

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE SOUTH AFRICAN NATIONAL ROADS AGENCY LIMITED (SANRAL)

DULY REPRESENTED BY

MR NAZIR ALLI

IN HIS CAPACITY AS

CHIEF EXECUTIVE OFFICER

AND

THE DEPARTMENT OF MINERALS AND ENERGY

DULY REPRESENTED BY

ADV S NOGXINA

IN HIS CAPACITY AS

DIRECTOR-GENERAL: MINERALS AND ENERGY

ON

**FINANCIAL PROVISION ASSOCIATED WITH THE REHABILITATION OF QUARRIES AND
BORROWED AREAS USED TO OBTAIN GRAVEL, ROCK AND PROCESSED/CRUSHED ROCK
USED FOR ROAD BUILDING PURPOSES**

Jointly hereinafter referred to as the parties

Handwritten signature and initials in black ink, located in the bottom right corner of the page.

PREAMBLE

WHEREAS in terms of the South African National Roads Agency Limited and National Roads Act (Act No. 7 of 1998) (SANRAL Act), the South African National Roads Agency Limited (SANRAL) is mandated to take charge of the development, maintenance and rehabilitation of national roads, within the framework of government policy, in order to provide the necessary infrastructure to the people of South Africa.

WHEREAS section 41(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) requires an applicant for a prospecting right, mining right or mining permit, to make the prescribed financial provision for the rehabilitation and management of negative environmental impacts, before approval of the environmental management plan or environmental management programme;

WHEREAS SANRAL

raised concerns regarding the impact on it of the financial provisions of the MPRDA and in particular the implementation of section 41(1) of the MPRDA with respect to the methods of financial provision for the rehabilitation and management of negative environmental impacts prescribed in the Mineral and Petroleum Resources Regulation 53 as it relates to quarrying and borrowed activities undertaken during the development and maintenance of the roads infrastructure and recognising the requirements of the Public Finance Management Act, 1998 (Act No. 1 of 1998) in particular for the efficient use of state funds;

AND PURSUANT thereto a common understanding between the Department of Minerals and Energy (DME) and SANRAL has been reached on the implementation of sections 41(1) and 106 of the MPRDA read with the Government Notice No. R.762 of 25 June 2004 as published in Government Gazette No. 26501;

PURPOSE

The purpose of this memorandum of understanding is to provide an administrative framework toward a consistent approach regarding the financial provisions of the MPRDA and its application on SANRAL in terms of the MPRDA.

SCOPE AND PRINCIPLES

The DME and SANRAL commit to the responsible and effective administration of their shared responsibilities. Both undertake to provide timely notification and appropriate consultation whenever the activities of one organization directly affect the activities and responsibilities of the other.

The DME and SANRAL will convene on a regular basis to discuss issues within the scope of and related to the purposes of this MOU.

NOW THEREFORE THE PARTIES' UNDERSTANDING IS HEREWITH RECORDED AS FOLLOWS:

The purpose of this Memorandum of understanding is to confirm consistent compliance of legislation by SANRAL when mining aggregate for construction or maintenance of national roads infrastructure.

It is thus understood by both SANRAL and DME that:

- 1.1 In terms of section 106(1) of the MPRDA read with the Government Notice No. R.762 of 25 June 2004 published in Government Gazette No. 26501, an organ of state is exempted from application procedures and the approval or granting of such right or permit in terms of sections 18, 20, 22 and 27 of the said Act,
- 1.2 Notwithstanding the exemption in clause 1.1 above, in terms of section 106(2) of the MPRDA, the provisions pertaining to environmental management,

financial provision and mine closure in terms of the MPRDA and its supporting Regulations, applies to quarrying and borrowing activities undertaken by SANRAL during the construction, upgrading or maintenance of roads infrastructure.

- 2.1 with regard to section 41 of the MPRDA and its supporting Regulations 53 and 54, SANRAL, its agents, or developer or any other person contracted by SANRAL, is not exempted from these provisions that requires financial provision to be made.
- 2.2.1 It is therefore agreed between the parties that for the construction and maintenance of national roads in terms of the SANRAL Act and undertaken by SANRAL contractors appointed by SANRAL, SANRAL irrevocably undertake that:
- 2.2.1.1 the estimated costs for the management, rehabilitation and closure of such quarries and borrowed areas or works be provided for within the approved budget of SANRAL for such construction;
- 2.2.1.2 SANRAL further provide for contingencies (unforeseen costs) which account for 10% of the project budget as further assurance, in order to provide for the costs of environmental liability arising from site specific conditions;
- 2.2.1.3 should SANRAL include a controlled process (as contemplated below) which imposes contractual obligations on the contractors (undertaking the earthworks) as enforced by the following retentions and performance guarantees, in order to ensure compliance with the method statement in the approved EMP and closure requirements:
- SANRAL retains 10% of the approved contract value as performance security and;
 - And retention monies (equal to 10% of the completed value);
- 2.2.2 Consequently, The SANRAL contractor may only be issued with a performance certificate (and full payment) upon *proof of due performance in compliance with the approved EMP* (as part of his contractual obligations to rehabilitation and closure of earthworks). This process occurs in tandem with the DME's requirements and procedures for closure, therefore, as an outcome, the respective contractor may not be issued with a performance certificate from SANRAL should the rehabilitation not result in DME approval for closure (Appendix 1 illustrates the integration of deliverables in both processes).
- 2.2.3 It is also agreed that, in order to meet urgent deadlines for infrastructure delivery, SANRAL may negotiate contingency/project specific arrangements with the relevant DME regional managers in order to meet deadlines for strategically important development projects. Such an agreement would consist of measures to streamline the process of application for authorisation, without compromising the integrity of the associated environmental process or other requirements of the MPRDA, with respect to environmental management and rehabilitation.



3. This Memorandum of Understanding shall come into force upon signature by both parties, and shall remain in force until terminated by written notice signed by both parties.

DATED AND SIGNED AT Cape Town THIS 9th DAY OF FEB 2009

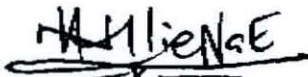


**ADV S. NOOKINA
DIRECTOR GENERAL
DEPARTMENT OF MINERALS AND ENERGY (DME)**

AS WITNESS:

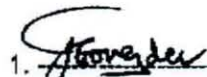
1. _____
FULL NAMES:

