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McCONNELL DOWELL CONSTRUCTORS LTD.

CLIENT: GOVERNMENT OF REPUBLIC OF KIRIBATI

PROJECT: KIRIBATI ROAD REHABILITATION PROJECT

LOCATION: TARAWA, KIRIBATI

PROJECT NO.: 2536

CONTRACTOR'S ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

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CREATIVE CONSTRUCTION

Revision History

Rev	Date	Details	By	Approved
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B	Mar 2013	Reviewed	J.Barker	
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ACRONYMS

CEMP – Contractors Environmental Management Plan (This Plan)

HSE – Health, Safety & Environmental

CEP – Construction Execution Procedure (Method Statement)

JSEA – Job Safety & Environmental Hazard Analysis (Hazard identification)

PEP – Project Execution Plan (Project Management Plan)

EMP – Environmental Management Plan

MMS – McConnell Dowell Management System (MacDow standard procedures & forms database)

TBT – Toolbox Talk (All-in weekly meeting attended by entire workforce covering Health, Safety & Environmental)

MacDow – McConnell Dowell Constructors Ltd

1.0 INTRODUCTION

1.1 PLAN OBJECTIVES

This Contractor's Environmental Management Plan or CEMP (originally referred to by Client as the Contractor's Environmental Plan) covers strategies, systems and procedures to ensure the Kiribati Road Rehabilitation Project (hereafter known as the Project) meets the environmental obligations and targets for the construction of the new main road, principal feeder and access roads. This CEMP forms an integral part of McConnell Dowell's Management System (MMS).

The purpose of this CEMP is to:

- Achieve the Project's stated environmental objectives and targets;
- Ensure legal and contractual compliance; and
- Outline procedures for the management of environmental protection issues.

The CEMP provides the framework for identifying and managing environmental aspects and impacts associated with the Project.

1.2 PROJECT DESCRIPTION

The works are situated on Tarawa, and include the rehabilitation of 24.7 km of the main road between the capital Betio and the international airport at Bonriki, and the rehabilitation of 14 km of minor feeder roads. In addition to the road rehabilitation works, there are repairs and improvements to the Betio Causeway Bridge, upgrading of 11 km of watermain from Teaoraereke to Betio, and coastal protection works.

1.3 PROJECT SCOPE

The Scope of the Project is to:

- Upgrade South Tarawa road consisting of 6-7m wide sealed road with 1.5m sealed shoulders which will act as footpaths and improved siting for drainage and service lines (electricity, water supply, telephone line and other services).

- Upgrade the road from the Toll Booth on the Betio Causeway to Tanaea including Buota and Temaiku roads (about 27.5 km) but will exclude the section linking Bonriki Airport to the Tarawa Bailey Bridge (includes a short single lane carriageway).

- Break up the surface of existing pavement – laying, mixing, spreading and compacting up to 30 cm of new imported crushed gravel base, and a new bitumen surface. The road will have concrete edging to prevent propagation of edge breakdown of the new road.

- Include the construction of speed humps at suitable locations, and construction of 166 bus stops at locations agreed through council / community consultation.

- Install physical drainage measures to capture stormwater flows. Discharges will be to the lagoon, ocean or land as per contract drawings.

- Rehabilitate the existing sealed roads to a similar level and slightly raise currently unsurfaced roads.

- Ensure surface drainage of the road and drains either side of the road using improved camber.
- Coastal Protection Works
- Modifications to Betio Causeway Bridge

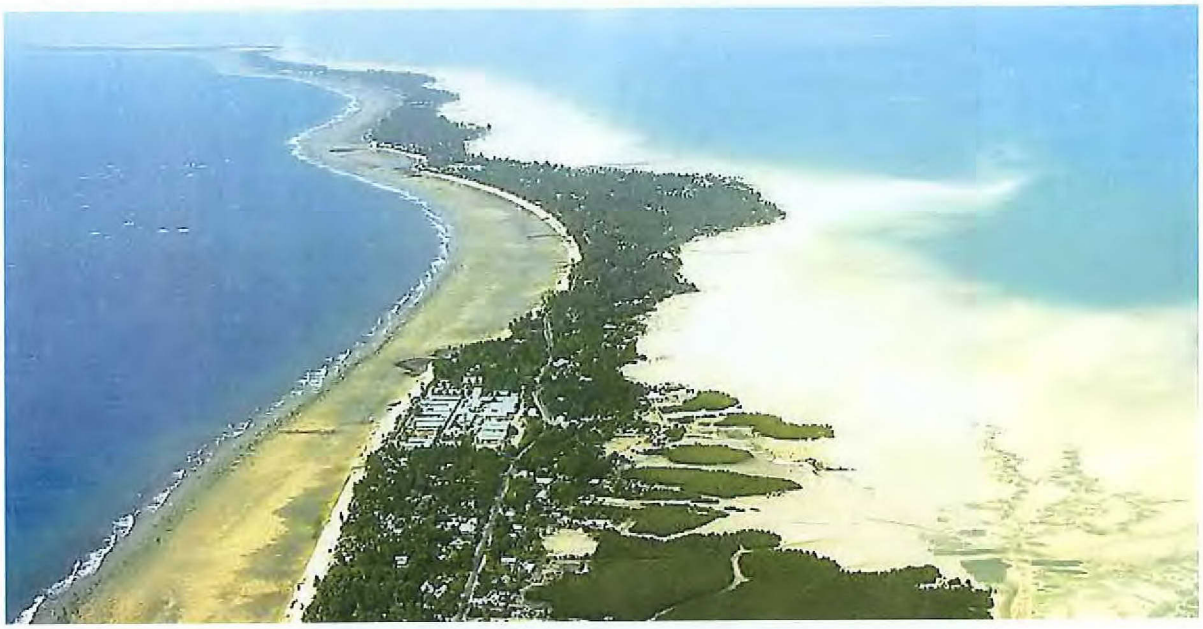
1.4 PROJECT DURATION

Work is expected to commence in October 2013 with a contract duration of 23 months.

1.5 PROJECT LOCATION

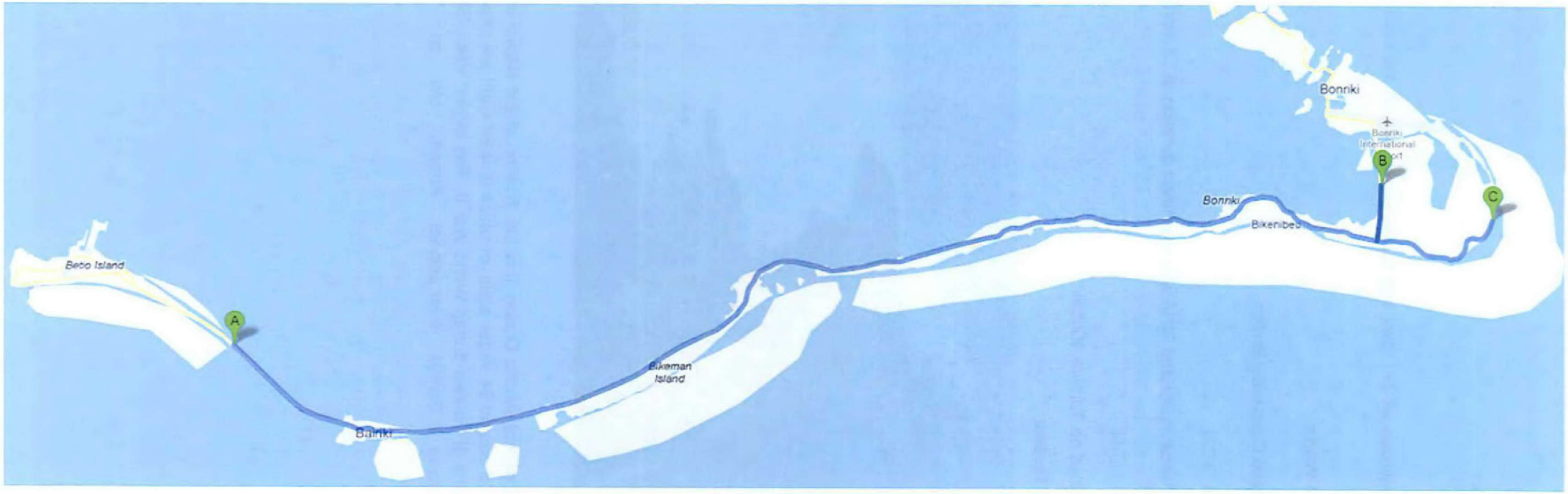
The Project works are located on Tarawa, Kiribati:

Figure 1 Aerial Photo of Tarawa



Tarawa is an atoll in the central Pacific Ocean. It is the location of the capital of the Republic of Kiribati. Tarawa consists of around 24 larger islets, of which at least eight are inhabited. The island is best known by the Battle of Tarawa during World War II. The largest town, Bikenibeu, and the only airport on Tarawa, Bonriki International Airport, are on South Tarawa.

Figure 2 Location Map



2.0 ENVIRONMENTAL LEGISLATION

This CEMP has been prepared to ensure compliance with Kiribati's relevant environmental legislation and aims to employ best practice environmental management procedures for the Project. The key environmental legislation for the management of the Project is detailed in PEP Att2-1B Review Record ENV Legal (MMS # 025-J002-2536) located in Attachment A of this document.

The Compliance with Legal and Other Requirements (MMS # 000-D004-000) procedure which is part of the Project Execution Plan outlines how McConnell Dowell identifies, maintains and evaluates compliance with legal and other related requirements that are applicable to delivery of the Project.

2.1 IMPORTANT LEGISLATION

2.1.1 Environment Act 1999

The Environment Act 1999 provides for the protection, improvement and conservation of the Environment of the Republic of Kiribati. Excerpts from this act are referred to in this management plan.

- Part III Development Control, Environmental Impact Assessment, Review and Monitoring
- Schedule Section 14 Prescribed Developments

The Project Team will adhere to all environmental requirements prescribed within the Environment Act and conditions of the contract.

According to the Kiribati Government's Environmental Act 2007, an Act to amend the Environment Act 1999, the Project will be required to prepare a Basic Environmental Impact Assessment, which is equivalent to the Asian Development Bank's Initial Environmental Examination and the World Bank's Environmental Management Plan (EMP). According to the Act, the Ministry of Public Works and Utilities (MPWU) will need to comply with the environmental requirements as detailed in the EMP and secure an Environment Licence from the Ministry of Environment, Lands, and Agricultural Development (MELAD).

2.2 ENVIRONMENTAL LICENCES

Licence Number	ELA 036/10
Licence Holder	Ministry of Public Works and Utilities
Description of allowed activity	Kiribati Road Rehabilitation Project
Site	Betio, South Tarawa and Buota
Date Granted	18 July 2013

Licence Number	ELA 123/12
Licence Holder	MPWU
Description of allowed activity	Seawall Construction
Site	Ambo-Taborio (Steward) Causeway
Date Granted	9 October 2012

Licence Number	ELA 084/13
Licence Holder	MPWU
Description of allowed activity	Repair of Causeway (Remedial Work to Dai Nippon Causeway)
Site	Dai Nippon Causeway
Date Granted	9 August 2013

Licence Number	ELA 075/13
Licence Holder	MPWU
Description of allowed activity	Seawall Construction
Site	Ananau Causeway
Date Granted	3 October 2013

Licence Number	ELA 118/12
Licence Holder	MPWU
Description of allowed activity	Seawall Construction
Site	Nanikaai (lagoon side)
Date Granted	9 October 2013

Copies of Environmental Licences in Attachment G

3.0 MANAGEMENT OF WORKS

3.1 ENVIRONMENTAL POLICY

McConnell Dowell Constructors Ltd will lead by example in ensuring that statutory and contractual requirements are met and positive environmental outcomes are maintained. To achieve this, the McConnell Dowell Board have developed an Environmental Policy that directs the level of commitment to positive environmental performance for the Project (refer **PEP Att2-3,** MMS **# 010-J005-100)**. Attachment B

The Policy makes the following key commitments:

- Continuous Improvement;
- Prevention of Pollution;

- Compliance with Legal and Other Requirements; and
- Sustainable Development.

3.2 ENVIRONMENTAL MANAGEMENT SYSTEM

McConnell Dowell operates an ISO 14001 accredited Environmental Management System (EMS) that forms part of the integrated McConnell Dowell Management System (MMS). Attachment B

3.3 ENVIRONMENTAL MANAGEMENT FRAMEWORK

3.3.1 Contractors Environmental Management Plan

This Contractors Environmental Management Plan (CEMP) forms part of the overarching Project Execution Plan (PEP) for the delivery of the Project. It provides a system and set of procedures to ensure that McConnell Dowell establishes and maintains sound and effective controls to manage potential environmental impacts throughout the Project, and wherever practicable, realise opportunities for enhanced environmental outcomes.

Effective environmental management needs to be proactive rather than reactive. The CEMP is therefore based upon a risk management approach to identify and assess environmental risk associated with each element of the project and to implement appropriate mitigation strategies to minimize the subsequent risk.

The approach to managing environmental risk is shown graphically in Figure 3 Environmental Management Approach

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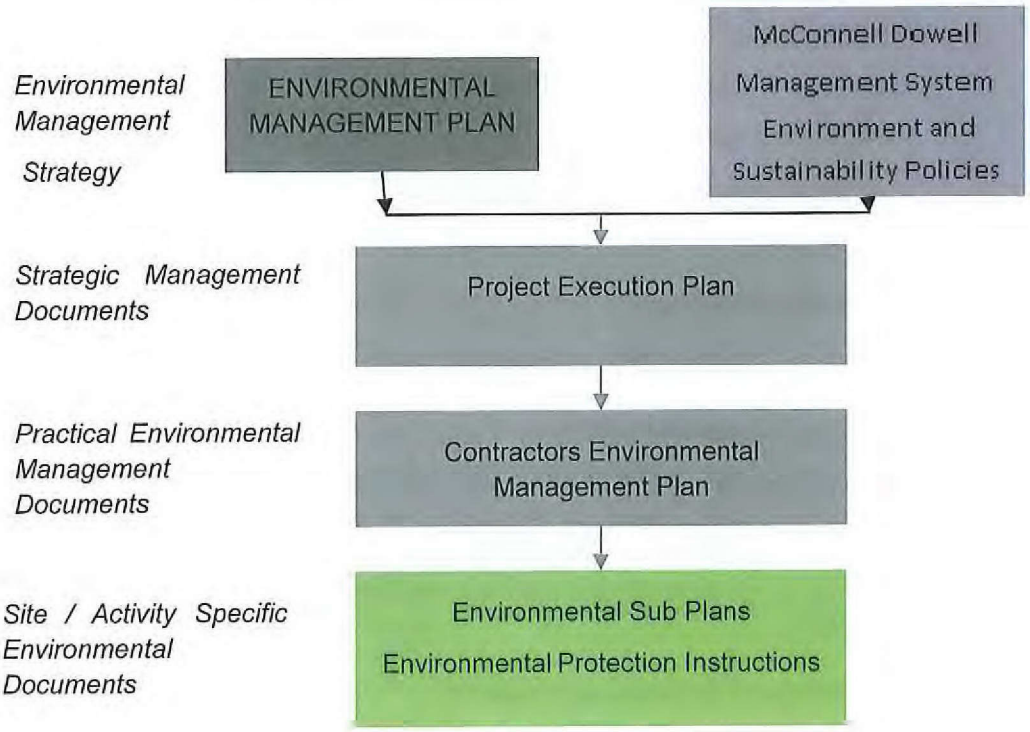
Figure 3 Environmental Management Approach



3.3.2 Environmental Protection Instructions

Environmental Protection Instructions (EPIs) provide detailed summaries of the method of implementation for a number of environmental controls discussed in this CEMP (e.g. air quality, noise, vibration, spill response, and erosion and sediment control) New EPIs will be developed by the HSE Advisor for the Project and changing conditions as required.

EPIs will be prepared to cover the following environmental control areas that have been identified from the initial risk assessment process completed during the planning phase:

- Erosion and Sediment Control;
- Noise Emissions;
- Atmospheric Emissions;
- Vibration;
- Storage, Maintenance and Refuelling of Machinery;
- Storage and Handling of Hazardous Substances;
- Disturbance to Terrestrial Flora and Fauna;
- Disturbance to Aquatic Flora and Fauna
- Disturbance to Cultural Heritage:
- Land Contamination; and
- Energy and Water Consumption.

3.3.3 Environmental Sub Plans

Environmental Sub Plans will be set up for the Project as required by work packages and client requirements. The following Environmental Sub Plans will be available for the Project:

- Noise and Vibration Management Plan;
- Flora and Fauna Protection Plan;
- Water and Wastewater Management Plan;
- Dust Suppression Management Plan; and,
- Spill Response Plan.
- Storage & Handling of Hazardous Substances

3.3.4 Construction Execution Plans

Construction Execution Plans (CEPs) are developed by the Project Team in advance of work commencing, providing a technical explanation of the requirements for each major work activity. The Plans are developed in consultation with the HSE Advisor to ensure that any required environmental or sustainability controls are embedded into the processes adopted. Blank form: Attachment C

3.3.5 Job Safety and Environmental Analysis

The Job Safety and Environmental Analysis (JSEA) is a tool used to determine health, safety and environmental risk associated with tasks prior to commencing a component of work. Each task is

reduced to individual steps and the potential hazard associated with each step identified. Risk mitigation steps are attributed to each hazard, thus providing a detailed plan for installation of control measures. Blank form: Attachment C. Current approved JSEAs in Attachment H

The main strength of JSEAs prepared on the job is their ability to focus on unique risks at a particular point in time — for example, current weather conditions, resources, experience of workers and impact with other jobs, people or environment..

3.4 ENVIRONMENTAL RESPONSIBILITIES

3.4.1 Leadership

Environmental protection is a core value in the position descriptions of all staff. From Project Manager down, all staff will lead by example, setting the highest standards for environmental management and performance.

The following personnel have key accountabilities in the development, approval and execution of the works in accordance with this Plan:

- Project Manager
- Superintendent and Supervisors
- Project and Site Engineer
- HSE Advisor
- Employees and Sub-Contractors

Environmental responsibilities for each of the nominated Project Team representatives are outlined below:

3.4.2 Project Manager

The Project Manager has ultimate responsibility to:

- Promote at all times McConnell Dowell's policies, procedures and standards relating to environmental management and ensure that they are complied with;
- Ensure sufficient resources are available to achieve the Project's policy, objectives and targets and that those resources have sufficient skills to conduct the roles competently;
- Report performance on a regular basis to internal and external stakeholders;
- Report significant incidents internally and externally;
- Ensuring the Project achieves legislative compliance;
- Provide leadership in the ongoing development and implementation of the CEMP;
- Ensure that all staff and sub-contractors are familiar with and implement all relevant environmental control measures;
- Periodically review all environmental control measures to assess their ongoing applicability and effectiveness;
- Encourage all employees to maintain acceptable standards of environmental work practices and foster awareness of environmental matters; and

- Encourage the reporting of incidents, events and other concerns and ensure appropriate feedback on proposed corrective actions.

3.4.3 Superintendent and Supervisors

The Superintendent and Supervisors have the responsibility to:

- Provide effective hands on environmental leadership;
- Ensure work is undertaken in accordance with all environmental requirements; and
- Participate in incident and non-conformance report investigations and ensure that corrective and preventative actions are implemented effectively.

3.4.4 Project and Site Engineers

The Project and Site Engineers have the responsibility to:

- Provide effective environmental leadership;
- Ensure designs are undertaken in accordance with the requirements of the Project Scope and Technical Requirements, CEMP and relevant environmental requirements;
- Ensure design has minimal environmental impact;
- Participate in incident and non-conformance report investigations and ensure that corrective and preventative action proposed are implemented effectively.

3.4.5 HSE Advisor

The HSE Advisor has the responsibility to:

- Be the leader for the Project's environmental obligations, and the first contact for internal and external environmental communication;
- Oversee all environmental management aspects of the Project;
- Provide environmental leadership;
- Review, update and ensure implementation of this CEMP and other applicable environmental documentation for the Project;
- Ensure all staff and contractors are inducted and trained in environmental issues and controls;
- Ensure all required monitoring and reporting is undertaken; and
- Investigate and report environmental incidents and non-conformance and close out as required.

3.4.6 Employees and Sub-Contractor

All employees and subcontractors engaged on the Project are required to operate within the requirements of this CEMP and relevant environmental legislation.

3.5 CONTRACTOR INDUCTION PROCESS

All site personnel are inducted to the project. All activities have a Construction Execution Procedure (CEP) and associated Job Safety & Environmental Analysis (JSEA) The CEP is

developed with potential environmental impact acknowledged. The JSEA describes the environmental hazard and how it is mitigated.

Prestart Talks, Toolbox talks, START cards, Weekly Inspections, Hazard Reports all help to minimise impact on environment

4.0 ENVIRONMENTAL REQUIREMENTS

4.1 HAZARD AND RISK IDENTIFICATION

During Project execution, the principal objectives of risk management are to develop and monitor the implementation and effectiveness of risk treatments and to identify and evaluate changes in the risk profile of the Project.

A Project HSE Risk Register of all identified hazards and risks will be created and kept as a live document on the Project site (refer **PEP Att13-1 Project HSE Risk Register**). This register will be updated where appropriate through the lifetime of the Project.

4.2 ENVIRONMENTALLY SENSITIVE AREAS

Environmental issues generated by the construction of the Project may affect environmentally sensitive areas surrounding the site. Environmentally sensitive areas are as follows:

- Coastal areas of Kiribati – characterised by:
- white sandy beaches;
- reef flats / reef patches;
- lagoons;
- mangrove forests;
- Live Coral formations
- extensive reef mud flats
- sea grass beds.
- Drinking water resources
- Communities adjacent to the project

Management techniques applicable to these environmentally sensitive areas will be detailed in full, within the Environmental Sub Plans, CEPs, JSEAs and Environmental Protection Instructions.

Environmentally sensitive areas and the appropriate management techniques will be communicated to all staff during their initial site induction training and reinforced when the scope of works to be completed may have a degree of impact upon the identified sites.

4.3 UXO

Areas specified to have UXO will be surveyed by a specialist contractor as per Section 1900 of the Specifications and disposed of as directed by the Engineer.

UXO retrieved will be transported to the Police Station bunker at Betio and placed behind sand bag walls as directed by the Engineer

An Explosive Ordnance Disposal (EOD) expert will be nominated by the Contractor, of qualifications acceptable to the Engineer, who will direct disarming/defusing, transport and final placement operations and have sole responsibility to declare areas site safe. Staff engaged in detection and clearance shall have received formal and recognized training.

The current scheduled timing of commencement of works in areas where there is a risk of UXO is approximately October 2014.

4.4 AC PLANT OPERATION & MAINTENANCE

See attachment F for details of AC Plant operation & maintenance including:

- Details of the plant, its origins, processes used & environmental standards that it has conformed to during its previous use
- A description of the baghouse including operation & maintenance manual including description of procedure for disposing of filtered dust
- Layout & location of AC Plant with respect to nearby dwellings as provided by the Government
- Description of surfacing of the AC Plant area.

4.5 ENVIRONMENTAL ISSUES AND IMPACTS

The table below summarizes the environmental impacts associated with the activities during the Kiribati Road Rehabilitation Project. The identification of risks and risk management options are in accordance with Procedure E009-020-100 Risk Management (Environment).

Table 1 Summary of Environmental Impacts without mitigation

Issue	Contributing Factor / Root Cause	Potential Impact	Risk Likelihood / Severity
Erosion & Sediment Control	Soil instability and erosion	Increase amount of sediment lost from the site; Affected vegetation area Damage to marine habitat	Likely / Minor
	No regular monitoring, routine maintenance	Drainage and erosion problems during the Maintenance and Rehabilitation of road	Possible / Minor
Wastewater Discharges	Uncontrolled sediment and excessive ground disturbance	Impact of storm water containing sediment on streams and coasts including suspended sediment in the lagoon	Likely / Moderate
	Discharged storm water without passing through geotextile silt traps	Impact of contaminated runoff water	Likely / Moderate
Atmospheric Emissions	Unstable stockpiles and spoil-heaps; unidentified dumping location	Dust emissions and runoff especially during dry periods	Almost Certain / Moderate
	No dust suppression	High levels of particulates may cause inconvenience to adjacent community	Likely / Moderate
Noise Emissions and Vibration	Generation of noise from construction activities without noise buffer in place	Nuisance from noise at construction especially during night time	Likely / Minor

Issue	Contributing Factor / Root Cause	Potential Impact	Risk Likelihood / Severity
	Excessive vibration due to construction activity	Nuisance	Likely / Minor
Archaeological / Visual Amenity	Disturbed sensitive natural areas	Negative impacts on sensitive ecosystem or the natural environment; Potential harm to mangroves during the course of construction activities	Almost Certain / Moderate
	Improper Material Management	Impacts of materials delivery and waste disposal;	Likely / Moderate
	Minimum standards of site supervision and vehicle and plant operation in event of any utility disruption	Damage to water, power and telecommunication lines	Likely / Moderate
Disturbance to Cultural Heritage	Intentional excavation of artifacts of cultural or historic importance including military graves	Serious damage to cultural site (i.e. ceremonial sites and burial grounds)	Likely / Moderate
	Unauthorized excavation activities undertaken to build or extend homes	Rupture aesthetic and archaeological value of damaged area	Likely / Moderate
Solid and Liquid Wastes	Generation and improper disposal of offsite wastes	Land and water contamination from solid waste and sewerage	Likely / Moderate
Hazardous Chemicals and Dangerous Goods	Improper storage, handling and disposal of dangerous goods; Unsegregated chemicals	Land and water contamination from hazardous chemicals	Almost Certain / Moderate
Fuel and Oil Spills	Improper storage and handling of fuel and lubricants; no oil-water separator in place	Hazards relating to fuel and oils etc.; Potential intrusion to water source	Almost Certain / Moderate
	Refuelling of vehicles and equipment within 20 meters away from the lagoon areas	Contamination of water bodies by potential oil spill	Almost Certain / Moderate
Social Impact	Lack of road safety practices	Increased rate of accidents during and after construction of the road; Increased vehicle speed amongst complacent drivers	Likely / Moderate
	Destruction of aesthetic value in terms of social disturbance	Damage to personal and community property	Likely / Moderate
	Direct benefit from the project	Generation of job opportunities and training for local people;	Almost Certain / Insignificant

Issue	Contributing Factor / Root Cause	Potential Impact	Risk Likelihood / Severity
		Additional revenue to the community through the payment of local permits and resource consents;	
Disease	Hygene	Illness	Likely / Moderate
Social Violence	Alcohol / Drugs	Poor relations with community	Possible / Moderate
Damage to Marine Environment	Siltation / Pollution	Damage to marine flora / fauna. Imbalance to ecosystems	Possible / Moderate
Water Conservation	Excessive burden on water supply	Disruption to supply to community	Unlikely / Major
Importation of pests and diseases	Importation of aggregate	Damage to Flora & Fauna	Likely Moderate

5.0 ENVIRONMENTAL MITIGATION

Management strategies for the mitigation of environmental aspects for the project are listed in the following tables and represent the best available for the Project team:

Table 2 Environmental Management Plan: Design/Pre-Construction Phase

Environmental Issue and Objective	Mitigation Measures	Treatment during Pre-Construction
DESIGN/PRE-CONSTRUCTION PHASE		
Protection of (sensitive) Natural areas *To minimize negative impacts on sensitive ecosystems, or the natural environment*	• Identify potential environmentally sensitive / natural areas • Locate optional construction sites/activities away from them. • Ensure construction personnel are aware of locations of sensitive areas and avoid them • If the proposed construction passes close to these areas, include temporary fences to restrict machines and activities from encroaching in the area.	• The project road alignments were inspected and consultations undertaken. While most of the road alignment passes through densely populated areas where natural ecosystems have been substantially altered by human habitation, some widening is to take place adjacent to mangrove stands, including some being established under the KAP. Improved revetment of the road is required, and this will be achieved by the construction of a small wall using cement filled sand-bags, well clear of the mangrove stands. Environmental sub-plan 025-Y002-2536 Flora & Fauna for the construction phase provides for protection of the mangroves during the course of construction activities.
Road Safety *To avoid accidents during and after construction of the road*	• Include occupational health and safety requirements are in place on construction sites in work camps. . • Include install of lights and cautionary signs in hazardous areas. • Ensure that footpaths and pull-off bays along roads; through villages; and near markets, schools, and other community facilities are included in the design. • Include safety instructions for the construction activities in the contract documents.	• Villages and sections of road passing hospitals, schools and manaebas have been treated as speed control zones. With these zones, the following safety measures are provided (i) "village gateways", which display the village name and speed limits (in English and I-Kiribati) and have road markings to give the impression of constriction and encourage slower driving (ii) marked pedestrian walkways, (iii) speed humps (iv) raised kerbs, (v) marked bus bays and (vi) lighting. In all other areas, safety measures include footways on either side of the road wherever space permits, appropriate signage and trimming of vegetation where required to achieve adequate visibility. • Project Traffic Management Plan covers road safety during construction

Environmental Issue and Objective	Mitigation Measures	Treatment during Pre-Construction
	• Ensure that speed bumps near schools, hospitals, and markets are included in the road design. • Ensure sufficient visibility along the road section according to standard specifications.	
Cultural Heritage *To avoid any serious damage to cultural heritage site (i.e., ceremonial sites and burial grounds)*	• In case a cultural heritage site is identified during the construction, the Contractor will cease all work immediately and notify the PSC	• Consultations confirm that artifacts of cultural or historic importance do not occur during excavation activities that are undertaken regularly to build or extend homes and public buildings. However, if artifacts are found, the engineer will be notified and the artifacts protected from damage.
Community Concerns *To minimize social impact of an relocation or resettlement of people*	• Plan activities to avoid/minimize displacement of residents • Discuss the projected impacts and negotiate proposed measures in advance with the affected community; work with local government officers and NGOs • Conduct surveys before activities commence to identify all members of affected populations • Identify other land based natural resources, infrastructure and services which may be lost to the affected community • Identify suitable land (if possible, land having the same clan ownership) for resettlement.	• Consultations have taken place with groups of villagers according to a publicized schedule. These identified little some concerns related to design and minor concern over construction activities. Concerns related to design were (i) the need to correct existing problems with drainage (ii) possible removal of trees to make way for footways and (iii) some concerns over land acquisition issues. These are addressed by (i) provision for drainage as described above, (ii) allowing for retention of trees in designing footways and (iii) development and implementation of a comprehensive land acquisition plan, including a 100% inventory of losses and enactment of specific compensation policies acceptable to affected persons, the government and the financing agencies. • Where practicable, labor based techniques have been provided for. This includes the prescribed concrete surfacing of feeder roads, which makes use of labor rather than heavy machinery.
To minimize damage to personal and community property	• Ensure works will be restricted to the 'right-of-way' of the existing road; • Ensure projected impacts and proposed measures have been discussed in advance with the affected community; work with local government officers and non-governmental organizations.	• Project impacts and proposed mitigation measures have been discussed with communities and councils during design. • Detailed surveys of affected property will be completed by Lands Department Officers prior to construction

