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## TECHNICAL

# Designing for Health and Safety Procedure

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Revision Changes:

Revision	Status / Description of Changes
General	Introduction of Construction (Design and Management) Regulations 2015. Change of CDM-C to Principal Designer (PD) plus other updates related to changes in Regulations and re-organisation to Sectors.
Clause 7.5	Reinforces the requirement for the Principal Designer (typically CRL) to provide pre-construction information to Designers as soon as practicable.

Learning Legacy Document

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## **1 Introduction**

This procedure sets out the mechanism by which Crossrail undertakes its design responsibilities as Principal Designer duty holder under the CDM 2015 Regulations and the requirements for Designers working for Crossrail in various parts of its supply chain.

## **2 Purpose**

The purpose of this procedure is to ensure comprehensive design risk management procedures are adopted across the entire programme and to ensure that so far as is reasonably practicable the project design complies with the requirements of all relevant health and safety legislation and to:

- Focus on all H&S risks affecting the project design, its constructability, future maintenance and end users which must be effectively managed;
- Undertake and document comprehensive Risk Assessments through the production of project and project wide Risk Registers;
- Ensure the correct identification of all reasonably foreseeable hazards and risks during the design process, and in compliance with CDM 2015, to consider construction, maintenance, cleaning, de-construction and/or demolition and to ensure that these are correctly understood and managed;
- Ensure the integration of H&S into the design process and to ensure that risks arising from this are either eliminated or managed to an ALARP condition;
- Ensure the organisation of H&S information and ensure that this is communicated to those who need to receive it.

## **3 Scope**

This procedure describes the general design methodology prescribed by Crossrail to deliver best practice in design risk management to ensure appropriate integration of Health & Safety into the design process.

This procedure applies to all Designers under the project management control of Crossrail.

This procedure is designed to ensure so far as is reasonably practicable, the robust application of the CDM Regulations to all design work undertaken in order to correctly manage hazards and risks and to apply appropriate control measures where these hazards and risks cannot be eliminated.

This procedure outlines the general arrangements to be implemented for:

- Design H&S co-ordination within Designer organisations;
- Design Risk Management philosophy and the production of the CDM Risk Registers by all design organisations;
- Designers' co-operation and co-ordination with one another on H&S design interfaces;
- Management of H&S information generated by Designers and its incorporation into the Pre-construction information.

Reference should also be made to the Construction (Design and Management) (CDM) Procedure (Ref 1), which sets out how the wider Crossrail duties under CDM are discharged.

## 4 Terms & Definitions

ALARP	ALARP is an abbreviation for 'as low as reasonably practicable'. ALARP describes the level to which the Health and Safety Executive (HSE) expect to see workplace risks controlled.
CDM 2015	Construction (Design & Management) Regulations 2015
CDM Integrator	The CDM Integrator is a Crossrail post holder who shall facilitate, coordinate and ensure cooperation between all those involved in the discharge of a function under the CDM Regulations
Designer	Designers are defined under Regulation 2 (CDM 2015) "as any person in the furtherance of a business who prepares or modifies a design or arranges for or instructs any person under his control to do so".
HSE	Health and Safety Executive
L153	Construction (Design and Management) Regulations 2015, Guidance on Regulations. Document published by HSE.
Principal Designer (PD)	As defined in the Construction (Design and Management) Regulations 2015.
RIBA	Royal Institute of British Architects
PCIP	Pre-Construction Information Pack

## 5 Responsibilities

### 5.1 Principal Designer (CRL)

The Principal Designer shall:

- Fully comply with their respective obligations under CDM 2015;
- Ensure that pre-construction information (in the possession of the project) is provided to the Designer or potential Designer as soon as practicable.
- Ensures that the Designer fulfils his duties under CDM15 and ESM 3.6.5(iii) (Ref 3)
- The duties of the Principal Designer shall be delegated on behalf of the Chief Engineer to the Lead Field Assurance Engineers (LFAE's) at each site.