DATED AND SIGNED AT Pretoria THIS 20th DAY OF February 2009

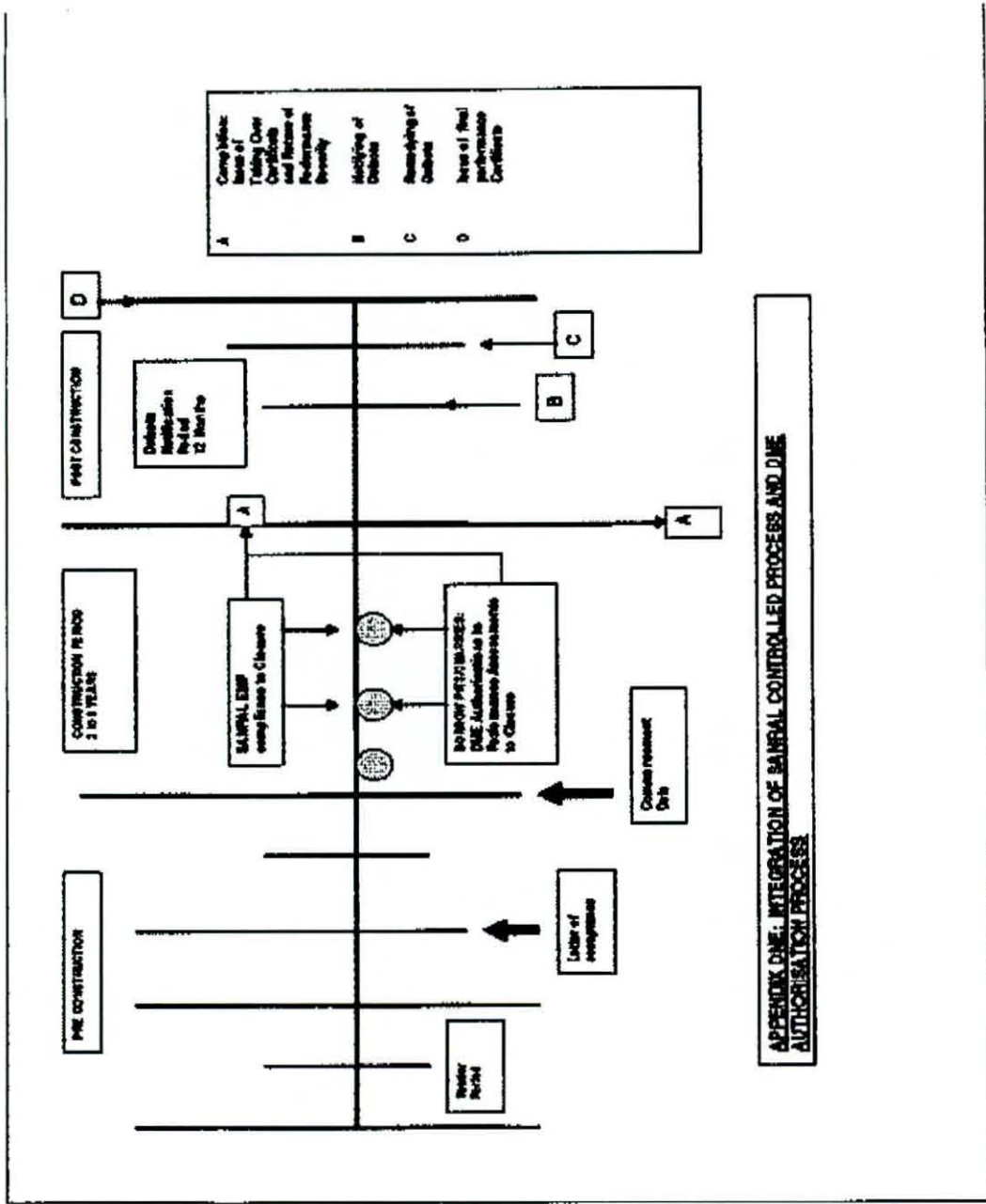


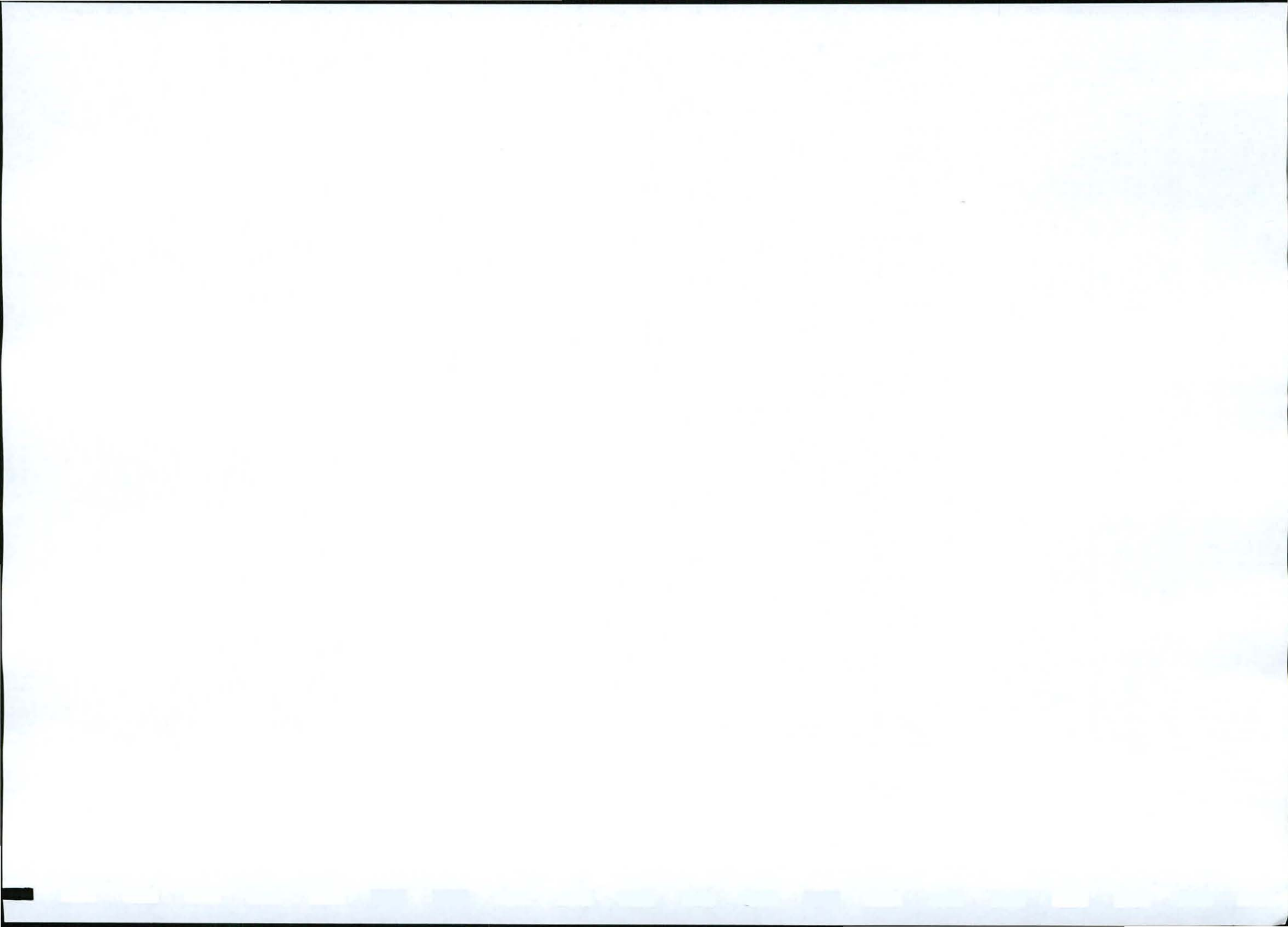
**MR NAZIR ALLI
CHIEF EXECUTIVE OFFICER
SOUTH AFRICAN NATIONAL ROADS AGENCY LIMITED (SANRAL)**

AS WITNESS:

1.  _____
FULL NAMES:

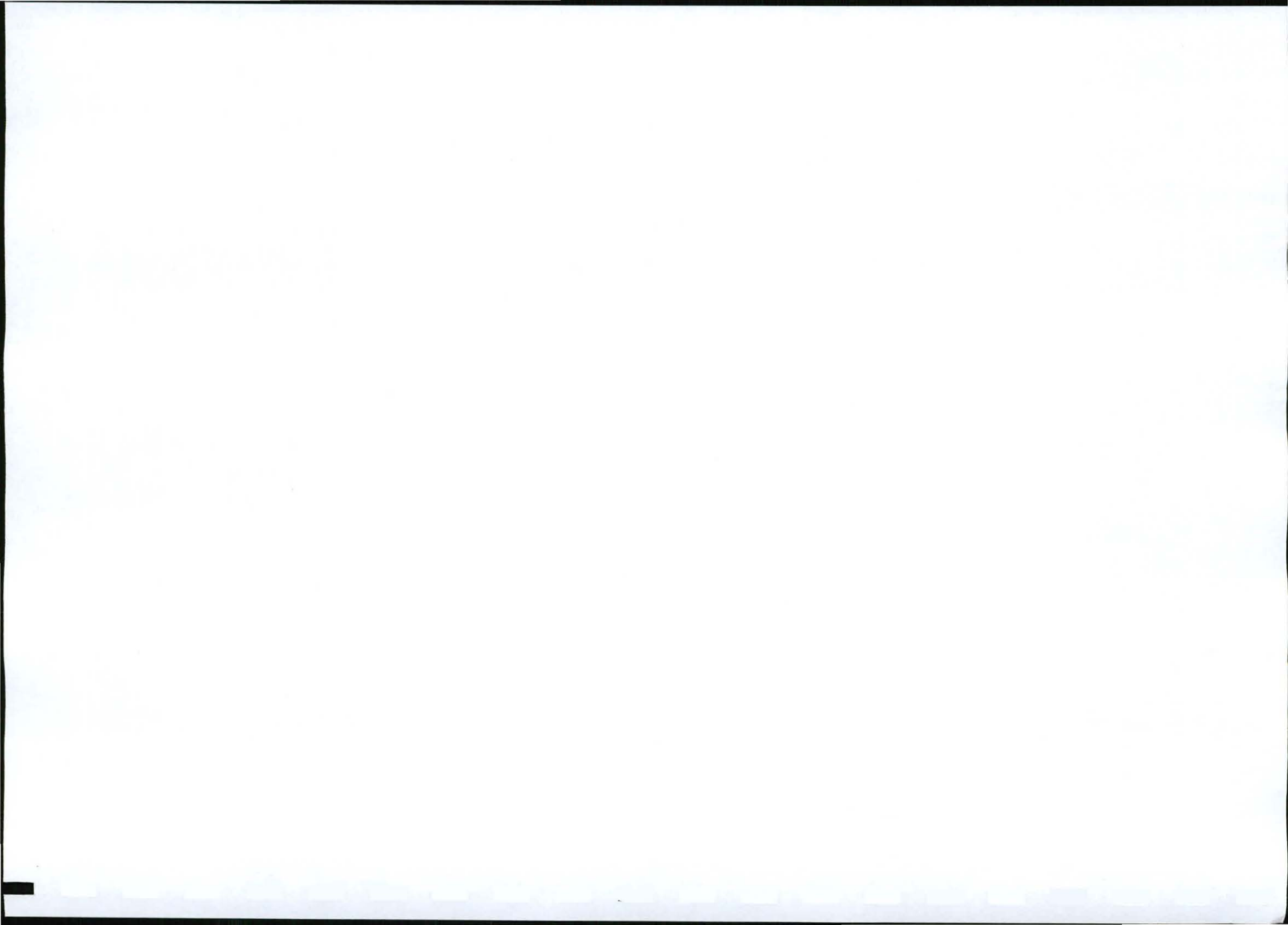
APPENDIX ONE





APPENDIX H:

Letter of Undertaking from SANRAL





REGISTRATION NO. 1998/009584/06



Southern Region

SANRAL House, Southern Life Gardens, 70 2nd Avenue, Newton Park, Port Elizabeth
P O Box 27230, Greenacres, South Africa, 6057
Tel +27 (0) 41 398 3200 Fax +27 (0) 41 398 3211 / 3222

Reference:	16/1/4 – N.002-200-2006/1 (#418036v1)	Your Ref	
Date:	03 August 2010	Fax Number:	+27 (0) 41 398 3222
Enquiries	Mike Kaiser	Direct Line:	+27 (0) 41 398 3219
Email:	kaiserm@nra.co.za	Website:	<u>www.nra.co.za</u>

*Creating
wealth through
infrastructure*

Department of Minerals and Energy
Private Bag X6076
PORT ELIZABETH
6000

Attention: Ms D. Watkins

**CONTRACT NRA N.002-200-2006/1 : UPGRADE OF THE NATIONAL
ROUTE N2 SECTION 20 FROM THE NGCWELENI RIVER (KM 39,4)
TO BROOKES NEK (KM 70,4)**

UNDERTAKING

I, **Mbulelo Simon Peterson**, the undersigned and duly authorised thereto by the South African National Roads Agency Limited hereby undertake to implement all the aspects contained in the EMP and accept full responsibility therefore.

SIGNED at PORT ELIZABETH this 06 day of AUGUST 2010

SIGNATURE

WITNESSES:

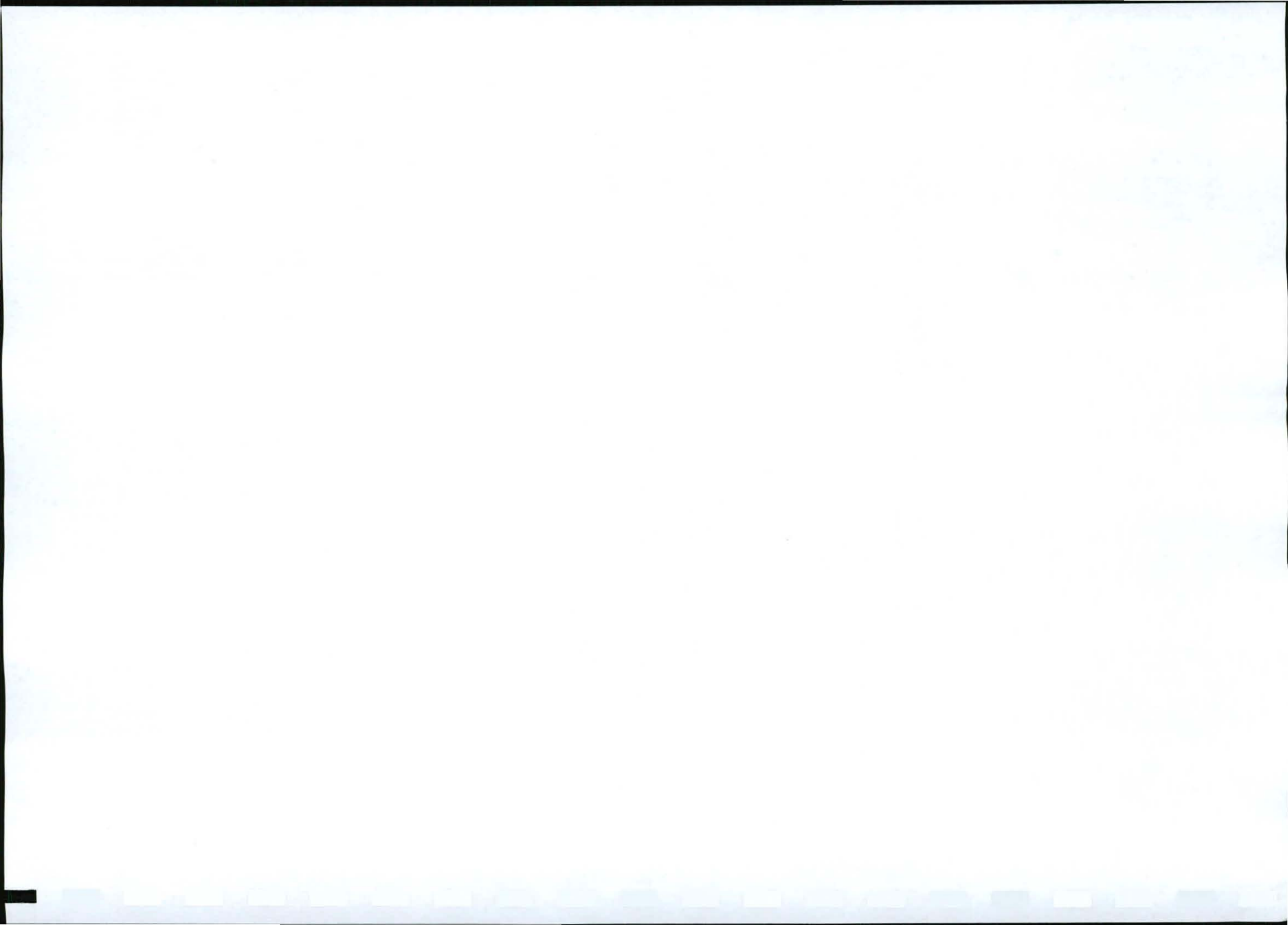
1. 2.