Table 3 Environmental Management Plan: Construction and Maintenance Phase

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
CONSTRUCTION PHASE						
Social or Community Concerns *To minimize social disturbance and maximize community benefits from the project:*	• Advise the local community of project plans in advance of construction, and involve them in planning, as necessary • Avoid or minimize disturbances near living areas, schools, hospitals, etc. • Control runoff and manage sediments near cultivated areas • Abide by the laws of the Republic of Kiribati relating to employment and use of labor • Maintain liaison with community representatives and arrange for the involvement of community groups where practicable. • Consult local residents on selection of trees & shrubs to be planted • AC Plant to be located as far away from communities as possible • Dust suppression where required • Lighting directed away from communities • Noise minimised • Community Liaison concerning UXO investigation, transportation & storage	Along road alignment	During mobilization and commencement of construction activities in the communities	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Soil Instability and Erosion *To minimize the amount of sediment lost from the site*	• Reduce the time excavated drainage channels remain unsupported • Keep vegetation clearing to a minimum	All areas where clearing is required & shore protection	Continuous	Minimal (part of standard construction practices)	Contractor	MPWU/CSC

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	• Place geotextile silt traps as appropriate • At sites where vegetation is removed, encourage re-vegetation immediately after construction activity finishes • Exposed face on shore protection to be kept to a minimum. Work face to be covered with cloth end of shift					
Controlling Sediment *To minimize impact of storm water containing sediment on streams and coasts including suspended sediment in the lagoon*	• Install silt traps at drainage ditches and materials stockpiles • Re-vegetate all areas where vegetation was removed which are not to be paved after final land shaping Limit ground disturbance to areas of a workable size • Schedule construction to minimize areas of soil disturbance during heavy rain • Contain or isolate construction areas where practical, using a bund or trench, from other surface runoff. Clean and rehabilitate when construction is complete • Discharge of sediment bearing contaminated water to the lagoon is prohibited • Minimise exposed face on shore protection works. Cover with cloth at end of shift • Stockpiles to be managed to avoid washing out sediment	All areas where clearing is required. & shore protection	Continuous	Minimal (part of standard construction practices).	Contractor	MPWU/CSC
Damage to Marine Habitat due to Seawall toe construction *No Damage to Marine Environment*	• Refer to Shore Protection JSEA / CEP for detail • Excavators to work on the beach at low tide • Toe excavation to be separated from lagoon / ocean using a bund. No flow of water / silt from toe to ocean	Shore Protection locations specified on contract drawings	Continuous	Minimal – standard procedure	Contractor	Engineer

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	• All plant to be well maintained. Prestart check before shift starts • Spill kits available • Immediate removal of excavated material to dry land					
Water supply *No disruption to water supply*	• Minimise use of clean water for construction purposes (incl. concrete) • Collect rainwater for washing vehicles • Use seawater for dust suppression. • Grey water to be collected from laundry & bathrooms at accommodation block for washing trucks • Avoid contamination to water lens • Betio Causeway Bridge modifications to be carried out without disturbing existing water supply • No UXO disposal adjacent to watermain except in emergency public safety situations	Throughout project	Continuous	Minimal	MacDow site	MacDow Audits
Controlling Storm water *To minimize the impact of contaminated runoff water:*	• Pass storm water run-off from construction areas through geotextile silt traps before discharge into culverts or drainage systems. • Store oil and bituminous products in a contained location away from drainage ditches. • Shore protection works involving fresh concrete – no work during heavy rain • Bitumen equipment washed down on designated wash down slab • Betio Causeway Bridge Modifications to ensure to fresh concrete	All areas where clearing is required.	Continuous	Minimal (part of standard construction practices)	Contractor	MPWU/CSC

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	or grout falls into the ocean					
Management of Stockpiles and Spoil-heaps *To minimize dust and runoff*	• Locate stockpiles with regard to minimizing impact on local communities • Ensure proper drainage to isolate the sites. • Ensure stockpile or spoil-heap locations do not block surface runoff or drainage lines • Cover spoil-heap or stockpiles if prolonged exposure is envisaged, to minimize erosion and sediment runoff • Place geotextile silt traps around materials stockpiles on ocean / lagoon side • Adequate provision shall be made to ensure that no stockpiles are able to release material into the sea or lagoon. • Mitigation measures to be addressed specifically in JSEAs • Stockpile locations will be managed with consideration to the local community, who will be consulted beforehand if a proposed stockpile location has potential to cause nuisance. • Height of stockpile will be managed so as to minimize nuisance • AC Plant stockpiles located away from community • Work on stockpiles limited on extremely windy days without rain	Dumping areas and areas where materials are stored.	Continuous	Minimal (part of standard construction practices)	Contractor	MPWU/CSC
Dust Control *To minimize health risk or inconvenience due to dust production*	• Spray water on exposed surfaces in construction zones • Ensure trucks are not overloaded when transporting friable materials.	Cleared areas, material transport	During dry periods	Minimal (part of standard design practices).	Contractor	MPWU/CSC

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	• Speed limits for transportation					
Noise Control *To minimize nuisance from noise*	• Use modern and well maintained equipment • Carry out noisy construction activities during daylight hours (0700 – 1900) or as per environmental license conditions • Advise local people, schools, hospitals, etc., when there will be unavoidable noise activities. • AC Plant to be located away from community	All construction areas, access routes	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Material Management *To minimize impacts of materials delivery and waste disposal*	• Place silt fences around materials stockpiles • Develop safety measures to avoid loss of load from trucks • Implement methods to reduce dust emission from the loads • Implement site safety plan with regard to vehicle operation and use. Restrict peak traffic delivery. • See Environmental sub plan 025-Y004-2536 – Dust Management Plan • Materials for shore protection to be transported in method minimizing environmental impact • Construction waste to be minimized • Recycle concrete products • UXO to be stored / disposed of as directed by the engineer in locked, protected bunker & kept behind sand bag walls • MSDS to be available • Incoming Hazardous Goods Risk Assessments to be carried out & recorded	All materials management areas	Continuous	Minimal (already part of standard design practices)	Contractor	MPWU/CSC

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	• Correct signage to be used • Segregation guidelines to be followed					
Offsite and Waste Management *To prevent / minimize contamination from solid wastes and sewerage*	• Contain all solid waste within construction sites and remove to landfill • Prepare procedures for managing spillages to ensure rapid containment, immediate site cleaning and appropriate disposal (as for depots and workshops) • Remove all inorganic solid waste to landfill • All plant, vehicles and machinery to be removed from Kiribati at the end of the contract, ensuring that no unserviceable items of equipment are left on the island • Install onsite toilets with appropriate management arrangements for effluent and collection of sludge to prevent any release of contamination into the soil. Liaise with the Public Utilities Board for appropriate collection and disposal of sludge • SOP Storage & Handling of Hazardous Substances describes procedure to dispose of waste off island (025-L008-2536)	All off-sites storage and disposal sites	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Storage and handling of fuel and lubricants *To minimize hazards relating to fuel, oil, paints etc.*	• Fuel and oil will be stored in dedicated areas at least 20 m away from the lagoon areas. • Where fuel in excess of 5,000 liters is stored on site, it will be stored in sealed tanks on a concrete base that is bunded to hold 110% of the tank capacity. • Vehicles and machinery will not to be refueled within 20 m of the lagoon. • Nominate authorized personnel for fuel handling					

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	• Develop procedures for cleaning up accidental spills. • Report any major spill in the vicinity of the lagoon to MELAD. • Collect and dispose of all waste oil, oil and fuel filters at the landfill. • AC Plant fuelling carried out on wash down slab					
Safety and Health *To ensure maximum safety of construction personnel and local residents*	• Ensure all occupational health and safety requirements are in place on construction sites and in work camps • Refer to the Project Traffic Management Plan. • Install cautionary signs in hazardous areas • Establish footpaths and pull-off bays along roads through villages, near markets, schools and other community facilities • Limit construction activities from 0700 hr to 1900 hr to limit exposure to dust, noise etc. • Enhance safety and inspection procedures • Use Personal Protection Equipment (PPE)	All construction sites.	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
General Health and Safety Awareness for construction workers	• Refer to Project Safety Management Plan specifying responsibilities and authorities within the Contractor's staff for adhering to safety and health requirements, to cover adherence to occupational health and safety requirements, provide for use of personal protective equipment, provide for lighting and warning signs at hazardous areas, set rules for operation of vehicles and equipment by authorized personnel, set procedures for safe handling of toxic and hazardous materials, set arrangements for first aid and emergency procedures, provide for posting notices about medical assistance and location of emergency equipment,	Construction camps and all worksites	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	set schedules for regular checking of adherence to the plan and train staff to familiarize them with the plan their obligations to implement it and main areas of risk to workers and others • Education on basic hygiene practices to minimize spread of tropical diseases • A bi-monthly IEC programme is in place to Increase workers' HIV/AIDS and STD awareness, including information on methods of transmission and protection measures. Programme to be regularly monitored for effectiveness. • Prohibit usage of drugs and alcohol on construction sites as per McConnell Dowell Drug & Alcohol Policy & Programme. Random testing to be carried out on the project as well as where there is reasonable cause to test and after any incident.					
Disruption of utilities	• Ensure high standards of site supervision and vehicle and plant operation to reduce risks of damage to water, power and telecommunication lines • Prepare procedures for rapid notification to the Public Utilities Board and assistance with re-instatement, in the event of any disruption • Permit to dig procedure to be followed	All construction sites	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Site de-commissioning *To minimize ongoing impacts after construction is completed*	• Rake or loosen all compacted ground surfaces • Ensure that waste and surplus materials are removed from site, or otherwise dealt with according to the wishes of landowners or local residents • Excavate & remove any contaminated soil from fuel depots / workshops, remove and reshape the area.	All construction and camp sites	After completion of construction	Minimal (part of standard design practices).	Contractor	MPWU/CSC

Environmental Issue and Objective	Mitigation Measures	Locations	Timeframe	Estimated Mitigation Costs	Implementation	Supervision
	• All laydown areas & construction camps / yards to be left in their original state at the end of the project					
Importing Aggregate	• Approval from Quarantine Office • Fumigation Certificate	Place of embarkation	Each shipment	Included	Contractor	Ministry of Agriculture

5.1 MANAGEMENT STRATEGIES AND MITIGATION

Table 4 Matrix of CEMP Responsibilities

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
1. LANDSCAPING AND VEGETATION REMOVAL		
Vegetation removal from areas containing permanent and temporary works	Mitigation options listed in Sub Plan on Flora and Fauna Protection Plan (025-Y002-2536). Topsoil management will be implemented (e.g. even spreading over subsoil, transport and handling in dry conditions only to prevent run-off and erosion) Use of Native plants found traditionally and historically within the area for habitat and site restoration Oil spills will be contained and removed Workers must wear proper PPE	McConnell Dowell (Project Manager, Superintendent, HSE Advisor)
2. EROSION AND SEDIMENTATION		
Construction of site establishment areas and other earth working activities.	JSEA and EPI for Soil Erosion, Sedimentation and Surface run-off (025-L001-2536) finalized and released to all concerned employees	McConnell Dowell

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
	Stabilization of earthworks will be performed Silt curtains erected where applicable Surface run off will be diverted away from a water body Provision of catchments areas for surface water run-of	(Site Supervisors, HSE Advisor and Project Engineer) JSEA are to cover all environmental aspects such as soil erosion, sedimentation and Surface run-off when this is of a concern
Excavation of road and removal of road debris/ material	JSEA and EPI for Soil Erosion, Sedimentation and Surface run-off (025-L001-2536) finalized and released to all concerned employees Stabilization of earthworks will be performed Silt curtains erected where applicable	McConnell Dowell (Site Supervisors, HSE Advisor and Project Engineer)
Seawall Construction	Minimise exposed work face Cover with cloth end of shift	McConnell Dowell (Site Supervisors, HSE Advisor and Project Engineer)
Disposal of Excavated Material	JSEA and EPI for Soil Erosion, Sedimentation and Surface run-off (025-L001-2536) finalized and released to all concerned employees Stabilization of earthworks will be performed Silt curtains erected where applicable Surface run off will be diverted away from a water body	McConnell Dowell (Site Supervisors, HSE Advisor and Project Engineer)
3. FUEL AND OIL SPILL		
Spillage during handling or Transport	Provision of Sub Plan on Spill Response Plan (025-Y005-2536) Spill Response Management Training Refuelling and related activities will be handled with care. Drip Trays to be utilized under plant and equipment where a leak of fluids is expected. (except water from air conditioning units) Provision of oil and fuel spill control kits	McConnell Dowell (Compliance HSE Manager, Site Supervisors, tanker operators) Training of relevant personnel on Chemical Handling and Hazardous Materials management to be conducted by Environmental Manager

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
	Provision of PPEs for all personnel handling fuel and oils Spill and handling mitigation options elaborated in CEMP and in EPI 025-L007-2536 entitled "Maintenance and Refuelling of Machinery" Fuelling at AC Plant to be carried out on bunded wash down slab	
Leaks from damaged piping, storage tanks or equipment	Spill Management Training Refuelling and related activities will be handled with care. Provision of oil and fuel spill control kits Provision of PPEs for all personnel handling fuel and oils Spill and handling mitigation options elaborated in CEMP and in EPI 025-L007-2536 entitled "Maintenance and Refuelling of Machinery" Bitumen transfer in bunded area Qualified people to transfer bitumen & fuel Plant to be checked daily & recorded	McConnell Dowell (Designated work site foreman, Compliance HSE Manager, Site Supervisor)
4. DUST GENERATION		
Gravel and Sand Stockpile areas.	Cover smaller stockpiles where required Personnel working in high dust areas must wear the appropriate PPE's (dust mask, etc) at all times Undertake work in a manner that would aim to, as much as possible, reduce the amount of generated dust Other mitigating measures elaborated in CEMP and likewise contained in Sub Plan on Dust Suppression Plan (025-Y004-2536). AC Plant to be located away from communities	McConnell Dowell (Site foreman and Compliance HSE Manager)

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
Pavement Construction – Dust generated by skid steer broom.	Broom to be housed within a guard to reduce dust being flown up in the air	
Truck haul routes and areas subjected to high traffic.	Water Trucks with sprinkler systems to travel haul routes and other areas on fixed daily time intervals. Personnel working in high dust areas must ear the appropriate PPE's (dust mask, etc.) at all times Undertake work in a manner that would aim to, as much as possible, reduce the amount of generated dust Ensure vehicle operators observe speed limits in order to reduce dust generation Other mitigating measures elaborated in CEMP and likewise contained in Sub Plan on Dust Suppression Plan (025-Y004-2536). Speed limits for transportation	McConnell Dowell (Compliance HSE Manager, water truck drivers)
Transport of dried excavated materials.	Keep vehicle speeds limited in order to reduce dust generation on unsealed road surface Other mitigating measures elaborated in CEMP and likewise contained in Sub Plan on Dust Suppression Plan (025-Y004-2536).	McConnell Dowell (Compliance HSE Manager, Truck Drivers)
5. NOISE		
Noise from various construction activities	Locate parking areas/storage handling areas away from adjoining properties Always consider noise control when planning for activities in each work area Retain as much natural vegetation onsite for it to act as a natural noise barrier Engage community when any noise complaint is received and again after control measures have been applied –inform the Environmental Manager where genuine concerns are confirmed. Other mitigating measures elaborated in CEMP and likewise contained in Sub Plan on	McConnell Dowell (Compliance HSE Manager, Site Supervisor, equipment operators, Environmental Manager)

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
	Noise and Vibration Management Plan (025-Y001-2536). AC Plant to be located away from communities	
6. VIBRATION		
Vibration from various construction activities	Carry out operations to minimise impact of vibration Personnel working in high vibration areas are required to wear PPE's Other mitigating measures elaborated in CEMP and likewise contained in Sub Plan on Noise and Vibration Management Plan (025-Y001-2536).	McConnell Dowell (Compliance HSE Manager)
7. DRINKING WATER QUALITY		
Utilization of clean fresh drinking water from refilling station	Regular monitoring of drinking water quality and general maintenance of water sources Rain water to be collected for cleaning vehicles Saltwater to be used for dust suppression & concrete production where possible technically	McConnell Dowell
8. CONSTRUCTION WASTES		
Generation of general construction waste from various project activities and personnel onsite	Store construction waste at a secure and properly designated area Waste will be segregated and stored in storage area and prevented from coming into contact with either soil or water until removed. Waste not allowed to accumulate Provision of rubbish bins at key locations (e.g. frequently used areas) throughout the project facilities Any observed waste must be immediately and properly disposed of Stored waste must not be exposed to groundwater or soil Personnel handling construction waste must wear PPE's such as protective gloves at all	McConnell Dowell (Compliance HSE Manager, all personnel)

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
	times Other mitigation options outlined in EPI 025-L013-2536 entitled " Solid and Liquid Waste" Refer to Storage & Handling of Hazardous Substances (025-L008-2536)	
9. SPOILS / EXCAVATED MATERIALS		
Generation of spoils from construction activities particularly excavated materials	Provision of a spoil disposal area Management of spoils to prevent erosion All personnel handling waste materials must wear PPE such as protective gloves at all times	McConnell Dowell (Environmental Manager, Compliance HSE Manager, Project Engineer and Site Supervisors)
10. DANGEROUS GOODS AND HAZARDOUS CHEMICALS		
Storage and Handling of Dangerous Goods	Implement proper segregation of dangerous goods according to classes and risks Refer to McConnell Dowell's Central MSDS database for MSDS used on site. Ensure incoming chemicals have their own MSDS before receiving on site Provision of bunded areas for all hazardous chemicals to be used on site. All chemical containers should be closed when not in use. Chemicals must not be stored in unventilated areas, or where the vapours may be accumulated in overhead air voids. Adequate precautions must be taken to prevent the ignition of flammable/combustible vapours. Chemicals must not be stored outside, in direct sunlight, or near sources of heat or sparks. Incompatible materials must not be stored together Chemicals must not be stored or handled near water and on floor drains without being provided with secondary containment. All personnel who work in areas where hazardous chemicals are stored, dispensed, handled, or used must complete HAZMAT training and wear proper PPE for handling	McConnell Dowell (Compliance HSE Manager, Environmental Manager and all personnel)

Project Phase / Activity	Management Strategies and Mitigation	Responsible Person/Unit
	specific chemicals. Other mitigation options outlined in EPI 025-L008-2536 entitled "Storage and Handling of Hazardous Substances" Incoming Hazardous Substance Risk Assessment to be carried out	
Generation of Hazardous Waste	Preparation of an inventory list of all hazardous goods and their corresponding wastes located onsite Hazardous waste will be stored in properly labelled bins with cover. Proper labelling and MSDS will be attached to the containers of hazardous wastes Any spills, leaks or residues from containers should be cleaned up promptly and properly disposed.	McConnell Dowell (Compliance HSE Manager, Environmental Manager and all personnel)
Disposal of Hazardous Waste	Hazardous waste to be removed from island outlined in 025-L008-2536 entitled "Storage and Handling of Hazardous Substances"	MacDow
Green Waste	Mulch to compost for landscaping areas Food waste to pigs	MacDow
UXO Storage & Disposal	As directed by the engineer behind sand bag wall in Police bunker at Betio	MacDow
11. SOCIAL IMPACT		
Hiring & training of local workers	Coordinate with the local community for the list of qualified workers	McConnell Dowell (Project Manager)
Provide livelihood for the host community	Minimise impact on adjacent communities.	McConnell Dowell (as required)
Complaints Management (Grievance Redness Mechanism)	Raised through public consultations and sponsored meetings, the community is able to address the issues pertaining to the environment (may it be minor, major/more substantial or land use issue)	McConnell Dowell (Project Manager, Environmental Manager, as required)

6.0 TRAINING AND COMPETENCY

6.1 OVERVIEW

The environmental competency requirements for all staff positions are contained in the relevant Position Descriptions. Recruitment and procurement processes are conducted with the aim of engaging personnel with the required competency and experience.

All personnel will receive training of a type and level of detail that is appropriate for the environmental aspects of their routine and emergency work assignments. As a minimum, all personnel are required to satisfactorily complete the Project Induction Training. Other mechanisms of communicating environmental controls are through the JSEAs, Tool Box Talks and Pre-Start Meetings.

6.2 INDUCTION TRAINING

The Project Induction includes a presentation and overview of the requirements of this CEMP and in particular the requirements of the issue specific Environmental Sub Plans, incident response, emergency procedures and spill management. The purpose of the induction is to ensure that, at a minimum employees and subcontractors:

- Understand the importance of conforming with the environmental policy and procedures and to the requirements of this CEMP;
- Are aware of the significant environmental values and issues within the vicinity of the Project and the potential impact of the construction activities on these values;
- Understand the sustainable activities and environmental control measures available to assist the Project to minimise its environmental impact;
- Understand the potential consequences of a breach of an environmental regulation or consent/condition;
- Are aware of the roles and responsibilities relating to environmental management for the Project; and
- Are aware of the emergency response and incident procedures.

Attendance records of all training and briefing sessions will be maintained by the Project Team.

6.3 TOOLBOX TALKS

Toolbox Talks are conducted weekly for all staff & site personnel to deliver specific training in an aspect of work or controls, such as spill kit training or correct erection of a silt fence, to provide site personnel with ongoing environmental training and information throughout the Project.

6.4 PRE-START MEETINGS

Pre-start meetings are used by the supervisors and foremen to explain the work to be done in the upcoming shift. All operational aspects of the task are discussed including environmental issues and controls, particularly if there are new hazards or if there has been a recent incident.

7.0 MONITORING, EVALUATION AND REPORTING

7.1 ENVIRONMENTAL MONITORING

Environmental monitoring is required during the construction of the Project to ensure that no adverse impact on the environment occurs. In general, monitoring is conducted on a routine basis; however, additional monitoring may be required in the event of a complaint or incident, or before, during and after a significant rain event to monitor erosion and sediment controls.

The HSE Advisor is responsible for ensuring the onsite environmental monitoring takes place.

7.2 ENVIRONMENTAL INSPECTIONS

Weekly Environmental Compliance Inspections are managed by the Compliance HSE Manager and carried out by staff members in pairs and rotated. The findings of the Inspection are recorded on **Site Inspection Environmental Checklist – Weekly** (MMS # **025-F002-2536**), in which required remedial actions are recorded, including a responsibility and timeline for close out. These shall be monitored to ensure that they are closed out in the required time frame.

7.3 AUDITS

Environmental audits are to be carried out throughout the course of the project by New Zealand Environmental Manager, and reported in accordance with the requirements of **Audit Internal** (MMS # **010-D008-000**) procedure. In addition to these internal audits, McConnell Dowell will cooperate with any external environmental audits as required and conducted by an authorised party in relation to compliance with contract or legislative requirements.

7.4 REPORTING REQUIREMENTS

Reporting requirements will evolve as the Project progresses. In the early phase emphasis will be on the establishment of systems, controls and competence of all personnel, while later the emphasis will shift to monitoring performance. When nearing completion (as applicable) the focus will be on final reports to address approval requirements.

The HSE Advisor is responsible for managing the Project environmental reporting The Project Manager is responsible for submitting the reports required externally.

McConnell Dowell will comply the monitoring measures prior to the commencement of rehabilitation works until the completion of the project. Field Monitoring Checklist provided in the EIA report shall be used during the monitoring process.

Incidents, Near Misses, Hazards and sustainability data are reported as and when they occur. Results are collated and submitted to MacDow head office and the client on a monthly basis

7.5 ENVIRONMENTAL MONITORING PLAN

Table 5 Matrix of Environmental Monitoring Plan

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
CONSTRUCTION PHASE						
Protection of Ecosystems, Flora & Fauna *Minimise impact on ecosystems due to construction activity*	• Weekly Environmental Checklist • Reporting Procedure • JSEA / TBT / Prestart meetings to address risk	Throughout Project	• Zero non-compliance • Zero Incidents	Weekly checklists, Reporting as required	CEMP	MacDow
Protection of Cultural Heretage *Protect Cultural Heritage. Avoid Damage or loss of Artifacts.*	• Notification to Engineer	Throughout Project	• Zero loss or harm to Cultural Heritage • Zero complaints	Constant	CEMP, TBTs	MacDow
Social or Community Concerns *Minimization of social disturbance and maximize community benefits.*	• Verbal or formal complaints. • Project progress	Along the entire road alignment	• Zero complaints • Zero Non-compliance with Statutory Regulations	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor. MELAD	MacDow

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
	reports.					
Soil Instability and Erosion *Minimization of the amount of sediment lost from the site.*	• Inspection • Visual check for sediment load and waste management procedures. • Verbal or formal complaints.	All areas where clearing is required.	• Construction and waste materials should be controlled. • Waste can only be disposed of at approved sites. • Zero non-compliance	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	MacDow
Controlling Sediment *Minimizing storm water containing sediment from discharging into watercourses*	• Inspection • Visual and field Inspection. • Verbal or formal complaints.	All areas where clearing is required.	• Erosion should be controlled.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Controlling Storm water *Minimizing contaminated runoff water.*	• Visual check for water and drainage	All areas where clearing is required and	• No increase of drainage problems or water logged areas. • Waste can only be disposed of at	Continuous (minimal costs, included in standard	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
	management. • Verbal or formal complaints.	construction sites.	approved sites.	supervision)		
Management of Stockpiles and Spoil-heaps *Manage to minimize dust and runoff.*	• Visual field checks. • Verbal or formal complaints.	Stockpile areas	• Construction and waste materials should be controlled. • Waste can only be disposed of at approved sites • Maximum stockpile height 3m	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Air Quality and Dust Control *Ensure there is no health risk or inconvenience due to dust production:*	• Visual field checks. • Verbal or formal complaints.	Cleared areas,	• MacDow Environmental Protection Procedures	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Noise control *Ensure nuisance from noise is minimized.*	• Visual field checks. • Verbal or formal complaints	All construction areas, access routes	• MacDow Environmental Protection Procedures	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor. Acceptable working hours to be followed	ES and Engineer of MPWU

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
Waste Management *To prevent / minimize contamination from solid wastes and sewerage:*	• Visual field inspections • Verbal complaints by workers	All construction sites.	• All solid waste contained within construction sites and removed to landfill • Spillages managed according to stated procedures	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Storage and handling of fuel and lubricants *To minimize hazards relating to fuel, oil, paints etc.*	• Visual field inspections • Verbal complaints by workers • Daily Plant inspections • Weekly Environmental Inspections	All construction sites.	• Fuel and oil stored at least 20 m away from the lagoon areas. • Quantities more than 5,000 liters stored in sealed tanks on a concrete base that is bunded to hold 110% of the tank capacity. • All workshops provided with oil and water separators. • Vehicles and machinery not refueled within 20 m of the lagoon. • Authorized personnel only handling fuel • Accidental spills dealt with according to set procedures. • Immediate reporting of any spills into lagoon to MELAD. • Collect and dispose of all waste oil, oil and fuel filters outside Kiribati	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
			• Follow 025-L008-2536 entitled "Storage and Handling of Hazardous Substances"			
Safety and Health *Ensure maximum safety of construction personnel and local residents.*	• Visual field inspections • Verbal complaints by workers	All construction sites.	• MacDow Health & Safety Procedures	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Health and Safety Awareness for construction workers.	• Verbal and formal complaints by communities and workers.	Construction camps	• As per Project Health & Safety Management Plan	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Disruption of utilities	• Verbal and formal complaints by communities and workers.	Construction camps	• As listed in the EMP.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Site de-commissioning *Minimize ongoing impacts*	• Counting of replanting.	All construction	• No increase of soil erosion	After completion of construction	Joint monitoring by the MPWU Engineer and	ES and Engineer of

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
after construction is completed	• Agreement with Communitie	and camp sites	• Vegetation, if any to be restored	(included in standard supervision)	the Contractor.	MPWU
Water Supply *No disturbance to supply*	• Complaints	Throughout	• Watermain not to be damaged	Ongoing	MacDow	MPWU
Materials Management *No chemical spills*	• Reporting procedure • Weekly Inspection • Prestart Checks • Material Hazard Assessments	All	• MSDS • No spills	ongoing	MacDow	MPWU
Importing Aggregate *No Biosecurity issues*	• Fumigation certificate for all loads	Fiji	• Kiribati Ministry of Agriculture specified	Each load	MacDow or their supplier	MPWU

Environmental Issue and Objective	Ways for Verification	Location	Standards / Criteria	Duration / Frequency and Estimated Costs	Implementation	Supervision
OPERATION & MAINTENANCE PHASE						
Rehabilitation and Road Maintenance Practices *Avoid drainage problems, aggravation of erosion, and reduced visibility.*	• Monitoring & Inspection	Entire road section	• Routine and Periodic Maintenance • Ensure maintenance crews operating to correct standard	As per contract	MacDow	MacDow

7.6 COMPLIANCE WITH ENVIRONMENTAL LICENCE

In addition to compliance with the measures in the above table and with the Environmental Licence (Licence application **# ELA 036/10**) issued on 26 November 2012 by the Ministry of Environment Lands and Agricultural Development, McConnell Dowell shall carry out the following monitoring measures which are also integrated in the Sub Management Plans:

Table 6 Compliance with Environmental Licence

Licence Condition(s)	Compliance Measures / Reference Documents	Requiring Authority
General		
Excavation or mining aggregates including sand, gravel and reef mud to supply the rehabilitation of the road and to construct seawall is prohibited.	A separate Environmental Licence is currently being secured to allow the use of excavated aggregates	
Public complaints shall be communicated to MELAD during the rehabilitation stage.	No complaints received as to date.	MELAD
Notify in writing two weeks prior the commencement of construction		MELAD
Compliance with EMP; copy of CEMP shall be submitted for approval before construction	025-J002-2536 PEP Att 14-1 Contractor's Environmental Management Plan	MELAD
Request approval for the importation of aggregates		Quarantine Office
Secure certified document from the country of origin to prove that aggregates have been treated and are free from pests and diseases and invasive alien species		Quarantine Office
Aggregates (sand and gravel) imported or sourced locally shall be stock piled with fence in a secured area 20 meters away from the shoreline, flow of storm water, drainage courses and low grounds	Disturbance to Aquatic Flora & Fauna (EPI 025-L003-2536)	Civil Engineering Unit
Hazardous materials (coal tar, fuel, oil and lubricants) shall be stored in a secured area with a roof and concrete base that is bunded to hold any spillages	Spill Response Plan (Doc.# 025-Y005-2536) Storage & Handling of Hazardous Substances (EPI 025-L008-2536)	Civil Engineering Unit
Asphalt mixing plant shall be kept for operation in a secured area at least 20 meters away from the shoreline		
Aggregate stockpiling and hazardous materials storage areas shall be secured with approval for any State Land or shall deal directly with landowners	Dust Suppression Management Plan (Doc.# 025-Y004-2536)	Lands Management Division; Landowner
Construction Phase		
PUB water shall not be utilised for dust control and washing of equipment and machineries, except for concrete production and rollers	Water and Wastewater Management Plan (Doc.# 025-Y003-2536)	PUB CEO
Noise and vibration levels must be acceptable and does not unreasonably interfere with health or comfort of any person. Rehabilitation works shall be done between the hours of 07:00am to 7:00pm.	Noise and Vibration Management Plan (Doc.# 025-Y001-2536)	MELAD

Licence Condition(s)	Compliance Measures / Reference Documents	Requiring Authority
Aggregate depot must use geotextile silt fences or traps and sediment barriers, must not occupy an area of more than 200m^2 and height not more than 3 meters from the ground	Soil Erosion, Sedimentation & Surface Run-Off (EPI 025-L001-2536) Dust Suppression Management Plan (Doc.# 025-Y004-2536)	
Hazardous materials shall be stored as per good practice. Spill incidents must be reported immediately. Contaminated soil shall be decontaminated and remove off the island. Waste and debris shall be contained and no waste to be dumped in the sea or lagoon.	Spill Response Plan (Doc.# 025-Y005-2536)	Civil Engineering Unit
Surplus materials and demolishing wastes shall be reused where possible		MELAD
Wastewater from concrete mixing shall not be discharged into the sea or marine habitat	Water and Wastewater Management Plan (Doc.# 025-Y003-2536)	
Dust and fumes must not interfere with the health and comfort of any person and important ecosystem	Dust Suppression Management Plan (Doc.# 025-Y004-2536)	
Spraying of water on site and on the road to reduce dust	Dust Suppression Management Plan (Doc.# 025-Y004-2536)	
Impact or damage to land and coastal vegetation (Mangrove ecosystem) must be avoided	Flora and Fauna Protection Plan (Doc.# 025-Y002-2536)	
Visible signs during the day and night must be put up at construction sites	Flora and Fauna Protection Plan (Doc.# 025-Y002-2536)	
Post Construction Phase		
Notify one month prior to the completion of the expansion of the rehabilitation works		MELAD
Waste and debris, hazardous materials shall not be left along the road side after the completion of the project	Solid and Liquid Waste (EPI 025-L013-2536) Visual Amenity (EPI 025-L016-2536)	
Imported machineries shall be removed	Storage, Maintenance & Refuelling of Machinery (EPI 025-L007-2536)	
Proper decommissioning / landscaping and rehabilitation of temporary construction yards	ELA 036/10 18 Jul 13	MELAD
Final inspection		MELAD
Monitoring		
Undertake monitoring according to Environmental Monitoring Plan Section 7.5 of CEMP		
Dust and noise level to be monitored regularly		

8.0 INCIDENT REPORTING AND INVESTIGATION

8.1 RECORDING OF INCIDENTS

All environmental incidents shall be reported and recorded in accordance with **Incident Reporting and Investigation** (MMS # **020-E004-100**). The cause of all incidents will be subject to an investigation, convened by the HSE Advisor to determine the root cause(s) of the incident and to ensure that remedial / corrective actions are able to be implemented to ensure a repeat of the incident is avoided.