### 5.2 Designer

Designers shall:

- Fully comply with their respective obligations under CDM 2015;
- Where projects are notifiable to the HSE Designers shall check the client is aware of their duties and the PD has been appointed (if an external PD is to be appointed);
- Undertake Design Risk Assessments for individual work packages, which they are responsible;
- Ensure that the "Principles of Prevention" are adhered to;
- Ensure that designs they prepare correctly consider hazards and associated risks;
- Apply suitable and sufficient control/ mitigation measures to reduce risks to an ALARP condition;
- Continually develop, regularly review, amend and update the CDM Risk Register;
- Highlight risks on the drawing by the use of the SHE box system;
- Pro-actively co-operate with other Designers;

- Prepare the PCI (Pre-Construction Information) and provide information needed for the Pre-Construction Information Pack and/or the Health & Safety File;
- Develop suitable Red, Amber and Green lists (RAG lists); and
- Attendance or representation at regular collaborative workshop sessions leading to formal RIBA and/or Gate reviews.

### **5.3 Designers Lead Coordinator**

The Designers lead coordinator shall:

- Chair the design reviews; and
- Provide all necessary liaison and communication with the Project Manager or PD and the CDM Integrator,

### **5.4 Project Manager**

The Project Managers shall:

- Ensure that preconstruction information is collected and provided to Designers or potential Designers (ie tender stage).
- Review and accept the submitted PCIP and incorporate any additional information that may be necessary.
- Attend or ensure representation at design review meetings
- Review updated health and safety information and provide it, where relevant, to other duty holders across the project with advice from the health and safety team where required; and
- Review health and safety deliverables with advice from the health and safety team where required.

### **5.5 CDM Integrator**

The CDM Integrator shall:

- Attend, or ensure representation at design review meetings; as and when necessary
- Facilitate, coordinate and ensure cooperation between all those involved in the discharge of a function under the CDM Regulations

### **5.6 The Health and Safety Advisor**

The Health and Safety Advisor shall:

- Provides support and advice, including assisting in reviewing the CDM documentation e.g.PCIP, Construction Phase Plan, including Designers and construction risk assessments.

## **6 Crossrail Organisation for CDM**

Crossrail Ltd is the default Client for the programme unless otherwise agreed in writing and the Principal Designer function shall be carried out by Crossrail staff, unless there is a need to appoint other Principal Designers. Crossrail shall discharge its duties as PD under The CDM Regulations 2015 in accordance with the Technical Assurance Plan (TAP) (Ref 2) and associated CRL documents and within the Crossrail Management system (CMS).

There shall be suitable attendance at design review “workshops” organized and managed by the Designers Lead Co-ordinator together with respective Designers present to review and collectively discuss and review design risk management proposals. Formal design reviews shall be undertaken at key RIBA stages and/or “Gate Review” milestones.

Engineering safety risks in connection with the operation and maintenance of the railway and its engineering systems shall be identified and managed by the Designers. In brief Engineering Safety Management (ESM) is the activities involved in designing, planning, installing or introducing new or modified rail systems, products or other changes affecting the safety of railway passengers, staff or neighbours, that make it safe and demonstrate throughout the life of the change, that it is safe, Where a system is a collection of equipment, people and procedures which work together to achieve a common goal (including train and rail infrastructure working together as a system). ESM is comprehensively covered in Crossrail System Safety Plan (Reference 3).