Official use

APPROVAL

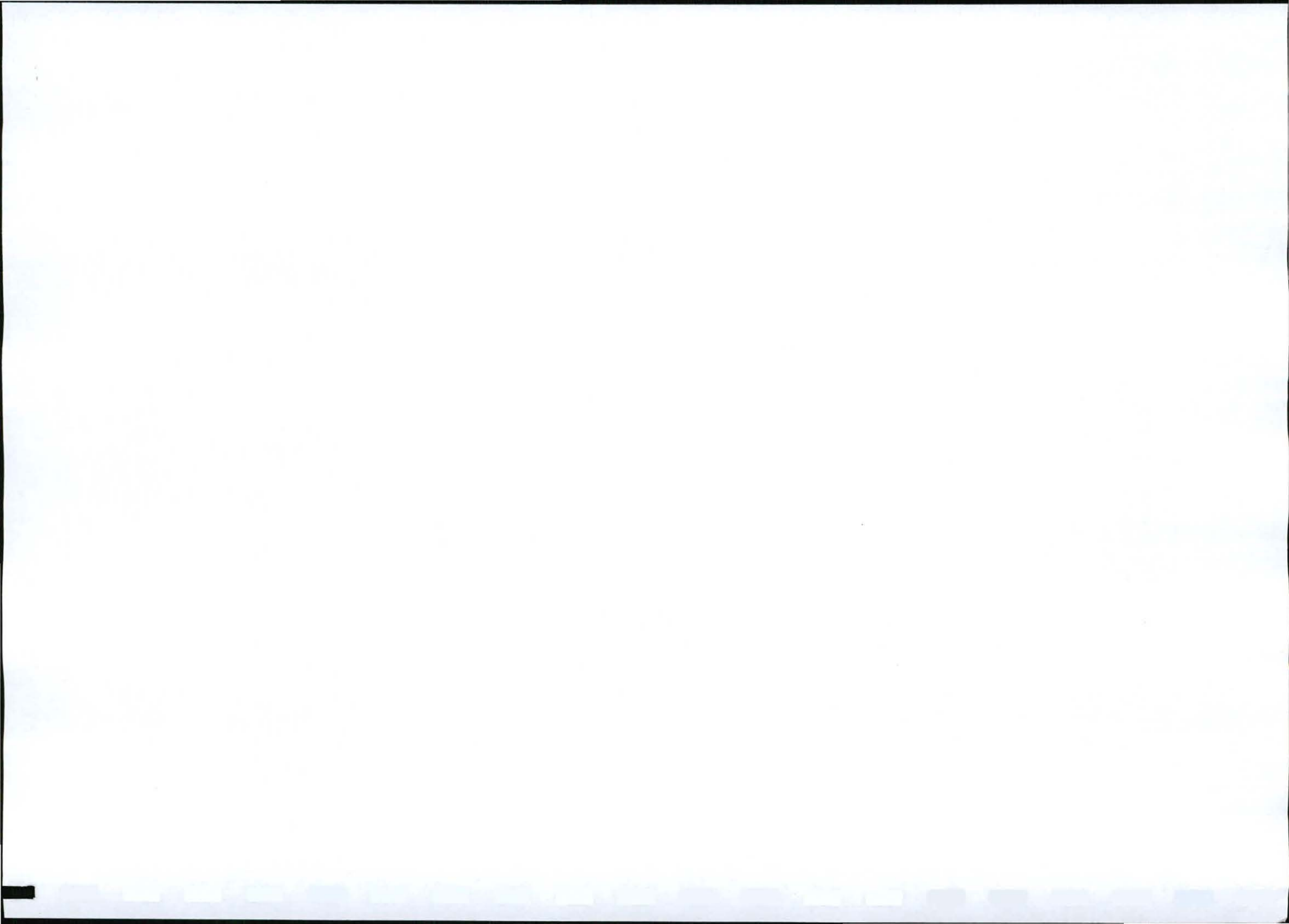
Approved in terms of the provisions of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

SIGNED at this day of 2010



APPENDIX I:

Letter confirming SANRAL project





REGISTRATION NO. 1998/009584/06

*Creating
wealth through
infrastructure*

Southern Region

SANRAL House, Southern Life Gardens, 70 2nd Avenue, Newton Park, Port Elizabeth
P O Box 27230, Greenacres, South Africa, 6057
Tel +27 (0) 41 398 3200 Fax +27 (0) 41 398 3211 / 3222

Reference:	16/1/4 – N.002-200-2006/1 (#418028v1)	Your Ref	
Date:	03 August 2010	Fax Number:	+27 (0) 41 398 3222
Enquiries	Mike Kaiser	Direct Line:	+27 (0) 41 398 3219
Email:	kaiserm@nra.co.za	Website:	<u>www.nra.co.za</u>

Department of Minerals and Energy
Private Bag X6076
PORT ELIZABETH
6000

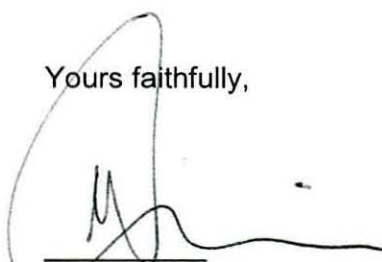
Attention: Ms D. Watkins

Dear Ms Watkins

**CONTRACT NRA N.002-200-2006/1 : UPGRADE OF THE NATIONAL
ROUTE N2 SECTION 20 FROM THE NGCWELENI RIVER (KM 39,4)
TO BROOKES NEK (KM 70,4) : UMZIMVUBU LOCAL MUNICIPALITY**

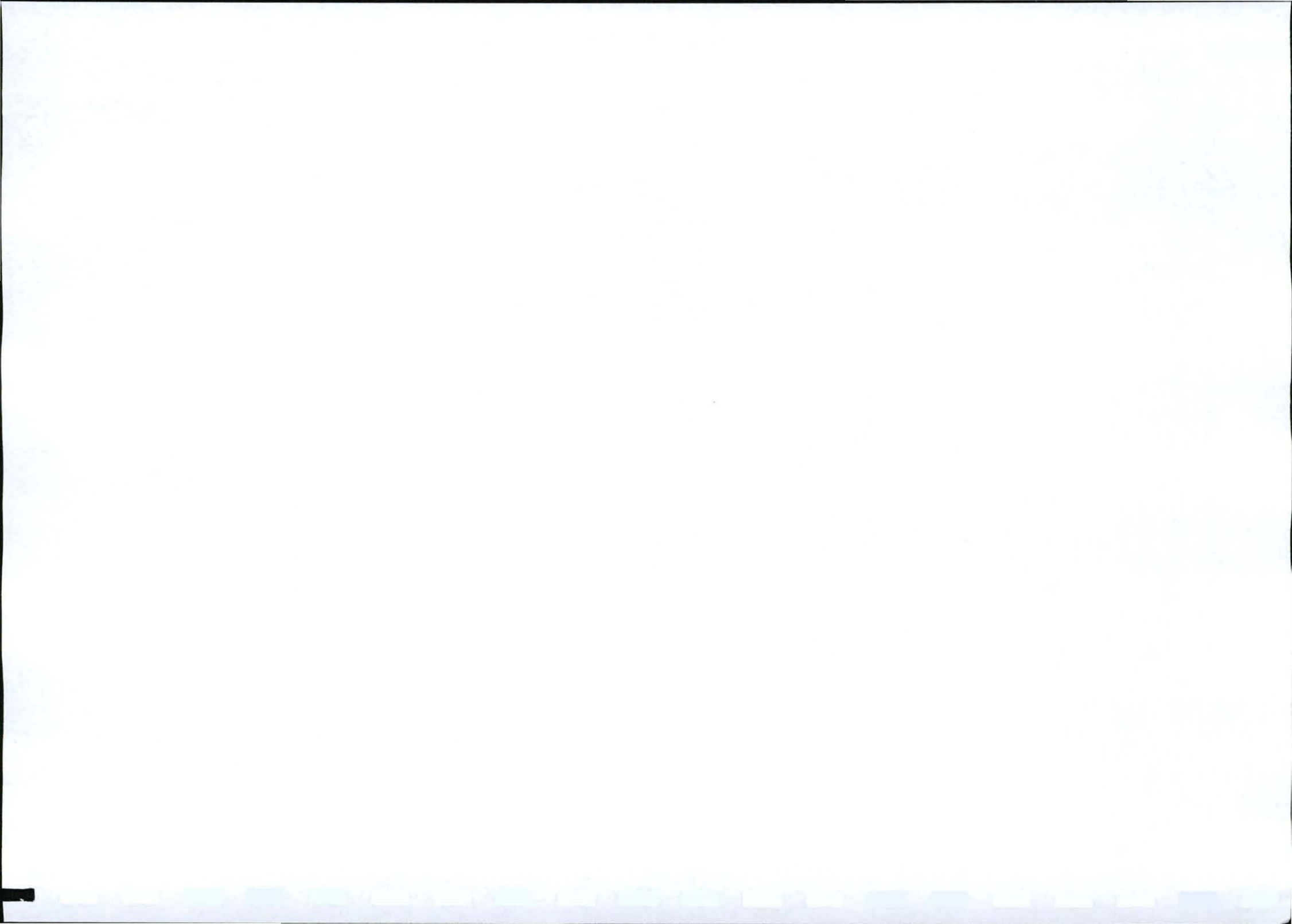
This letter is submitted in support of the Environmental Management Plan for the proposed mining sites to be used for the upgrading of Section 20 of the N2: Ngcweneni River to Brookes Nek. We would like to confirm that this is a South African National Roads Agency Limited (SANRAL) project.

Yours faithfully,

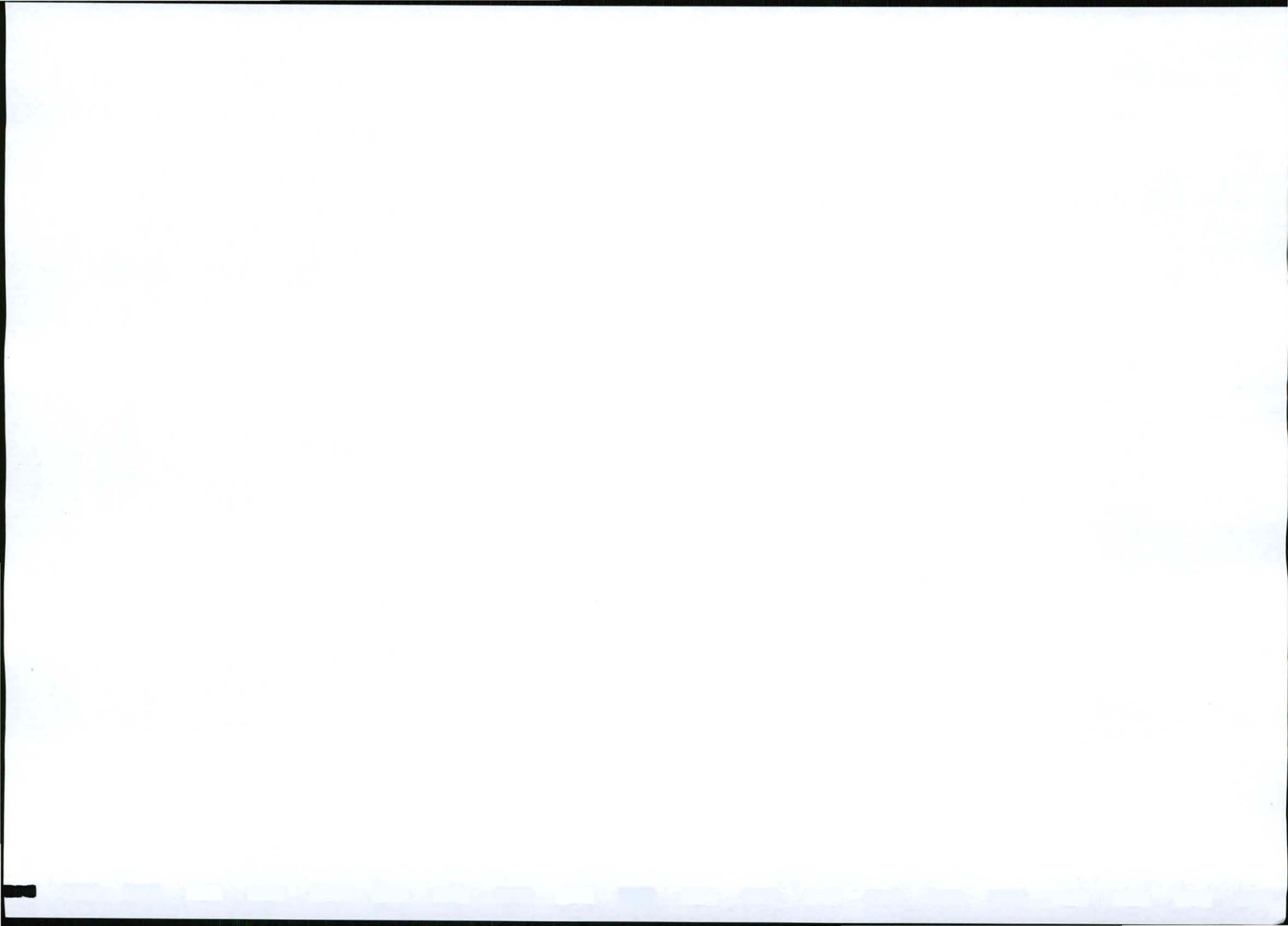


Mike Kaiser

For : Regional Manager: Southern Region



APPENDIX J:
Examples of "Toolbox Talks"





TOOLBOX TALK



No 1

SPILL CONTROL

WHAT?