In the event of a spill to water, the Project Team will immediately report the incident or as soon as practical to the Client's rep and provide records of the incident, response and corrective actions as required.

In the event of an environmental incident, the Project Team will notify the Client's rep with notification within 7 days and will provide records of the incident, response and corrective actions as required.

A summary and review of incidents for the duration of the Project and for the relevant month shall be included in the Project Monthly Report.

8.2 HAZARDOUS SUBSTANCES

Hazardous substances will be stored on site appropriately as per good practice depending on the material and the nature of the hazard. All hazardous substances will be listed in the **Hazardous Substance and Dangerous Goods Register** (MMS # **020-F028-100**).

MacDow will initiate a detailed spill response procedure which communicates the responsibilities and management actions required in the event of a spill of a hazardous substance to the environment.

8.3 EMERGENCY RESPONSE AND FIRE SAFETY

The Emergency Response Plan (ERP) to be produced for the Project will take into account the following factors:

- the parts of the site or adjoining properties likely to be affected;
- the degree of predictability of the emergency;
- the likely speed of onset;
- the likely effect of the emergency;
- The contents of the Emergency Response Plan are to include:
- description of the potential emergency;
- the person responsible for actioning the ERP;
- the equipment required to deal with the emergency including rescue equipment;
- emergency contact numbers;
- direction to site workers and other affected persons on what they are required to do; and
- methods used to deal with the emergency (e.g. How to use specific equipment).

As necessary, emergency services such as Police, Fire Brigade, Ambulance, and a pollution response contractor are to be contacted and invited to visit the site in order to become aware of site access and other emergency considerations.

The ERP will incorporate the following components:

- Emergency contact list (for the above);
- Emergency Reporting Instructions;
- Emergency Muster Point Location;
- Emergency Response Co-ordinator Action Plan; and
- Emergency Personnel and Equipment.

The emergency response plan will be displayed in prominent locations around the site and employees will be trained in its requirements. All relevant Project personnel, subcontractors and relevant emergency agencies will be instructed and rehearsed, as appropriate, in the requirements of this Plan.

8.4 ENVIRONMENTAL SPILLS

The most effective spillage control system is prevention. To ensure that there is an adequate quantity and type of spill response equipment on site, the Project Team will evaluate the nature and frequency of various activities that pose the potential for spills / leaks. Based on these evaluations, the Project Team will obtain the adequate spill response material and equipment prior to work beginning on site.

As deemed necessary, the Project site will have spill kits that, at a minimum, will contain sufficient oil absorbent material to contain (e.g. oil absorbent boom) and cleanup any drips, leaks, or spills (e.g. ruptured hydraulic line) and plastic bags to contain any contaminated absorbents, soils, or wastes.

Spill kits for equipment maintenance, fuel storage areas, and fuel trucks will also contain sufficient absorbent material to contain the quantity of the material stored in the stationary containers (e.g. tanks, drums, cylinders) and equipment to cleanup (e.g. shovel, broom) and store used absorbent material.

9.0 MANAGEMENT REVIEW

9.1 CEMP REVIEW

This CEMP has been developed using the best available methods, procedures, expertise and experience available to McConnell Dowell Constructors. However, consistent with the philosophy of continuous improvement, there will be opportunities during the Project to implement new or improved procedures. Additionally, a specific review of the CEMP will be undertaken on an annual basis.

The root cause of many incidents leads to a need for action to prevent recurrence of that kind of incident. Where a repeat incident occurs or where there is a significant incident, an Environmental Alert may be issued. Environmental Alerts are used where incidents with broader implications and lessons that may be applicable to other Projects and Facility's are summarised and distributed to disseminate findings more widely. Environmental Alerts from other Projects and Facility's may also

be relevant to this Project. Where applicable these lessons are communicated to the work force through Tool Box Talks and Pre-start Meetings.

Where any changes and improvement to working practices are identified through the investigation of environmental incidents, these will be assessed and incorporated into the EMP as part of the Incident Reporting and Investigation process.

9.2 STAKEHOLDER AND COMMUNICATIONS MANAGEMENT

9.2.1 Internal Communication

Communication regarding environmental issues and controls is important to ensure that management techniques are being adhered to and that employees have the opportunity to address concerns.

Environmental communication will primarily be through Pre-Start Meetings, weekly team meetings and Tool Box Talks; however it can also occur during site inspections or through members of the environmental or management teams.

9.2.2 External Communication

Communications and the management of complaints and enquiries are managed through the implementation of the Project Communications – Procedure – Internal and External (MMS # 300-E008-100).

The Project Manager is responsible for the conduct and coordination of communications with all key external stakeholders. Subject to any specific Project requirements, the Project Manager will be the key liaison person in dealing with:

- **Ministry of Public Works and Utilities (MPWU)** – as the implementing agency for the Project and will be responsible for the implementation and compliance with the EMP and Monitoring Plan.
- **Project Supervision Consultant (PSC)** – will be tasked for the day-to-day implementation and compliance. They will prepare quarterly progress reports based on findings of regular monitoring activities

Progress Reports which will include an overview of the status of the implementation of the EMP's and compliance to the national environmental regulations shall be submitted for information to the Ministry of Environment, Lands, and Agricultural Development (EDC-MELAD), the Asian Development Bank, and The World Bank if required.

9.2.3 Complaints Management

In the event that complaints relating to environmental management are received, the Project team will direct such complaints and enquiries to the HSE who will act on them.

Complaints will be recorded on **Environmental Incident / Event** (MMS # **020-F053-100**) form and entered into the Enquiry and Complaints Register. As a minimum, the following will be recorded:

- The date and time of enquiry / complaint;
- Personal details of the party lodging the enquiry / complaint (subject to privacy considerations);
- Nature of the enquiry or issue of concern;

- Outcome of complaint investigation and any remedial actions taken by the Project Team to cease the impact.

At the completion of the investigation, a summary of the findings and action taken will be provided to the party that lodged the complaint / enquiry.

9.2.4 Grievance Redress Mechanism

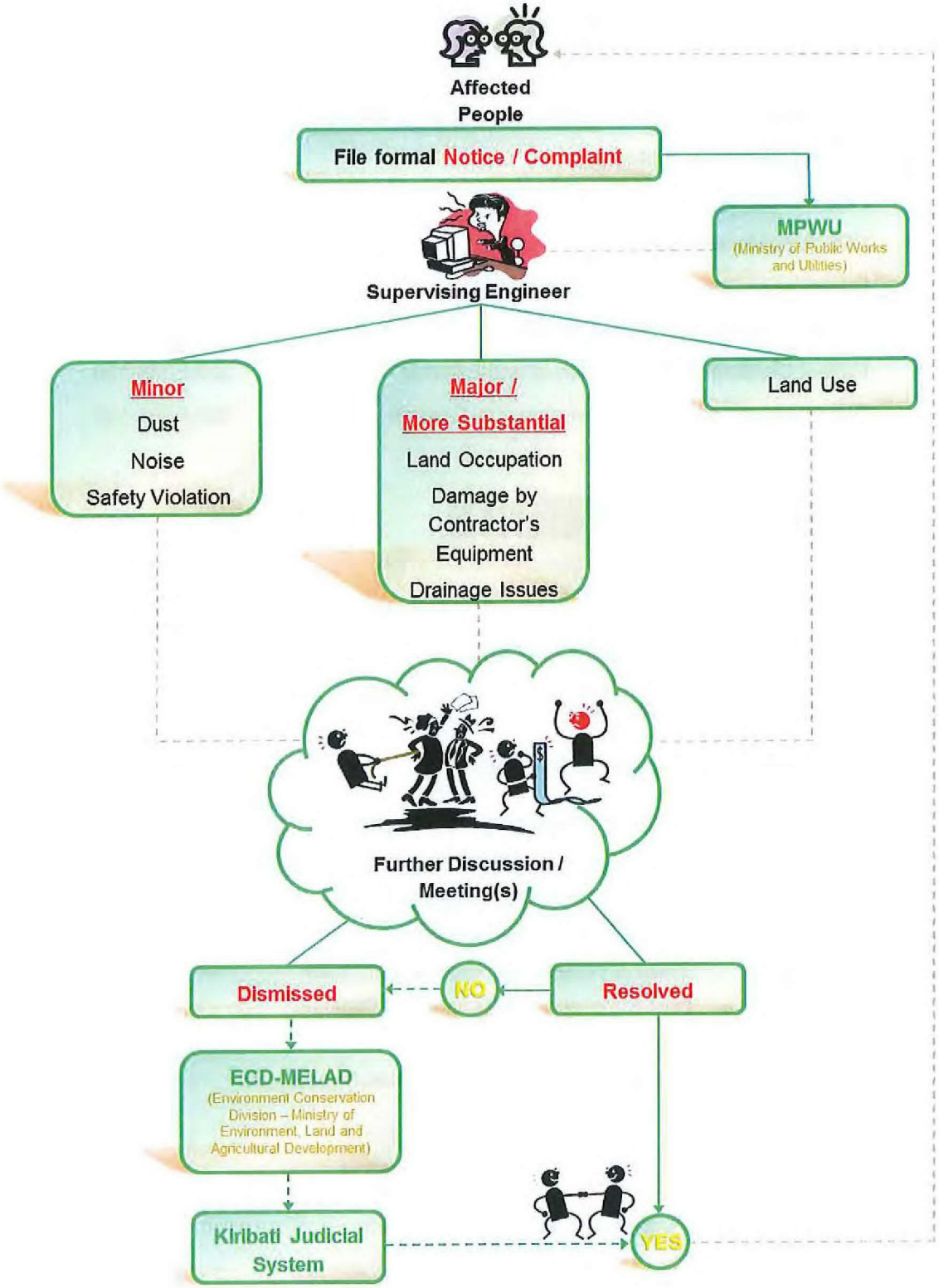
Issues and concerns from the stakeholders and community concerning the environment during the project duration may be submitted to the MPWU office.

This will be assessed and validated as genuine complaints by a Supervising Engineer.

Further discussion and meetings may be carried on before forwarding to EDC-MELAD.

In occasion where resolution is not granted, the issue/concern may be elevated to the Kiribati Judicial Courts for final settlement.

Figure 4 Grievance Redress Mechanism flowchart



10.0 REFERENCES

Not included in this plan. Copies available on request

HSE Inspections and Monitoring	020-E001-100
HSE Performance Reporting	020-E006-100
HSE Risk Management	020-E008-100
Identification and Control of Nonconformity	017-E002-100
Incident Reporting and Investigation	020-E004-100
Project Communications – Internal and External	300-E008-100
Subcontractor Safety and Environmental Controls	020-E007-100

11.0 ATTACHMENTS

ATTACHMENT A – ENV Legal

ATTACHMENT B – Policies & Certification

ATTACHMENT C – Blank Forms

ATTACHMENT D – Sustainability Reporting

ATTACHMENT E – Environmental Hazard Identification Checklist

- Environmental Protection instructions standard
- Noise & Vibration Management Plan
- Flora & Fauna Protection Plan
- Water & Wastewater Management Plan
- Dust Suppression Management Plan
- Spill Response Plan
- Storage & Handling of Hazardous Substances

ATTACHMENT F – AC Plant Operation & Maintenance

ATTACHMENT G – Current Environmental Licences

ATTACHMENT H – Current Approved JSEAs

Mobile Asphalt Plant

BACK ROUND

The Asphalt Plant was commissioned in the early 1990s by Island Asphalts Ltd, a roading construction company based in Hamilton. The Asphalt Plant (Drum Mixer) was manufactured in New Zealand by Bitumen Equipment Ltd, a company who specialise in building asphalt plant and related equipment. The dust collection part of the plant known as the Baghouse component was manufactured by Filtercorp International Ltd, requested by Bitumen Equipment Ltd which is now formally known as Black Gold Equipment Ltd.

Island Asphalt Ltd was purchased by Blacktop Group take over in 2006 - 07. During Blacktops ownership the plant was used in Waikato region to manufacture asphalt for reseals contract such as Rotorua District Council, Hamilton State highway's, as well as overseas project in PNG. Blacktop Construction Group went into receivership September 2013 by appointed receiver's BDO. McConnell Dowell Constructors Ltd was successful in its bid to purchase the plant for the KRRP project in late October 2013.

Table 1 Plant History - Drum Mix Plant, below summarise a brief of previous jobs the plant has produced for, and amount of tonnages it had produced.

PROJECTS MOBILE ASPHALT PLANT HAS BEEN INVOLVED TO MANUFACTURE ASPHALT:

Table 1 Plant History - Drum Mix Plant

Recent Projects :	**Standard:**	**Date:**	**Mix Produced MT**
PNG – ESSO Highlands LNG Plant. Port Moresby / LNG Site Contractor: Leighton/ Curtain Bothers Ltd PNG The asphalt plant produced dense graded mix over 8 weeks, in a successful partnership with Curtain Brothers responsible for supplying all raw materials. Attached case study, supplied by previous ownership Blacktop Construction Ltd, in which plant manufactured for the project. ***Appendix 1. PNG Case Study Blacktop Construction*** *Contact reference: Steve McCone OPUS +64 27445 0287, Responsible for design of mix.*	No details available:	2011	18,500

NZ – RDC Reseals Contract. Taotaoroa Quarry, Swaps Quarry Contract – Rotorua District Council Reseals. The asphalt plant provided mix to TNZ Specification, specific mixes such as Mix 10, Mix 15 and Mix 20 commonly used for overlay program. Project Duration 5 months. SWAPS quarry supplied all raw aggregate materials to plant. Consulting Engineer – Neil Gumbley OPUS Consultants. **Appendix 2: Letter 5 Feb 2010, confirming Qtys from Taotaoroa Quary – Blacktop GM**	TNZ / NZTA	2009/10	10,000
NZ – New Market Viaduct. Blacktop Yard, Blacktop Yard NZTA Blonde Asphalt Project . Attached case study, supplied by previous owner Blacktop Construction Ltd regarding the project. Attatched is case study of the project **Appendix 3: Newmarket Viaduct Case Study Blactop Construction Ltd** *Contact: Steve McCone OPUS +64 27445 0287, Responsible for design of mix.*	TNZ / NZTA	2006	300
NZ – Marsden Point 2005, Marsden Point Oil Refinery Yard No details available of Mix produced.	TNZ / NZTA	2005	2,000
NZ – Marsden Point 2005, Marsden Point Oil Refinery Yard Under Island Asphalt Ltd Ownership – No details available.	TNZ / NZTA	2002	5,500

APAS ACCREDITATION

The plants history was also registered under Asphalt Plant Accreditation Scheme (APAS) program administered by Roading New Zealand. The APAS is the most recent aspect of contracting industry operations to be developed as a form of industry self-governance.

APAS is designed to provide an internal process control system for asphalt producers that sets rules around assessing the quality of asphalt manufactured in New Zealand. The scheme requires asphalt producers to formally register their plants with RNZ in order to apply for accreditation under the scheme.

Email correspondence from Alan Stevens, from RNZ in charge of the programme APAS 28/01/2014

"I can confirm that the Blacktop Taotoroa asphalt plant was a registered participant in the Programme for about two and a half years. During that time a number of different mix test data sets were submitted for consideration."

"I believe that the plant you now have is quite capable of meeting the current APAS requirements, but like all plants consistency in the aggregate supplies is of utmost importance as is the ability to understand each plants' operational quirks.'

PROCESS METHODS USED:

Drum mixing plant is a relatively simple process of producing asphalt. The mixing drum from which this type of plant obtains the drum mixing name is very similar in appearance to a batch plant dryer drum. The key difference between the drum mix plants and batch plants is that in drum mix plants the aggregate is not only dried and heated in the drum, but also mixed with the binder. There are no gradation screens, hot bins, weigh hoppers, or pugmills in a drum a plant. Aggregate gradation is controlled at the cold feed.

The key components of drum mixing plant, as shown below Figure 3/25: Basic Drum Mix Plant

1. Aggregate Cold Feed Bin
2. Conveyor and aggregate weighing system
3. Drum Mixer
4. Dust Collection System
5. Hot mix conveyor
6. Mix surge Bin
7. Control Van (Room)
8. Binder storage tank

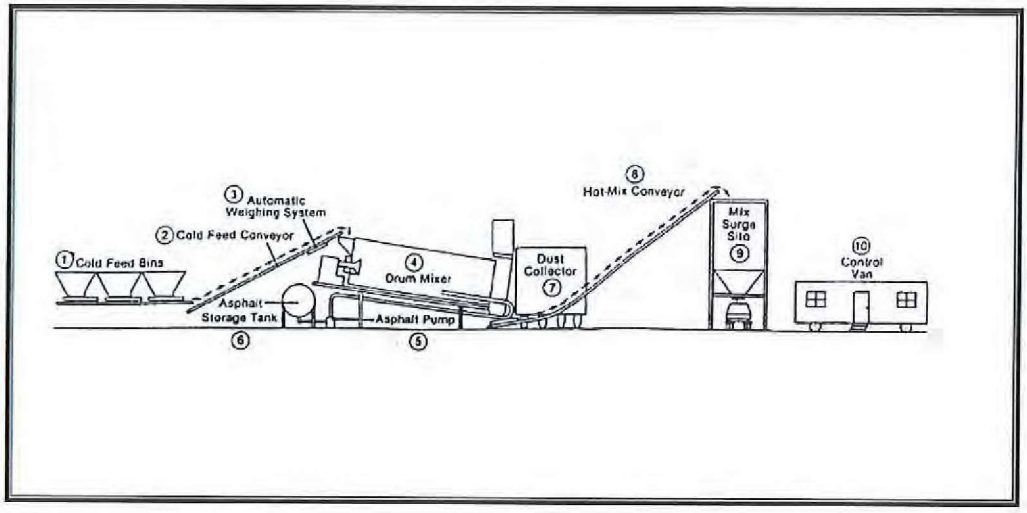


Figure 3-25, Basic Drum Mix Plant
3-37

Typical Drum Mix Plant: Source: 3 Asphalt Mixture Plant Operations2014.

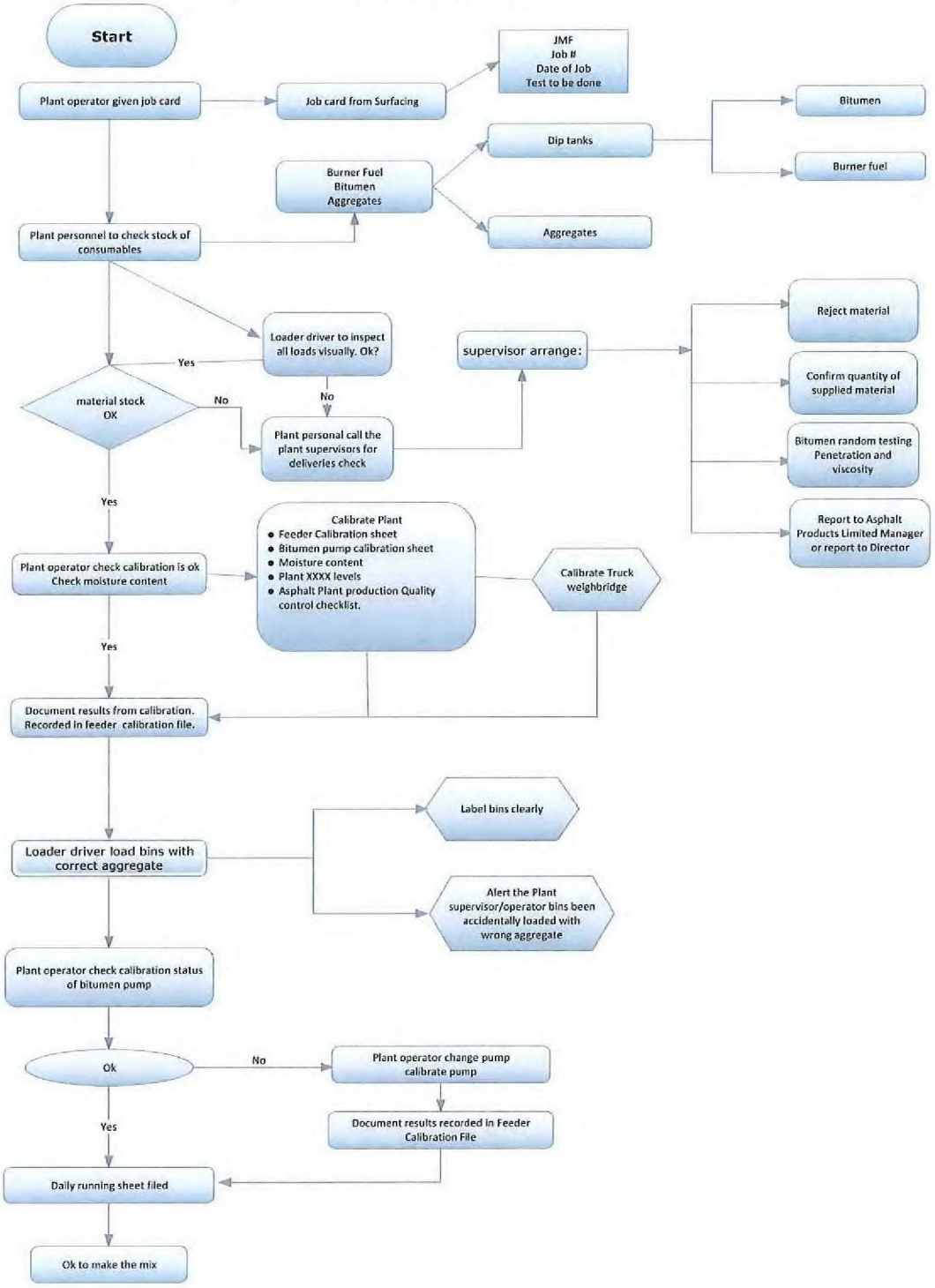
General sequence method involved with drum mix plant setup:

- Controlled gradations of aggregate already tested to correct grading are deposited by loader into cold feed bins (1)
- Aggregates are deposited are then fed in exact proportion's onto a cold feed conveyor (2)
- An automatic aggregate weighing system (Load cells) (3) monitors the amount of aggregate flowing into the drum mixer (4).
- The weighing system is interlocked with the controls on the binder storage pump (5),
- which draws the binder from the storage tank (6) and introduces the binder into the drum where the binder and aggregate are thoroughly blended by the rotating action of the drum.
- From the drum, the asphalt mixture is transported by hot mix conveyor (8) to a surge bin (9) from which the mixture is loaded into trucks and transported to site for placement. All plant operations are monitored and controlled from instrument's in the control room.

MANUFACTIRING PROCESS DRUM MIX PLANT – TEMAIKU LOCATION

Below is summary flow chart process of the plant operators processes to manufacture asphalt. The details will be covered further in the CEP detailing key activities when manufacturing asphalt.

ASPHALT MANUFACTURING PROCESS:



TECHNICAL DETAILS: MACDOW DRUM MIX PLANT

PLANT TYPE: Drum/ Baghouse Mobile Asphalt Plant (Drum Mixing Plant)

- Production capacity: 120 MT/Hour. KRRP Project Estimated 22,000 MT of asphalt to be manufactured
- Storage Capacity Hot Bin: 30 – 35MT
- 2 Bitumen Tank Capacity: 40 MT/ Each Tank
- Drum Chassis 12.2m Length
- Baghouse Filtration Unit: Manufactured by Filtercorp International Ltd, NZ 110 stack housing unit. Further details covered below under Baghouse Details.
- Control Unit: Computerised System
- Cold Feed Bins – 3 Units, 30m3 Capacity Total. Weigh feeder capacity.
- Generator: 300Kva Power Supply
- Diesel Tanks – 10,000 Litre (self bunded) Enviro Bulka EBD50 X 2
- Toltec 2295 – 20 Weighbridge MT IND310

Material usage: The current design for KRRP Project, proposed uses 3 raw aggregates in the mix design. The imported sealing aggregates shall be used to manufacture 22, 000MT of asphalt. Breakdown of materials are as follows:

Londoni Quarry in Suva, Fiji

- SCIL Sealing Chip 7mm – 17,000 MT
- SCIL Sealing Chip 10mm – 2,300 MT
- SCIL Crusher Dust – 2,000 MT

Bitumen – is supplied by Technix Pacific Ltd, Fiji

- CL170 Technix Bitumen – 1,300 MT

SURFACE AT AC PLANT YARD

Current location is coralinus material covering full 8,900m2. Proposed surfaced to be altered will be the following locations:

1. Stockpile location for sealing aggregates (proposed AC Surface) TBC 100m2
2. Bitumen Transfer Area (proposed to AC and bunded) approximately 60m2
3. Concrete Pad – for truck wash shall be constructed approximately 50m2
4. Refuelling area – as above (3) same location

ENVIRONMENTAL STANDARDS:

Under the previous ownership, the plant manufactured majority of asphalt under NZ environmental regulations and standards. Only recently was the plant sent overseas to manufacture specifically for a Head Contractor Leighton/ Curtain Brothers Ltd PNG.

The table below is a brief summary of the projects the plant was involved in, and comments on the environmental regulations it had to comply with during its operation.

Table 2 Environmental Regulations

Country	Project / Location	Environmental Standard used:	Comments
PNG	LNG Site Contractor: Curtain Bothers Ltd PNG	Asphalt Plant used a Blanket Consent Curtain Brother had acquired for its Crushing Plant Operation the plant was situated Port Morsby. Contact details: Justin. M. Details Env standard not available.	Contact – Justin McGan GM Curtain Brothers +675-321-2300
NZ	Taotoroa Quarry 2009, Swaps Quarry Contract	The asphalt plant came under Resource Consents of SWAPS Quarry Ltd, speaking with GM SWAPS Quarry, Local Authority permitted Asphalt activity under its Original Quarry Resource. The consents for permitted the asphalt manufacturing activity. this meant a Discharge permit was not required as the licensee can produce asphalt in the vicinity for a certain qty per year. Due to commercial sensitivity the documents were not available for viewing. Waikato Regional Council, Act: Resource Management Act 1991.	Contact – Mike Swaps GM Swap Quarry Ltd Matamata +64 274359275 Head Office +647 888 7025 Fax +647 888 8121
NZ	Blacktop Yard, 2006, Blacktop Yard NZTA Blonde Asphalt Project	The mobile Asphalt Plant would have come under Blacktop Discharge Permit for its main AC plant then Manukau City Council. The main AC main was also a drum mixing plant with a capacity to hold 130MT at any one time. For this reason, the plant was	No contact available info available. Blacktop ceased trading October 2013 – NZ operations.

		used provided one was only in operation at one time. Auckland Council - Air Discharge permit. Act: Resource Management Act 1991.	
NZ	Marsden Point 2005, Marsden Point Oil Refinery ownership – Island Asphalts Ltd – Hamilton.	The *permit was lodged on behalf of Island Asphalts by consulting firm, Wendell Taylor & Associates Ltd, Hamilton in 2001.* *Permit approved by Whangarei District Council – Discharge Permit.* *Local authority Northland Regional Council.* Act: Resource Management Act 1991.	Approved consents. Application Number: LU01/936 Resource Consent: 36662

BAGHOUSE (DUST CONTROL) DETAILS

Purpose of the Baghouse process is to simply control dust emissions, during the manufacturing of asphalt. A typical baghouse is a large metal housing containing hundreds of synthetic , heat resistant fabric bags collecting fines. The fabric bags are usually silicone –treated to increase their ability to collect very fine particles of dust. A baghouse functions much the same way as a vacuum cleaner . A large vacuum fan creates a suction with in the housing, which draws in dirty air and filters the air through the fabric of the bags. To handle a huge volume of exhaust gases from aggregate dryer, a very large number of bags is required. *Source: 3 Asphalt Mixture Plant Operations2014.*

A baghouse is divided into a dirty gas chamber and a clean gas chamber. The filter bags are contained in the dirty gas chamber, into which the air from dryer enters. The flow of air carrying the dust particles passes through the fabric of the filter bags, depositing the dust on the surface of the bag. The air then continues to the clean gas chamber. During the operation, the fabric filter traps large quantities of dust. Eventually, the dust accumulates into a "dust cake", that is required to be removed before the dust reduces or stops the flow of gas through the filter.

