orders per year (during execution)
Environmental	Consistent with station targets	No reportable spills	0 "A" spills (>45 pts) ≤ 1 "B" spills ≤ 3 "C" spills
Corporate Reputation	Positive image for OPG	No complaints from public or from external stakeholders  Positive publicity at least at local level	Any complaints satisfactorily dealt with and not escalated  No negative news stories
Regulatory/Legal Compliance	Number of infractions/violations	No infractions or violations leading to charges, fines, etc.	No infractions or violations by OPG staff
Schedule	Complete all preparatory work requiring plant outages within scheduled planned outages in 2012 – 2015  No delay to in-service dates by Refurbishment program	As per Program Major Milestones Schedule (PMMS)	~15% on the longest path in the critical path schedule
Financial/Cost	Complete within authorized funding (Release Estimate plus approved changes)	Cost ≤ \$TBD million	≤+TBD% of Release Estimate, including contingency
Scope	Execution of all scope as described in approved Project Scope of Work Document	No scope changes following project release except as required: a) To meet new shareholder or corporate directives or b) To meet new legal or regulatory requirements	≤TBD scope changes  Scope reductions to meet approved cost target, but without compromising safety, environmental performance or contractual requirements

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Objective	Measure	Target	Tolerance
Quality	<ul style="list-style-type: none"> <li>Achieve guaranteed performance on <u>Under development</u></li> <li>Comply with regulatory emission limits</li> <li>Turnover of equipment to Operations</li> </ul>	<p>EFOR (Contribution to Equivalent Forced Outage Rate) ≤ <u>Under development</u>%</p> <p>All CofA commitments met</p> <p>No incompletes or reservations preventing full operation at turnover</p>	<p>EFOR ≤ <u>Under development</u>%</p> <p>≤ <u>Under development</u> CofA amendment requests required</p> <p>≤ <u>Under development</u> outstanding incompletes or reservations at turnover</p>
Meet all Corporate and Business Unit expectations	Compliance with project management governance	<p>No negative PM audit findings</p> <p>No totally unexpected project occurrences</p>	<p>Audit findings are minor and corrective actions completed</p> <p>Any unexpected events promptly reported and satisfactorily resolved</p>

## 3.12 Identifying and Reporting Risk – Formats and Process

### 3.12.1 Identifying Risks

A number of techniques or forums can be used for the identification of risks, such as:

- Workshops (using brainstorming or prompts);
- Structured Interviews;
- Team Reviews
- Identification of risk by individual team members or subject matter experts (SME)

Darlington Refurbishment Risk Team and risk SPOCs will use all the above to identify and input risks into RADAR, and shall monitor risks as follows:

- Program-level Workshops will be held quarterly, focusing on upcoming challenges (NR Planning and Controls Risk Team)
- Structured interviews focusing on current or impending issues will be held monthly with Risk Owners, functional Departmental Heads or Project Managers.
- Team reviews will be held as required, particularly during periods of change or stage gate transitions
- Discussion with individual team members or Subject Matter Experts at any time.
- A proposed Agenda for Risk Workshops can be found in Appendix A.

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### 3.12.2 Qualitative Risk Analysis

Utilizing the Risk Breakdown Structure, stakeholder tolerances, and the definitions of probability and risk impact, risks are entered in the Program or Project/Departmental risk database, RADAR. For each risk the following information is documented:

- Risk description
- Project objectives impacted
- Limits/boundaries of the risk
- Risk triggers
- Risk causes
- Assigned probability and impact
- Risk rating
- Rationale applied in assigning the probability and impact scores
- Key assumptions for the risk
- Risk mitigation actions

### 3.12.3 Quantitative Risk Analysis

Quantitative Risk Analysis is carried out on the identified risks in order to assess their likely impact on the Program and to set priorities for mitigating action, see OPG-STD-0062, Project Risk Management, for details.

Quantitative Risk Analysis consists of three components:

- Consultation with risk owners and appropriate subject matter experts, either in meetings or at risk workshops.
- Appropriate level of assessment, using the Program 'Heat Map' as a guide.
- Documentation of the results. For Refurbishment, risk quantification is documented in the Program or Project/Departmental risk database, RADAR.

Monthly reviews of the Program's risks will be carried out to determine if the current risk profile is changing from the baseline assessment in response to mitigation activities or additional concerns on the part of the risk owners.

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#### **3.12.4 Risk Response Planning**

See N-MAN-00120-10001 Sht: RISK, Nuclear Projects Risk Management Process and OPG-STD-0062, Project Risk Management for details.

Program risk responses shall be documented in the Program or the Project/ Departmental risk database, RADAR. The minimum acceptable response information to be recorded in RADAR for both Program and Project/Departmental risks is identified in N-FORM-11306 - Program Risk Identification Form.

#### **3.12.5 Reporting Risks**

Program risk reports are available through the Refurbishment Sharepoint site, and Top Program risks and top function/project bundle risks are included in the Refurbishment Monthly Status Report. Top 5 risks are reported quarterly in in the Nuclear Oversight Committee (NOC) and Executive Advisory Committee (EAC) reports.