Accidental releases of oils and chemicals from construction sites make up a large number of pollution incidents that occur each year.

Many spillages can be prevented. It is important that everyone on site knows how to control a spill to minimise its impact.

Would you know what to do?



WHY?

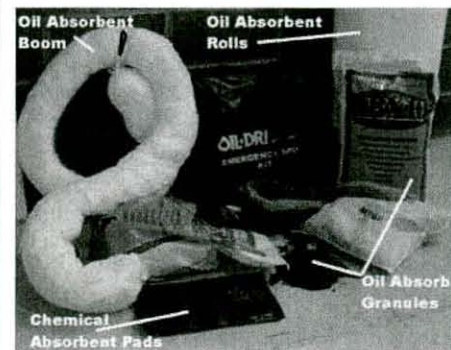
- ❑ **Minimise potential harm:** Spills spread very quickly and lead to environmental harm.
- ❑ **Avoid prosecution:** Fines and clean up costs can be expensive
- ❑ **Public relations:** Avoid negative publicity for the company and our clients and maintain our workload.

DO

- ✓ STOP WORK immediately
- ✓ If spillage is flammable, extinguish all possible ignitions.
- ✓ Identify the source of pollution and rectify the problem
- ✓ Contain the spillage – on land use earth/sand to construct a bund around the spill to stop it spreading. Use booms to contain oil spills that have already entered a watercourse
- ✓ Contact your Line Manager
- ✓ Put on appropriate PPE – typically rubber gloves
- ✓ Protect sensitive areas (e.g. watercourses or surface water drains – use drain covers or use earth/sand to construct a bund)
- ✓ Clean up the spill. Use absorbent granules/pads to mop up spills. Large pools of oil or spills which cannot be absorbed should be removed by gulper
- ✓ Dispose of all contaminated materials (soil/absorbent materials) correctly – those containing substances such as oil, diesel or paint will be hazardous waste. Ensure any contaminated water is taken to an appropriately licensed disposal site.
- ✓ Notify your line manager of actions taken

DON'T

- ✗ DON'T ignore it! STOP WORK and ACT immediately.
- ✗ DON'T hide the incident – ensure you report it and implement controls.
- ✗ DON'T ever hose a spill into the drainage system. Always use absorbent materials.





TOOLBOX TALK



No 2 WATER POLLUTION PREVENTION (FUEL & OIL)

WHAT?

A large number of oil related water pollution incidents occur each year.

Discharging fuel or oil or water containing fuel or oil into drains or watercourses is illegal

Many pollution incidents are from unbunded tanks and can easily be avoided by following simple guidelines.

WHY?

- ❑ **Avoid prosecution:** Your employer or you as an individual can be prosecuted for causing water pollution
- ❑ **Cost:** The costs of clean up far exceed those to put control measures in place
- ❑ **Damage to wildlife:** Long-term damage to watercourses including fish kills. Oil spreads rapidly - one gallon of oil can completely cover a lake the size of two football pitches

DO

General

- ✓ Store oils away from drains or watercourses
- ✓ Return oil and fuels to storage areas after use
- ✓ Locate oil stores away from areas of high vehicular movement to prevent accidental damage
- ✓ Bund individual 205 litre drums to 25%
- ✓ Supervise all fuel deliveries
- ✓ Lock oil stores when not in use
- ✓ Use drip trays under all static plant and during refuelling from mobile plant.

Bulk Storage

- ✓ Bund tanks and bowsers to 110%
- ✓ Ensure bunds are free from cracks and leaks
- ✓ Regularly empty bunds and drip trays of rainwater, which should be treated as contaminated
- ✓ Keep all hoses and pipe work within bunded area after use
- ✓ Keep a spill kit near to fuel and oil storage areas and refuelling areas
- ✓ Report any irregularities or incidents.

DON'T

- ✗ DON'T refuel or store oil within 10m of watercourses or surface water drains
- ✗ DON'T leave bunds and drip trays to overflow
- ✗ DON'T leave refuelling hoses outside of bunds after use
- ✗ DON'T use high pressure delivery systems when filling small containers
- ✗ DON'T hose down spills
- ✗ DON'T ignore spillages.



See also: Toolbox Talk No 1 – Spill control



TOOLBOX TALK



No 3

DUST & AIR QUALITY

WHAT?

Dust, emissions and odours can annoy neighbours and may cause health risks at very high concentrations

WHY?

- Avoid nuisance to neighbours:** Dust can settle on neighbours' properties and give rise to local dispute. Poorly controlled emissions and odours from plant or works may give rise to valid complaints.
- Avoid programme delays:** The Local Authority has the power to stop works if dust is causing a nuisance. Emission of dark smoke from plant and fires is illegal.
- Avoid health problems:** Dust may cause eye irritation or make asthma worse
- Avoid impact on ecology:** Dust can damage the ecology of a watercourse and affect plant growth, including crops

DO

- ✓ Keep surfaces swept and damp down with water at regular intervals
- ✓ Minimise drop heights into haulage vehicles and into conveyors
- ✓ Ensure cutting and grinding operations are adequately shielded or wetted
- ✓ Sheet lorries carrying dry materials off site
- ✓ Keep to site speed limits to minimise dust generation
- ✓ Use the wheelwash, for appropriate vehicles, if one is provided on site
- ✓ Store fine, dry materials within buildings or provide adequate protection from the wind.
- ✓ Store bulk cement and bentonite in silos
- ✓ Position silos and stockpiles away from residential areas or watercourses.
- ✓ Clean up or damp down any spillage of dry dusty materials
- ✓ Notify your Line Manager if work activities are causing poor air quality.

DON'T

- ✗ DON'T burn materials on site without approval from your Project Manager. Permission is required first from the Environment Agency
- ✗ DON'T use poorly maintained plant. Black smoke may give rise to poor health and can cause a nuisance
- ✗ DON'T leave plant running if not in use
- ✗ DON'T ignore sources of poor air quality, notify your line manager
- ✗ DON'T ignore complaints





No 4

NOISE AND VIBRATION

WHAT?

The Construction Industry is one of the leading sources of noise complaints made to Local Authorities.

Something is considered 'noisy' when the sound is unwanted by the listener. Noise and vibration emissions can disturb local residents and give rise to complaints and delays.

Noisy activities include: excavation, tunnelling, concrete cutting, piling, using un-silenced generators and concrete pours.

WHY?

- To act as a good neighbour:** avoid complaints and maintain good relations with the local community
- To avoid programme delay:** The Local Authority have the power to stop works if noise from the site is causing a nuisance
- To avoid fines:** Failing to meet noise constraints can result in fines.
- To avoid structural damage:** vibration may cause structural damage
- To comply with contractual requirements**
- To prevent harm to wildlife:** Noise can disturb wildlife as well as humans

DO

- ✓ If possible, restrict noisy activities to certain times of the day
- ✓ Adhere to working hours. Some sites are only consented to work at certain times
- ✓ Plan deliveries. Arrange routes and times to minimise potential nuisance to the local community
- ✓ If possible, keep noisy plant away from public areas
- ✓ Minimise drop heights into hoppers, lorries and other plant
- ✓ Use local screening where necessary. Noise can be reduced if a screen is placed between plant and nearby sensitive locations eg. houses. Screens can be straw bales or ply board
- ✓ Use silenced generators and tower lights where necessary
- ✓ Keep acoustic doors and hoods on plant closed – it does make a difference!
- ✓ Contact your Line Manager if you are in doubt about noisy activities.

DON'T

- ✗ DON'T undertake noisy works during the evening, at night or very early in the morning if it can be avoided!
- ✗ DON'T leave doors and hoods open on plant
- ✗ DON'T leave plant running unnecessarily
- ✗ DON'T use poorly maintained plant
- ✗ DON'T ignore complaints from the local community
- ✗ DON'T undertake activities that could cause damage to nearby structures through vibration unless approved by your line manager.



No 5

WATER POLLUTION - SILT

WHAT?

Silt is the term used for very fine particles of soil.

Silt mixed with water in the form of mud, can be washed off construction sites into nearby watercourses and drains.

Pollution by silt can be caused by:
rainwater run off from uncovered areas of the site,
pumping out and dewatering of excavations,
tunnelling operations and cleaning of ditches and drains.

Proper planning will prevent these pollution incidents.



WHY?

- ❑ **Avoid environmental harm:** High levels of silt suspended in water can suffocate fish by blocking their gills, can remove essential oxygen from the water and can kill plants, animals and insects living in the water by stopping sunlight reaching them.
- ❑ **Avoid environmental harm:** Silt often combines with other contaminants such as oils and chemicals potentially causing greater pollution than silt alone.
- ❑ **Avoid prosecution:** Because of the potential for harm, it is illegal to allow silt to enter a watercourse or drain. Silt pollution spoils the appearance of watercourses, is easily traceable to the site from where it originated and, in the past, has been a major cause of prosecution.

DO

- ✓ Only discharge silty water into designated settlement systems
- ✓ Check that site drainage and settlement systems are working - discolouration may indicate high pollutant loading
- ✓ Stop pumping and contact your manager if you think a problem is arising
- ✓ Ensure that all hardstandings are kept clean – notify your manager if an area is silty or is covered in mud
- ✓ Notify your manager immediately if you see silty water entering a watercourse or drain and do try to stop it or divert it away by, for example, using sand bags.

DON'T

- ✗ DON'T dewater any excavation without getting permission from your manager
- ✗ DON'T pump silty water directly into rivers, ditches or surface water drains
- ✗ DON'T strip land of vegetation unless it is absolutely necessary – vegetation reduces silt run-off
- ✗ DON'T store soil, stone or similar materials within 10 metres of watercourses or drains
- ✗ DON'T dig a grip to release ponded water to a watercourse or drain.





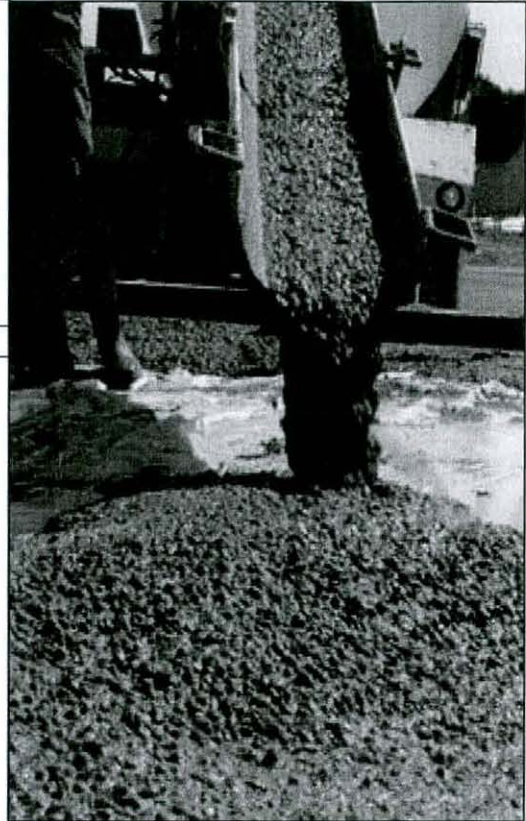
No 6 WATER POLLUTION – CEMENT and CONCRETE

WHAT?

Cement and concrete are probably the most common materials used in construction.

Cement is a highly alkaline material and is corrosive.

If cement or concrete is allowed to enter a watercourse in an uncontrolled manner it can have a devastating impact on wildlife.



WHY?