There are many ways of cleaning the bags, back flush the bags with clean air, or both flex and back flush. Dust removed from the bags drops into an auger at the bottom of the baghouse and is transferred to a storage silo. The dust is then returned to the plant as aggregate. Dust not returned to the process will be removed from island along with the used bags.

Typical Baghouse: Source: 3 Asphalt Mixture Plant Operations2014.

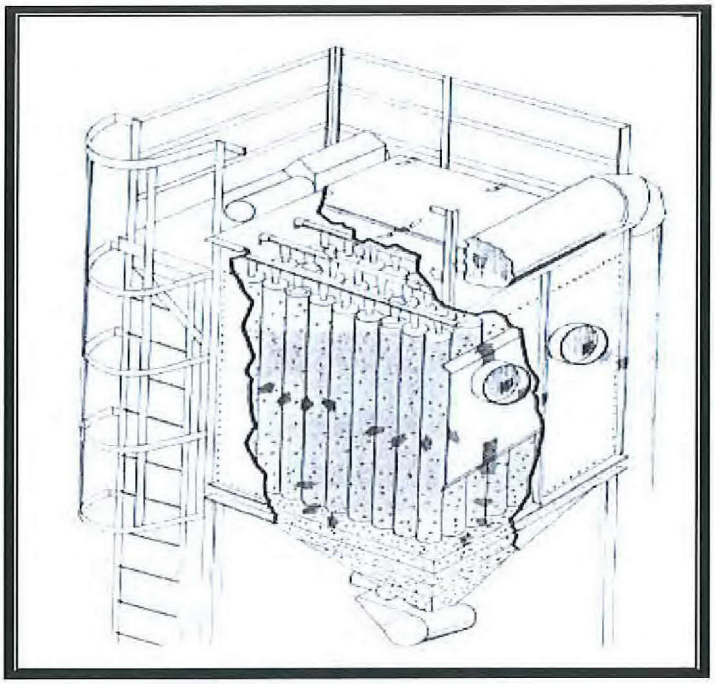


Figure 3-7. Typical Baghouse

MANUFACTURER BAGHOUSE:

Manufacturer: Filtercorp International Ltd

Full details of design are covered in **attachment 4: Operation Setting to Work Maintenance Manual – Sonic Pulse Dust Collector (Filtercorp)**

The Drum mixer plant to be erected in Temaiku, has the following dimensions: 7m high with an additional 3m stack giving the discharge point of 10m above ground level. Particulate emissions from the plants using a bag house filter system are comparatively low and emission parameters are typically less than 50mg/m3 at maximum operational capacity. Letter Wendell and Taylor Assc, 2001. Figure 1 and 2below, are pictures of the baghouse in operation in 2009 at Taotaoroa Quarry / SWAPS Quarry – Waikato NZ.

Figure 2 (Right) AC plant pic of Drum mixer

Figure 1 MacDow Drum Mix Plant – (left) Baghouse, Compressor, Fan stand. Baghouse in operation in 2009 at Taotaoroa Quarry / SWAPS Quarry – Waikato NZ.

Specifications : Attached document supplied by Filtercorp International Ltd

Filter bag temperatures are generally up to 220°C during normal operation (which is hotter than normal). The filter bags are replaced annually. The baghouse is equipped with an over-temperature sensor which is alarmed in the control room, and pressure differential monitoring (which is also alarmed) to monitor filter bag condition

Disposal of bags:

Silicone Bags that are to be replaced for maintenance reasons, shall be disposed in sealed tight bags, and stored in 20ft containers with limited access. The bags shall be sent back to NZ for proper disposal in accordance with manufactures specifications for proper discharge.

Offsite and Waste Management Plan: EPI Storage & Handling of Hazardous Substances Doc# 025 – L008 - 2536

MONITORING DUST AND NOISE

The details relating to Baghouse Maintenance is covered under MacDows EPI Dust Suppression Management Plan Doc # 025 – Y004- 2536. Rev C Feb 2014.

The details for monitor Noise and Vibration levels are covered under MacDows EPI Noise and Vibration Management Plan Doc # - 025 – YOO1 – 2536 Rev C Feb 2014

ASPHALT PLANT LOCATION

Only one access is established to Asphalt Plant currently. The access point is off Airport Road, at CH 0160m See Fig.3

The dwellings near location of AC plant is highlighted in Figure 4. The nearest dwelling is on the North East, estimated to be 160m – 200m from boundary line.

The dwellings are surrounded by trees and prevailing wind is from the dwellings towards the AC Plant.

Access for dwellings are not affected by asphalt plant haul road, as there is no direct access to dwellings through the established route. Access to North Eastern part of dwellings is via Temaiku access road, truck movements created by asphalt plant do not impact on access of these dwellings.

The stockpile location of raw imported aggregates as well local coralline materials is stockpiled further 300m away towards the entrance gate. This is shown in Fig 5. SSOP (Survey Set out Plan).

Details of actual location of concrete foundations is covered in Fig. 6 Detail of Foundation Layout Asphalt Plant

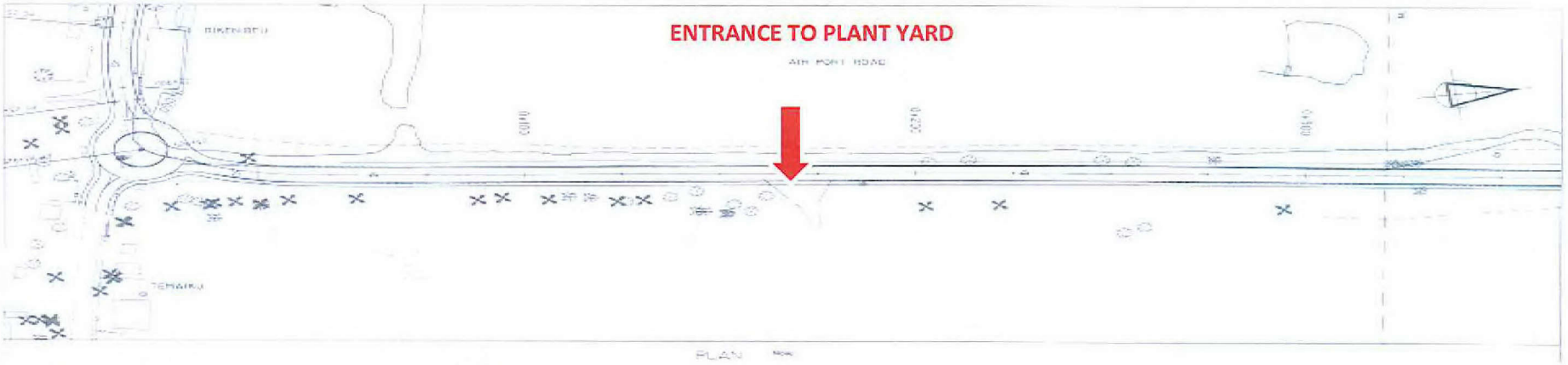


Figure 3: Access point to Asphalt Plant via Airport Rd CH 0160

Figure 4: Dwelling Location near Asphalt Plant

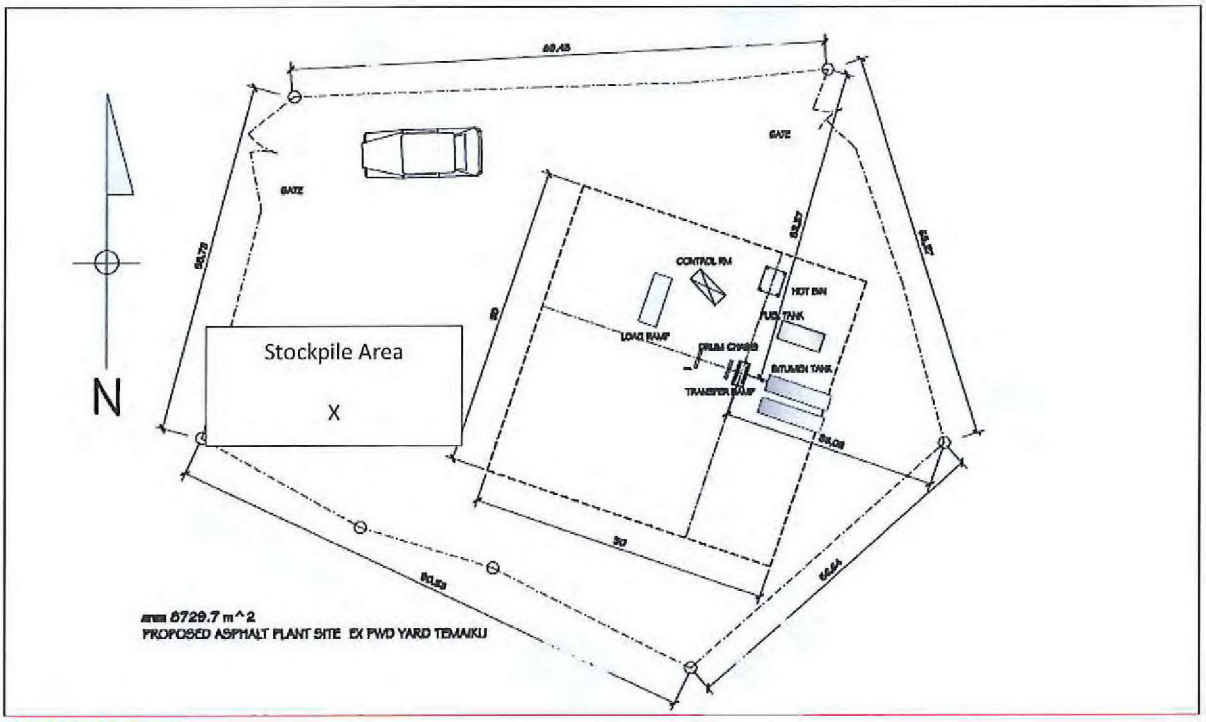


Figure 5: SSOP

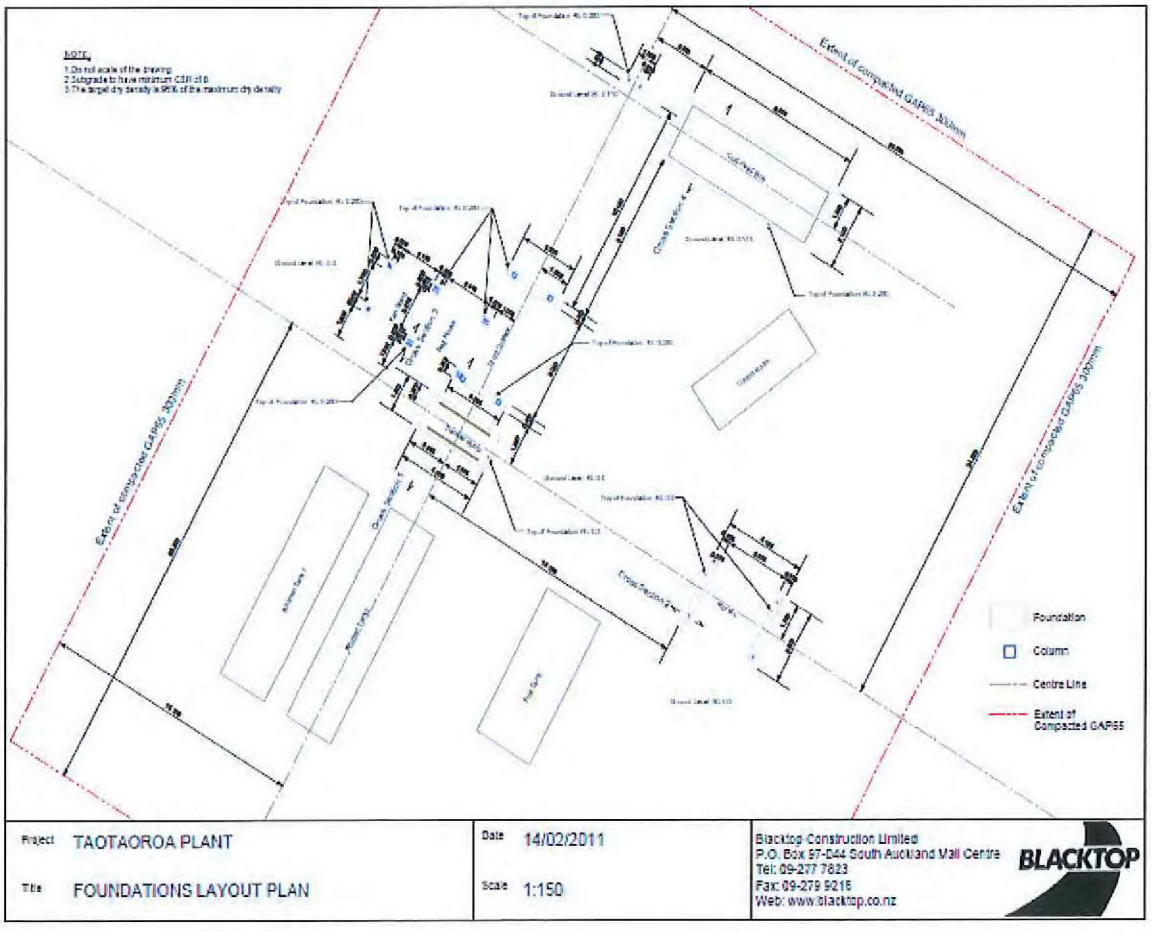


Figure 6: Detail of Foundation Layout Asphalt Plant

ATTACHMENT'S

1. Attachment 1: PNG LNG Plant, Papua New Guinea
2. Attachment 2: Appendix 2: Letter 5 Feb 2010, confirming Qtys from Taotaoroa Quary – Blacktop GM
3. Attachment: 3 Newmarket Viaduct Case Study
4. Attachment 4: Filtercorp International Ltd – Baghouse specification Model Number: CSC 130 – 45 (150)

Construction of access roads for the establishment of the ESSO Highlands LNG plant, Papua New Guinea

– offshore asphalt manufacture and paving

"The entire works at the LNG site are an outstanding success (representative) of professional construction"

Justin McGann, General Manager, Curtain Brothers

"In an eight week period 18,500 tonnes of mix was produced and laid – the equivalent of twice the annual output of a standard hotmix plant in New Zealand"

Esso Australia Pty

Curtain Brothers Papua New Guinea

BLACKTOP

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DELTA

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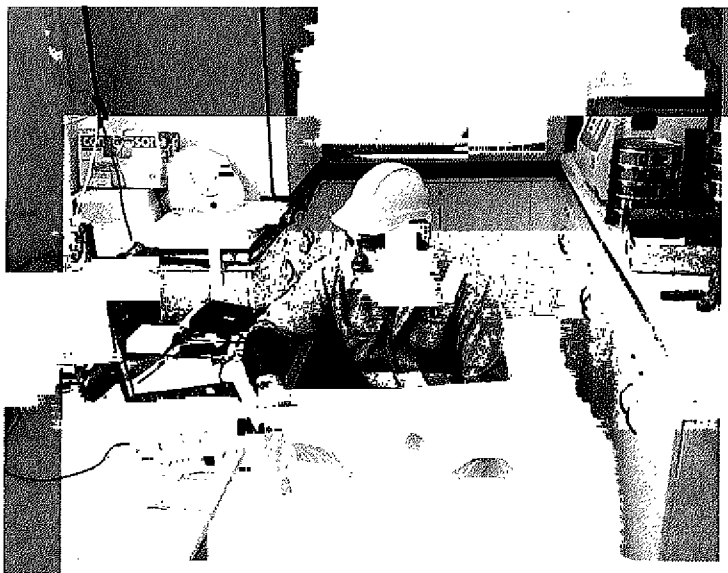


"Paving in subtropical temperatures was a challenge with crews having to be hydrated regularly and there was extended curing time of the asphalt due to higher temperatures."

Papua New Guinea has huge natural gas reserves in the highlands area and as part of the extraction and development of these resources, a refinery is being built 15kms out of Port Moresby to process and convert the natural gas to a liquid form for shipping.

Blacktop Construction completed the manufacture and paving of hotmix asphalt on 23kms of access roads for the establishment phase to allow the construction of the LNG plant to begin.

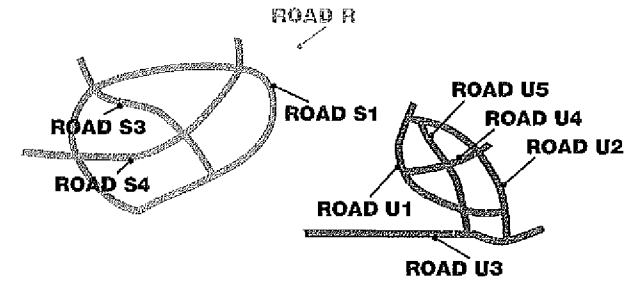
In order to mobilise operations for this project, Blacktop Construction shipped an asphalt plant, laboratory and paving crew to Papua New Guinea.

This establishment phase included a lay down trial in the construction car park to ensure suitability of the mix design in the subtropical environment (temperatures range from 35-40 degrees Celsius.)

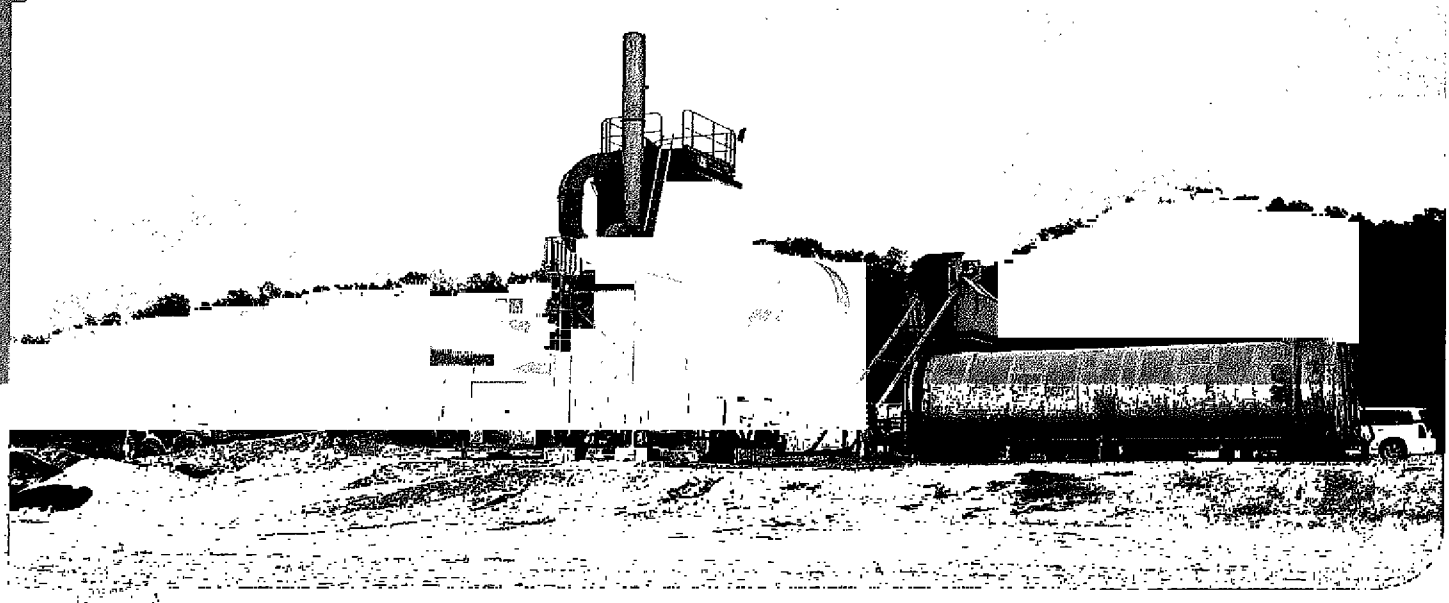
Construction Period	25 days (Continuous operations)
Weekly Asphalt Production	1750 to 3000 tonnes per week
Total Asphalt Production	18,500 tonnes
Transportation Logistics	A portable asphalt plant and paving equipment was shipped to Papua New Guinea
Lost Working Days	Weather delays accounted for 15 days.

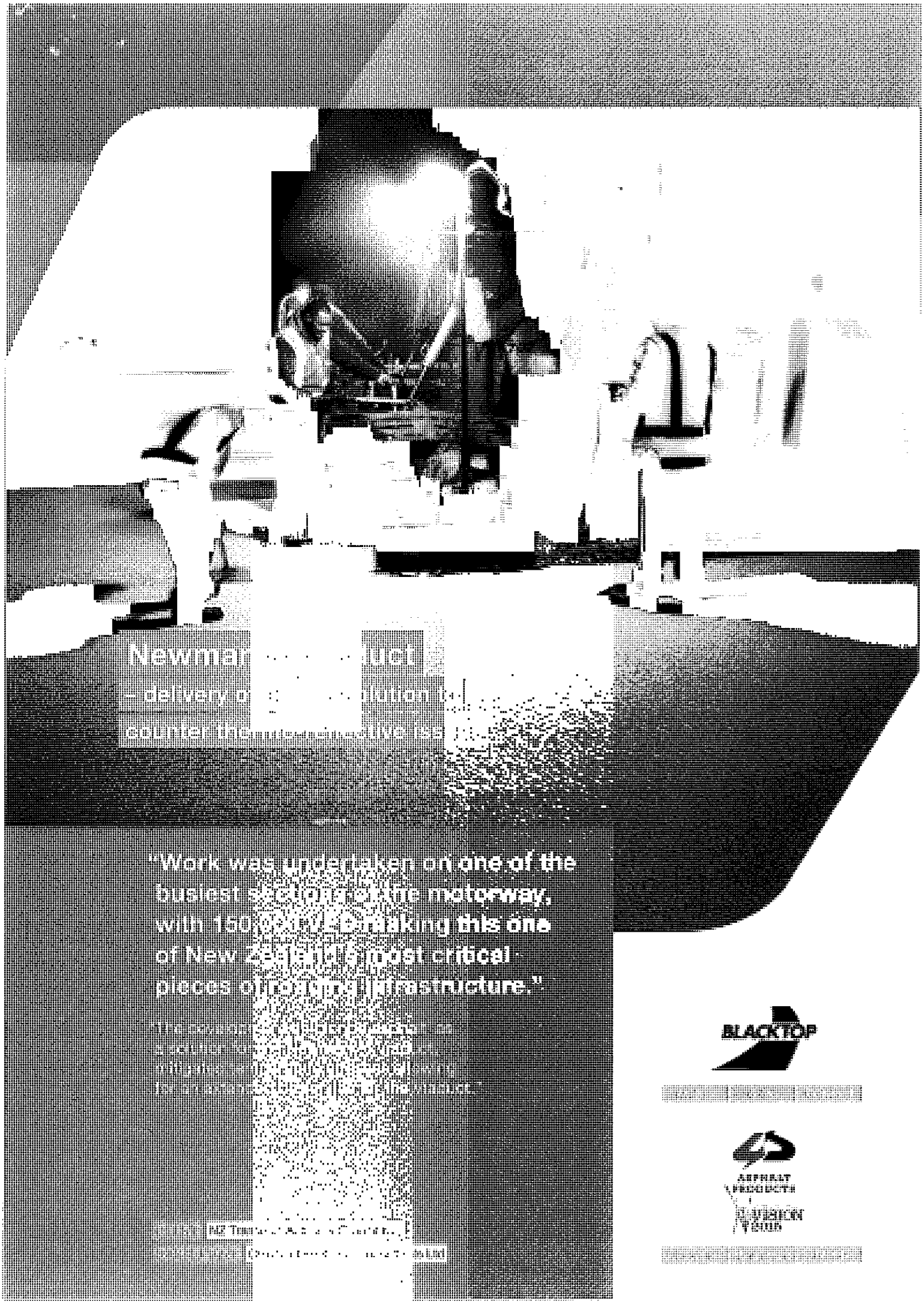
Asphalt Products using its portable asphalt plant manufactured 18,500 tonnes of hotmix asphalt to construct access roads, bus parking areas, car park areas and access into the medical centre for the LNG project. Blacktop Construction's scope of work required the management of the whole process from receiving, heating and transfer of bitumen, through to manufacture of asphalt, pre-levelling and paving and compaction.

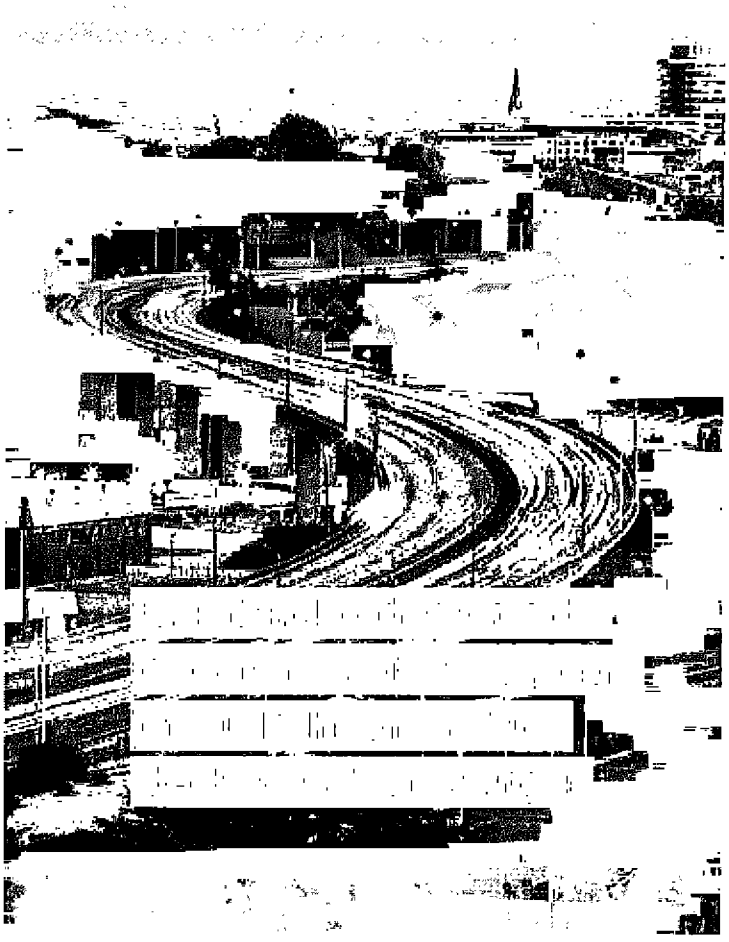
Areas for paving were determined by Curtain Bros programme, and timeframes required to produce road sections and prime prior to hotmixing. Areas paved each day largely depended on truck supply and pavement preparation.



There were many constraints to be overcome with this project. The project started in late May and ran through until late August, and although work was planned for a structured roster, due to time constraints Blacktop's asphalt crews worked extended hours to ensure that the project met the delivery programme.




"Work was undertaken on one of the
busiest sections of the motorway,
with 150
of New
pieces
BLACKTOP
ASPHALT
PRODUCTS
DIVISION



The Newmarket Viaduct was the first bridge in New Zealand to use a pre-stressed continuous box-girder design (a method for overcoming concrete's natural weakness in tension), Freyssinet (prestressed) concrete hinges at the base and cantilever construction techniques.

Despite utilising a groundbreaking design at the time the viaduct has a shortened design-life because temperature effects were not fully realised in the first design; the existing viaduct being subject to very high stresses resulting from temperature variations.

The traditional black chipseal surface attracted heat, with a high level of thermo-reflectivity resulting in more heat retention and significant structural stresses and movement. To extend the life of the bridge an alternative sealing solution was sought to mitigate against this scenario.

An asphaltic concrete mix design was developed utilising white dacite as a base material to reduce levels of thermo -reflectivity. The dacite, as a material would reflect light.

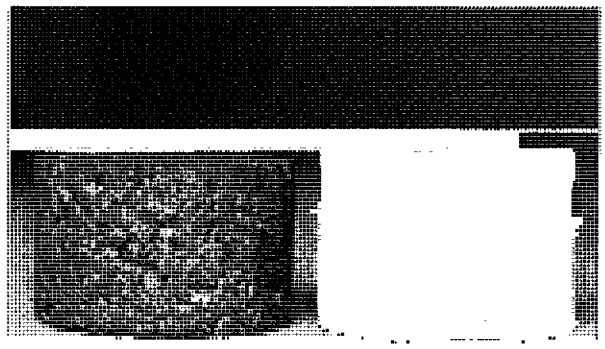
There was a hitch though, in order to source this aggregate a quarry in Northland had to be specially re-opened, stone blasted and crushed to create chip for asphalt paving.

Refining the concept design to create a blonde asphalt was crucial to success

The proposed concept design for the asphaltic concrete needed refinement and to achieve this, a purpose designed clear binder was developed. A clear bitumen ('Blonde bitumen') was also sourced and a dye was added to make sure the final material was all white in colour to maximise the reflective qualities of dacite.

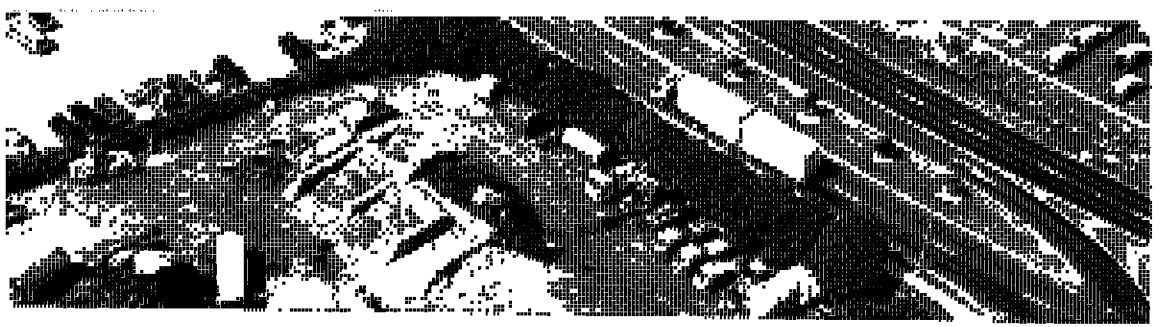
In order to manufacture the blonde asphalt, a portable hotmix plant had to be steam cleaned and all plant, trucks and storage tanks had to be free of any black bitumen residue.

As well as the logistics of the manufacturing process being difficult, access to the viaduct site to mill out the chipseal and lay the hotmix was challenging, with the motorway having to be closed to traffic overnight.



The resultant blonde asphalt solution developed was very successful, reducing levels of light reflectivity, ultimately achieving the desired outcome of extending the lifespan of the viaduct.

This was recognised as a challenging project and a significant achievement with Blacktop Construction winning the Goughs Regional Supreme Award 2006 for its work on the State Highway 1 Newmarket Viaduct resurfacing contract.



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P O Box 97044, South Auckland Mail Centre 1730

5th February 2010

J Swap Contractors Limited
Po Box 153
Matamata

Attention Michael Swap

Taotaoroa Quarry – Portable Asphalt Plant Throughput 2009

Further to our conversation we confirm the following information for your records.

During 2009 the volume of asphalt manufactured and transported from our portable asphalt plant located at Taotaoroa Quarry amounted to 9792.86 tonnes.