As well, Top Ten Program risks are reported to the Chief Risk Officer monthly while Refurbishment's BURSA risks are reported to Corporate Finance quarterly

#### **3.12.6 Closing Risks**

A Risk can be closed for any of the following reasons:

- (a) Risk matured, the expected time for risk is passed and no events happened.
- (b) Risk response plan applied and the risk has no further effect on the program or project.
- (c) The cause of risk is not valid anymore.
- (d) Risk duplicate/ similar with another identified risk.

An identified risk in RADAR should never be deleted; instead the risk shall be closed. Rational for risk closure should be documented in RADAR.

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### 4.0 CONTINGENCY MANAGEMENT

Three categories of contingency will be used to address residual risks in the project. The accountable person and the type of risks that will be addressed by each category are tabulated below:

Category	Type of Risks addressed	Accountable Person
Management Reserve	"Unknown-unknowns" that could impact the viability of the Nuclear Refurbishment Program	EVP, Nuclear Projects
Program Contingency	Known, discrete risks in the Nuclear Refurbishment Program, including risks from functional groups	SVP, Nuclear Refurbishment
Project Contingency (released funding at gate) <sup>1</sup>	Known, discrete risks in a Project Bundle and estimating uncertainty at Release Quality Estimate	VP, Execution

#### 4.1 Request for Contingency Allocation

Contingency Allocation must be based on identified and documented risks in the project bundle or the program. Contingency estimates shall be justified by proper risk assessments related to the associated probability, cost and schedule impact of the residual risk (post-mitigation). This will be done in line with N-MAN-00120-10001 Sht: RISK-05, Nuclear Refurbishment - Contingency Development And Management.

Management Reserve and Program Contingency is established via Program Releases. The NR Planning and Controls Risk Team shall prepare contingency estimates to support Refurbishment Business Case Summaries.

Project contingency for each project bundle will be allocated from the program via the Gated Process and the Gate Review Board in accordance with N-MAN-00120-10001-GRB, Nuclear Projects Gated Process.

No unallocated or general contingency is allowed as management reserve will be used to address "unknown-unknowns" in the Program.

#### 4.2 Contingency Release/Drawdown

Release of Contingency and Management Reserve will be controlled via the change control process as per NK38-PLAN-09701-10067, Nuclear Refurbishment Program Cost Management Plan.

<sup>1</sup> Project contingency forecasted, but not yet released to the project bundle will be held in the program level

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### **5.0 TRACKING METHODOLOGY & INFORMATION MANAGEMENT**

#### **5.1 Tracking Methodology**

After baselining the program risk register, on completion of the Release 4 contingency assessment, Program risk metrics will be tracked monthly and reported graphically, or otherwise, through the Refurbishment Program Monthly Status Report.

#### **5.2 Information Management**

Information specific to individual risks shall be captured in the Program or Project/Departmental RADAR as appropriate. Mitigating actions shall be tracked through either, a) the Program schedule, b) Action Tracking, or c) Action Log, where appropriate.

All other formal Risk Management documentation shall follow the OPG Nuclear Records and Documents Control process, N-PROG-AS-0006.

### **6.0 RISK REGISTER**

The RMP includes two sets of Risk Registers; one for "Program Level Risks" and a second Risk Register for local "Project or Departmental Level Risks". These Risk Registers are called RADAR. These registers shall include the identification, assessment, urgency, and response plan (including actions) for each risk. N-MAN-00120-10001 Sht: RISK describes the requirement to document risks in RADAR.

#### **6.1 Program Risk Register**

The Refurbishment Program Risk Register (RADAR) database is maintained by the NR Project Planning and Project Controls Risk Team. Reports are updated monthly and can be found on SharePoint. Any risk information that is to be input to the Program RADAR shall first be reviewed by the NR Risk Team via the population of N-FORM-11306, Program Risk Identification Form. Any refurbishment group can submit this form for consideration (i.e. not just local risk SPOCs).

#### **6.2 Project/Departmental Risk Register**

The Refurbishment Project/Departmental Risk Register (RADAR) is created by the NR Project Planning and Project Controls Risk Team but shall be maintained and updated by local (Project/Contractor/Departmental) risk SPOCs. Reports can be produced as required by the project/contractor/department to support risk management activity.

Risk information that is to be input to the Project/Departmental RADAR does not need to be reviewed by the NR Risk Team.

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The NR Project Planning and Controls will provide oversight and interface with the local risk SPOC to ensure the RADAR database is being updated as per the existing risk management governance.

NR Risk Team will manage the integration between Program RADAR and Project/Departmental RADAR.

N-FORM-11306 can be used as a guide to identify the key risk information that shall be identified prior to a risk being input into the Project/Departmental RADAR database.

## **7.0 RISK MANAGEMENT PLAN APPROVAL AND REVISIONS**

Approval of this Risk Management Plan shall be as shown on the cover sheet and compatible with the governing documents approvals.