- Avoid environmental harm:** Water contaminated with cement is highly alkaline and can be toxic to fish, plants and animals living in watercourses. Cement particles entering a watercourse can clog fishes' gills and also destroy their spawning grounds.
- Avoid prosecution:** It is illegal to allow cement, unset concrete or washout water containing cement to enter a watercourse or drain. (Special permission is needed before construction work can take place in a watercourse).

DO

- ✓ Identify all watercourses, gullies and drains prior to commencing work
- ✓ Store bulk and bagged cement and concrete additives at least 10 metres away from watercourses, gullies and drains
- ✓ Undertake mixing/batching works well away from watercourses and drains.
- ✓ Use only designated areas for concrete washout
- ✓ Where necessary protect nearby drains against washout water running into them.
- ✓ NOTIFY your manager IMMEDIATELY if you see any concrete spillages or concrete washout likely to cause pollution.

DON'T

- ✗ DON'T hose down spills of concrete or cement into surface water drains.
- ✗ DON'T allow washout water to flow into any watercourse or drain.
- ✗ DON'T allow ready-mix trucks to washout anywhere other than in areas designated for the purpose.
- ✗ DON'T wash off any tools or plant in watercourses



TOOLBOX TALK



No 7

TREE PROTECTION

WHAT?

Trees and hedgerows are an important part of the environment and the countryside.

They provide a vitally important habitat for wildlife and many trees and hedgerows are protected by law.



WHY?

- ❑ **Avoid prosecution:** It is illegal to cut down trees protected by law under a Tree Preservation Order or to grub up certain countryside hedges.
- ❑ **Avoid environmental harm and prosecution:** During certain times of the year trees and hedgerows may contain nesting birds. Nesting birds are protected by law against disturbance under the Wildlife and Countryside Act.
- ❑ **Ensure safety is maintained:** Damaged trees may become unstable and potential hazards.

DO

- ✓ Check with your manager before felling any trees or removing any hedgerows
- ✓ Clear only vegetation as instructed by your manager
- ✓ Check for nesting birds and if any are found contact your manager immediately
- ✓ Ask your manager what protection is required to trees and hedgerows
- ✓ Check with your manager before excavating near to trees and hedgerows.

DON'T

- ✗ DON'T undertake tree felling or hedgerow clearance during the bird nesting season
- ✗ DON'T undertake any works to, or near to, trees without authorisation from your manager
- ✗ DON'T track vehicles or plant over tree protection areas
- ✗ DON'T store materials, especially fuels and oils under or near trees.



image: www.freeimages.co.uk





TOOLBOX TALK



No 8 WASTE MANAGEMENT – REDUCE / RE-USE / RECYCLE

WHAT?

The construction industry generates over 70 million tonnes of waste per year and it is estimated that this total includes 13 million tonnes of construction materials thrown away unused

To minimise waste we must

- Firstly **Eliminate** the waste if we can
- secondly **Reduce** the waste we create
- then **Reuse** materials until we can't use them again and
- only then **Recycle** the waste. Only if we can't recycle can we
- finally **Dispose** of the waste to landfill.



WHY?

- **Avoid environmental harm:** Reduction, reuse and re-cycling of waste minimises the environmental impacts of disposal of waste to landfill.
- **Reduce costs:** The true cost of waste is more than just the disposal cost and is made up of
 - the original purchase price of the material
 - the cost of unloading, handling, storage and transporting the material around site
 - the cost of collecting the waste or damaged material, reloading, moving and storing waste on site
 - the cost of transporting waste to a tip, the tipping charges and landfill taxes
 - the purchase price of replacing damaged and wasted materials.

DO

- ✓ **Eliminate** unnecessary wastage by storing materials neatly on flat solid ground to avoid damage and loss
- ✓ **Reduce** the amount of waste you create on site
- ✓ Keep materials in their packaging for as long as possible to protect them from damage
- ✓ Keep significant offcuts for use elsewhere
- ✓ **Reuse** materials until no longer fit for purpose, for example, shuttering, fencing
- ✓ Then reuse materials for alternative purposes for example, use old shuttering ply for hoardings
- ✓ **Recycle** materials whenever possible
- ✓ Segregate waste on site into different types
- ✓ Store waste in the appropriate skip or container until removed from site

DON'T

- ✗ DON'T put waste materials into the wrong waste container
- ✗ DON'T open new cans or pallets before the ones in use are empty
- ✗ DON'T leave materials unprotected and where they are likely to be damaged by, for example, rain or mud.
- ✗ DON'T burn or bury waste – it's illegal
- ✗ DON'T mix different types of waste – it prevents recycling





TOOLBOX TALK



No 9

STORAGE OF WASTE

WHAT?

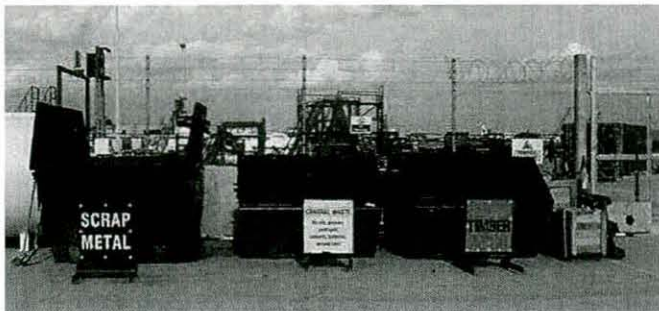
Allowing waste to escape into the environment not only causes nuisance to neighbours and generates a poor public image it is illegal

WHY?

- ❑ **Avoid prosecution:** It is the duty of all waste producers to prevent their waste escaping into the environment.
- ❑ **Reduce costs:** The segregation of waste into separate containers or skips can lead to lower costs by
 - reducing disposal costs and landfill tax payments through preventing the contamination of inactive wastes by active wastes
 - maximising the potential for reusing and recycling materials
 - making it easier to see how much of each type of waste is being produced and hence where efforts to reduce waste need to be targeted

DO

- ✓ Keep sites tidy and collect up any waste regularly
- ✓ Use waste containers or skips suitable for the type of waste being stored
- ✓ Use skips with lids or cover them with sheets or nets to prevent dust and litter being blown out
- ✓ Check that containers and skips are not corroded or worn out to minimize the risk of accidental spillages or leaks
- ✓ Mark waste containers clearly with their intended contents and ensure labels on containers are kept in good order
- ✓ Segregate waste before putting it into the designated containers



DON'T

- ✗ DON'T throw materials into the wrong container
- ✗ DON'T contaminate one waste type with another
- ✗ DON'T mix hazardous with non-hazardous waste – it's illegal
- ✗ DON'T give waste away, all waste taken off site needs to be accompanied by paperwork
- ✗ DON'T damage covers over or bunds around any skips or containers
- ✗ DON'T burn or bury waste – it's illegal



**No. 13 STORAGE and USE OF PETROL, DIESEL and OILS****WHAT?**

Petrol, diesel and oils inappropriately used, stored or disposed of can give rise to pollution of the environment.

Generally these substances are released into the environment through spillages during delivery or use or through waste materials being poured directly to drains or gullies or being burned.

**WHY?**

- Avoid prosecution:** If pollution is caused then prosecution may follow.
- Avoid environmental harm:** Petrol, diesel and oil are all highly harmful to plants, animals and humans
- Cost:** The cost of clean up and legal proceedings following a spillage incident far exceeds the cost of putting proper control measures in place.

**DO
Storage**

- ✓ Store bulk petrol, diesel and oil in bunded tanks and store smaller containers on drip trays that have 110 % capacity of the largest container
- ✓ Keep a spill kit near to fuel and oil storage areas
- ✓ Store petrol, diesel and oil away from drains or surface watercourses.
- ✓ Always put lids on any containers after use.
- ✓ Ensure that all containers are undamaged.

Use

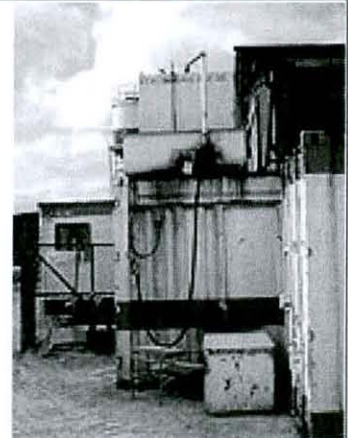
- ✓ Use the automatic shut off "pistol grip" delivery systems when refuelling from tanks or mobile bowser – do not tamper with the shut off system at any time.
- ✓ Return spare fuels and oils to proper storage areas
- ✓ Ensure that all refuelling is constantly attended and only undertaken at least 10m away from watercourses and drains.
- ✓ Lock the mobile bowser or storage tank after use.
- ✓ Use drip trays under all static plant and during refuelling from mobile plant.
- ✓ Clean up any minor spillages
- ✓ Use funnels when refuelling small plant and equipment to avoid spillages.

Disposal

- ✓ Ask your manager what to do with waste oil, petrol and diesel prior to any disposal.

**DON'T
Storage**

- ✗ DON'T refuel or store oil tanks within 10m of watercourses or surface water drains
- ✗ DON'T leave bunds and drip trays to overflow
- ✗ DON'T leave refuelling hoses outside bunds after use
- ✗ DON'T use high pressure delivery systems when filling small containers

**Use**

- ✗ DON'T leave refuelling operations unattended at any time
- ✗ DON'T leave containers open when unused
- ✗ DON'T leave containers in an area where they can be damaged
- ✗ DON'T ignore spillages

Disposal

- ✗ DON'T pour petrol, diesel or waste oil down drains or gullies
- ✗ DON'T try to dispose of petrol, diesel or waste oils by setting fire to them.



TOOLBOX TALK




No 14 MATERIAL HANDLING and HOUSEKEEPING

WHAT?
 Poor storage and handling of materials creates waste.
 Waste is a loss of resource and is very costly.
 Poorly stored materials increase the risk of pollution incidents.

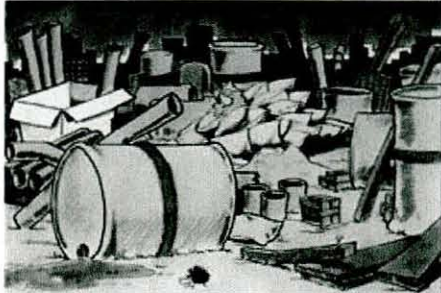
WHY?

- Reduce costs:** Wastage costs money: - not only the cost of the cost of replacement materials but also the disposal cost of those that are damaged.
- Reduce pollution risk:** Good storage reduces the risk of spillages.
- Avoid waste:** Re-use of materials reduces the requirement for new materials.
- Improved safety:** A tidy site is a safe site.
- Public image:** Good housekeeping creates a positive image to the general public.

DO

- ✓ Avoid double handling as much as possible: less effort, less damage, less wastage
- ✓ Supervise the delivery of materials to ensure correct location and method of storage
- ✓ Check that a material is fully used prior to starting a new batch
- ✓ Return to storage any materials that have not been used
- ✓ Use off-cuts where possible
- ✓ Re-use formwork as often as practically possible
- ✓ Designate an area for surplus concrete – it can be crushed and re-used
- ✓ Pick up litter
- ✓ 

DON'T

- ✗ DON'T store or leave unprotected any materials that can be damaged by weather, eg. cement bags
- ✗ DON'T over order materials
- ✗ DON'T put materials in a skip if they still have a use
- ✗ DON'T use new lengths of pipe or cable for short pieces of work. Minimise the need for off-cuts
- ✗ DON'T store together any materials that can contaminate each other.
- ✗ 



No 15

ARCHAEOLOGY

WHAT?

Archaeology is the study of human history through the excavation of sites and the analysis of physical remains.

Where no other records exist, it is often the only source of information about our previous occupation of an area from the earliest inhabitants many thousands of years ago to more recent times of just a hundred years or so.

It is not only buildings and their foundations but also artefacts such as jewellery, pottery, coins, bones and skeletons that need expert examination before removal and preservation.



WHY?

- Avoid prosecution:** It is illegal to damage some monuments and archaeological structures.
- Avoid environmental harm:** Archaeology is an important part of our heritage and valuable and irreplaceable remains can easily be damaged on construction sites.