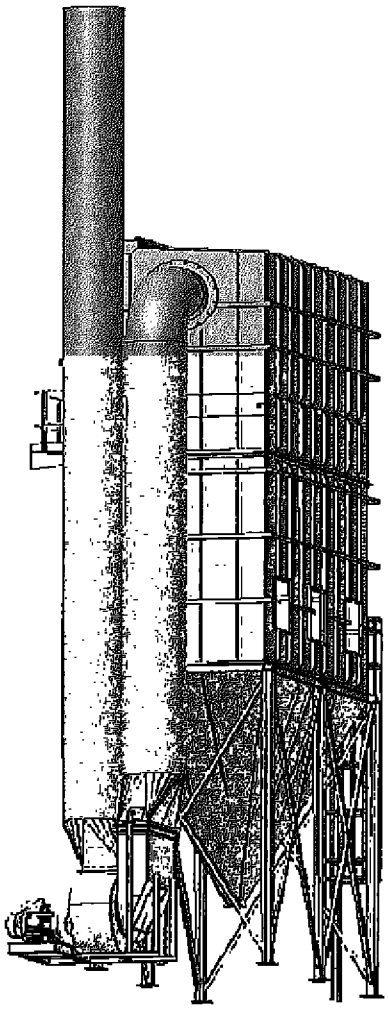
We trust that this meets your needs

Yours sincerely

Simon Everett
Director

OPERATION SETTING TO WORK MAINTENANCE MANUAL

SONIC PULSE DUST COLLECTOR



PROJECT NO.

MODEL NO. CSC130-45(150)

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1. CONFIDENTIALITY

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3. SCOPE

This Operation and Maintenance Manual for Filtercorp Dust Collectors has been prepared by FILTERCORP INTERNATIONAL LTD.

The purpose of this Manual is to provide information for the proper installation and removal of Filtercorp filter elements, and assessing when it may be necessary to do so.

4. INTENDED READER

This document is intended for use by the personnel involved in the day-to day operation of the equipment, the diagnosis and correction of faults, and day to day maintenance.

5. DESCRIPTION OF FILTERCORP SONIC PULSE DUST COLLECTOR

The FILTERCORP INTERNATIONAL LTD Sonic Pulse Dust Collector is a Continuous Online Cleaning System for the removal of dust or fume particulate from air streams.

The Dust Collector is divided by a cell plate into two compartments, the clean air chamber and the air borne dust particulate (dirty air) chamber.

The filter media (Snaptex bags and supporting cages) are retained and sealed into the cell plate and suspended into the dirty air chamber of the dust collector.

Dust laden air enters into the dirty air chamber and any dust particulate that does not settle out of the air stream contacts onto the outside surface of the filter material.

The air passes through the filter media leaving the dust particles on the dirty side of the filtration surface. The particles build up into permeable filter cake; the degree of permeability being dependent on the characteristics of the dust.

As the dust particulate cake builds up on the filter material, the pressure differential between the dirty and clean surfaces of the filter material increases and causes a reduction of airflow through the filter media.

To maintain the designed air flow through the dust collector the design pressure differential across the filter media must also be maintained by periodic and routine removal of the accumulated dust particulate from the surface of the filter media.

This removal of accumulated dust particles is facilitated utilising a sonic pulse wave of air, which passes down the length of the filter media loosening the dust cake. The pulse of compressed air, combined with an induced secondary air flow, inflates and ripples the filter media and the momentary reverse air flow through the filter media causes the dust cake to be released from the filter bags.

The cake of accumulated dust particulate falls from the vicinity of the filter tube as the air flow is less than the conveying velocity of the accumulated dust cake.

The sonic pulse system is fully automatic and in order to control the increase in resistance, a controller signals the diaphragm valve releasing the pulse of compressed air from a reservoir into the blow tubes, then down into the outlet opening of the Filter Element.

The filter bags that are pulsed at each sonic burst are only a fraction of the total, and are off line for about 0.3 of a second. This enables the Dust Collector to run continuously on line. The individual rows of filters are pulsed out of sequence to prevent re-entrainment of the released dust onto the adjacent row of filters.

The cleansed air is discharged from the clean chamber of the dust collector.

7. COMPRESSED AIR

The FILTERCORP INTERNATIONAL LTD Dust Collector requires a consistent Compressed Air supply to the air reservoir. The air must be dry and oil free.

When using filter bags the compressed air supply is to be adjustable between 450 and 820 kPA (65 > 120 psi) to produce an effective sonic pulse.

8. SONIC PULSE SYSTEM OPERATION

The Sonic Pulse Wave is generated by compressed air accelerating through a nozzle directed centrally into the outlet of the filter tube. The sonic pulse system control can be manual or fully automatic.

To control the filter air flow, the pressure differential caused by the permeable dust cake on the media must be monitored, and the cake periodically removed to maintain an acceptable pressure differential over the filter media thus ensuring a consistent air flow.

A signal to the diaphragm valve releasing the pulse of compressed air from a reservoir into the blow tube and through a sonic nozzle, where the velocity of the air is increased to sonic speed.

A sequence timer is programmed to automatically actuate the diaphragm valve to maintain and control the pressure differential across the filter media.

A Magnehelic Gauge is fitted to visibly monitor the pressure drop across the filter media.

9. FILTER SOCK SERVICING

Servicing filtration equipment can expose personnel to hazards such as confined spaces, compressed air, respirable/toxic dusts and potentially explosive dust/air mixtures. Therefore it is essential that operating and maintenance personnel be instructed in recognising hazards, and in the relevant safety procedures for dealing with them.

All dust must be considered a health risk and it is recommended that safety clothing, protective breathing apparatus and eye protection be used when changing the Filter Socks.

Suitable means of containing any residual dust and transporting the Filter Socks should be considered before removal of the Socks from the Dust Collector Cell Plate.

As any concentration of dust may be ignitable (explosive) any sources of ignition should be eliminated from or minimised at the work area. If present, the dust collector pulse sequence timer and controller should be electrically isolated before working within the dust collector.

FILTERCORP INTERNATIONAL LTD Dust Collectors are designed for tool free Filter Sock installation.

The clean air chamber of the Dust Collector should be cleaned before the installation of new or replacement Filter Socks.

The Cell Plate must be clean about each filter hole before the installation of any Filter Sock.

The edge of each filter hole at the Cell Plate must be undamaged and burr free.

10. Filter Sock Access

Access to the Dust Collector Filter Socks is through the clean air plenum chamber.

The Dust Collector incorporates the Filtercorp Sonic Pulse Cleaning System and requires removal of the blow tubes located over the Filter Socks. Open the access door, release the blow pipe securing handle and remove the blow pipe to Service/Replace the Filter Sock.

Replace the blow pipe into the coupling collar (apply a Petroleum gel or a similar product before pushing blow pipe into the coupling).

Secure the blow tubes into position ensuring that the sonic nozzles are aimed directly down the inside centres of the Filter Socks.

11. Snaptex Filter Sock Installation

Start the Filter Sock installation furthest away from the access platform, ladder, or access opening, and work back towards the opening or ladder.

Carefully pass the Filter Sock through the hole in the cell plate without damaging the filtration surface. Deform the open cuff end of Filter Sock inwards (kidney shape) locate the filter sock cuff recess groove onto the edge of the cell plate hole. Release and allow the deformed Filter Sock to resume the original shape ensuring that the cell plate hole edge fits into the groove recess. The Filter Sock must fully resume the original shape to ensure a seal at the cell plate (A snapping of the filter Sock into the Cell Plate usually indicates that the Filter Sock cuff is correctly fitted).

Insert the filter support wire cage carefully into the Filter Sock ensuring that the cage is fully lowered and that the cage top is seated onto the Filter Sock cell plate. (Static units may not use a cage and instead have a cuff that snaps onto a lower cell plate).

12. Snaptex Filter Sock Removal

Lift and remove the filter support cage from inside the Filter Sock.

Deform the top cuff band of the Filter Sock (may require loosening out of the cell plate filter hole by a sharp kick to the edge of the cuff) and withdraw the Filter Sock from the cell plate ensuring that the filter media does not scrap against the edge of the cell plate filter hole.

The Filter Sock should be placed into a bag (plastic) to ensure that any residual dust is not distributed / dislodged into the clean chamber of the Dust Collector.

Alternatively the Filter Sock (after removal of the support cage) can be forced through the cell plate into the dirty chamber of the Dust Collector and removed to a waste container.

13. FILTER BAG INSTALLATION

GENERAL

The correct fixing of the filter bag is of paramount importance and procedures must be adhered to with utmost diligence.

Negligence during filter bag installation will result in poor dust collection efficiency and high gas dust emission.

INSTALLATION OF "TOP REMOVAL" TYPE FILTER BAGS

Filter bags can only be installed from the clean gas plenum and prior to installation of blow tubes.

1. Insert filter bag through hole in cell plate starting with closed end of filter bag, until snap-band collar section rests on cell plate.

2. Insert groove in snap-band collar into one side of cell plate hole and compress the snap-band collar sufficiently until it can be inserted completed (Figure 1).

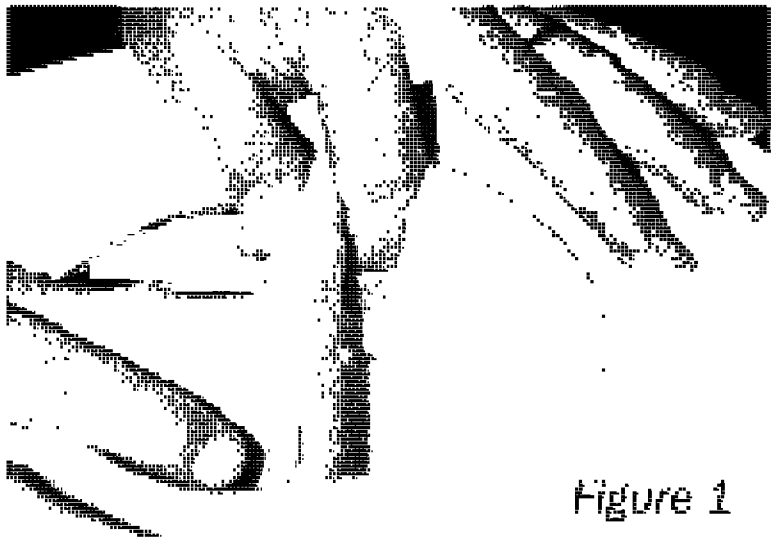


Figure 1

3. Release snap-band and make sure that the snap-band has assumed its circular shape and the snap-band collar groove is firmly seated I the hole of the cell plate (Figure 2).

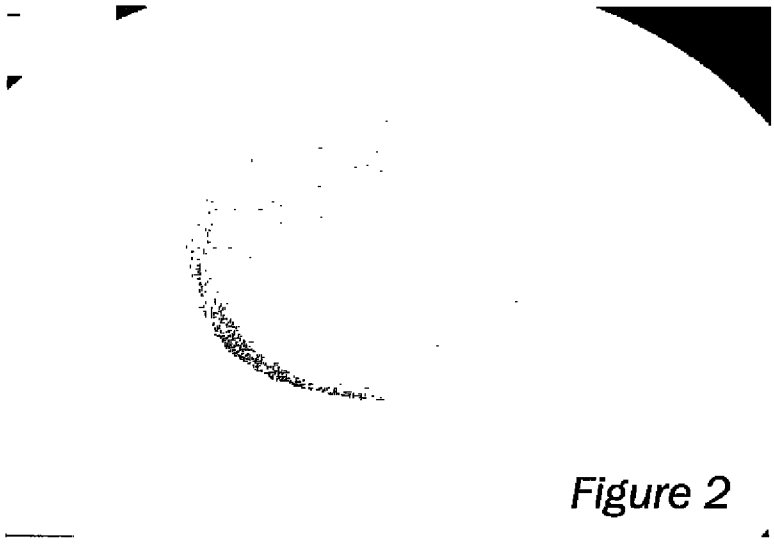


Figure 2

4. To prevent dislodging or damage to the filter bag installed, it is recommended to insert the filter bag support cage before installing the next filter bag.

   The filter bag support cage must be handled with care and it is imperative that it is straight before insertion. Bent or bowed cages will cause filter bag wear and reduce service life.

   "Top Removal" type support cages have an end cap on the one end and a support ring on the other end.

   The support cage is inserted into the filter bag with the end cap first, and pushed down until the support ring covers the bag snaptex collar and rests on the cell plate (Figure 3).

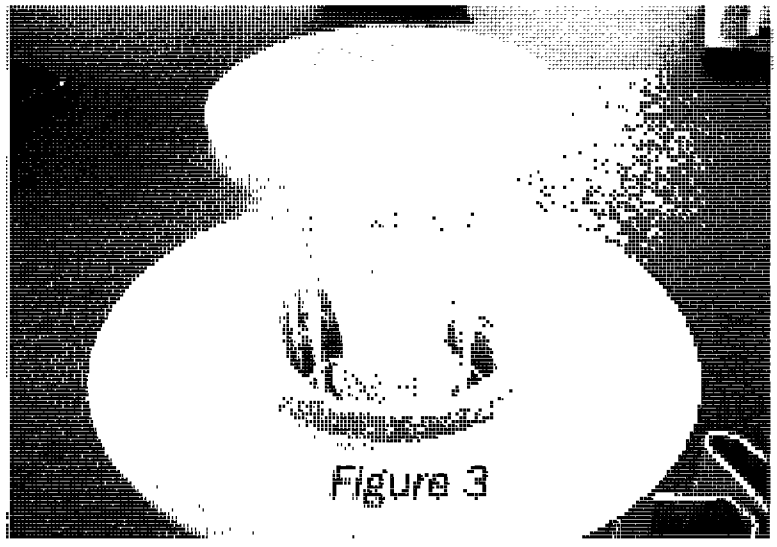


Figure 3

5. On completion of installation, check from raw gas side that the filter bags do NOT touch each other or the bag filter casing. Adjust where necessary by firmly holding down the ring onto the cell plate and gently bending the cages away from each other. Cages with bad bows or kinks must be removed for straightening or replacement (support cages may differ from the above image—Figure 3—depending on the application).

14. Filter Bag Replacement

It is acceptable to replace individual bags to solve an emission problem due to bag damage; however, if more than 15-20% bags require replacement it is recommended that a full bag house change be carried out.

Air finds the path of least resistance and will blind off the new filter bags very quickly (sometimes in a matter of hours). This premature overloading of the media will have a detrimental effect upon the new elements and result in a shortened operative life.

15. Filter Bag Operating Life

If a Dust Collector Pulse Sequence Timer is present it should be wired independently of the air flow fan to enable the pulsing of the filter elements to be continued for a period after shutting down of the Dust Collector fan so that when the fan is turned off, the Collector continues to pulse down for 5 to 10 minutes. This run-on of pulsing ensures removal of any residual dust cake, and prevents moisture or humidity causing any detrimental damage to the filter bags.

For any prolonged shut down period, and when filter bags are handling hygroscopic dusts, they should be removed, vacuum cleaned and dry stored to prevent any residual dust cake due to moisture or humidity causing any detrimental damage to the filter bags.

16. FILTER BAGS

Operating Life
Filter bags are usually effective for 12-18 months before requiring cleaning/laundering.

Filter bags can usually be laundered 2-3 times at decreasing intervals before requiring replacement.

Filter Sock Cleaning
- ◊ Soft Dry Brush and Vacuum
- ◊ Industrial Dry Clean (check with filter manufacturer)

17. SHUT DOWN

The Dust Collector Pulse Sequence Timer should be wired independently of the air flow fan to enable the pulsing of the filter bags to be continued for a period after shutting down of the Dust Collector fan so that when the fan is turned off, the Collector continues to pulse down for 5 to 10 minutes. This run-on of pulsing ensures removal of any residual dust cake, and prevents moisture or humidity causing any detrimental damage to the filter bags.

For any prolonged shut down period, and when filter bags are handling hygroscopic dusts, they should be removed, vacuum cleaned and dry stored to prevent any residual dust cake due to moisture or humidity causing any detrimental damage to the filter bags.

18. START UP

Prior to the start-up of a Filtercorp Sonic Pulse Dust Collector it is recommended and essential that a systematic and thorough check of the installation be undertaken.

- All Filter Bags are installed and sealed into the Cell Plate.
- All Blow Tubes c/w Sonic Nozzles are installed secured and aligned over Filter Element gas outlet at Cell Plate.
- All access covers, doors, inspection ports, and joints are shut and sealed to ingress of air.
- Test the Pulse system electrically to ensure that the Sequence Timer is operative.
- Air flow Fan is operative (direction of rotation).
- Ducting into Dust Collector, Ducting out from Dust Collector, connected.
- Waste product discharge shut.

Before starting the Dust Collector it is recommended that there be a means of:
- Measuring the Air flow through the Dust Collector.
- Measuring the pressure differential over the Filter Elements.
- Measuring the Fan absorbed power (Amps).

Start Procedure (Initial)
- Start air flow through Dust Collector (Minimal air flow utilising damper or a speed control).
- Measure the pressure differential over Filter Elements at Cell Plate.
- Start Pulse Sequence (to check operation).
- Open Compressed Air supply (to check supply of air).
- Shut Compressed Air.
- Operate Dust Collector at minimal duty to establish a dust layer upon the surface of the filter media.

Operational Procedures

- Start air flow through Dust Collector (Minimal air flow utilising damper or a speed control).

During start up with clean Filter Bags there will be very little resistance (Pressure differential) across the collector until a dust cake has built up on the filter media surface. Unless the fan is restricted the air flow through the Dust Collector will exceed the media recommended flow rate and have a detrimental effect on the filter media and thus shorten the operative life of the filter media.

It is recommended that when the dust to be collected is very fine and/or abrasive that the filter surface be artificially coated with a permeable cake to minimise the product fines being forced into the filtration material causing blinding of the filter media.

The artificial coating product is introduced onto the surface of the filter media at a reduced velocity until the pressure drop across the filter has increased to about 25 mm water gauge.

19. MONITORING PERFORMANCE

Monitoring of the filter elements is typically by daily visual observation of emissions and readings of the Differential Pressure Gauge by the Operator or Maintenance Engineer.

The nominal design pressure of a Dust Collector is 76 - 150mm Wg (3 - 4 in. Wg) Readings outside of this range may indicate a problem or potential problem.

19.1 Low Pressure Differential

Possible Cause

- Faulty Gauge
- Gauge connecting tube failure (blockage/leak)
- Gauge Sensor Outlet blockage
- Filter Element/Cell Plate seal failure
- Filter Element Media failure
- Low Air Flow through Dust Collector

19.2 High Pressure Differential

Possible Cause

- Faulty Gauge
- Gauge connecting tube failure (blockage/leak)
- Gauge Sensor Outlet blockage
- Filter Element Media Blinded
- High Air Flow through Dust Collector

19.3 Visible Dust Emission from Exhaust

Possible Cause

- Filter Element/Cell Plate seal failure (by-passing of Filter Media)
- Filter Element Media failure (by-passing of Filter Media)
- Insufficient Dust cake on Filter Media surface (dust penetrating Filter Media)

19.4 Excessive Filter Element Failure

Possible Cause

- Filter Element Failure (mechanical) to individual elements
- Filter Element Failure (decomposition)
- Blinding of Filter Media surface
- Change to dust being Filtered (size, material, etc.)

The filter media should be compatible with the dust particles that are to be captured onto the filter media surface to minimize penetration of the filter media.

Moist dust and/or air will cause caking upon the filter media surface and should be avoided whenever possible (momentarily moist flow blinding may be removed by subsequence operation of the Dust Collector under dry conditions).

Heated dust and/or air flowing onto cooler filter media will react similar to moist air if the dew point of the air entering is higher than the temperature of the filter media.

A permeable coating can be applied onto the Filter Element surface by introducing the coating (usually fine Lime dust) into the Dust Collector at the rate of 0.25 - 0.50 Kg / M^2 of Filter Media surface area.

Storage or accumulation of dust within the Dust Collector can increase the effective density of the dust loading on the Filter Elements and thus blinding due to over loading.

Confirmation of several of the malfunctions of the Dust Collector components requires specialist knowledge, experience or equipment.

FILTERCORP INTERNATIONAL LTD can supply this specialisation.

21. PREVENTATIVE MAINTENANCE PROCEDURES

Daily –

Check pressure drop. *(Refer 21. Monitoring Performance)*

Observe stack (visually or with opacity metre). *(Refer 21. Monitoring Performance Item #4)*

Check for unusual occurrences in process. *(Refer 21. Monitoring Performance)*

Observe control panel indicators. *(It is suggested that an equipment logbook system be initiated and used to record all gauges and indicators. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

Assure that dust is being removed from system. *(Plant/Machine Operators to carry out continuous Visual Inspection during normal operations)*

Check compressed air pressure. *(Refer 7. Compressed Air)*

Weekly –

Check compressed air lines, including line filters and dryers. *(Refer 22. Trouble Shooting Item #1)*

Check that valves are opening and closing properly in bag-cleaning sequence. *(Refer 24. Accessories and Equipment Item #4)*

Check pressure drop indicating equipment for plugged lines. *(Refer 22. Trouble Shooting Item #1; Refer 24. Accessories and Equipment Items #1, 2, or 3 depending on equipment supplied)*

Monthly –

Inspect fans for corrosion and material build up. *(Refer 24. Proprietary Equipment)*

Inspect and lubricate appropriate items. *(Refer 24. Proprietary Equipment)*

Spot check for bag leaks. *(Refer 22. Trouble Shooting Item #2, 3 & 4)*

Check hoses and clamps. *(Refer 27. Safety Precautions Item #2)*

Check accuracy of indicating equipment. *(Refer 22. Trouble Shooting Item #1)*

Inspect housing for corrosion. *(It is suggested that an equipment logbook system be initiated and used to record all visual inspections. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

ATTENTION

As the Dust Collector may be fully or partially operational during monitoring or fault diagnosis of the equipment, the service personal undertaking the process must ensure at all times that all care is taken to eliminate or minimize injury or damage from Electrical, Mechanical, or Pneumatic components of the Dust Collector.

20. TROUBLE SHOOTING

20.1 Gauge / Gauge Tubing / Sensor Outlets

- Test Gauge by replacing Gauge with a Gauge of known reliability (temporary)
- Test and Check Gauge Tubing failure by fitting Gauge direct to Sensor Outlets
- Test and Check Gauge Sensor Outlets by fitting Gauge direct to Sensor Outlets

20.2 Filter Element / Cell Plate Seal

- Filter Element must seal into hole at Cell Plate
- (Leakage may be visual as a product dust streak on the cell plate, or the situation confirmed by introducing a fluro-tracing dust into the Dust Collector to indicate the leak point)

20.3 Filter Element Media

Abrasive damage may be caused by;

- Contact with other Filter Elements (air flow induced sway or circular movement)
- High Velocity Dust entering the Dust Collector
- Obstruction contact within the confines of the Filter Element

Mechanical damage may be caused by;

- Contact with other Filter Elements
- Obstruction contact within the confines of the Filter Element
- Prior to or after installation of the Filter Element into the Cell Plate Excessive pulsing of the Filter Elements
- (Leakage may be visual as a product dust streak, or by utilizing a fluro-tracing dust introduced into the Dust Collector to indicate the leak point).

20.4 Blinding of Filter Element Media

Blinding of the Filter Element Media can be the result of;

- Excessive air flow through the Filter Media
- Incompatibility of Filter Media and Dust Material
- Insufficient permeable cake build up on media during initial start-up
- Moist dust or air flowing into Dust Collector
- Heated dust or air flowing into Dust Collector
- Re-entrainment of dust after Pulsing of Filter Element

The airflow through the Dust Collector should NOT be greater than the original design flow to ensure that dust particles are not impinged (forced) into or through the filter media.

Excessive air flow through the Dust Collector may produce air velocities about the Filter Elements that could re-entrain the dust particles dislodged from the Filter Elements at each Sonic Pulse causing a concentrating accumulation of dust and thus increasing the probability of dust penetration of the filter media.

24. SAFETY STATEMENT

FILTERCORP INTERNATIONAL LTD is committed to supplying Equipment that ensures a safe working environment for your company.

However, safety also requires a continuous commitment to the proper use, operation and maintenance of all the equipment supplied.

It is important that operating and maintenance personnel be instructed in recognising hazards, and in the relevant safety procedures.

Staff should be encouraged to report any accident, no matter how minor, so that its effect on safety can be immediately assessed. The realisation that they could suffer injury is often a powerful incentive to their observance of this, but it would help if you, as the employer, can be seen to take notice of their reports and have serious faults rectified immediately.

FILTERCORP INTERNATIONAL LTD recommends that the guidelines contained within this section be implemented in regards to the supplied equipment.

As the customer, it is your responsibility to establish a maintenance program, which ensures that all equipment is kept in a safe condition.
All maintenance must be carried out by trained personnel.

Only trained Employees shall be permitted to operate equipment. Training shall include instruction in operation under both normal and emergency conditions.

25. SAFETY PRECAUTIONS

Following is a list of recommendations for your guidance and safety. These should be adhered to at all times.

Further, more specific, safety recommendations are listed at other relevant locations throughout this manual.

25.1 Confined Space Safety Procedures

Dust Collector Vessel
Persons entering these locations may be;

- Exposed to an oxygen deficient atmosphere.
- Exposed to the risk of engulfment by either the product, water, or another material.

(Note that a person whose upper body, or head, is within the confined space is considered to have entered that space).

The procedure should give due consideration to;

- Ensuring that the location is fully isolated from services, product, etc prior to entry.
- Ensuring that the atmosphere within the location is properly purged with fresh air prior to entry.
- Ensuring that the location is properly ventilated throughout with an adequate flow of fresh air whilst it is occupied.
- Ensuring that, where an adequate supply of fresh air to the occupant(s) of the location cannot be guaranteed, the occupant is equipped with appropriate personal protection equipment.
- Ensuring that occupants of the location are properly and continuously supervised by person (s) outside the location, and that adequate communication exists between the occupant and said supervision.

Quarterly –

Inspect baffle plate for wear. *(It is suggested that an equipment logbook system be initiated and used to record all visual inspections. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

Inspect bags thoroughly. *(Refer 22. Trouble Shooting Item #2, 3 & 4)*

Check duct for dust build up. *(It is suggested that an equipment logbook system be initiated and used to record all visual inspections. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

Inspect paint, insulation etc. *(It is suggested that an equipment logbook system be initiated and used to record all visual inspections. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

Annually –

Check welds. *(It is suggested that an equipment logbook system be initiated and used to record all visual inspections. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

Inspect hopper for wear. *(It is suggested that an equipment logbook system be initiated and used to record all visual inspections. By maintaining good records it is possible to detect potential problems and therefore carry out preventative maintenance before major shutdowns are necessary.)*

22. ACCESSORIES AND EQUIPMENT

22.1 Magnehelic Gauge

A Magnehelic Gauge accurately measures the pressure differential across the Filter Socks/ Elements.

22.2 Diaphragm Valves

The Diaphragm Valve delivers compressed air to the Sonic Nozzle located above each Filter Sock Element.

The valve is normally closed and controlled by the timer sequence pilot valve.

The diaphragm valve may occasionally need the rubber diaphragm and body spring replacing. Ensure the spring is replaced between the diaphragm and the bonnet.

MODEL	DIAPHRAGM KIT
TBA	TBA

22.3 Explosive Vents

As a mixture of air and fine dust can be explosive a means of relieving the pressure generated by the ignition of the air dust should be fitted into a Dust Collector. This is usually a rupture panel.

23. PROPRIETARY EQUIPMENT

The Dust Collector incorporates a number of components that are supplied to FILTERCORP INTERNATIONAL LTD by other companies.

FILTERCORP INTERNATIONAL LTD refers to these as Proprietary or Original Equipment Manufacturer (OEM) parts.

- Monitoring the atmosphere within the location whenever it is occupied.
- Ensuring that any adverse affect on the occupant of the location is made immediately apparent to the person(s) charged with the continuous supervision of the occupant.
- Ensuring that the occupant of the location can be immediately and quickly removed from the location, in an unconscious state if necessary, by person(s) charged with the continuous supervision of the occupant.

25.2 Risks Associated with Pneumatic Equipment

Hazards to personnel due to pneumatic component failures include;

- The release of compressed air.
- Whipping of disconnected tubing.
- The ejection of damaged or incorrectly fitted components.

Precautions to be adopted when working with or around pneumatic equipment;

- Always wear safety glasses.
- Ensure pneumatic equipment is isolated and tagged out prior to commencing maintenance work.
- Work to an appropriate "Air On" procedure, in which the compressed air is reapplied to the plant in a controlled and safe manner.

25.3 Suggested Compressed "Air On" Procedure;

- All isolation valves closed.
- Final connections between isolation valve and equipment should be disconnected to allow purging of the air lines.
- Purge the air lines.

Purging of the air lines is paramount to the reliability of the equipment.

Any contamination forced into equipment will cause problems, and possible equipment failures.

Do not purge air lines by blowing through solenoid valves, which have been energised or manually over ridden. This may cause contaminates to become lodged in the valve, resulting in a valve failure.

25.4 Compressed Air is Dangerous

It is important that all precautions and safety guidelines as stated in this manual are followed.

- Open each isolation valve and blow air to atmosphere, long enough to remove any contamination from the pipes. The time will depend on the length and size of the line.
- Reconnect equipment.
- Preset all regulators to 0-bars.
- Turn main supply - On - (Slowly).
- Check for leaks between the isolation valve and the regulator(s).
- Increase the pressure on the regulator to 1 bar.
- Check for and remedy any air leaks downstream along the remainder of the line.
- Increase all regulators to the pressure stated on the P & I diagram, and check again for leaks.

25.5 Mitigation of Risks Associated with the Creation of Potentially Explosive Dust/Air Mixtures

Many organic powders are capable of producing potentially explosive dust/air mixtures.

FILTERCORP INTERNATIONAL LTD has taken the following steps to minimise this risk.

- Provision of explosion venting panels in vessels deemed to be at risk.
- Provision of earthing Filter Socks / Elements at all potential static points.
- Provision of appropriate levels of protection for electrical equipment in high risk area.

The following points should be noted.

In order to minimise the risk of a secondary explosion being ignited in the room(s) in the event of an explosion within the equipment itself, good housekeeping practices should be maintained at all time. In particular, the accumulation of powder at any point within the powder handling area should be avoided.

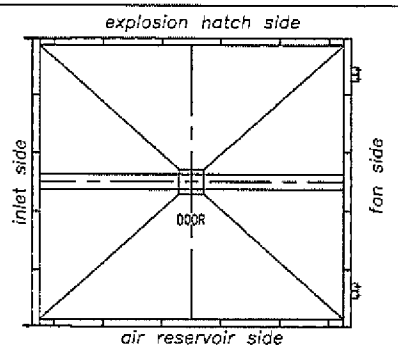
Static earthing provisions should be inspected regularly to ensure that all static earth discontinuities are satisfactorily bridged.