## **7 Requirements on Design Organisations**

All organisations undertaking design shall appoint a Lead Design Co-ordinator. The Lead Design Co-ordinator will be required to provide all necessary liaison and communication with Crossrail’s Project Manager or PD and the CDM Integrator, including specific CDM deliverables during the design and closing out processes in order for the Project Manager to perform duties required by the CDM Regulations. The individual Designers will be required to undertake Design Risk Assessments for individual work packages, which they are responsible for as required and described below:

Designers are required to ensure that designs they prepare correctly consider hazards and associated risks to persons:

- carrying out construction work;
- cleaning or maintaining the permanent the facility;
- using a structure designed as a place of work, including operation of the facility;
- demolishing all or part of a structure;
- who may be affected by the construction work;

including third parties who may be affected by the designed facility or infrastructure, i.e. as passengers/users, maintenance workers, emergency rescue services, adjacent neighbours, land and/or property and the general public; this list is not intended to be exhaustive. This concept extends the hazard and risks considered by CDM and opens up the risk assessment and risk management process to the consideration of a wider sphere of project safety risks through the Engineering Safety Management Safety System Plan (ESM) (Reference 3). As such this risk assessment process shall be captured in an ESM Hazard Record.

Designers are required to:

- Fully comply with their respective obligations under CDM 2015;
- Through competence and knowledge, identify the hazards and associated risks inherent in their designs and consider how these can be either eliminated or substituted. Moving down the hierarchy of risk management where elimination or substitution is not possible; consider how risks during construction, operation, maintenance, cleaning and de-construction/demolition can be reduced to an ALARP condition (giving collective protective measures priority over individual protective measures). Any residual risks which remain following the application of control measures are communicated to the project team and eventual maintainers /users of the facility;

- Continually develop, regularly review, amend and update the CDM Risk Register for which the design team are responsible in the CRL format within Appendix A;
- Through competence and knowledge apply suitable and sufficient control/ mitigation measures to reduce risks to an ALARP condition. Where a design or part of that design includes a place of work as defined under the Regulations the Designer shall include adequate provision for the necessary space and other requirements to comply with the relevant statutory provisions, e.g. The Workplace (Health, Safety & Welfare) Regulations 1992;
- Identify significant residual hazards and/or risks that remain i.e. those which cannot be eliminated, controlled or reduced to an ALARP condition during the design process. The Designer shall identify where residual hazards and/or risks lie e.g. at construction, operation, maintenance or demolition phases, and identify the entity responsible for the action and when the action is to be implemented;
- Communicate and co-ordinate all information relating to residual risks to all those who need to be aware of it;
- Where the Designer considers the design to have a residual risk that a competent contractor may not be familiar with, this risk shall be highlighted on the drawing by the use of the SHE box system. See Appendix C of this document for details of the SHE box;
- Where there is no SHE box shown on a drawing, the Designer is deemed to have reviewed the relevant risks and considers that “there are no significant or unusual, location specific risks which would be unfamiliar to a competent contractor or other Designers, or likely to be difficult to manage effectively”;
- Comply with the management and risk reduction arrangements established for the project, including the co-ordination of this information by the Designer’s Lead Co-ordinator for design risk management and CDM Risk Register requirements in section 7.4
- Pro-actively co-operate with other Designers, taking into account interfaces with other design elements. This will ensure a sharing of lessons learnt;
- Prepare the supporting information for and pro-actively co-operate with the Project Manager and with the Principal Contractor, including providing any information needed for the Pre-Construction Information Pack and/or the Health & Safety File.

Where projects are notifiable to the HSE, Designers shall check the client is aware of their duties and the PD has been appointed (if an external PD is to be appointed). Designers shall also provide information needed for the health and safety file which is passed on to the client at the end of the project.

## **7.1 Key Principles in Design**

The following key principles of design apply:

- Equipment should be designed in accordance with key ergonomics standards including EN614 Parts 1 and 2.
- Control rooms should be designed in accordance with key ergonomics standards including EN11064, EEMUA 191 and EEMUA 201;
- Users, where practicable, should be involved in the design process. This should include different types of users including operatives, maintenance and systems support personnel;
- Consideration should be given to operator characteristics including body size, strength and mental capability;



- Plant and processes should be designed for operability and maintainability and other elements of the life cycle such as decommissioning;
- Consideration should be given to all foreseeable operating conditions including upsets and emergencies; and
- Consideration should be given to the interface between the end user and the system.