DO

- ✓ Stop work if you find any archaeological features and immediately contact your manager for instructions
- ✓ Obey the advice provided by any appointed archaeologist.



DON'T

- ✗ DON'T assume that any artefacts or features discovered are unimportant
- ✗ DON'T remove any 'finds' such as coins, pottery, or bones from the site. It is illegal
- ✗ DON'T undertake work adjacent areas of archaeological importance without considering if any damage may be caused
 - vibration may cause cracking
 - dewatering may cause a preserved feature to settle and crack.
- ✗ DON'T drive vehicle through protected sites





TOOLBOX TALK



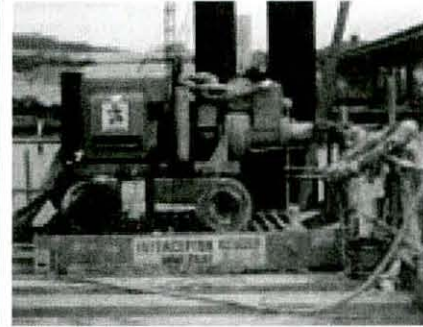
No 17

PUMPING AND OVERPUMPING

WHAT?

Excavations often require prior dewatering of the ground and/or the pumping out of any rainwater or groundwater collected in them. Both processes require the disposal of water pumped out, which can find its way into a watercourse or, if contaminated and with prior consent of the Statutory Sewerage Undertaker, it can be discharged to a sewer.

Sections of existing sewers and pipelines are sometimes taken out of service to allow repair or alterations and flows can be maintained by installing temporary pumps and "overpumping" those sections.



WHY?

- ❑ **Avoid harm to the environment:** Water pumped from excavations can be muddy (silty) and, when the excavations are in previously developed or "brownfield" land, it can be contaminated. The improper discharge of water polluted by mud or contaminants can cause serious damage to watercourses.
- ❑ **Avoid harm to the environment:** Overpumping is often required in maintaining the flows of foul sewage which, if it is allowed to escape to find its way into a watercourse, can have a devastating effect on wildlife.
- ❑ **Avoid prosecution:** It is illegal to allow polluted water to enter a watercourse or surface drain
- ❑ **Avoid flooding:** If water is discharged into a sewer or gully of insufficient capacity then flooding will occur, potentially causing pollutants to enter watercourses or creating nuisance to site operations.

DO

- ✓ Check with your line manager, before pumping, whether any treatment systems are required before final discharge of pumped out water. Typical systems include: settlement tanks or lagoons, discharge over grassed areas, through silt socks or hay bales.
- ✓ Check that the point of discharge is to the correct location, that is to the sewer, manhole or gully as set out by your line manager.
- ✓ Check that all couplings and other pipework fittings are secure.
- ✓ Periodically check that any treatment systems are working and that water being finally discharged is clear of silt or solids that may give rise to pollution, and is not causing damage to the bed or banks of any watercourse
- ✓ **NOTIFY** your line manager immediately if you notice:
 - pollution (muddy water, oils etc) occurring
 - the discharge causing flooding
 - any pipework is damaged or connections have broken or are leaking.

DON'T

- ✗ DON'T leave pumping operations unattended for long periods unless authorised to do so by your line manager.
- ✗ DON'T continue with overpumping if the receiving sewer or pipeline cannot cope with the capacity.
- ✗ DON'T ignore signs that pollution is occurring, for example muddy water entering watercourses or gullies.
- ✗ DON'T tamper with pipework or discharge points without the authorisation of your line manager.





TOOLBOX TALK



No 18 WASHING DOWN PLANT & MACHINERY

WHAT?

Washing down plant and machinery, hosing down concrete truck mixers or degreasing engines can all lead to serious pollution incidents if it is not properly carried out.

The resulting dirty water should not be allowed to enter surface water drains or road gullies, which generally discharge directly into local streams, rivers or soakaways.

Careful consideration must be given to where washing down is carried out.



WHY?

- ❑ **Avoid environmental harm:** Dirty washing and rinsing water may contain dislodged mud, grease, oils, detergents, cleaning agents or toxic chemicals and materials that can kill fish and other aquatic life and which may also seriously affect the surrounding environment.
- ❑ **Avoid prosecution:** It is an offence to allow polluting matter such as silt, cement, concrete, fuel, oils, cleaning chemicals and detergents to enter a watercourse or a drain.
- ❑ **Cost:** The cost of cleaning up a pollution incident far exceeds the cost of putting proper control measures in place.

DO

- ✓ Ask your manager if there is a place specially designated for washing down plant and machinery
- ✓ Use only these designated wash down areas whenever they are provided
- ✓ Ensure that any wash down slurry or residue is contained and cannot enter drains or watercourses
- ✓ Check with your manager before using degreasing or cleansing solutions – don't just assume they can be used
- ✓ Report to your manager any washing down that may cause a pollution incident.

DON'T

- ✗ DON'T wash down before finding out the proper place in which to do it
- ✗ DON'T wash down directly into watercourses or surface water drains
- ✗ DON'T allow dirty wash down water to go down roadside gullies
- ✗ DON'T wash down near material or storage areas or immediately next to working areas
- ✗ DON'T use any more water than is necessary – reduce waste.





No 21

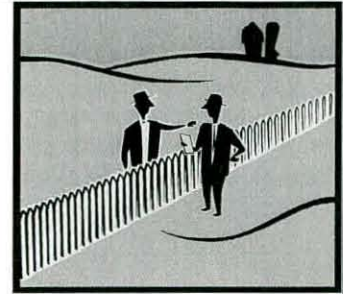
BE A GOOD NEIGHBOUR

WHAT?

Many in the local community will regard the start of construction work in their neighbourhood with great concern.

The public are often afraid that construction work will bring noise, dust, road closures, increased heavy road traffic and disruption to normal life.

Being a good neighbour means all those involved in a construction project acting with consideration for all those who live and work in the area surrounding the construction site to minimise their inconvenience.



WHY?

- Public image** Being a good neighbour creates a positive image of the industry
- Avoid programme delays** If neighbours complain to their Local Authorities about dust or noise nuisance caused, the Local Authority can impose conditions and restrictions on working, which can lead to delays.
- Avoid prosecution** If any problems being caused by dust or noise are not satisfactorily resolved the Local Authority can prosecute those responsible.
- Reduce costs** If good relations can be established with neighbours, many issues such as access to site, material deliveries and working hours can be improved through friendly negotiation.

DO

- ✓ Be polite and considerate to members of the public at all times
- ✓ Take accurate notice of any complaint made by a neighbour and pass it on to your line manager
- ✓ Only use approved routes to access the site
- ✓ Use only designated parking areas, if they are provided, otherwise always park vehicles with consideration for the needs of others
- ✓ Keep dust and noise to a minimum
- ✓ Always close any noise reducing engine covers while plant is in use
- ✓ Direct site lighting and task lighting away from neighbouring properties
- ✓ Tell your line manager if rubbish bins or skips are full or nearly full
- ✓ Notify your line manager immediately if you find any flytipped waste in the area

DON'T

- ✗ DON'T obstruct vehicle accesses or driveways to neighbouring properties
- ✗ DON'T obstruct public rights of way such as pavements, footpaths, bridleways
- ✗ DON'T drag mud onto the roads outside the site - make sure vehicle wheels are clean before leaving
- ✗ DON'T trespass on neighbour's land
- ✗ DON'T leave engines running unnecessarily
- ✗ DON'T shout on site or have noisy radios on



- ✗ DON'T shout or whistle at passers-by
- ✗ DON'T drop litter or leave sites untidy
- ✗ DON'T leave gates to the site open.

No 24

SEGREGATION OF WASTE

WHAT?

Segregating wastes into hazardous, non-hazardous and inert waste types for disposal can help minimise costs and maximise the opportunities for recovery and recycling of wastes. Look out on waste containers for these standard signs, which are being introduced across the UK to encourage and improve the segregation of waste.



WHY?

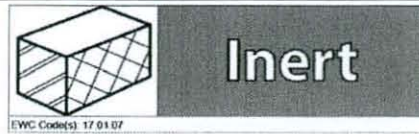
- ❑ **Avoid prosecution:** It is illegal to mix hazardous waste with other waste types which are to be sent directly to landfill. You could be fined up to £20,000 and imprisoned for up to 2 years.
- ❑ **Avoid environmental harm:** Incorrectly disposing of hazardous waste could cause water pollution and damage habitats. Landfills and waste treatment centres are specially designed to be able to handle specific wastes without causing environmental harm.
- ❑ **Reduce Costs:** Segregating wastes can minimise landfill tax and can also allow certain types of waste to be recycled and reused on site.

DO

- ✓ Look out for the standard signs shown here and whenever possible segregate wastes into the different types
- ✓ Use enclosed or covered skips
- ✓ Ask your line manager for advice if you are unsure about correct waste segregation on site

DON'T

- ✗ DON'T overfill skips
- ✗ DON'T mix different types of waste
- ✗ DON'T put liquids and flammable wastes into skips



EXPLANATORY NOTES:

CARA: Refers to the "Conservation of Agricultural Resources Act" which is **national legislation** that has classed some plants as declared weeds and invader plants in various categories and governs the control of certain plants.

- **Category 1** plants are prohibited and must be eradicated
- **Category 2** plants are often escapees from commercial plantations and may only be grown in demarcated areas under controlled conditions with special permits.
- **Category 3** plants are often ornamental introductions and may no longer be traded or planted. Where they occur within 30m of the 1:50 year floodlines of watercourses or wetlands, they must be eradicated.

BIODIVERSITY: Refers to the richness of the variety of living plants animals, organisms and ecosystems and their inter-relationships which make up our environment. These elements of the environment need to be intact and functioning properly in order to effectively provide "**Ecosystem services**", such as cleansing of water, clean air and provision of other resources that are necessary for human survival.

COPPICE: Refers to a plant producing many new shoots at the point where its stem has been cut.

BIOCONTROL: Refers to the use of living organisms to control pests.

LEAF SHAPES:

COMPOUND: Refers to leaves where the leaf is divided up into many smaller leaflets which are attached to the leaf stalk. Some leaves are twice compound (such as the bipinnate leaves of the wattles)



PALMATE: Refers to leaves which have three or more lobes or segments spreading from the same point, like the fingers of a hand.



CONTROL METHODS:

RINGBARKING:

Refers to the removal of bark from the bottom of the stem of the tree around the circumference of the stem so that it interrupts the flow of nutrients and water between leaves and roots, causing the tree to die.

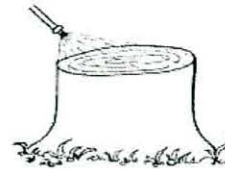


FOLIAR SPRAY:

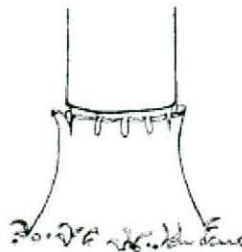
Refers to the spraying of the leaves (foliage) of a plant. It is usually only cost effective to do this when plants are still small.

CUT STUMP TREATMENT:

Refers to the felling of the tree or shrub and then spraying the stump with a herbicide.



FRILLING: Refers to the use of a cane or bush knife to make a ring of downward slanting cuts through the bark into the sapwood near the base of the stem of a tree or shrub. A complete or partial ring may be made depending on plant to be treated. Herbicide is then applied into the cuts.



BASAL BARK TREATMENT:

Refers to the application of herbicide mixed in a diesel carrier to the portion of the stem of the tree or shrub at the base of the stem.



REFERENCES AND FURTHER READING:

Bromilow, C. (2001). *Problem plants* : Briza

Henderson, L. (2001). *Alien Weeds and invasive plants* : Plant protection Research Institute.

Campbell, P. L. (2000). *Rehabilitation recommendations after alien plant control*. *Plant protection research institute handbook 11*. Plant Protection Research Institute

BALLOON VINE

Botanical name: ***Cardiospermum grandiflorum***



DESCRIPTION AND IDENTIFICATION:

- Balloon vine is **originally from South America** and is thought to have been introduced as an ornamental.
- It is a **fast growing creeping annual or perennial climber** depending on the area in which it is growing. Although fairly slender stemmed, it has strong tendrils and can **climb up and smother trees over 10m tall**.
- The **stems and leaves are often covered in tiny hairs**. The compound **leaves** are bright green with distinctly **serrated leaf edges**.
- It has **small white or yellow flowers** which are produced most of the year round.
- It has **balloon-like inflated seed capsules** which hang in clusters and turn from green to brown before releasing the seed.