26. OEM Equipment Items

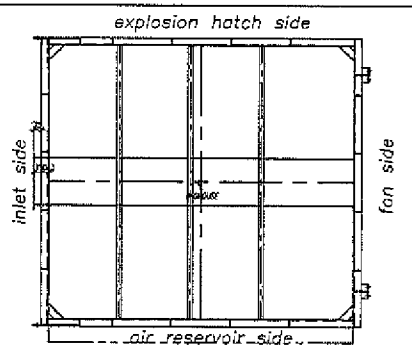
The system incorporates a number of components that are supplied with the Dust Collector by other companies.

Follows is a List of OEM parts, for which the manufacturer has produced an Operating and Maintenance Manual, a copy of which is included in this manual.

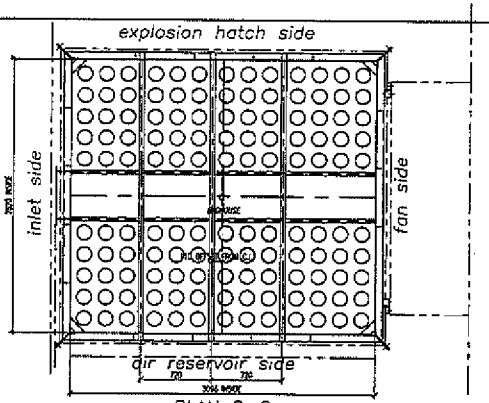
- TBA



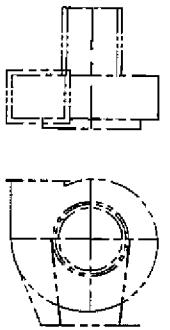
SECTION A–A

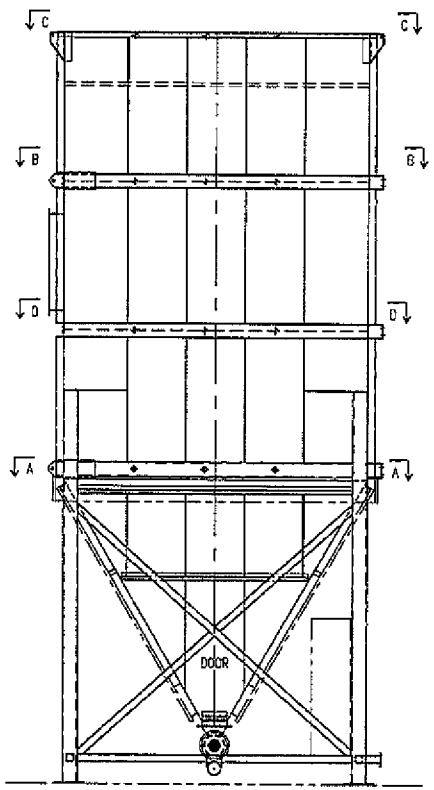


SECTION B–B & D–D

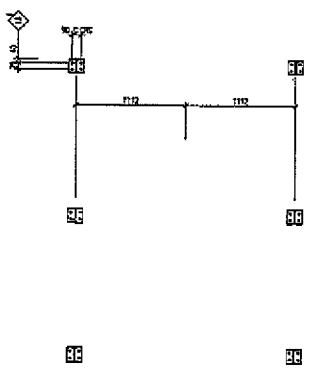


PLAN C–C





ELEVATION ON AIR RESERVOIR SIDE



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REV	DATE	REVISION DESCRIPTION	DRN	CHD
A		ISSUED FOR –		

N.S. = NEAR SIDE N.P. = NO PAINT C/C = CROSS CENTERS
F.S. = FAR SIDE A.R. = ALL ROUND B.M. = BACKMARK OR GAUGE ON LEG
B.S. = BOTH SIDES U.N. = UNLESS NOTED S.O.C. = SAME AS OTHER END

GENERAL NOTES
HOLES 14 DIA FOR M12 GALVENG BOLTS UNLESS NOTED
WELDS 5 CONT. FILLET UNLESS NOTED
USE ONLY Z.P. BOLTS / THR. ROD IN TAPPED HOLES
USE JIGS IN WORKSHOP WHERE POSSIBLE
REMOVE ALL SHARP EDGES–MAKE SAFE FOR HANDLING
PAINT TO SPECIFICATION
THIRD ANGLE PROJECTION UNLESS NOTED

"DO NOT SCALE – IF IN DOUBT ASK"

ENQUIRIES TO GRAHAM ATKINSON

DRAWN	JD	23/8/01
CHECKED		
SCALE	1:50@A1:1:500@A3	
MAT. LIST		
VOLT LIST.		

BITUMEN EQUIPMENT LTD.

BITUMEN EQUIPMENT LTD.
59 REDMOND ROAD, PENROSE
P.O. BOX 62-181 SYLVIA PARK
AUCKLAND, NEW ZEALAND
TELEPHONE 64 9 5250532 FAX 64 9 5250534

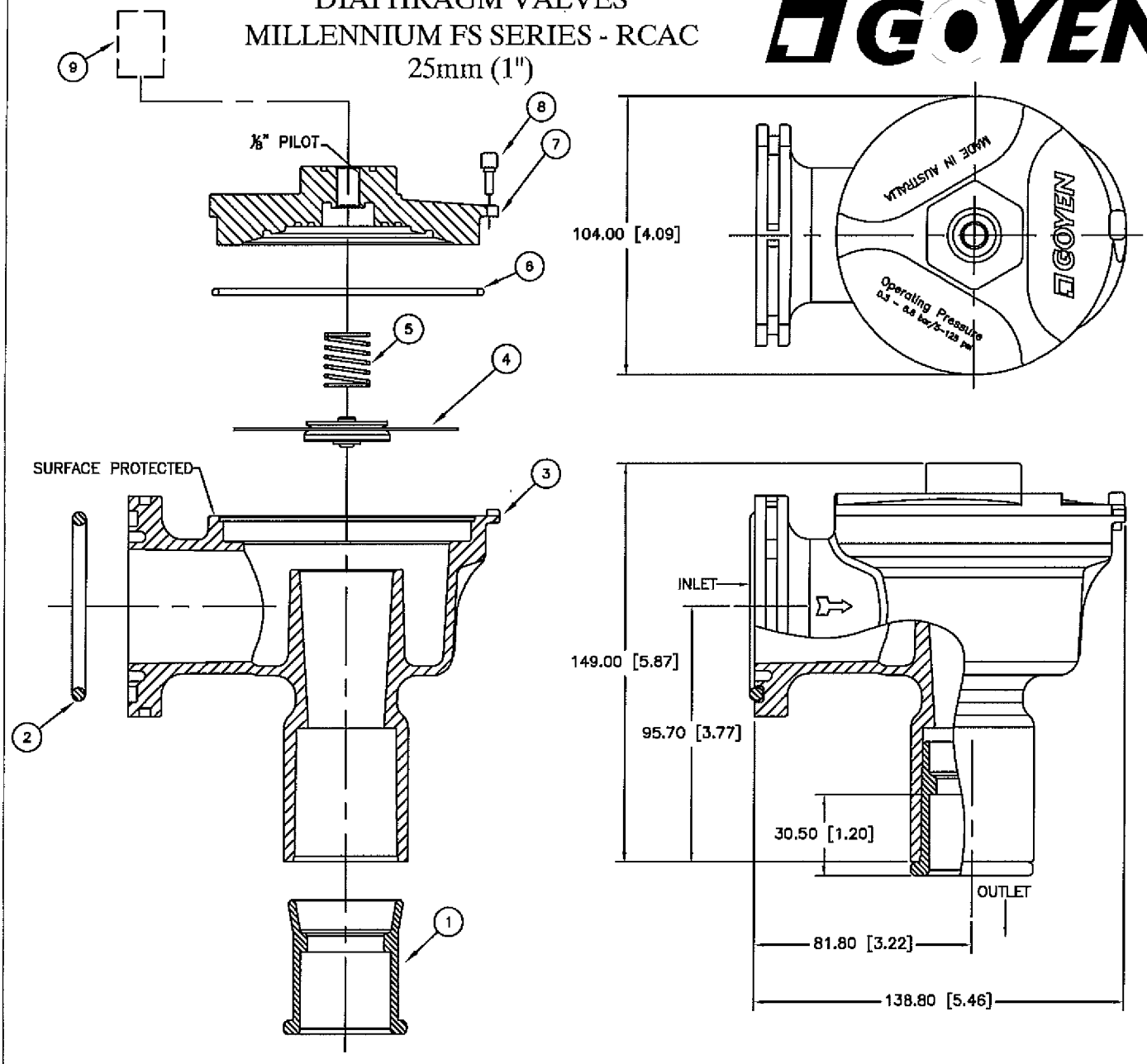
ISLAND ASPHALTS

PROJECT 100 TPH TRANSPORTABLE
TITLE LAYOUT & DTLS FAN, PL'FORM, DUCTING, SLAMSHUT– BAGHOUSE

CLIENT REF TA | BEL REF 543/A | DRAWING No. DP0166 | A

DIAPHRAGM VALVES
MILLENNIUM FS SERIES - RCAC
25mm (1")

GOYEN



MECHANICAL DETAILS

No	DESCRIPTION	STANDARD MATERIAL	PORT OPTIONS	HIGH TEMP MATERIALS	KIT No STANDARD	KIT No HIGH TEMP
1	SLIDE SEAL	EPDM	–	–	–	–
2	O' RING	NITRILE	–	–	–	–
3	BODY	DIE CAST ALUMINIUM	NPT/BSPT G	–	–	–
4	DIAPHRAGM	BUNA/NYLON		–	TBA	TBA
5	SPRING	SS 304		–	–	–
6	O' RING	BUNA	–	–		
7	COVER	DIE CAST ALUMINIUM	NPT/BSPT G	–	–	–
8	LOCATION PIN	NYLON	–	–	–	–
9	OPERATOR COIL KIT	COIL ENCAPTULATION = NYLON PLUNGER = SS SPRING = SS	–	–	TBA	N/A

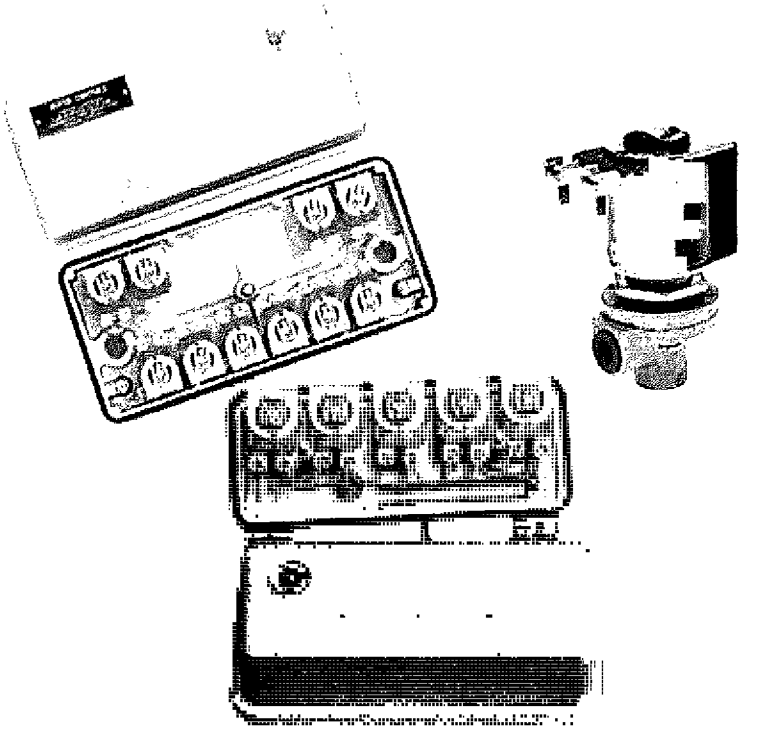
ELECTRICAL DETAILS

COIL VOLTAGE	240 VAC / 120 VAC / 24 VDC
COIL CONNECTION	IP65 DIN

WEIGHTS

UNIT WEIGHT	RCAC = TBA

DOC No	CAS_DG_MILL25FS3
REVISION No	2
ISSUE DATE	17.7.2002



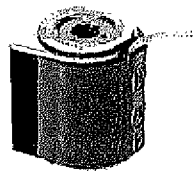
Pilot Valves and
Nema 4 Enclosures

Innovative Environmental Solutions

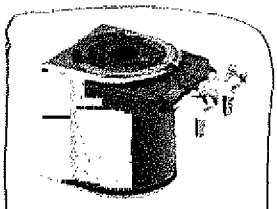
tyco | Flow Control | Environmental Systems

Technical Specification
Q Series Solenoid

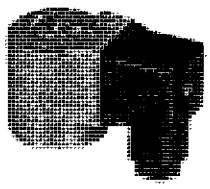
Solenoid used in the remote or integral actuation of dust collector diaphragm or pilot valves.



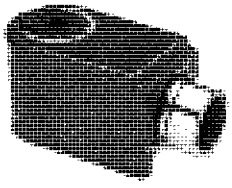
Flying leads, QF



Screws/spade terminals, QT2



DIN 43650A connection, QR



Conduit entry connection, QD

Suitable for

All integrally piloted Goyen dust collector diaphragm valves, RCA3D series pilot valves and pilot valve enclosures, and 3DS pilot valves.

Installation

Slide solenoid over ferrule tube. Ensure terminals are on top. For QT and QF type solenoids ensure nylon washer is in place. Slide clip onto pilot iron top. Ensure voltage supplied to solenoid is within -10% and +15% of the solenoid rated voltage.

Construction

Encapsulation: PA-6

C-frame: Mild steel zinc passivated

Bobbin: PA-6

Insulation class: B/130°C

Rating: Non-continuous use only

Clip: Mild steel (mechanically plated)

Operation

Recommended
on time range: 50-500ms

Recommended time
between pulses: 1 minute or greater

Approvals

- C-Tick
- EMC (89/336/CE)

Options

None

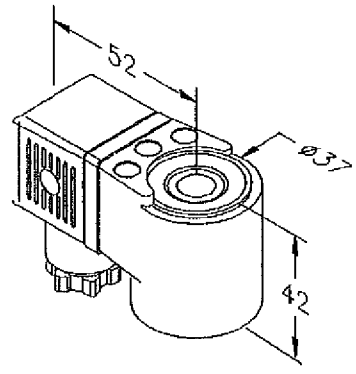
Spare Parts

None available

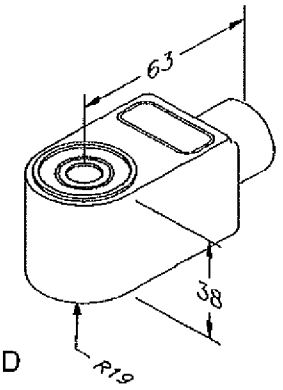
Dimensions and Weights

(Dimensions in mm)

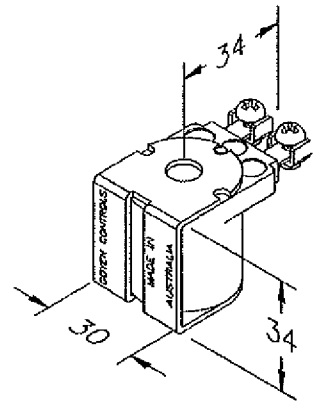
Series	Weight
QR	0.146 kg/0.322 lb
QD	0.210 kg/0.463 lb
→ QT2	0.106 kg/0.234 lb
QF	0.098 kg/0.216 lb



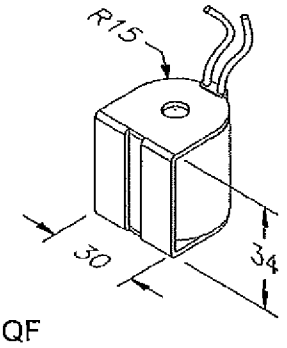
QR



QD



QT2



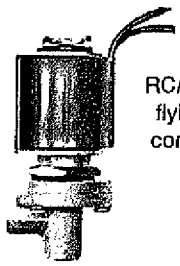
QF

Order Code and Electrical Characteristics

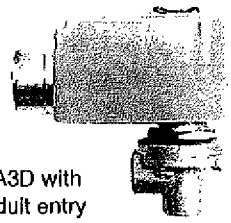
Code K-	Type	Connection Type	Class	Voltage	Inrush mA	Hold mA	Power	Colour
300	QR	DIN 43650A	IP64	200/240V 50/60Hz	148/143	105/94	23.1 VA	Grey
301	QR	DIN 43650A	IP64	100/120V 50/60Hz	234/255	180/152	19.8 VA	Grey
302	QR	DIN 43650A	IP64	24V 50/60 Hz	1338/1096	963/716	23.1 VA	Grey
303	QR	DIN 43650A	IP64	110VDC	212	212	24 W	Grey
304	QR	DIN 43650A	IP64	48VDC	429	429	20 W	Grey
305	QR	DIN 43650A	IP64	24VDC	873	873	20 W	Grey
306	QR	DIN 43650A	IP64	12VDC	1644	1644	20 W	Grey
310	QD	Conduit (M20x1.5)	IP31	200/240V 50/60Hz	148/143	105/94	23.1 VA	Green
311	QD	Conduit (M20x1.5)	IP31	100/120V 50/60Hz	234/255	180/152	19.8 VA	Green
312	QD	Conduit (M20x1.5)	IP31	24V 50/60 Hz	1338/1096	963/716	23.1 VA	Green
313	QD	Conduit (M20x1.5)	IP31	24VDC	873	873	20 W	Green
314	QD	Conduit (M20x1.5)	IP31	12VDC	1644	1644	20 W	Green
320	QD	Conduit (½" NPSC)	IP31	200/240V 50/60Hz	148/143	105/94	23.1 VA	Green
321	QD	Conduit (½" NPSC)	IP31	100/120V 50/60Hz	234/255	180/152	19.8 VA	Green
322	QD	Conduit (½" NPSC)	IP31	24V 50/60 Hz	1338/1096	963/716	23.1 VA	Green
323	QD	Conduit (½" NPSC)	IP31	24VDC	873	873	20 W	Green
324	QD	Conduit (½" NPSC)	IP31	12VDC	1644	1644	20 W	Green
330	QT2	Screw / spade	N/A	200/240V 50/60Hz	148/143	105/94	23.1 VA	Purple
331	QT2	Screw / spade	N/A	100/120V 50/60Hz	234/255	180/152	19.8 VA	Purple
332	QT2	Screw / spade	N/A	24V 50/60 Hz	1338/1096	963/716	23.1 VA	Purple
333	DT2	Screw / spade	N/A	240VDC	94	94	24 W	Purple
334	QT2	Screw / spade	N/A	110VDC	212	212	24 W	Purple
335	QT2	Screw / spade	N/A	48VDC	429	429	20 W	Purple
→ 336	QT2	Screw / spade	N/A	24VDC	873	873	20 W	Purple
337	QT2	Screw / spade	N/A	12VDC	1644	1644	20 W	Purple
338	QT2	Screw / spade	N/A	12VDC	2500	2500	30 W	Orange
340	QF	Flying leads	IP64	200/240V 50/60Hz	1338/1096	963/716	23.1 VA	Purple
341	QF	Flying leads	IP64	100/120V 50/60Hz	94	94	19.8 VA	Purple
342	QF	Flying leads	IP64	24V 50/60 Hz	212	212	23.1 VA	Purple
343	QF	Flying leads	IP64	24VDC	873	873	20 W	Purple
344	QF	Flying leads	IP64	12VDC	1644	1644	20 W	Purple
348	QF	Flying leads	IP64	12VDC	2500	2500	30 W	Orange
349	QF	Flying leads	IP64	36V 50Hz	555	350	15.6 VA	Purple

Technical Specification RCA3D Remote Pilot

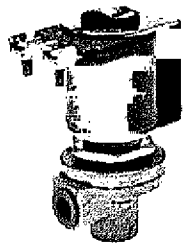
Remote solenoid pilot valve to control the actuation of dust collector diaphragm valves.



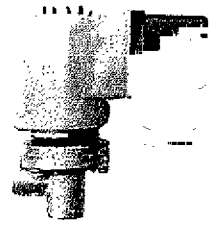
RCA3D with flying lead connection



RCA3D with conduit entry connection



RCA3D with spade connection



RCA3D with DIN43650A connection

Suitable for

All Goyen dust collector diaphragm valves.

Installation

Prepare pilot mounting hole in panel to Ø19.3/19.4 (Ø0.760"). Panel thickness must exceed 1.5mm (0.062"). Ensure o-ring is in place before tightening locknut. Preferably, install pilot valves with solenoid on top. For reliable operation, ensure supply voltage is within -10% and +15% of rated solenoid voltage. Replace components within 1 million cycles (refer to Spare Parts)

Construction

Body: Aluminium (diecast)

Ferrule: 304 SS

Armature: 430FR SS

Seals: Nitrile

Locknut: Mild steel zinc passivated

Screws: 302 SS

Clip: Mild steel (plated)

Operation

Recommended on time range: 50-500ms

Recommended time between pulses: 1 minute or greater

Approvals

- C-Tick
- EMC (89/336/CE)

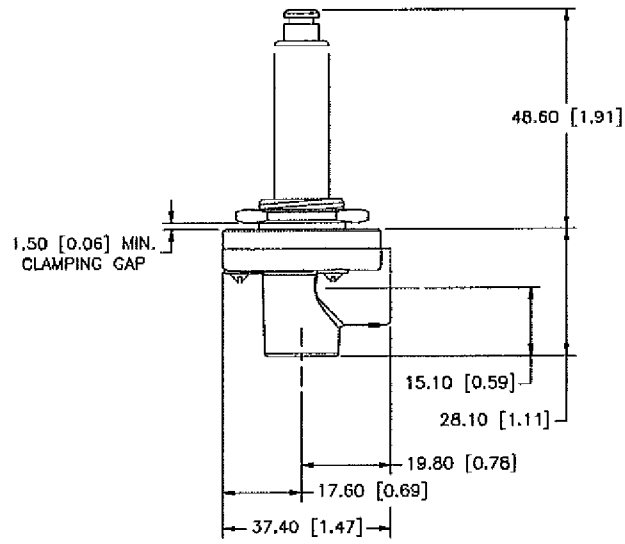
Options

None

Dimensions and Weights

(Dimensions in mm and inches)

Series	Weight
RCA3D0, RCA3D1 (no solenoid)	0.174 kg/0.384 lb



Product Performance

Flow	Maximum Working Pressure	Minimum Working Pressure	Temperature Min	Temperature Max	Fluid Media
0.32 Cv	860 kPa	0 kPa	-40°C	82°C	Air or
0.27 Kv	125 psi	0 psi	-40°F	180°F	inert gas

Order Code*

Model	Thread Type	Orifice Size
RCA3D0-...	1/8" NPT	3.2mm (0.126")
RCA3D1-...	1/8" BSPP	3.2mm (0.126")

**Please refer to Q Series Solenoid product data sheet on Page 3 for information on electrical characteristics and to complete the order code, e.g. 1/8" NPT pilot valve with 240VAC solenoid = RCA3D0-300*

Spare Parts

K0380 Replacement seal, armature, spring & ferrule kit.

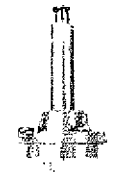
K0384 As above in viton.

Order Code and Electrical Characteristics

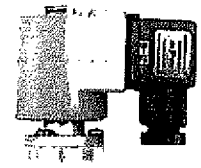
Model	Connection Type	Protection Class	Voltage	Power
3D0 Series = 1/8" NPT				
3D0-300	DIN 43650A	IP64	200/240V 50/60Hz	23.1 VA
3D0-301	DIN 43650A	IP64	100/120V 50/60Hz	19.8 VA
3D0-302	DIN 43650A	IP64	24V 50/60 Hz	23.1 VA
3D0-303	DIN 43650A	IP64	110VDC	24 W
3D0-304	DIN 43650A	IP64	48VDC	20 W
3D0-305	DIN 43650A	IP64	24VDC	20 W
3D0-306	DIN 43650A	IP64	12VDC	20 W
3D0-310	Conduit (M20x1.5)	IP31	200/240V 50/60Hz	23.1 VA
3D0-311	Conduit (M20x1.5)	IP31	100/120V 50/60Hz	19.8 VA
3D0-312	Conduit (M20x1.5)	IP31	24V 50/60 Hz	23.1 VA
3D0-313	Conduit (M20x1.5)	IP31	24VDC	20 W
3D0-314	Conduit (M20x1.5)	IP31	12VDC	20 W
3DD-320	Conduit (1/2" NPSC)	IP31	200/240V 50/60Hz	23.1 VA
3D0-321	Conduit (1/2" NPSC)	IP31	100/120V 50/60Hz	19.8 VA
3D0-322	Conduit (1/2" NPSC)	IP31	24V 50/60 Hz	23.1 VA
3D0-323	Conduit (1/2" NPSC)	IP31	24VDC	20 W
3D0-324	Conduit (1/2" NPSC)	IP31	12VDC	20 W
3D0-330	Screw / spade	N/A	200/240V 50/60Hz	23.1 VA
3D0-331	Screw / spade	N/A	100/120V 50/60Hz	19.8 VA
3D0-332	Screw / spade	N/A	24V 50/60 Hz	23.1 VA
3D0-333	Screw / spade	N/A	240VDC	24 W
3D0-334	Screw / spade	N/A	110VDC	24 W
3D0-335	Screw / spade	N/A	48VDC	20 W
3D0-336	Screw / spade	N/A	24VDC	20 W
3D0-337	Screw / spade	N/A	12VDC	20 W
3D0-340	Flying Lead	IP64	200/240V 50/60Hz	23.1 VA
3D0-341	Flying Lead	IP64	100/120V 50/60Hz	19.8 VA
3D0-342	Flying Lead	IP64	24V 50/60 Hz	23.1 VA
3D0-343	Flying Lead	IP64	24VDC	20 W
3D0-344	Flying Lead	IP64	12VDC	20 W
3D1 Series = 1/8" BSPP				
3D1-300	DIN 43650A	IP64	200/240V 50/60Hz	23.1 VA
3D1-301	DIN 43650A	IP64	100/120V 50/60Hz	19.8 VA
3D1-302	DIN 43650A	IP64	24V 50/60 Hz	23.1 VA
3D1-303	DIN 43650A	IP64	110VDC	24 W
3D1-304	DIN 43650A	IP64	48VDC	20 W
3D1-305	DIN 43650A	IP64	24VDC	20 W
3D1-306	DIN 43650A	IP64	12VDC	20 W
3D1-310	Conduit (M20x1.5)	IP31	200/240V 50/60Hz	23.1 VA
3D1-311	Conduit (M20x1.5)	IP31	100/120V 50/60Hz	19.8 VA
3D1-312	Conduit (M20x1.5)	IP31	24V 50/60 Hz	23.1 VA
3D1-313	Conduit (M20x1.5)	IP31	24VDC	20 W
3D1-314	Conduit (M20x1.5)	IP31	12VDC	20 W
3D1-320	Conduit (1/2" NPSC)	IP31	200/240V 50/60Hz	23.1 VA
3D1-321	Conduit (1/2" NPSC)	IP31	100/120V 50/60Hz	19.8 VA
3D1-322	Conduit (1/2" NPSC)	IP31	24V 50/60 Hz	23.1 VA
3D1-323	Conduit (1/2" NPSC)	IP31	24VDC	20 W
3D1-324	Conduit (1/2" NPSC)	IP31	12VDC	20 W
3D1-330	Screw / spade	N/A	200/240V 50/60Hz	23.1 VA
3D1-331	Screw / spade	N/A	100/120V 50/60Hz	19.8 VA
3D1-332	Screw / spade	N/A	24V 50/60 Hz	23.1 VA
3D1-333	Screw / spade	N/A	240VDC	24 W
3D1-334	Screw / spade	N/A	110VDC	24 W
3D1-335	Screw / spade	N/A	48VDC	20 W
3D1-336	Screw / spade	N/A	24VDC	20 W
3D1-337	Screw / spade	N/A	12VDC	20 W
3D1-340	Flying Lead	IP64	200/240V 50/60Hz	23.1 VA
3D1-341	Flying Lead	IP64	100/120V 50/60Hz	19.8 VA
3D1-342	Flying Lead	IP64	24V 50/60 Hz	23.1 VA
3D1-343	Flying Lead	IP64	24VDC	20 W
3D1-344	Flying Lead	IP64	12VDC	20 W

Notes: RCA3D0-305 is an RCA3D remote pilot with 1/8" NPT threads and a 24VDC DIN43650A connection.
RCA3D1-331 is an RCA3D remote pilot with 1/8" BSPP threads and 110/240VAC spade screw coil.

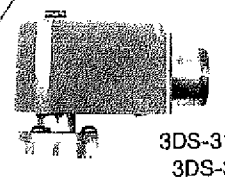
Pilot valve with integral silencer and dust shroud to mount directly to dust collector diaphragm valve.



3DS-0



3DS-300 to 3DS-306



3DS-310 to 3DS-324

Suitable for

RCAC20T3, RCAC20ST3, RCAC20DD3, RCAC20FS3, RCAC25T3, RCAC25DD3, RCAC25FS3 dust collector valves only.

Installation

Ensure o-ring is in place on diaphragm valve cover. Gripping the shroud, hand tighten 3DS pilot valve onto cover of diaphragm valve. For reliable operation, ensure supply voltage is within -10% and +15% of rated solenoid voltage. Solenoid is free to rotate on pilot valve. 3DS thread will suit 1/8 BSP T, 1/8 BSP P and 1/8 NPT ports. Replace pilot components within 1 million cycles (refer to Spare Parts).

Construction

Body: Al 2011-T3
Ferrule: 302 SS
Armature: 430FR SS
Encapsulation: PA-6
Insulation: Class B/130°C
Seals: Nitrile
Shroud: PA-6

Operation

Recommended on time range: 50-500ms
Recommended time between pulses: 1 minute or greater

Approvals

- C-Tick
- EMC (89/336/CE)

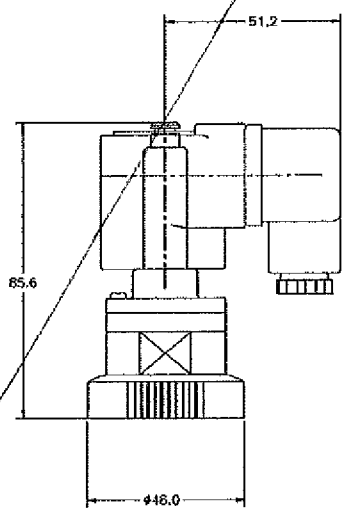
Options

None

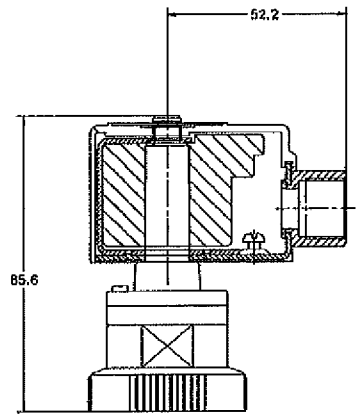
Dimensions and Weights

(Dimensions in mm)

Series	Weight
3DS-0	0.096 kg / 0.211 lb
3DS-300 to 3DS-306	0.246 kg / 0.542 lb
3DS-310 to 3DS-324	0.266 kg 0.586 lb



OR



3DS-300 to 3DS-306

3DS-310 to 3DS-324

Product Performance

Flow	Maximum Working Pressure	Minimum Working Pressure	Temperature Min	Temperature Max	Fluid Media
0.32 Cv	860 kPa	0 kPa	-40°C	82°C	Air or
0.27 Kv	125 psi	0 psi	-40°F	180°F	inert gas

Spare Parts

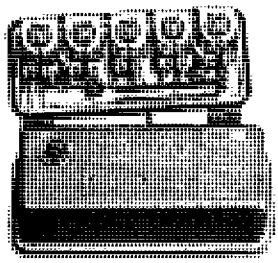
K0380 Nitrile replacement seal, armature, spring and ferrule.
K0384 As above in viton rubber.