At a minimum, the Program Risk Management Plan shall be reviewed and updated every two years. It shall also be reviewed and, if necessary revised, at major changes to scope or processes.

## **8.0 THE MANAGEMENT OF THIS PLAN**

The project team's risk management system is subject to regular review to ensure compliance with the requirements corporate governance guidance on internal control and risk management. The risk management process is designed to manage, rather than eliminate, the risk of failure to achieve project objectives and this plan will form part of the ongoing process in place for identifying, assessing, managing, monitoring and reporting on the significant risks.

The Program Risk Management Plan is a live document, to be maintained by the Program Manager, or delegate. This document should be considered a reporting tool to senior management, capturing the risk status of the project.

## **9.0 RISK MANAGEMENT SUITE OF METRICS**

- Top Ten Risks (list)
- New Risks added in Month (list and graph)
- Risks Closed in Month (list and graph)
- Un-assessed risks in database (list)
- Status of risk mitigating actions on Schedule (table)
- Risk Action Tracking items and status (table)

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- Risk Action Log items and status (table)
- Overall Risk Profile Change in Month (graph)
- Risk Trend (graph)

## 10.0 APPENDICES

Appendix A: Risk Identification Session Sample Agenda

Appendix B: Risk Assessment Criteria/Scale - Program

Appendix C: Risk Assessment Criteria/Scale - Project

Appendix D: Risk Heat Map



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## **Appendix A: Risk Identification Session Agenda Example**

1. Introductions, Process, Agenda and Objectives (Risk Team Facilitator)
2. Project Update – Current Status and Review (Project Manager)
3. Examination of Current and Latest Interfaces & Constraints (Project Manager)
4. Brainstorm Workshop including Issues Analysis (All, led by Risk Team Facilitator)
5. Explanation of Risk Ranking and Agreement of Ranked Values (Risk Team Facilitator)
6. Ranking of Risks (All, led by Risk Team Facilitator)
7. Identification of 'Show Stoppers' (All, led by Risk Team Facilitator)
8. Mitigation Action Planning ((All, led by Risk Team Facilitator))
9. Action Planning and Review Steps (Risk Team Facilitator)

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**Appendix B: Risk Assessment Criteria/Scale – Program**

Risk Attribute	Definition	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Very High)
Probability	The probability that a risk will occur	Improbable (<10%)	Unlikely (10% - 30%)	Possible (30% - 70%)	Likely (70% - 90%)	Probable (>90%)
Financial Impact *	The financial consequences of a risk should it occur.	Minimal (<\$5M)	Minor (\$5M - \$50M)	Notable (\$50M - \$200M)	Substantial (\$200M - \$500M)	Major (>\$500M)
Schedule Impact *	The impact that a risk would have on the schedule, and more importantly overall project duration, should it occur.	Minimal (No impact to critical path)	Minor (<2 weeks delay to critical path)	Notable (2 weeks - 2 months delay to critical path)	Substantial (2 – 6 months delay to critical path)	Major (> 6 months delay to critical path)
Manageability	The degree to which the Project is able to control the risk.	The Project will have minimal difficulty controlling or influencing the outcome of the risk	The Project will have minor difficulty controlling or influencing the outcome of the risk	The Project will have notable difficulty controlling or influencing the outcome of the risk	The Project will have substantial difficulty controlling or influencing the outcome of the risk	The Project will have major difficulty controlling or influencing the outcome of the risk

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**Appendix C: Risk Assessment Criteria/Scale – Project**

Risk Attribute	Definition	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Very High)
Probability	The probability that a risk will occur	Improbable (<10%)	Unlikely (10% - 30%)	Possible (30% - 70%)	Likely (70% - 90%)	Probable (>90%)
Financial Impact *	The financial consequences of a risk should it occur.	Minimal (<\$1M)	Minor (\$1M - \$10M)	Notable (\$10M - \$40M)	Substantial (\$40M - \$100M)	Major (>\$100M)
Schedule Impact *	The impact that a risk would have on the schedule, and more importantly overall project duration, should it occur.	Minimal (No impact to critical path)	Minor (<1 weeks delay to critical path)	Notable (1 week - 2 week delay to critical path)	Substantial (2 – 6 weeks delay to critical path)	Major (> 6 week delay to critical path)
Manageability	The degree to which the Project is able to control the risk.	The Project will have minimal difficulty controlling or influencing the outcome of the risk	The Project will have minor difficulty controlling or influencing the outcome of the risk	The Project will have notable difficulty controlling or influencing the outcome of the risk	The Project will have substantial difficulty controlling or influencing the outcome of the risk	The Project will have major difficulty controlling or influencing the outcome of the risk

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Appendix D: Risk Heat Map

Impact						
Major	5	5	10	15	20	25
Substantial	4	4	8	12	16	20
Notable	3	3	6	9	12	15
Minor	2	2	4	6	8	10
Minimal	1	1	2	3	4	5
	Likelihood/ Probability	1	2	3	4	5
		Improbable	unlikely	Possible	Likely	Probable
		< 10%	10% - <30%	30% - <70%	70% - 90%	>90%