### **7.1.1 Information on Design for human factors**

Information on design for human factors is contained in the following publications:

- Reducing error and influencing behaviour (HSG48) contains a good summary of key design issues;
- Improving maintenance – a guide to reducing human error (HSE Books, ISBN 0 7176 1818 8. 9) discuss designing plant and equipment for maintenance;
- Human factors integration: Implementation in the onshore and offshore industries (RR001) Gives an overview of best practice on how to build human factors into design.
- Key standards in Applied Ergonomics. This British Standards website lists the published standards in the area of applied ergonomics.
- Ergonomic principles in the design of work systems (BS EN ISO 6385:2004)
- Space Requirements for Plant Access, Operation and Maintenance (ISBN 0-11-772785-7)
- A Design Framework for Building Services BSRIA BG6/2012 (ISBN 978-0-86022-714-4)

### **7.1.2 Ergonomic Design of Control Centres**

Parts 1-7 of ISO 11064 Cover design principles, control room arrangements and layout, workstations, displays, controls, interactions, temperature, lighting, acoustics, ventilation, and evaluation. Designers should be following this standard for new control rooms, and it can usefully be referred to for upgrades and modifications especially where there are known problems.

## **7.2 Co-operation by Designers**

Cooperation by Designers shall include:

- Regular meetings of all members of the design team;
- Regular internal design and constructability reviews of developing designs. These internal reviews are to be documented;
- Formal review meetings to assess H&S aspects of design proposals and CDM Risk Register information, as requested by the Crossrail Project Manager, CDM Integrator or PD (where appointed);
- Assisting the Project Manager in use of the CDM Risk Register to identify actions required to manage risks and to follow up close-out of the actions and risks, including responding to requests to revise and edit the Risk Register to provide consistency of approach across different elements of the project and different Designers;
- Developing and designing common standards and solutions collaboratively with all Designers.

Space allocation and structures for M&E plant and services shall be designed to be adequate for the whole life of the facility including construction, use, and maintenance and plant replacement/decommissioning.

### **7.3 H&S Co-ordination with Design Organisations**

All design organisations are required to designate a named individual to provide co-ordination of H&S management in the design process. This role will be referred to as the Designer's Lead Co-ordinator.

H&S Management and design co-ordination to be undertaken (within the respective design organisations) shall include:

- Compliance with the relevant sections of the contract documentation including contract deliverables;
- Arranging internal meetings, design reviews and workshop sessions to ensure appropriate integration of H&S in the design process. This shall include the necessary "co-ordination" and "co-operation" between Designers and with the Crossrail Project Manager, facilitated by the CDM Integrator.
- Co-ordinating and development of the design organisation's CDM Risk Register;
- Arranging attendance by all relevant design personnel at formal review meetings with the objectives of assessing design proposals and adequacy of the Risk Register in respect of the requirements of CDM;
- Cascading any instructions, information or advice given at such meetings within the relevant teams in his organisation.

### **7.4 CDM Risk Register**

The Designer shall maintain a CDM Risk Register to identify hazards, assess risks and document mitigation measures or controlling actions taken. A copy of the template for the CDM Risk Register is attached in Appendix A. Designers shall use the CDM Risk Matrix Appendix A1 and the guide to impact and likelihood ratings Appendix A2 to assist the completion of the risk register.

The main aims of the CDM Risk Registers are to:

- Identify all reasonably foreseeable hazards and associated risks arising from a given design and to apply appropriate control and/or mitigation measures specifically directed at those hazards and risks where these cannot be eliminated;
- Specify a common and consistent CDM risk assessment process across the project;
- Identify adequate and sufficient control and/or mitigation measures to reduce risks to an ALARP condition where these cannot be eliminated through the normal hierarchy approach of risk management;
- Record which entity has ownership of each risk;
- Record what actions are to be taken (or have been taken), by whom and when, in design in respect of removing the risk or controlling the risk;
- Assess whether any residual risks remain in relation to the hazard and whom it is envisaged should own the residual risk;
- Indicate where the risk should be communicated, e.g. the pre-construction information (for construction risks) or the health & safety file for end user maintenance, cleaning or operational risks;
- Provide an auditable record for each hazard and risk identified and the control measures to be adopted.