Order Code and Electrical Characteristics

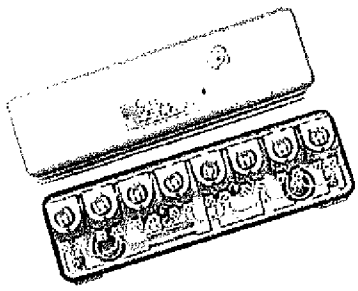
Model	Connection Type	Protection Class	Voltage	Power
3DS-300	DIN 43650A	IP64	200/240V 50/60Hz	23.1 VA
3DS-301	DIN 43650A	IP64	100/120V 50/60Hz	19.8 VA
3DS-302	DIN 43650A	IP64	24V 50/60 Hz	23.1 VA
3DS-303	DIN 43650A	IP64	110VDC	24 W
3DS-304	DIN 43650A	IP64	48VDC	20 W
3DS-305	DIN 43650A	IP64	24VDC	20 W
3DS-306	DIN 43650A	IP64	12VDC	20 W
3DS-310	Conduit (M20x1.5)	IP31	200/240V 50/60Hz	23.1 VA
3DS-311	Conduit (M20x1.5)	IP31	100/120V 50/60Hz	19.8 VA
3DS-312	Conduit (M20x1.5)	IP31	24V 50/60 Hz	23.1 VA
3DS-313	Conduit (M20x1.5)	IP31	24VDC	20 W
3DS-314	Conduit (M20x1.5)	IP31	12VDC	20 W
3DS-320	Conduit (1/2" NPSC)	IP31	200/240V 50/60Hz	23.1 VA
3DS-321	Conduit (1/2" NPSC)	IP31	100/120V 50/60Hz	19.8 VA
3DS-322	Conduit (1/2" NPSC)	IP31	24V 50/60 Hz	23.1 VA
3DS-323	Conduit (1/2" NPSC)	IP31	24VDC	20 W
3DS-324	Conduit (1/2" NPSC)	IP31	12VDC	20 W

Technical Specification: NEMA4/Rainlight/ ATEX II 3 D,G Diecast Pilot Valve Enclosures (5, 8, 12 valve)

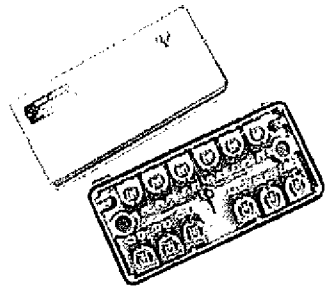
Diecast aluminium enclosures for Goyen RCA3D pilot valves, available optionally with anti-condensation heater.



3-5V Enclosure



3-8V Enclosure



3-12V Enclosure

Suitable for

ATEX Category Ex II 3 GD and Ex II 2D IP64 and all other non-hazardous applications, for piloting Goyen diaphragm valves.

Installation

Ensure device is disconnected from power before opening the enclosure. These enclosures are all finished with the common solenoid terminals pre-wired.

For reliable operation, ensure supply voltage is within -10% and +15% of rated solenoid voltage.

To guarantee NEMA4 performance ensure gasket is in place when attaching lid to enclosure base. Replace components within 1 million cycles (refer to Spare Parts).

Construction

Body: Aluminium (diecast)
Pilot Body: Aluminium (diecast)
Ferrule: 302 SS
Armature: 430FR SS
Seals: Nitrile
Screws: 302 SS
Clip: Mild steel (plated)
Pilot Valve Thread Type: PA-6
Conduit Entry Thread Type: PA-6

Operation

Recommended
on time range: 50-500ms

Recommended time
between pulses: 1 minute or greater

Options

None

Product Performance

Flow	Maximum Working Pressure	Minimum Working Pressure	Temperature Min	Temperature Max	Fluid Media
0.32 Cv	860 kPa	0 kPa	-40°C	82°C	Air or
0.27 Kv	125 psi	0 psi	-40°F	180°F	Inert gas

Refer to Q Series Solenoid product specification for electrical performance details.

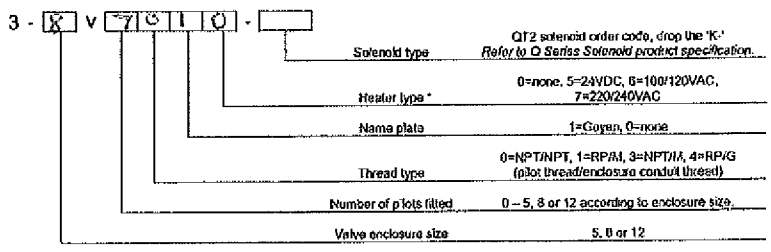
Approvals

- C-Tick
- EMC (89/336/CE)

Spare Parts

K0380	Nitrile replacement seal, armature, spring & ferrule kit.
K0384	As above in viton.
RCA3D0-***	Replacement pilot assemblies.
RCA3D1-***	Refer to RCA3D Remote Pilot product data sheet.

Order Code



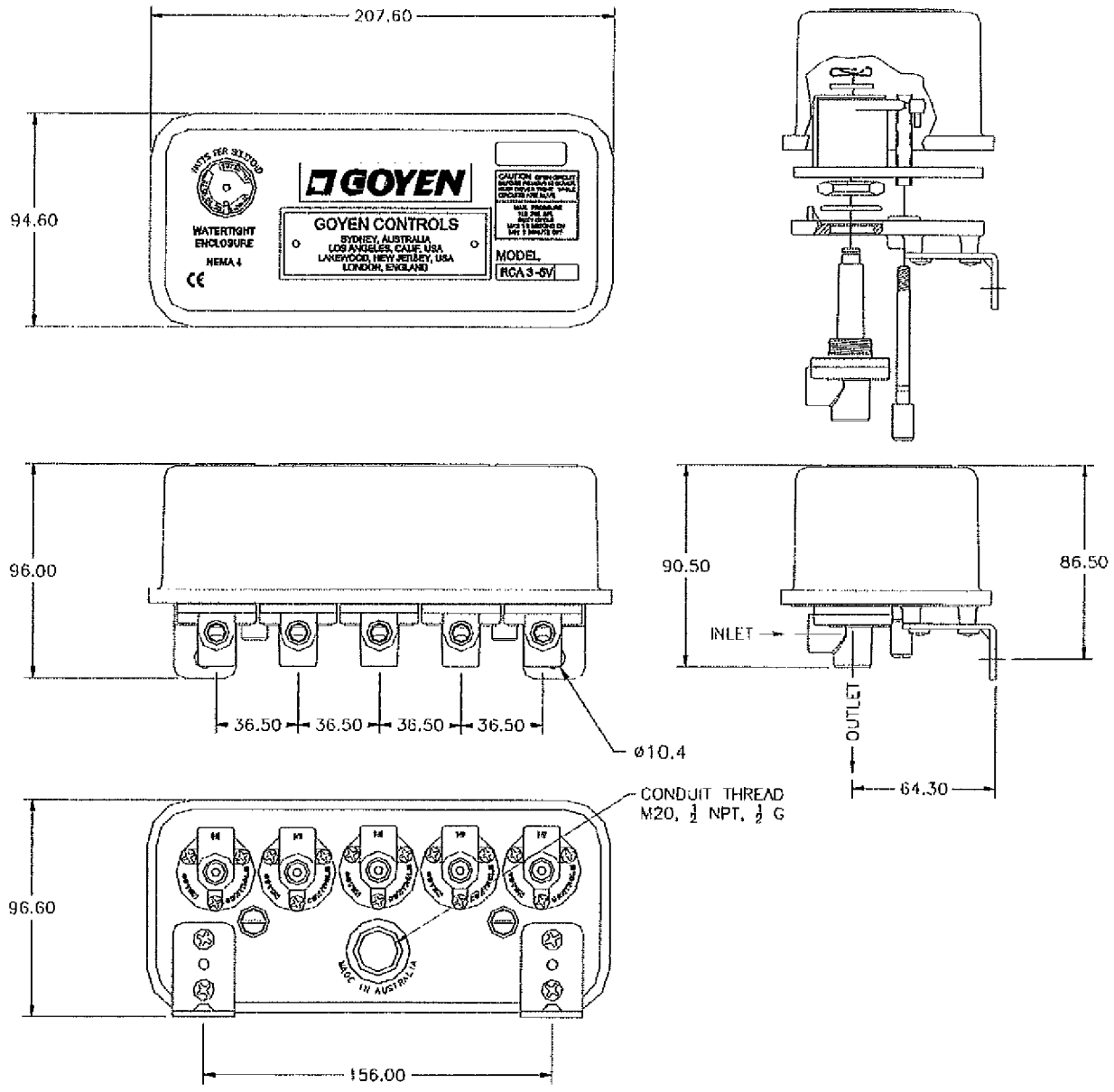
Example: 3-8V6010-330
8 valve enclosure, fitted with 6 pilots, with NPT pilot and conduit thread type, Goyen name plate, no heater element and 220/240VAC 50/60Hz solenoids.

Note that enclosures are pre-wired with QT2 type solenoids only.

** = heaters currently not available in 3-5V5 and 3-12V12 enclosures.*

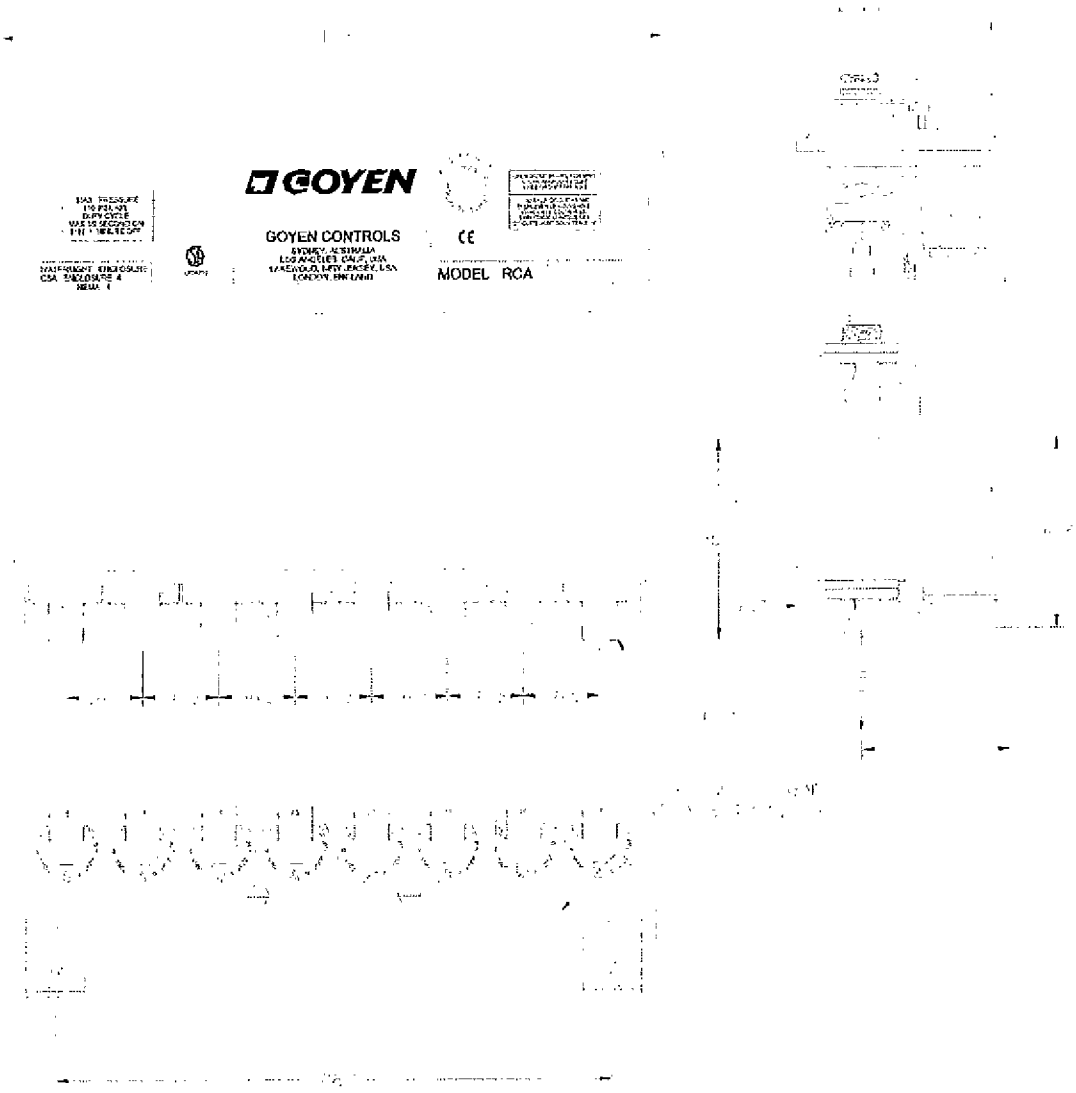
Dimensions and Weights

(Dimensions in mm)



3-5V5 Series

Mass = 0.814 Kg + 0.174 Kg per valve pilot fitted
(1.795 lb + 0.384 lb per pilot valve fitted)



3-8V8
Mass = 1.280 Kg + 0.174 Kg per pilot valve fitted
(2.820 lb + 0.384 lb per pilot valve fitted)

McCONNELL DOWELL CONSTRUCTORS

CLIENT: GOVERNMENT OF REPUBLIC OF KIRIBATI

PROJECT: KIRIBATI ROAD REHABILITATION PROJECT

LOCATION: TARAWA, KIRIBATI

PROJECT NO.: 2536

Environmental Protection Instruction

NOISE & VIBRATION MANAGEMENT PLAN

Document number 025-Y001-2536

Revision History

Rev	Date	Details	By	Approved
A	March 2013	Drafted as PEP Attachment	JB	
B	6 Jul 13	Updated for client submittal	M Lees	

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Based on IMS Template Document # J012-010-100 Rev0 8Apr2010

HOME WITHOUT HARM
EVERYONE EVERYDAY

McCONNELL DOWELL
CREATIVE CONSTRUCTION

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1.0 INTRODUCTION

Considering the low traffic volume and current demographic rate, noise is not considered a major concern in the area. Machineries, vehicles and construction sites where noise and vibration may affect susceptible receptors are highly considered. McConnell Dowell will be responsible for ensuring that noise and vibration does not affect the adjacent communities. While it is unlikely that noise and vibration will be an issue due to the large distances between the activities and the communities McConnell Dowell will confine all work to daylight hours (06:30hrs-18:00hrs) Nighttime operations not envisaged at this time

This Noise and Vibration Management Plan is prepared to satisfy the requirements of the Government of Republic of Kiribati during the implementation of contract conditions for Kiribati Road Rehabilitation Project. As stated, Part A Sub-clause 4.18 Condition under Protection of Environment, McConnell Dowell shall comply with all applicable national, local and environmental laws and regulations:

- Establish an operational system for managing environmental impacts;
- Carry out all of the monitoring and mitigation measures set forth in the Initial Environmental Impact Assessment and Environmental Management Plan;

McConnell Dowell shall submit monthly reports summarizing results to "the Engineer".

2.0 OBJECTIVES

- To limit the level of noise generated by the construction of the works so that it does not cause an environmental nuisance to nearby residents and the general public.
- The limit of level of vibration generated by the construction of the works so that it does not cause an environmental nuisance to site workers and adjoining property owners.

3.0 TARGETS

Performance Criteria	Target	Measurement
Noise emission	Zero complaints Minimise unacceptable disturbance to residents in the vicinity.	Complaints received
Vibration emission	Zero complaints No structural effect on adjoining or nearby buildings or structures caused by site works or laden trucks on public roads.	Complaints received
Compliance with consent conditions	100%	No infringements or abatement notices

4.0 DEFINITIONS

Nuisance – signifies that the "right of quiet enjoyment" is being disrupted to such a degree that a tort is being committed.

Noise control equipment – any device used to prevent or limit the emission of noise; any device used for indicating or recording the emission of noise

Offensive noise – noise made in or outside public premises, or outside private premises that, by reason of its level, nature, character or quality, or the time at which it is made is like to be harmful or to interfere unreasonably with the peace, comfort or convenience of any person (Environment Act 1999)

5.0 RESPONSIBILITIES

The Site Engineer and/or Supervisor are responsible for the continual monitoring of noise levels and vibration indicators on the site.

6.0 LEGISLATIVE INFORMATION/REFERENCES

6.1 ENVIRONMENT ACT 1999 – PART 4: CONTROL OF POLLUTION

6.1.1 Causing pollution and noxious discharges

No person shall emit or cause to be emitted from any premises noise which unreasonably interferes with the health, welfare, convenience, comfort or amenity of any person.

6.1.2 Occupier of premises to take certain measures

The occupier of any premises shall:

- comply with any prescribed standard for the emission of noise from such premises;
- take all reasonable and practicable measures to prevent or minimise the emission of noise from such premises.

6.1.3 Occupiers of prescribed premises to obtain a license

Subject to the provisions of this Act, no person who occupies prescribed premises shall:

- cause or increase, or permit to be caused or increased, the emission of noise from the prescribed premises; or
- alter or permit to be altered the nature of the noise emitted from the prescribed premises, unless in accordance with any conditions of the license.

Any occupier of prescribed premises who contravenes the provisions commits an offence against this Act.

6.1.4 Application for license

An application for a license to emit noise from prescribed premises shall be made to the Secretary in the prescribed form and:

- be accompanied by the prescribed fee; and
- include any information, plans, specifications and other document and information as the Secretary acting in accordance with the advice of the Cabinet may require.

7.0 CONTROL METHODS

McConnell Dowell shall take all reasonable steps to protect the environment (both on and off the site) and to limit damage and nuisance to people and property resulting from noise and other results of operations.

Noise mainly affects urban areas, villages, hospitals, schools, etc. along the roads. To control noise during construction, the suggested measures are:

- Use modern and well-maintained equipment (with mufflers where appropriate)
- Carry out noise construction activities during normal working hours.
- Advise schools, hospitals, churches, etc. when there will be unusual or unavoidable noise.

7.1 NOISE CONTROL

- Working hours to be in accordance with contractual and legislative limitations
- All plant and equipment to be regularly serviced in accordance with manufacturers' specification.
- Where possible plant and equipment to be selected with lowest noise rating or to have silencing and noise suppression equipment fitted.
- Generators and other fixed machines to be situated to minimize noise disturbance to local residents and the general public.
- Trucks and plant to follow approved, designated transport routes.
- Noisy equipment to be removed from site.
- Trucks to be loaded within legal limits for travel on public roads.
- HSE officer to be issued with an android phone with noise monitoring capability for carrying out regular checks for noise emanating from construction equipment.
- The communicating of operations that will have an impact on surrounding communities, schools churches etc will be carried by our Community Liaisons Officer

7.2 VIBRATION CONTROL

- Review the contract and/or construction activities to determine the need for vibration monitoring and dilapidation surveys of adjoining properties.
- As necessary implement vibration monitoring and dilapidation surveys of buildings, roads, footpaths.
- Plan transportation routes in consultation with the Superintendent.
- Ensure trucks remain on designated routes.

8.0 MONITORING

- Observation of noise levels from equipment, vehicles and operation during working hours.
- Vibration monitoring as required.
- Observation of vibration levels during construction works. Observation of trucks.

9.0 EMERGENCY RESPONSE

In the event of an emergency:

- Cease noisy work and consider alternative methods.

- Repair or service noisy equipment.
- Advise the Superintendent.
- Cease work causing vibration and consider alternative methods in consultation with the Superintendent.

10.0 RECORDS

In the event of a complaint record the following:

- Use standard complaint record form
- The date, time, source and reason for the complaint or the observation.
- Details of any sources of noise.
- The date and time of any corrective action.
- The date, time, source and reason for the complaint.
- Details of any observed building damage.
- Details of vibration.
- Latest vibration monitoring levels.
- The date and time of any corrective action.

McCONNELL DOWELL CONSTRUCTORS LTD.

CLIENT: GOVERNMENT OF REPUBLIC OF KIRIBATI

PROJECT: KIRIBATI ROAD REHABILITATION PROJECT

LOCATION: TARAWA, KIRIBATI

PROJECT NO.: 2536

Environmental Protection Instruction

WATER & WASTEWATER MANAGEMENT PLAN

Document number 025-Y003-2536

Revision History

Rev	Date	Details	By	Approved
A	March 2013	Drafted as PEP Attachment	JB	
B	6 Jul 13	Updated for client submittal	M Lees	
C	12 Mar. 14	Updated for ECD AC Plant Water Testing Requirements	T Samau	

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1.0 INTRODUCTION

Kiribati is a coastal area widely covered with sandy beaches, lagoons, coral reefs, sea grass beds and mangrove forests. There are a number of ecosystems and marine organisms which are constantly threatened from various human activities on the areas.

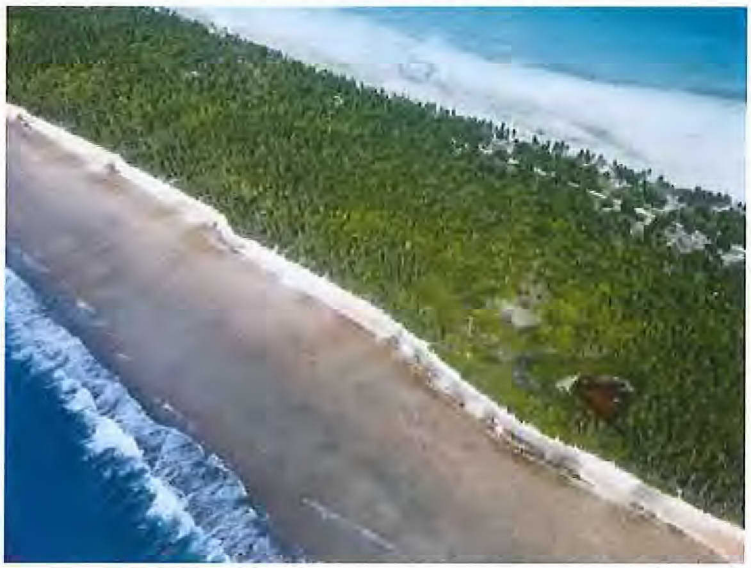

Figure 1. Coastal area of Kiribati

In a recent case study on Water Resources Management in Kiribati with Special Emphasis on Groundwater Development using Infiltration Galleries, the major water sources in Kiribati and Tarawa in particular, are groundwater and rainwater. Fresh ground water occurrence of significant extent is, in general, limited to larger islands, where lenses of freshwater 'floating' on seawater have developed in the underground. The performance of the South Tarawa Water Supply system, which is serving more than 60% of the 38,000 people living on South Tarawa, is an exemplary case of groundwater supply using fully developed groundwater lenses (Bonriki and Buota). The use of groundwater resources as the main water source for the public water supply remains the cheapest and most appropriate option for Kiribati. However, other water sources such as desalination should be considered for future generations, as groundwater will, most probably, be insufficient to meet projected future water demands. (T. Metutera, 2002)

This Water and Wastewater Management Plan is prepared to satisfy the requirements of the Government of Republic of Kiribati during the implementation of contract conditions for Kiribati Road Rehabilitation Project. As stated, Part A Sub-clause 4.18 Condition under Protection of Environment, McConnell Dowell shall comply with all applicable national, local and environmental laws and regulations:

- Establish an operational system for managing environmental impacts;
- Carry out all of the monitoring and mitigation measures set forth in the Initial Environmental Impact Assessment and Environmental Management Plan;

McConnell Dowell shall submit monthly reports on the carrying out of such measures to "the Engineer".

2.0 OBJECTIVES

- To minimise the use of clean fresh water
- To minimise contamination of water on and in the vicinity of the work

3.0 TARGETS

Performance Criteria	Target	Measurement
Fresh Water Usage minimised	Use of water is optimised.	Consumption Reading(s)
Water Pollution	Zero non-compliance Zero incidents No contamination of the soil or waters on and in the vicinity of the works.	Complaints received Incident reports
Compliance with consent conditions	100%	No infringements or abatement notices
AC Plant Yard Water Quality	Maintain existing water quality levels for Hydrocarbons and Coliforms.	Monitored monthly – Coliform Testing Monitored every 6 months – Hydrocarbon testing

4.0 DEFINITIONS

Groundwater lens – In hydrology, a **lens** is a convex layer of fresh groundwater that floats on top of denser saltwater. It arises when rainwater seeps down through a soil surface and then gathers over a layer of seawater at or down to about 1.2m below ground level.

Wastewater – any water that has been adversely affected in quality by anthropogenic influence.

Wastewater discharge – also known as ***Effluent***, is an outflowing of water from a natural body of water, or from a human-made structure

5.0 RESPONSIBILITIES

- The Site Engineer and/or Supervisor is to implement the fuels, chemicals and waste management procedures.
- Project HSE Advisor is to:
  - monitor use of water.
  - inspect the site and the adjoining habitats.
  - notify any significant breaches.
  - inspect storage facilities and work practices and report non-conformances.
  - Monitor Water Quality Testing AC Plant Yard

6.0 LEGISLATIVE INFORMATION/REFERENCES

6.1 ENVIRONMENT ACT 1999 – PART 4: CONTROL OF POLLUTION

6.1.1 Causing pollution and noxious discharges

No person shall emit or cause to be emitted from any premises pollutant waste which unreasonably interferes with the health, welfare, convenience, comfort or amenity of any person.

6.1.2 Discharge of waste in circumstances in which it is likely to cause pollution

No person shall cause or allow waste or pollutant to be discharged in any position, place, land, beach, sea, lagoon or foreshore from which the waste or pollution is likely to result in pollution or in the unreasonable interference with health, welfare, convenience, comfort or amenity of any person.

6.1.3 Occupier of premises to take certain measures

The occupier of any premises shall:

- comply with any prescribed standard for the discharge of waste pollutant from such premises;
- take all reasonable and practicable measures to prevent or minimize the discharge of waste from such premises.

6.1.4 Occupiers of prescribed premises to obtain a license

Subject to the provisions of this Act, no person who occupies prescribed premises shall:

- cause or increase, or permit to be caused or increased, the discharge of waste or pollutant from the prescribed premises; or
- alter or permit to be altered the nature of the waste or pollutant discharged or raised from the prescribed premises, unless in accordance with any conditions of the license.

Any occupier of prescribed premises who contravenes the provisions commits an offence against this Act.

6.1.5 Application for license

An application for a license to discharge waste or pollutant from prescribed premises shall be made to the Secretary in the prescribed form and:

- be accompanied by the prescribed fee; and
- include any information, plans, specifications and other document and information as the Secretary acting in accordance with the advice of the Cabinet may require.

6.2 PERMIT TO OBTAIN BORE WATER

7.0 CONTROL METHODS

The key to the resolution of water problems is control - by water quality management planning, by the enforcement of national standards, by the licensing and policing of discharges, by following approved environmental operating procedures, and by good environmental awareness on the part of the public and other users.

Control, not prohibition, is the keyword: it is unrealistic to prohibit all discharges to our water bodies. Instead, the careful, diligent control of discharges to water bodies will go a long way towards restoring and preserving the good water quality.

7.1 WATER USAGE

- McConnell Dowell shall be responsible for the provision of water required for the construction activities and for the tests. Potable water obtained from underground reserves is a scarce resource in Kiribati. This resource shall only be used for the purpose of the works.

- Services for water run throughout the site. McConnell Dowell may only access these services after making appropriate commercial arrangements with the relevant service owner or authority.
- All plant and machinery to be regularly serviced to ensure optimum fuel efficiency
- Water truck with sprinklers installed to be considered for use on roads & laydown areas.
- Seawater to be used for spraying the road
- Rain water is to be collected from office & lab, base camp and workshop roof with a total holding capacity 150,000 liters.
- Alternate sources of water to be considered if available and if allowable under the contract.
- Water harvested from onsite storage wells and pump holes will be monitored and will cease if ground water level recede during a prolonged dry period.

7.2 SPILL MANAGEMENT

- An Emergency **Spill Response Plan** (**025-Y005-2536**) to be prepared and employees be inducted in its application.

7.3 WATER PROTECTION

- McConnell Dowell shall take all reasonable steps to protect the environment (both on and off the site) and to limit damage to people and property resulting from pollution and other results of operations.
- Ensure that emissions, surface discharges and effluent from the construction activities shall not exceed the values stated in the Contract or prescribed by applicable Laws.
- Asphalt Plant Yard - Install truck wash bay area fully bunded, that is connected to gravity separator to process gray water during plant operations. The gray water shall be filtered at the discharge area by filter cloth to separate gray water and sediments.

8.0 MONITORING

- Weekly inspection of the containment bunds and identify location of any spills
- Observation of plant maintenance and refueling activities and identification of any spills and oil/fuel leaks.
- Plant & Equipment daily prestart checks
- Asphalt Plant Yard – Monthly testing for water quality for coliform and hydrocarbons levels surrounding site tested every 6 months

9.0 EMERGENCY RESPONSE

- Advise the Supervisor or Site Engineer and the spill response team.
- Cease work contain the spill, cleanup and correct disposal in accordance with the Emergency Response Plan.
- If the failure does not involve an environment threatening spillage review the control measures and amend as necessary.
- Identify the contaminant and ensure correct removal and disposal as per legislative requirements.

- If the failure involves an environmental threatening spillage immediately notify parties as necessary in accordance with the Emergency Response Plan.

10.0 RECORDS

- Weekly inspections
- Incident reports of spills and their corrective actions.
- Record any preventive actions undertaken.
- Plant & Equipment daily prestart checks
- Sustainability Monthly report
- Monthly reporting AC Plant Yard water quality testing, monitor coliform levels onsite
- Every 6 months – Hydrocarbon Testing of surface water surrounding AC Plant yard area
- AC Plant Yard Truck wash bay service records – weekly

McCONNELL DOWELL CONSTRUCTORS

CLIENT: GOVERNMENT OF REPUBLIC OF KIRIBATI

PROJECT: KIRIBATI ROAD REHABILITATION PROJECT

LOCATION: TARAWA, KIRIBATI

PROJECT NO.: 2536

Environmental Protection Instruction

DUST SUPPRESSION MANAGEMENT PLAN

Document number 025-Y004-2536

Revision History

Rev	Date	Details	By	Approved
A	March 2013	Drafted as PEP Attachment	JB	
B	6 Jul 13	Updated for client submittal	M Lees	
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1.0 INTRODUCTION

Dust problems created by road traffic are a nuisance but not a very critical issue along the proposed road section, mainly because the traffic volumes are relatively small. However, to control unnecessary dust from the road section under construction, McConnell Dowell will spray water on exposed surfaces during dry periods within construction & maintenance zones.