ENVIRONMENTAL THREAT:

- **Balloon vine is a category 1 prohibited declared weed and must be eradicated.**
- Balloon vine **reproduces prolifically from seed** and will quickly cover substantial sections of indigenous vegetation if allowed to establish itself. It **smothers indigenous vegetation** and blocks out light from forest floors. It is particularly problematic in riverine areas and kloofs where it can affect large trees.

CONTROL:

- **Do not move plant material or material containing balloon vine seeds without specific instructions on preventing further weed dispersal.**
- Balloon vine is relatively easily **controlled by pulling the roots out of the ground**, after which the rest of the plant will wither and die. Remaining vine pieces in tree canopies are often left there to die as they are relatively inaccessible in the upper branches. It is at first unsightly, but will usually disintegrate and fall off within a year.
- A substantial seed bank is often in the soil & **follow up treatments** to pull out emergent seedlings are needed.

BLACK WATTLE

Botanical name: *Acacia mearnsii*



DESCRIPTION AND IDENTIFICATION:

- Black wattle was **introduced from Australia**. It is grown commercially to produce tannic acid, wood pulp and timber.
- Black wattle is an **evergreen tree** which grows to about **15m** high. The **branchlets** are shallowly **ridged** and most parts are finely **hairy**, with the **growing tips** having a **golden** colour.
- The dark olive green **leaves** are **bipinnately compound** with tiny leaflets about 0.5cm in length. There are **raised glands** **irregularly spaced** along the main leaf stalk.
- The **flowers** are in sprays of small fluffy fragrant **creamy or pale yellow balls**.
- Dark brown **longitudinal seed pods** with constrictions around each seed are formed.

ENVIRONMENTAL THREAT:

- **Black wattle is a category 2 declared invader** and may only be grown in demarcated areas under controlled conditions with a permit. This species produces lots of seed which can be viable for over 50 years and is stimulated by fire to germinate.
- The growth of wattles along watercourses results in a greater **loss of water from the rivers** than would otherwise take place if indigenous vegetation was intact. Wattles replace indigenous plants.

CONTROL:

- Contact the site manager for instructions on the eradication and control methods for this weed. **Do not move** plant material or soil containing **seed without specific instructions for preventing further weed dispersal**. If using herbicide, always adhere to the correct application recommendations & **avoid contamination of non-target areas**.
- **Seedlings & saplings should be pulled out**. Wattle coppices easily so cut stumps and frilling of bark requires application of a herbicide such as 'Access'. Biological control agents are under investigation.
- **Plan for follow up treatments** to eradicate emergent weed seedlings and **rehabilitation** of degraded areas.

BUGWEED

Botanical name: ***Solanum mauritianum***



DESCRIPTION and IDENTIFICATION:

- Bugweed is originally from South America. It **produces numerous seeds** and is found along disturbed areas, watercourses, vacant land and in forest plantations.
- Bugweed grows quickly into a **shrub or tree to a height of 3-5m**.
- It has large, thick light **grey green leaves**. The leaves smell strongly when crushed.
- All parts of the bugweed, except for older stems are **densely covered with a whitish felt-like hairs**.
- Bugweed produces compact clusters of **purple flowers throughout the year**.
- Groups of globose **berries** are produced after flowering which then turn **yellow**.

ENVIRONMENTAL THREAT:

- **Bugweed** is a *category 1 prohibited declared weed and must be eradicated*. It **reduces** the capacity for indigenous vegetation to provide **ecosystem services**. It degrades riverine areas which causes loss of soil, **increased flooding potential** and negatively affects water quality.
- The **unripe fruits are poisonous** for people and the **hairs irritate the skin and lungs**.
- Bugweed fruits act as a **host for the fruit fly pest** which negatively affect food crops.
- The fruit is attractive to **birds** which spread the seed and in turn **fail to spread seed of certain indigenous trees**.

CONTROL:

- Contact the site manager for instruction on eradication and control methods for this weed. **Take care not to move plant material or soil containing bugweed seeds without specific instructions on preventing further weed dispersal**. If using herbicide, always adhere to correct application and safety recommendations.
- Bugweed is killed by **pulling out smaller plants by hand** before they make seed, **ringbarking** bigger plants or using a registered **herbicide**, such as 'Garlon 4', as a **foliar spray, bark or stump application**.

SESBANIA

Botanical name: *Sesbania punicea*



DESCRIPTION AND IDENTIFICATION:

- Sesbania is a **shrub from South America** which is found mainly in damp or wet places in or near rivers but is also often seen in dense stands along roadsides and refuse dumps.
- This **deciduous** shrub or small tree with **slender branches** has an overall **greyish green appearance** and grows about 2 - 4m high. The compound leaves have small pinnate **leaflets** which have **tiny pointed ends**.
- Sesbania produces dense **sprays of red or orange flowers** that droop down or outwards from Spring to Autumn.
- Longitudinally **winged brown seed pods** are produced after the flowers.

ENVIRONMENTAL THREAT:

- **Sesbania is a category 1 prohibited declared weed** and must be eradicated.
- Sesbania has the potential for rapid spreading, particularly when soil containing seeds is disturbed or transported. It forms dense stands which out-compete other plants and **reduce biodiversity**, particularly along rivers and wetlands, which in turn negatively impacts on water quality.
- Sesbania is **toxic**. The seeds are particularly lethal to birds and sheep.

CONTROL:

- Contact the site manager for instruction on eradication and control methods for this weed. **Do not move plant material or soil containing seeds without specific instructions for preventing further weed dispersal**. If using herbicide, always adhere to the application recommendations and **avoid contamination of non-target areas**.
- **Seedlings should be pulled out**. Cutting the plants whilst leaving roots intact encourages vigorous regrowth, so should be avoided unless it is followed by foliar or cut stump treatment with a registered herbicide such as 'Garlon 4'. Effective biological control in the form of an Argentinian beetle is also available.
- **Plan for follow up treatments** to eradicate emergent weed seedlings and **rehabilitation** where clearing of dense weed stands leaves areas with potential erosion problems.

LANTANA

Botanical name: *Lantana camara*



DESCRIPTION and IDENTIFICATION:

- Lantana is one of the world's 10 worst weeds and comes from tropical areas of America.
- It is a flowering **shrub up to about 2m** or can **scramble** on other plants **to 4m** high.
- The **stems** are pale, **4 angled in cross section** and have **backward facing prickles**. (sometimes when Lantana grows in shady or wet soils there are no prickles)
- The **leaves** are rough, **hairy** and **smell strongly** when crushed. The leaf **edge** is **serrated**.
- **Flowers** are produced all year in compact heads and can be **pink, orange, yellow, white** or a combination thereof.
- Lantana produces many small black berries with **seeds** which are **spread easily by birds** (Hence the isiXhosa name of Lantana is "ubutywala bentaka").

ENVIRONMENTAL THREAT:

- **Lantana is a category 1 prohibited declared weed** and must be eradicated. It forms dense impenetrable thickets, which replace indigenous plants and causes **loss of biodiversity**.
- Lantana contributes to an increase in **soil erosion** and can be **poisonous** for cattle.
- It increases degradation of watercourses which contributes to **increased flooding** and **poor water quality**.

CONTROL:

- Contact the site manager for instruction on control methods for this weed. **Take care not to move lantana seeds** or soil containing seeds **without specific instructions on preventing further weed dispersal**. If using herbicide, always adhere to correct application recommendations & **avoid contamination of non-target areas**.
- Lantana plants can be removed by digging out or chopping down dense bushes and spraying stumps and early regrowth with a registered herbicide such as 'Access'. **Small plants** should be **pulled out by hand before they make seed**.

NKBERRY

Botanical name: ***Cestrum laevigatum***



DESCRIPTION AND IDENTIFICATION:

- Inkberry is **originally from South America** and was introduced as an ornamental shrub and for windbreaks.
- It is an **evergreen shrub or tree** up to 15m in coastal areas.
- The inkberry tree has **shiny elliptic shaped leaves** with pointy ends. They have a **pungent smell** when crushed.
- Small **greenish yellow flowers** are produced in **clusters** at the end of branchlets from Spring to Autumn.
- **Purple-black berries**, after which the plant is named, are produced after the flowers.

ENVIRONMENTAL THREAT:

- Inkberry is a **category 1 prohibited declared weed and must be eradicated**. It is a serious **invader of coastal bush** and **forms dense stands** that replace indigenous vegetation and negatively impact ecosystem functioning.
- Inkberry is **poisonous** and the **unripe berries and young shoots** are **particularly toxic** to livestock, which get Chase Valley disease from ingesting it.

CONTROL:

- Contact the site manager for instruction on eradication and control methods for this weed. **Do not move** plant material or soil containing inkberry **seeds without specific instructions on preventing further weed dispersal**. If using herbicide, always adhere to correct application and safety recommendations and **avoid contamination of non-target areas**.
- Inkberry **coppices vigorously** so ringbarking is not an effective control method. **Seedlings can be pulled out by hand**. Chemical treatment on larger plants by means of **stump or basal bark treatment** with a registered herbicide such as 'Garlon 4' is effective.
- **Plan for follow up treatments** to eradicate emergent seedlings and plants and rehabilitate where necessary.

GUAVA

Botanical name: *Psidium guajava*



DESCRIPTION AND IDENTIFICATION:

- The guava tree is a native of **South America**. It was brought to South Africa as an agricultural crop for its fruit.
- It is an **evergreen tree or shrub** up to about 5m high. The **young branchlets are angled** and hairy.
- The **medium leaves** turn from a **bronze colour to green**, and have **clearly visible veins** which stand **raised on the leaf underside**. The leaves are **hairy**.
- Groups of **white flowers** are produced in **summer**, followed by the **round fruit** which contains many seeds. Ripe fruit **turns yellow** and has a **musky smell**.

ENVIRONMENTAL THREAT:

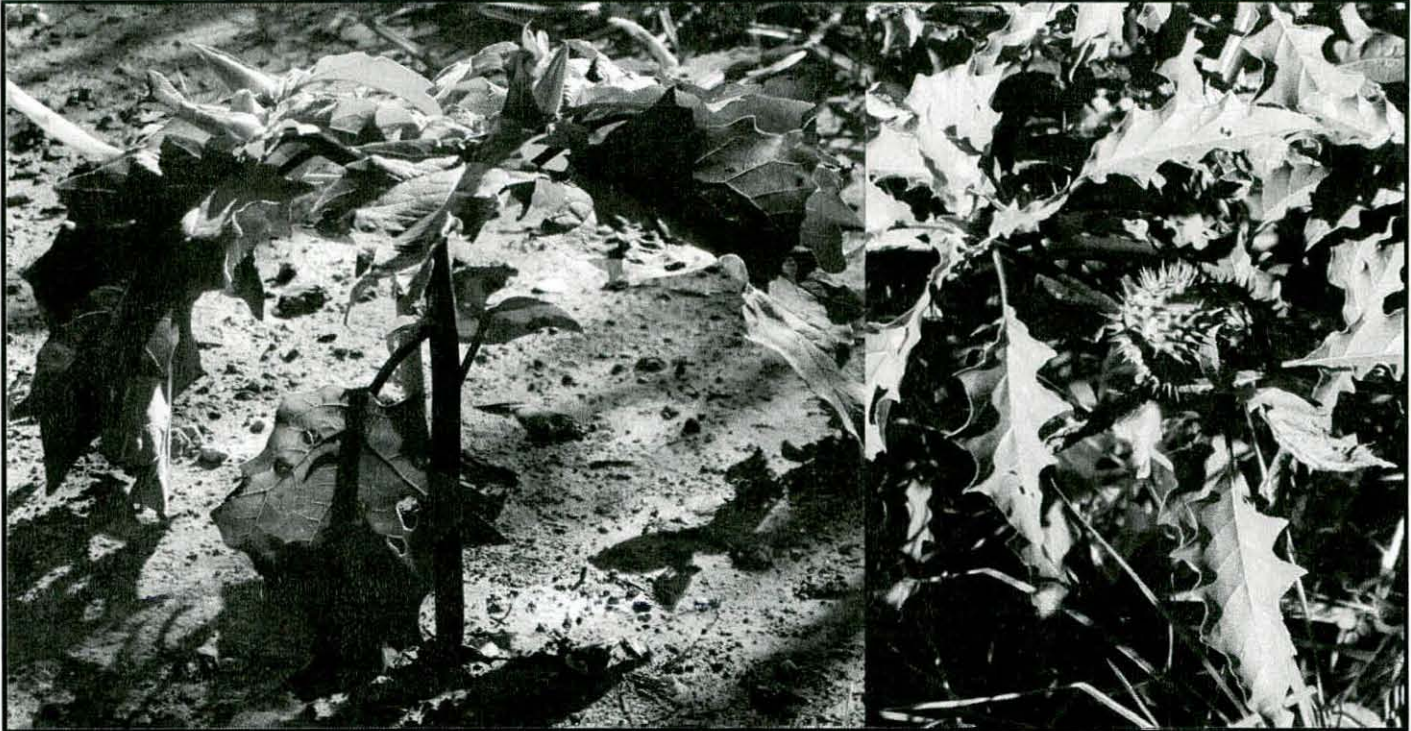
- **Guava** has escaped to the wild and become a serious weed. It is a **category 2 declared invader** and may only be grown in demarcated areas under controlled conditions with a permit.
- Guava is a **host for fruit fly pests** and can act as a source of infection for other crops.
- Guava is difficult to control once established because it has a **strong root system which coppices easily and produces root suckers**.