The CDM Risk Register is a live document and data entries shall be required justifying why a particular risk has been modified/ closed and who made the change.

The risk register shall be treated as a controlled document and managed in accordance with relevant procedures.

Organisations carrying out design for Crossrail are required to produce a CDM Risk Register in electronic form in the format set out in Appendix A. Each Designer organisation's CDM Risk Register shall be kept up-to-date and shall reflect the progress of the design. It is the responsibility of the Designer's Lead Co-ordinator to co-ordinate development of the CDM Risk Register.

Ownership of particular risk items shall be proposed by the Designer in the submission of the CDM Risk Register to the Project Manager, who shall review and whether or not this is appropriate.

## **7.5 Pre-Construction Information**

The Regulations require that pre-construction information already in the client's possession (such as existing health and safety files, asbestos surveys, structural drawings etc) or which is reasonable through sensible enquiry must be made available as soon as practicable to each Designer and contractor (whether bidding or already appointed). The information must be relevant to the project, have an appropriate level of detail and be proportionate to the nature of the risks.

### **Provision of Pre-Construction Information to Designers**

The Project Manager shall ensure that as part of the appointment process for its Designer(s), that an appropriate level of existing information is collected and made available. Crossrail may seek support from existing suppliers to research the available information on its behalf.

### **Provision of Pre-Construction Information to Contractors**

In order to assist Crossrail to comply with their respective duties to provide information, the Designer shall prepare PCI (Pre-Construction Information) containing the available health & safety information needed to identify hazards and risks associated the proposed design and construction work. The PCI shall (where this applies) include all relevant survey and other information necessary including any Health & Safety Files which may exist for any enabling or other previous works as may be relevant. The incumbent design team is responsible for completing the preparation of the PCIP documentation in accordance with CDM 2015, (including guidance L153) and the submission of the documentation to the Project Manager for review and acceptance.

The Project Manager shall review and accept the submitted PCIP and incorporate any additional information that may be necessary prior to inclusion into the respective procurement documentation or arrange for the issue of such parts of the information that is relevant to contractors or Designers.

During the Design Development stage of the Crossrail project, pre-construction information will be required for individual site packages of preliminary works to be given to organisations to be appointed as Principal Contractors.

During the ongoing development of the design the Designers shall update the relevant information to order to incorporate changes to health & safety information; this shall be submitted to the Project Manager for review and acceptance as part of the design deliverable and where necessary communicated with those involved with the project.

If the Designer identifies any significant change to the health and safety information, details of this change shall be promptly provide in a convenient form to the Project Manager who shall provide such information that is relevant to those involve in the project so that health & safety risks can be addressed.

A template for a pre-construction information package is provided in **template reference A** of this document. It should be stressed that the PCIP should seek to focus on:

- Information relevant to the project
- Have a proportionate level of detail
- Be proportionate to the risks involved

## **7.6 Design Review**

The CDM Regulations 2015 requires Designers to eliminate hazards which may give rise to risks and to reduce risks to an ALARP condition by following the principles of prevention, with the emphasis on collective protection measures. These hazards and risks shall be considered throughout the life cycle of the building or facility commencing at design stage. Part of the design review process shall include regular 4 weekly collaborative workshop sessions leading to formal RIBA and/or Gate reviews as prescribed under the contract. The design reviews shall be chaired by the Designers Lead Co-ordinator with a Project Manager (or PD representative if appointed) in attendance. All relevant design contributors shall be present to facilitate a workshop discussion with action points and improvements to the registers noted by the Lead Design Co-ordinator. The general aim is to steer the CDM Gate Review deliverables to a point of acceptability before the formal gate review process. All formal design/gate reviews shall include all relevant contractual design H&S/CDM deliverables and shall be assessed as to quality and suitability by the Project Manager commensurate with the level of detail appropriate to the design stage reached.