This Dust Suppression Management Plan is prepared to satisfy the requirements of the Government of Republic of Kiribati during the implementation of contract conditions for Kiribati Road Rehabilitation Project. As stated, Part A Sub-clause 4.18 Condition under Protection of Environment, McConnell Dowell shall comply with all applicable national, local and environmental laws and regulations:

- Establish an operational system for managing environmental impacts;
- Carry out all of the monitoring and mitigation measures set forth in the Initial Environmental Impact Assessment and Environmental Management Plan;

McConnell Dowell shall submit monthly reports on the carrying out of such measures to "the Engineer".

2.0 OBJECTIVES

- To minimize the potential for deterioration of the quality of the air due to dust or gasses from construction operations

3.0 TARGETS

Performance Criteria	Target	Measurement
Dust emission	- Zero complaints - Zero incidents - Minimal reduction in air quality during Project - Zero emission of harmful substances that are likely to create objectionable conditions for the public	Complaints received Incident reports
Compliance with consent conditions	100%	No infringements or abatement notices

4.0 RESPONSIBILITIES

The Site Engineer and/or Superintendent are responsible for the continual monitoring of air quality indicators on the site.

5.0 LEGISLATIVE INFORMATION/REFERENCES

5.1 TRAFFIC ACT 2002

5.1.1 Section 12

Vehicles may only be registered if they are mechanically sound and if their exhaust systems control the emission of excessive exhaust fumes.

5.1.2 Section 18

Defect notices may be issued on a number of grounds including the emission of excessive exhaust fumes.

5.1.3 Section 30

The road rules listed in the Schedule apply in Kiribati.

5.1.4 Division 3

Provision is made in a number of sections for the issuing of penalty notices.

6.0 CONTROL METHODS

6.1 DUST MANAGEMENT

Dust Management applies to all of construction sites and haul roads. During construction, when dust may be generated, McConnell Dowell will monitor the worksite conditions and apply dust control measures, which include reducing construction traffic movements and spraying water on exposed areas.

- Spray water on exposed surfaces during dry periods especially near schools, hospitals, rural communities, etc.
- For occasional houses, dust fence barriers (using traditional material such as coconut leaves mat) commonly used in Tarawa might be considered.

6.1.1 Control site dust as follows

- Limit the extent of disturbed areas.
- Areas of exposed soil to be minimised.
- Restore disturbed areas as soon as practicable.
- Limit construction activities on windy days.
- Trucks and plant to follow designated haul roads, access roads.
- Refer also to Environmental Protection Instruction – **Soil Erosion, Sedimentation & Run-Off** (Document # 025-L001-2536) for additional controls for wind erosion and disbursement.

6.1.2 Control vehicle and plant emissions as follows

- All vehicles and plant to be regularly maintained. Daily Prestart checklist.
- Ensure appropriate emission control equipment is fitted.
- Minimise smoke & fume generation.

6.1.3 General Staging Areas

- Activities that will generate dust such as concrete batch plant, screening and asphalt batch plant are to be located as far as possible & practicable from dwellings.
- As far as possible, staging areas to be located where the prevailing wind will be offshore.
- Asphalt plant generates harmless odour. If complaints are received, they will be managed on a case by case basis with the aim of relieving the concerns of the people involved.

6.1.4 Asphalt Plant – Operation

- Setup 20ft containers in stockpile bins to control dust from prevailing winds

- Where stockpiles are located close to fence line, appropriate sheeting are to be erected to stop dust spilling over the boundary line

- Where required, water cart to be used to dampen the site to control dust caused by truck movements including haul road

- Regular checks on baghouse to insure all silicone bags are in good working order, bags are to be replaced immediately as to manufactures specification

- Heating Bitumen, insure chimney stack is appropriate cap fitting to control outlet realease of fumes during heating process.

- Heating Bitumen in Half Height Containers – follow manufactures specification use correct heating mechanism i.e. Burner size, fuel etc.

7.0 MONITORING

- Visual inspection of the site while transport and construction equipment is in operation, paying particular attention to emission of fumes and generation of dust.
- Weekly Environmental Inspection 025 – F002 – 100

7.1 MANAGEMENT STRATEGIES AND MITIGATION

Project Phase/Activity	Management Strategy/Mitigation	Responsible Personnel
Gravel and Sand Stockpile areas.	Cover smaller stockpiles if wind anticipated to occur Personnel working in high dust areas must wear the appropriate PPE's (dust mask, etc.) at all times Undertake work in a manner that would aim to, as much as possible, reduce the amount of generated dust	McConnel Dowell (Site foreman and HSE Advisor)
Truck haul routes and areas subjected to high traffic.	Water Trucks with sprinkler systems to travel haul routes and other areas as required. Personnel working in high dust areas must ear the appropriate PPE's (dust mask, etc.) at all times Undertake work in a manner	McConnel Dowell (HSE Advisor, water truck drivers)

Project Phase/Activity	Management Strategies and Mitigation	Responsible Person/Unit
	that would aim to, as much as possible, reduce the amount of generated dust Keep vehicle speeds in order to reduce dust generation	
Transport of dried excavated material.	Keep vehicle speeds in order to reduce dust generation on unsealed road surface	McConnell Dowell (HSE Advisor, Truck Drivers)
Baghouse – Asphalt Plant	Routine check on baghouse shall be undertaken to insure bags are in working condition, Insure fans and compressor are in working condition	Asphalt Plant Operator / Supervisor/ HSE Advisor
Burner – Bitumen Heating Process	Follow manufactures guidelines for heating and transferring bitumen with the correct tools Insure appropriate end caps on each stack is fitted where appropriate	Asphalt Plant Operator / Supervisor/ HSE Advisor

8.0 EMERGENCY RESPONSE

In the event of an emergency:

- Cease any work causing atmospheric pollution.
- Review implementation and adequacy of control methods.
- Modify as necessary.

9.0 RECORDS

- Complaint Form
- Incident form
- Weekly Inspection Records
- Monthly Report

McCONNELL DOWELL CONSTRUCTORS LTD.

CLIENT: GOVERNMENT OF REPUBLIC OF KIRIBATI

PROJECT: KIRIBATI ROAD REHABILITATION PROJECT

LOCATION: TARAWA, KIRIBATI

PROJECT NO.: 2536

Environmental Protection Instruction

SPILL RESPONSE PLAN

Document number 025-Y003-2536

Revision History

Rev	Date	Details	By	Approved
A	March 2013	Drafted as PEP Attachment	JB	
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1.0 INTRODUCTION

Oil spill contingency plan is a fundamental component of the oil spill preparedness process. A contingency plan is a tool to assist in the effective response to an incident and comprises the actions that an organization needs to implement.

In Kiribati, there are no formal arrangements established for oil spill response. The focal point for government control during an oil spill is the Ministry of Information, Communication and Transport, Marine Division in Tarawa. The Betio Port Authority controls shipping movements to Tarawa and would act as a notification point outside office hours. Other authorities with an interest in spills are the Ministry of Environment and Natural Resources Development, and the Ministry of Works and Energy.

Kiribati was provided with assistance in formulating the national plan consistent with international best practice. Currently there are no formal response policy that has been determined; no facilities for oily waste disposal exist locally; no specialized response equipment owned by the government; local oil industry has only limited resources; and, no specialist oil spill cleanup contractors locally available. Fortunately, only very minor fuel spills (non-persistent oils) have been previously reported in the commercial port. (ITOPF, July 2009)

This Spill Response Plan is prepared to satisfy the requirements of the Government of Republic of Kiribati during the implementation of contract conditions for Kiribati Road Rehabilitation Project. As stated, Part A Sub-clause 4.18 Condition under Protection of Environment, McConnell Dowell shall comply with all applicable national, local and environmental laws and regulations:

- Establish an operational system for managing environmental impacts;
- Carry out all of the monitoring and mitigation measures set forth in the Initial Environmental Impact Assessment and Environmental Management Plan;

McConnell Dowell shall submit monthly reports on the carrying out of such measures to "the Engineer".

2.0 OBJECTIVES

To minimise contamination of the soil or waters on and in the vicinity of the work caused by oil or fuel leak or spillage.

- Identify designated fuel storage and re-fuelling locations
- Ensure that all designated re-fuelling areas are bunded or contained in such a manner so as to prevent the discharge of contaminants
- Require that spills kits capable of absorbing oil and petroleum products, chemicals and antifreeze shall be kept on site at all times
- Identify methods for minimising the risk of a contaminant spill including but not limited to: requiring any re-fuelling pump to be attended at all times during re-fuelling activities, specifying a double skinned fuel tank and delivery system that includes an automatic shut off valve with a pump contained within the outer skin of the tank
- Contain instructions for removing and disposing of contaminated material to minimise further contamination
- Record the names of operators trained in spill response and remediation
- Require that all machinery is regularly maintained in such a manner so as to minimise the potential for leakage of contaminants.
- Require that all contaminants (e.g. fuel, hydraulic oil, lubricants, etc.) are removed from the site at the end of the construction period, and the end of any maintenance activities
- Identify measures to be undertaken to remediate a contaminant spill

3.0 TARGETS

Performance criteria	Target	Measurement
Spill Containment	Zero incidents No contamination of the soil or waters on and in the vicinity of the work.	Incident Reports
Compliance with consent conditions	100%	No infringements or abatement notices

4.0 DEFINITIONS

Spill containment –
Spills of chemicals, oils, sewage etc. are contained within a barrier or drainage system rather than being absorbed at the surface. One method is to use an inflatable stopper or pneumatic bladder which is inserted into the outflow of a drainage system to create a containment vessel. In the event of a spill the stopper bladder is inflated to block the drain/s and to prevent the spilled agent from entering the ground water, stream or river.

5.0 RESPONSIBILITIES

- The Site Engineer and/or Supervisor is to implement the fuels, chemicals and waste management procedures.
- Project HSE Advisor is to:
  - inspect the site and the adjoining habitats.
  - report on minor spills and notify relevant authorities on major spills.
  - inspect storage facilities adjoining waterways and drains and work practices and report non-conformances.

6.0 LEGISLATIVE INFORMATION/REFERENCES

6.1 MARINE POLLUTION PREVENTION BILL 2000

To implement the provisions of the MARPOL (Marine Pollution) Convention and to make comprehensive provision for matters relating to marine pollution and responses to marine pollution incidents. Controls over marine pollution and the capacity of a country to respond to marine pollution incidents are key aspects of its domestic laws and international obligations in the environment context.

6.2 KIRIBATI PORTS AUTHORITY ACT 1990

6.2.1 Section 52

Regulations may be made to keep the waters of a port clean and preventing them free of oil, rubbish or other things.

7.0 SPILL RESPONSE PLAN

7.1 POTENTIAL EFFECTS OF A FUEL OR OIL SPILL

Various activities to be undertaken during the project works will entail the requirement and use of heavy equipment, generators, heavy machinery and other vehicles. All of which rely on a regular supply of fuel and oil.

All vehicles and plant equipment required in this project will use diesel. A diesel truck will be assigned to fuel up the various facilities/equipment onsite (e.g. generator sets, etc).

Fuels and Oils can become a significant pollutant if discharged to the environment. This discharge can occur by a variety of means including accidental spillage when refueling, spillage during maintenance, accidental damage, vandalism, and careless disposal of fuel and oil containers.

The potential effects of a fuel or oil spill include:

- Poisoning of terrestrial/aquatic animals and their habitat
- Contamination of soils
- Safety issues if spilt on a road or footpath
- Contamination of watercourses
- Human health hazard

8.0 CONTROL METHODS

8.1 GENERAL ACTIVITY

- Carry out maintenance in designated area only. Designated areas to be located away from vegetation if possible.
- Fuel truck driver to be suitably trained and a spotter may be required if operating outside daylight hours.
- A hydrocarbon spill kit to be maintained and located close to designated maintenance, storage and refuelling area.
- An Emergency Response Plan to be prepared and employees be inducted in its application.
- Specific personnel to be trained in the efficient deployment of the spill kit.
- Refuelling location to be such that there is no possibility of discharge into a natural watercourse or stormwater system in the event of accidental spillage.
- Fuel and oil storage facilities to be established in accordance with the requirements of AS1940. Storage facilities to be located away from watercourses and areas prone to flooding or tidal areas.
- Fuel storage tank to be bunded.
- Any spills are to be rendered harmless and collected for treatment and disposed of outside Kiribati, including cleaning materials, absorbents and contaminated soils.
- Waste oil to be stored on site in a secure area and periodically removed from Kiribati
- Refuelling of machinery and vehicles to be carried out in a manner which prevents spills.
- Any maintenance or servicing of machinery and vehicles to be undertaken in accordance with best practice guidelines to minimise the potential for site contamination through oil or fuel leakage.

- Used oil filters to be drained overnight and removed from Kiribati
- Maintain plant and vehicles so they have no oil/ fuel leaks.

8.2 MANAGEMENT STRATEGIES AND MITIGATION

Project Phase/Activity	Management Strategies and Mitigation	Responsible Person/Unit
Spillage during handling or Transport	Refuelling and related activities will be handled with care. Drip Trays to be utilized under plant and equipment where a leak of fluids is expected. (except water from air conditioning units) Provision of oil and fuel spill control kits Provision of PPEs for all personnel handling fuel and oils Spill and handling mitigation options elaborated in EMP and in EPI **025-L007-2536** entitled "Maintenance and Refuelling of Machinery"	McConnell Dowell HSE Advisor, Site Supervisors, tanker operators Training of relevant personnel on Accelerated chemical handling and hazardous materials management
Cleaning Bituminous Equipment	All plant equipment are to be cleaned in AC Plant wash down pad. Exception will be paver, where drips trays shall be implemented onsite on completion of each day's work.	McConnell Dowell HSE Advisor, Site Supervisors, tanker operators Training of relevant personnel on Safe Bitumen Handling Activity
Transferring Bituminous Material to Tanks and Sprayers	Process shall be transferred in approved bunded area where it is specific level location has been set out Only trained personnel to undertake the transfer operation to manufactures specifications Regulatory checks on tools and transfer hoses to be routinely check and maintained by trained personnel Inspection Checklist: 045 – F030 - 100	McConnell Dowell HSE Advisor, Site Supervisors, tanker operators Training of relevant personnel on Safe Bitumen Handling Activity
Transporting Bitumenous Material onsite	Follow Manufactures Specification for transporting material in approved transport vehicles Provision of oil and fuel spill	McConnell Dowell HSE Advisor, Site Supervisors, tanker operators Training of relevant personnel on Safe Bitumen Handling

Project Phase/Activity	Management Strategies and Mitigation	Responsible Person/Unit
	control kits	Activity
	Provision of PPE -for all trained and approved personnel handling material	
	Superviosrs to plan safe parking holding area, away from seaside location and water source area where plant can safely wait without exposure to plant and pedestrians	
Leaks from damaged piping, storage tanks or equipment	Refueling and related activities will be handled with care Provision of oil and fuel spill control kits Provision of PPEs for all personnel handling fuel and oils Spill and handling mitigation options elaborated in EMP and in EPI **025-L007-2536** entitled "Maintenance and Refuelling of Machinery" Spill management training	McConnell Dowell (Designated work site foreman, HSE Advisor, Site Supervisor and Environmental Manager)

The fuel and oil spill management and mitigation plan will incorporate the relevant and applicable information contained in EPI **025-L007-2536** entitled "Maintenance and Refuelling of Machinery".

As part of the Foreman's ongoing daily supervision, the condition of fuel and oil handling or storage facilities and all equipment that would utilize such, will be checked regularly and appropriate repairs made to avoid the occurrence of burst hoses, etc. that could lead to possible fuel or oil spills.

The Foreman will also monitor and supervise the operators' work practices to check that refueling, oiling and greasing and other related activities are being conducted in a safe and appropriate manner in order to minimize the potential for a spill.

The weekly environmental inspection to be conducted by the HSE Advisor will note:

- Locations of spill kits and the condition of their contents,
- Availability and condition of PPE's to be used in case of fuel or oil spills,
- Whether oils are being stored appropriately in their designated storage areas,
- The condition and integrity of the storage areas and containers securing used fuel or oil including the integrity of individual storage containers holding materials contaminated by fuel or oil

9.0 EMERGENCY RESPONSE

- Advise the Supervisor or Site Engineer and the spill response team.

- Cease work contain the spill, clean-up and correct disposal in accordance with the Emergency Response Plan.
- If the failure does not involve an environment threatening spillage review the control measures and amend as necessary.
- Identify the contaminant and ensure current removal and disposal as per legislative requirements.
- If the failure involves an environmental threatening spillage immediately notify parties as necessary in accordance with the Emergency Response Plan.

An Emergency Plan as described in PEP Attachment 13-4 "Emergency Response Plan" will be implemented in the event of fuel and oil spillage, and in the event of fire.

The general mitigation measures during operation include:

- Refueling and activities shall be carried out with care to avoid or contain spillage;
- Drip trays will be placed during refueling to avoid unnecessary spillage.
- Any spilled material collected on the drip trays will be decanted into an appropriate leak-free container and stored in a secure covered facility, properly labeled, and protected from rainfall or any contact with soil and water while awaiting proper disposal.
- Oil Fuel Spill Control Kits (which are to be located within easy reach) are to be present at the diesel refilling station and carried together with the re-fuelling mini tanker.

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Fuel Spill Reference Card

Isolate or shut off the Source
Shut off the pumping system
Evacuate to designated assembly point
Contact HSE department
Do not operate vehicles in area
Remove contaminated clothing
Use eye wash if required
Shut of main electrical supply
Contact medical if required
Assume command of situation

To minimize the potential of a fuel or oil spill, the following measures will be taken:

- Limited volumes of fuel will be stored on site, the majority of fuel deliveries will be by mini tanker.
- Mini tanker will carry a spill containment kit and will include an auto shut-off system.
- Mini tanker operators will be advised of areas where refuelling is not allowed.
- Oils, grease etc. will be stored in secure covered facilities, properly labelled, and protected from rainfall or any contact with soil and water.
- Bins will be provided for the disposal of empty oil containers, grease cartridges, oily rags etc. These will then be stored in secure facilities, with proper labeling, and protected from contact with soil and water.

In the event of a spill to ground, the following procedures will be followed:

- The source of the spill will be identified and further spillage prevented by stopping the machine, ceasing refueling, plugging burst hoses, standing up overturned containers etc.
- All personnel tasked with handling the spill and storage of contaminated materials should always wear Personal Protective Equipment (PPE) such as the appropriate chemical filtration masks and chemical resistant gloves.
- The area of the spill will be bunded as appropriate.
- Any free fuel or oil will be soaked up by sawdust (from the spill containment kit), petroleum sorbent material, or similar and disposed of in the spill container.

- Any contaminated soil will be excavated and also disposed of in the spill container, if the volume is too great a similar appropriate container or sealed body truck will be used.
- Contaminated soil will be disposed of outside Kiribati.
- Material containing recovered fuel or oil will be stored in secure covered facilities protected from rainfall or any contact with soil and water until ready for disposal.
- Dispersing agents will not be used to control spills of fuel or oils.
- Details of the spill and remedial actions are to be recorded; the Environmental Manager is to be notified immediately if there is a spill. The Environmental Manager will then notify the relevant supervisors and the HSE Advisor for corresponding actions.

In the event of a spill to a watercourse, the following procedures will be followed:

- The source of the spill will be identified and further spillage prevented by stopping the machine, ceasing refueling, plugging burst hoses, standing up overturned containers etc.
- All personnel tasked with handling the spill and storage of contaminated materials is to always wear Personal Protective Equipment (PPE) such as the appropriate chemical filtration masks and chemical resistant gloves.
- If the watercourse is ephemeral and there is no flowing water a temporary bund will be placed at the lowest extent of the spill within the worksite.
- If the watercourse is perennial or there is flowing water or the spill has extended beyond the extent of the site the absorbent boom from the spill kit is to be installed at the lower extent of the spill.
- Any free fuel or oil on the ground is to be soaked up by sawdust (from the spill containment kit), petroleum sorbent material or similar and disposed of in the spill container.
- Fuel or oil floating on the surface of the watercourse will be absorbed / mopped up with rags and or suitable non-woven geotextile.
- Any contaminated soil outside the watercourse will be excavated and also disposed of in the spill container, if the volume is too great a similar appropriate container or sealed body truck will be used.
- Material containing recovered fuel or oil will be stored in secure facilities protected from any contact with soil and water until ready for disposal. Disposal shall be as per statutory regulations.
- Dispersing agents will not be used to control spills of fuel or oils.
- Details of the spill and remedial actions are to be recorded; the Environmental Manager is to be notified immediately. The Environmental Manager will then notify the relevant supervisors and the HSE Advisor for corresponding actions.

10.0 MONITORING

- Weekly inspection of the containment bunds and identify location of any spills
- Observation of plant maintenance and refuelling activities and identification of any spills and oil/fuel leaks.
- As an Environmental `Toolbox' topic, a Spill Response management will be discussed during HSE toolbox training sessions and further environmental information from JSEA's to be delivered by the Project Engineers or Site Foreman.

11.0 RECORDS

Keep written records showing:

- Weekly inspections
- Daily Inspection Form 045 – F030 -100
- Incident reports of spills and their corrective actions.
- Record any preventive actions undertaken.
- Training records / competency register
- Site Inspection Environmental Checklist – Weekly Form: 025 – F002- 100

McConnell Dowell Constructors Ltd

CLIENT: GOVERNMENT OF REPUBLIC OF KIRIBATI

PROJECT: KIRIBATI ROAD REHABILITATION PROJECT

LOCATION: TARAWA, KIRIBATI

PROJECT NO.: 2536

Environmental Protection Instruction

STORAGE & HANDLING OF HAZARDOUS SUBSTANCES

Document number 025 – Y008 - 2536

Revision History

Rev	Date	Details	By	Approved
A	8. FEB 2014	Draft as PEP Attachment	TS	
0	9 Apr 14	Revised & issued	ML	

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Based on IMS Template Document # J012-010-100 Rev0 8Apr2010

HOME WITHOUT HARM
EVERYONE EVERYDAY

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1.0 OBJECTIVES

To manage the storage and use of hazardous substances so as to prevent contamination of the soil and water or drains on and in the vicinity of the works.

The purpose of this procedure is to set out the systems required to remove hazardous material away from Republic of Kiribati.

2.0 TARGETS

- No contamination of the soil waters or drains on and in the vicinity of the works.

3.0 DEFINITIONS

MSDS – Material Safety Data Sheets

EPA – Environmental Protection Authority

4.0 RESPONSIBILITIES

The Project Environmental Management Representative is to inspect storage facilities adjoining waterways, dams and drains and work practices and report non-conformances.

5.0 LEGISLATIVE INFORMATION/REFERENCES

5.1 KIRIBATI GOVERNMENTS ENVIRONMENT ACT 1999

5.2 ENVIRONMENT LICENSE NO. ELA036/10

Refer to EL Clause 15, 16, 17, 25 and 26

6.0 CONTROL METHODS

6.1 GENERAL

- Material Safety Data Sheets (MSDS) to be readily available and accessible for all hazardous substances used on site. Where particularly dangerous substances are used or stored, the MSDS must be displayed at the storage area. Workers are to be made aware of the types, usage and storage requirements of hazardous substances found on site.
- Incomming Hazardous Substance/ Dangerous Goods Assessment Document number: - 020 – F085- 100
- Hazardous Substance Register: Document # 020 – F028 - 100
- Hazchem signs to be displayed as necessary.
- The control, usage, transportation and storage of hazardous substances must be in accordance to manufacturers' instructions and any license requirements.
- Hazardous substances to be stored neatly in a secure container.

- Segregation requirements of hazardous substances to be complied with.
- All containers, carrying hazardous substances, to be clearly and correctly labelled.
- Storage areas for fuel and other hazardous substances to be placed away from watercourses, drains whenever possible.
- Storage areas for fuel and other hazardous substances to be bunded to prevent discharge in the event of a spillage.
- As necessary bund areas where motors are placed to prevent discharge of fuel or oil into any nearby water facility (e.g. a pump placed next to a dam).
- Construct pollution traps as necessary at entrances into stormwater drains (i.e. grated drains, site entry pits etc.).
- Carry out works involving use of large quantities of hazardous substances (e.g. spray sealing) only when rain is not anticipated in the immediate future.
- Spillage response kits to be ready and accessible at all times and monitored for replenishment of contents sufficient to clean up spillages and prevent discharge to watercourses dams and drains.
- Superintendent to be notified of spillage of hazardous substances where a potential of environmental harm/impact can occur.
- Trucks or vehicles carrying hazardous substances to be appropriately licensed, signed and to carry the required shipping and emergency response documentation.

6.2 OFFSITE DISPOSAL

Materials that are not environmentally suitable to be discharge at local tip site, shall be disposed in accordance with Manufactures/ Suppliers specification. Material such as:

1. Lubricants/ Oils form workshop and asphalt plant operations
2. Dust Bags – Baghouse Consumables
3. Waste Fuels (Diesel/ Kerosene/ Chemicals)
4. Left over Bituminous Binder / Emulsions
5. Adhesion Agents
6. Empty Aerosol Cans
7. Used absorbent bunds – spills
8. Batteries/ Acids
9. Lab Chemicals – e.g. Tri ethyl chlorine
10. Empty bitumen containers

All storage containers shall contain a register on qty, material type so this can be tracked and given to HSE Adviser for approval for tracking and monitoring purposes.

- Arrangements have been made with the following companies in New Zealand to handle all waste returned from Kiribati
    - Waste Oil – Salter Cartage
    - Oily Rags – Hitech Environmental
    - Empty pressure pack spray cans – Hiteck Environmental
    - Empty paint and oil containers – Hitech Environmental
    - Used oil and fuel filters – Hitch Environmental

Supervisors for both Asphalt Plant Yard and Plant Yard in Betio are responsible for accurate upkeep of the register.

6.3 LOCATION OF STORAGE FACILITIES DURING CONSTRUCTION

HSE Advisor to authorize and setout instructions Dangerous Goods Storage layout in both sites.

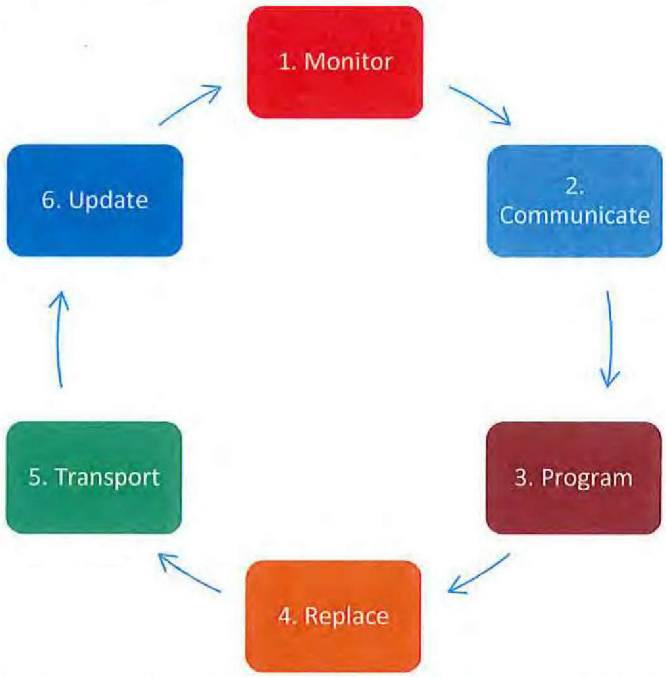
Betio - McConnell Dowell Constructors Ltd Plant Yard,

- Capacity 2 x 20 ft Containers – capacity to take Items 1, 6, 7 and 9 only
- Workshop – Betio 2 x 2,500 lt waste oil tanks, 1 x 1,000 toat tank for used oil and fuel filters, 1 x 1,000 lt toat tank for used oil rags, 1 x 1,000 toat tank for used pressurized cans for spray paints etc. process for collection
-

Temaiku – Airport Rd, Asphalt Plant Yard

- Earmarked for 7 x 20ft Containers. Capacity to take 1 – 9

To avoid stockpiling accumulating in both locations the following process is to insure appropriate process are in place and materials are handled correctly.



Above: Cycle to monitor and process waste/solids materials:

Steps	*Who is responsible?*	*When?*	*How?*	*Next step*
Monitor	*Plant Yard Supervisor – Temaiku* *Plant Yard - Betio* *Auditor/ PE/SE* *HSE Officer*	*Weekly checks on register on qty stored in container*	*-Weekly inspection checklist Supervisor* *- Register of each container*	*Is it near capacity?* *No – monitor* *Yes – Communicate to HSE/ Superintendent*
Communicate	*Above to Superintendent*	*Immediately* *Start Lock out procedure – stop further storage*	*- Lockout procedure*	*Confirmed? NO –* *Yes – notify, lock out and Isolate away from site Action:*

		capacity		*Superintendent*
Program	*1. HSE Advisor to NZ* *2. Superintendent to Supervisor transport to port side*	*Receive of notification*	*Request for offsite removal to Plant Yard NZ* *PO Number Request*	*Confirmed?* *No –* *Yes – Replace spare container* *Action: Superintendent*
Replace	*Superintendent*	*Request received*	*Request form*	*Yes – Transport spare to site where it required Betio/ Temaiku*
Transport	*Superintendent*	*Monthly*	*Side lifter, Transporter,* *Barge*	*Confirmed?* *New Container received used as standby, Earmarked container returned to NZ or place of agreed disposal*
Update	*HSE Advisor/ NZ Plant Yard*	*Fortnightly*	*Register*	*Update records in the system – containers sent, containers in stock – update project records*

6.4 PERMITS FOR CONTAINERS (DANGEROUS GOODS)

All relevant documents for Dangerous Goods exports are to be arranged through HSE Advisor, this will be sent to NZ receiving for details on in coming cargo and approval before shipment is arranged.

7.0 MONITORING

- Weekly inspection of storage facilities.
- Observation of the location and bunding of pumps, refuelling locations storage areas etc.
- Observation of pollution controls in drains and watercourses.

8.0 EMERGENCY RESPONSE

- In accordance with emergency procedures in the Project Execution Plan to contain any spill and prevent substances entering water courses, dams and drains.
- If the failure does not involve an environment threatening spillage review the control measures and amend as necessary.
- Identify the contaminant and ensure current removal and disposal as per legislative requirements.

- If the failure involves an environmental threatening spillage immediately notify the Superintendent and the EPA.

9.0 RECORDS

- Weekly inspections
- Stocktake of material held in both Betio/ Temeku
- Planned cycle of waste material disposal

Document No. 020 – F085 – 100

Document No. 020 F028 - 100