Each design organisation shall be responsible for internal, periodic review of its CDM Risk Register. As part of this process, Designers shall with competence knowledge and adequate research critically assess and evaluate hazards and risks created by their design and determine through a hierarchy of risk management whether elimination is initially possible or that risk reduction presents the only option. Designers as part of the review process shall ensure the selection of appropriate risk reduction measures have been applied to reduce risks or whether further measures need to be applied to reduce these to an ALARP condition.

## **7.7 Red Amber Green Lists (RAG Lists)**

Designers are required to develop suitable Red, Amber & Green lists (RAG lists) to provide practical advice to design teams on what to eliminate or avoid and what to encourage in the design. Based on the HSE guidance and best practice the design team shall identify design elements, materials and processes which are either to be avoided because they are judged to represent significant risk to construction personnel, facilities users and/or the environment or to be preferred because they represent a reduction in such risks.

### RED LIST ITEMS

Hazardous elements materials or processes, which are effectively prohibited and shall be eliminated from the project excepting only where no alternative can be found. If any Red List item is to be employed, it requires formal justification within the design documentation.

### AMBER LIST ITEMS

Hazardous elements, materials and processes which are to be employed in a careful and sparing way because they represent significant risks (although they may be justified on a risk-management basis). If any item on the Amber List is to be employed, it requires information within the design documentation on its minimisation and shall require advice and guidance to be provided as part of the design for the safe execution of that design.

### GREEN LIST ITEMS

Elements, materials and processes which are preferred because they represent significant risk reduction.

See Appendix D for Red, Amber and Green examples.

## 8 Reference Documents

Ref:	Document Title	Document Number:
1.	Construction (Design and Management) (CDM) Procedure	CR-XRL-O3-GPR-CR001-00001
2.	Technical Assurance Plan (TAP)	CRL1-XRL-O7-STP-CR001-50003
3.	Engineering Safety Management – System Safety Plan	CRL1-XRL-O7-GST-CR001-00001
4.	Design Management Process	CRL1-XRL-O7-GPS-CR001-50005

## 9 Standard Forms / Templates

Ref:	Document Title	Document Number:
A	Pre-Construction Information Pack	CR-XRL-Z7-ZTM-CR001-50002

## 10 Appendices

Appendix A – Example CDM Risk Register Template

Appendix A1 – Crossrail CDM Risk Matrix

Appendix A2 – Guide to Impact and Likelihood Ratings

Appendix B – Not Used

Appendix C – Typical SHE box on drawings

Appendix D – RAG List Examples

**Appendix A: Example CDM Risk Register Template**

(This template is for guidance only and indicates the typical information and layout that should be used but Designers are encouraged to develop this template in accordance with their own processes and arrangements subject to the agreement of the Crossrail Project Manager.

<b>Risk Register for:</b>					<b>Location(s)</b>					<b>Date:</b>							
<b>Name of Design Team:</b>					<b>Lead</b>	<b>Design</b>		<b>Co-ordinator</b>		<b>Contact</b>		<b>Project Manager or PD Representative:</b>					
<b>Design Package Ref No:</b>					<b>Name:</b>												
<b>Design Risk Register developed to RIBA Stage:</b>					<b>Risk from:</b>	<b>Register</b>		<b>under</b>		<b>Review</b>		<b>Design</b>	<b>Team</b>		<b>Leader</b>	<b>Contact</b>	
<b>Design Risk Register Interface(s) with:</b>					<b>Interface</b>	<b>Lead</b>		<b>Design</b>		<b>Co-ordinator</b>		<b>Contact</b>		<b>Interface Crossrail CDM Integrator:</b>			
<b>Interface Design Package Ref No(s) (if applicable):</b>					<b>Name(s):</b>												
Ref No	Location	Operation or activity being considered	Item Affected	Hazard	Risk	Current Risk Exposure (Risk Matrix)		Design Mitigation Action	Risk Owner	Residual Risk (Risk Matrix)		Residual Risk Owner	Comments and/or details of further development and/or information required	Interface with and location			
						L	I			L	I						
						L	I			L	I						

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**Appendix A1: Crossrail CDM Risk Matrix**

The Risk Matrix is a tool to enable the ranking of risks so that the Project team can prioritise actions, irrespective of the ranking or score the requirement to reduce risk to as low as reasonable practicable remains.

<b>Likelihood Rating</b>	<b>Very High</b>	<b>5</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>
	<b>High</b>	<b>4</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>
	<b>Medium</b>	<b>3</b>	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>HIGH</b>
	<b>Low</b>	<b>2</b>	<b>LOW</b>	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>
	<b>Very Low</b>	<b>1</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
		<b>Very Low</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>	<b>Very High</b>	
<b>Impact Rating</b>							



## Appendix A2: Guide to Impact and Likelihood Ratings

### Guide to Impact Rating (Severity of impact)

Descriptor	Description
Very Low	Minor Injuries- may require some minor first aid treatment but not requiring medical attention
Low	Minor injuries-requiring first aid and/or medical attention
Medium	Injury or illness incurred reportable under RIDDOR and/or lost time from work
High	Major injury or illness with long term health effects, long absence from work
Very High	Fatality, Fatalities

### Guide to Likelihood Rating (probability or chance that event will occur)

Descriptor	Description
Very Low	Improbable, highly unlikely to occur
Low	Remote, unlikely to happen but could
Medium	Occasional, increased chance or probability, event could happen or occur
High	Probable, more likely to happen than not
Very High	Frequent, highly likely to happen, almost certain.

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**Appendix C - Typical SHE box on drawings**

1. The SHE box shall be included where the Designer has identified risks that may not be apparent to other Designers or competent contractors, or are likely to be difficult to manage effectively.
2. The style of numbering shall allow ease of cross referencing to the CDM Risk Register;
3. Future dismantling information, and other post construction risks, shall be identified in the future part of the SHE box.

<b>Safety, Health and Environment Information</b>
Notes below are additional to hazards/risks normally associated with this type of work:
<b>Construction</b> <b>    Ci.</b> <b>    Cii.</b> <b>    Ciii.</b>
<b>Operations</b> <b>    Oi.</b> <b>    Oii.</b> <b>    Oiii.</b>
<b>Maintenance</b> <b>    Mi.</b> <b>    Mii.</b> <b>    Miii.</b>
<b>Dismantling/Demolition (Future)</b> <b>    Fi.</b> <b>    Fii.</b> <b>    Fiii.</b>
These notes are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.

## **Appendix D – RAG List Examples**

### **RED LIST EXAMPLES:**

- Use of hazardous materials where other less or non-hazardous material alternatives exist;
- Wet services installed within electrical rooms
- Services run through escape routes
- Torturous delivery routes for heavy plant
- Installing services near or in shafts or confined spaces
- Routes / equipment that are on / trackside or require track access
- Equipment in an inaccessible location
- Access facility for cleaning and maintenance.
- Equipment at very high levels needing frequent access.
- Equipment needing frequent or occasional access eg fans, not accessible at floor level, and without an easy means of gaining access.
- Noise levels above that needing ear defenders.
- Scabbling of concrete ('stop ends', etc);
- Demolition by hand-held breakers of the top sections of concrete piles (pile cropping techniques are available);
- Other works likely to generate loud noise or require vibrating tools;
- Fragile roof-lights and roofing assemblies or other fragile? surfaces;
- Processes giving rise to large quantities of dust (dry cutting, blasting etc.);
- On-site spraying of harmful particulates;
- The specification of structural steelwork which is not purposely designed to accommodate safety nets;
- Designing roof mounted services requiring access (for maintenance, etc), without provision for safe access e.g. barriers; and
- Use of processes that may contaminate environmental media (soil, water or air).

### **AMBER LIST EXAMPLES**

- Room / floor plan layouts such that heavy cabling is as straight and direct as possible to avoid heavy pulling
- Adequate clearances around electrical equipment.
- Correct corrosion resistance to avoid future failures
- Make cladding and enclosures readily demountable without heavy lifting
- Inadequate clearances between services for access.

- Access to ductwork for cleaning not maintained.
- Electrical isolation of mechanical equipment inadequate for maintenance regimes.
- Certification of life safety systems eg fire rated ductwork, fire dampers, fire suppression systems
- Equipment at very high level needing occasional access.
- Equipment not accessible at floor level.
- Noise levels above that needing ear defenders with appropriate signage/ warning.
- Erection or other execution sequences which require personnel to work at height, exposed to leading edge risk of falls;
- Inadequate external or internal illumination;
- Internal manholes in circulation areas;
- External manholes in heavily used vehicle access zones;
- The specification of “lip” details (i.e. trip hazards) at the tops of pre-cast concrete staircases;
- The specification of shallow steps (i.e. risers) in external paved areas;
- The specification of heavy building blocks i.e. those weighing > 20kgs;
- Large and heavy glass panels;
- The chasing out of concrete / brick / block work walls or floors for the installation of services;
- The specification of heavy lintels (the use of slim metal or concrete lintels being preferred);
- The specification of solvent-based paints and thinners, or isocyanates, particularly for use in confined areas;
- Specification of curtain wall or panel systems without provision for the tying of scaffolds for construction and/or maintenance;
- Specification of block work walls >3.5 metres high and retarded mortar mixes.
- Formaldehyde-containing materials which compromise indoor air quality.

### **GREEN LIST EXAMPLES**

- Access routes suitable for personnel but not for tools, etc eg vertical ladder ways.
- Voids, unallocated rooms, unclassified spaces not assessed against the ‘Safe work in confined spaces Confined Spaces Regulations 1997’.
- Vertical access routes suitable for personnel and tools, etc
- Low headroom spaces with marked warnings/ signage.
- Co-ordinating fixings with structure to avoid drilling where possible
- Design around set components to avoid site cutting or adapting
- Horizontal access for equipment replacement.
- Ensuring adequate drain off points and drainage to avoid hauling containers of discharge

- Off-site fabrication, and ground-level fabrication and assembly, so that work may be carried out as far as possible in a “manufacturing environment” vis-à-vis HS&E controls and working at height may be minimised by pre-assembly and craneage of finished/semi-finished components;
- Adequate access for construction vehicles to minimise reversing requirements (one-way systems and turning radii);
- Concrete products with pre-cast fixings to avoid drilling;
- Half board sizes for plasterboard sheets to make handling easier;
- Demolition of the top sections of concrete piles by pile cropping techniques;
- Low volatile organic compound materials, e.g., water-based paint coatings, adhesives, etc;
- Structural steelwork purposely designed to accommodate safety net fixings and/or suitable harness anchorages;
- Timber from sustainable sources;
- Early installation of permanent means of access, and prefabricated staircases with hand rails;
- The provision of edge protection at permanent works where there is a foreseeable risk of falls after handover;
- Practical and safe methods of window cleaning (e.g. from the inside) and other normal maintenance and cleaning activities;
- Thoughtful location of mechanical/electrical equipment, light fittings, security devices etc. to facilitate access and away from crowded areas;
- Provision of adequate access and headroom for maintenance in plant rooms, and adequate provision for replacing heavy components; and
- Off-site timber treatment of PPA- and CCA based preservatives (boron or copper salts used for cut ends on site) – delivered dry and cured to site;