CONTROL:

- Contact the site manager for instruction on eradication and control methods for this weed. **Do not move plant material without specific instructions for preventing further weed dispersal**. If using herbicide, always adhere to the application recommendations and **avoid contamination of non-target areas**.
- Guava plants are **best controlled with total removal of the roots** or cutting and then control of the stumps with herbicide such as 'Chopper'. Ringbarking, bark-stripping and ordinary felling are ineffective.
- **Plan for follow up treatments** to eradicate emergent plants and **rehabilitation** where clearing of dense weed stands creates a potential for erosion problems and invasion of other weed crops.

COMMON THORN APPLE

Botanical name: *Datura stramonium*



DESCRIPTION AND IDENTIFICATION:

- The **common thorn apple** is from **North America**. It is grown in Europe & South America to produce atropine.
- It is a herbaceous **annual shrub** which grows up to **1.5m high**. The stems are often a dark purple colour.
- The dark green **leaves** are **large** with **clearly visible veins** and **lobed leaf edges**. They have a pungent smell.
- It produces erect **funnel shaped flowers** up to 10cm long in **white, mauve or purple**.
- **Seed capsules** turn from green to **brown** and become hard. They are **covered with slender spines**.

ENVIRONMENTAL THREAT:

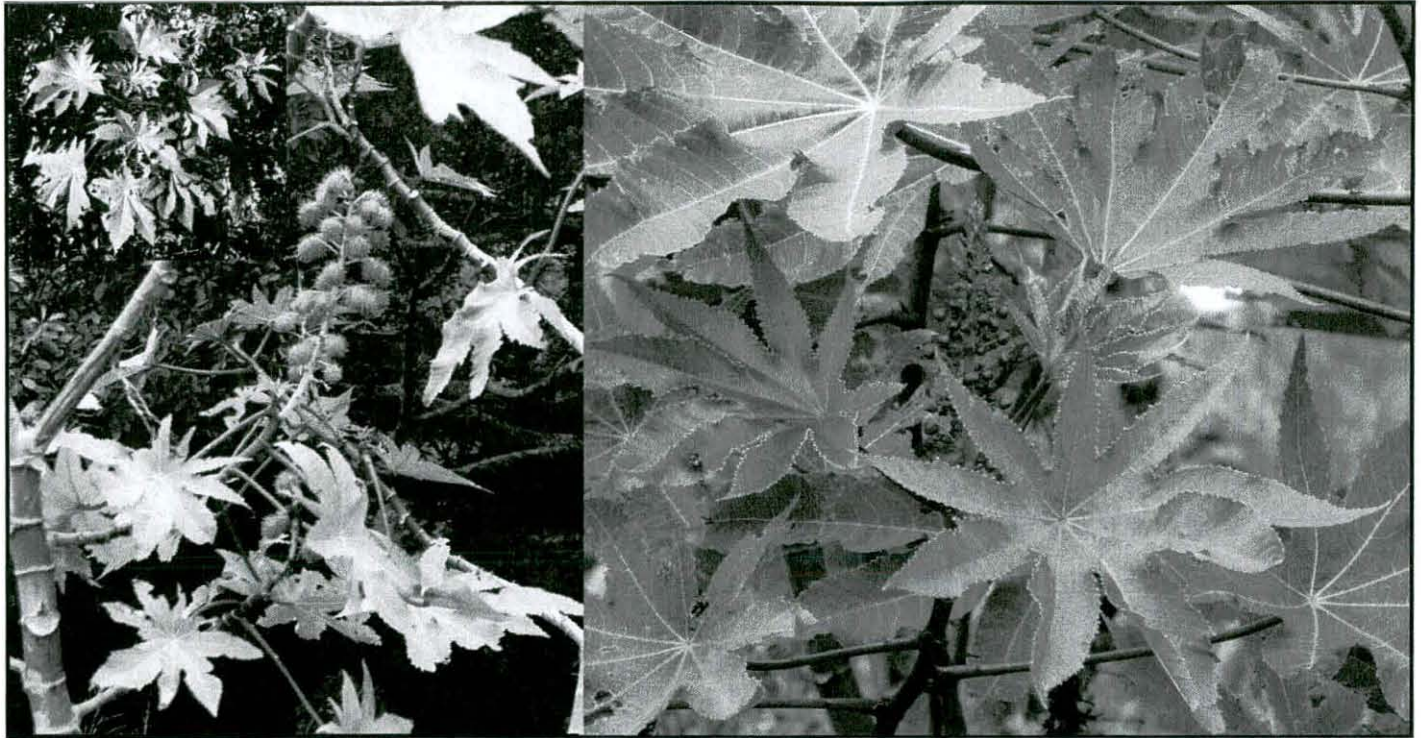
- The **common thorn apple** is a *category 1 prohibited declared weed* and must be eradicated.
- It has an **aggressive growth habit** and reproduces prolifically with seed which can germinate from deep in the soil. It is a pest in agricultural crops, on rubbish heaps and on disturbed soils such as roadsides and construction sites.
- Datura seeds and plants are **poisonous** and **human fatalities** have been **recorded** where people have ingested it.

CONTROL:

- Contact the site manager for instruction on eradication and control methods for this weed. **Do not move plant material or soil containing seeds without specific instructions on preventing further weed dispersal**. If using herbicide, always adhere to correct application and safety recommendations and **avoid contamination of non-target areas**.
- The common thorn apple can be killed by **uprooting seedlings by hand** or **applying a foliar spray** with a registered herbicide such as MCPA.
- **Plan for follow up treatments** to eradicate emergent seedlings.

CASTOR-OIL PLANT

Botanical name: *Ricinus communis*



DESCRIPTION AND IDENTIFICATION:

- **Origins** of the castor oil plant are thought to be **north or central Africa**. **Castor oil is extracted from the seeds after extensive purification** to make it safe for consumption.
- Castor oil is an annual or perennial **softly woody shrub up to 4m high**. The **younger stems are a reddish brown colour** and do not have milky sap.
- The leaves are **palmately compound** (like a hand with fingers) with 5 - 9 lobes and **serrated leaf edges** (margins).
- The small **flowers** are produced in most months except winter, **on upright spikes** and are a **cream and red** colour.
- **Seeds** are produced in **spiky lobed capsules** that are green, brown or reddish, depending on growing conditions.

ENVIRONMENTAL THREAT:

- **Castor oil plant** is a *category 2 declared invader* and may only be grown in demarcated areas under controlled conditions with a permit.
- It infests roadsides, riverbanks and areas of disturbed soil, causing **loss of biodiversity** & degrading natural areas.
- Castor oil seeds are **extremely toxic** to both humans and animals and ingestion of one seed is **potentially fatal**.

CONTROL:

- Contact the site supervisor for instruction on eradication and control methods for this weed. **Do not move** plant material or soil containing **seed without specific instructions for preventing further weed dispersal**. If using herbicides, always adhere to application recommendations and **avoid contamination of non-target areas**.
- **Seedlings can be pulled out by hand** or dug out relatively easily. A **foliar or basal bark herbicide application** such as 'Chopper' could also be applied.
- **Plan for follow up treatments** to eradicate emergent weed seedlings and rehabilitation where necessary.

SYR NGA

Botanical name: *Melia azederach*



DESCRIPTION AND IDENTIFICATION:

- The Syringa tree is native to areas **from India** to Australia. It was once planted in drier areas of South Africa as a shade tree and is now naturalised here. It is also known as the Persian lilac.
- It is a tall **deciduous tree** growing up to 23m high. The **bark on younger stems** is a **smooth reddish brown** with paler flecks.
- It has **glossy green compound leaves** that turn yellow and fall off in autumn. The leaflets have **serrated edges**.
- The Syringa produces large sprays of small **lilac and purple flowers in Spring**. The **flowers are scented**.
- It produces green **berries which turn yellow and wrinkled** and stay on the tree for a long time.

ENVIRONMENTAL THREAT:

- **Syringa** is a *category 3 declared invader plant* and may no longer be planted. Existing Syringa trees **must be removed where they lie within 30m of the 1:50 year flood line of a watercourse or wetland**.
- Syringa trees **replace indigenous vegetation and reduce biodiversity and natural ecosystem functioning**.
- The leaves, bark, flowers and ripe fruits are **poisonous** and the flowers can be a respiratory irritant.

CONTROL:

- Contact the site manager for instruction on eradication and control methods for this weed. **Do not move plant material or soil containing seed without specific instructions for preventing further weed dispersal**. If using herbicide always adhere to the correct application recommendations and avoid contamination of non-target areas.
- Physical removal of the stump and roots is effective so **roots must be removed or killed** by means of a basal bark treatment with a registered herbicide such as 'Garlon 4'. Seedlings should be uprooted in their entirety. Syringa coppices easily so **ringbarking and bark stripping are not effective** control methods.
- **Plan for follow up treatments** to eradicate emergent seedlings and plants.

APPENDIX K:

Company Profile for Aurecon

AURECON RSA OVERVIEW

Company Profile

Aurecon is a leading, vibrant, global group created by the recent fusion of three world-class companies, Africon, Connell Wagner and Ninham Shand. This new global group has a combined 210-year history; a staff complement of 6 700; and an office network extending across 28 countries worldwide.

Aurecon provides a broad range of multi-disciplinary professional services across diverse market sectors, and serves clients globally. Aurecon is committed to securing an enduring sustainable future and embraces diversity.

The company is principally owned by our executive staff; a group of hands-on professionals who continue to build their technical expertise. They are heavily involved in team management, staff development, and project work, with a strong focus on economic viability, constructability, functionality and sustainability.

The market sectors in which the groups forming Aurecon currently operate and in which they will continue to operate in an enhanced manner are:

- Advisory and Management Consulting
- Buildings and Property
- Community Infrastructure
- Defence
- Education and Training
- Energy
- Environment
- Health
- Integrated Communications Technology
- Industrial
- International Development Assistance
- Local Government
- Mining and Metals
- Oil and Gas
- Telecommunication
- Transportation
- Water

With our stability, geographic reach, depth of knowledge and experience Aurecon is able to effectively, efficiently and constructively manage your project.



offices: 87
 countries: 28
 employees: 6 700
 contact numbers:

AME Zone: +27 12 427 2000
 APAC Zone: +61 3 8683 1333

Africa-Middle East-Europe (AME) Zone

Asia Pacific (APAC) Zone

AURECON RSA OVERVIEW

Aurecon's Heritage Companies

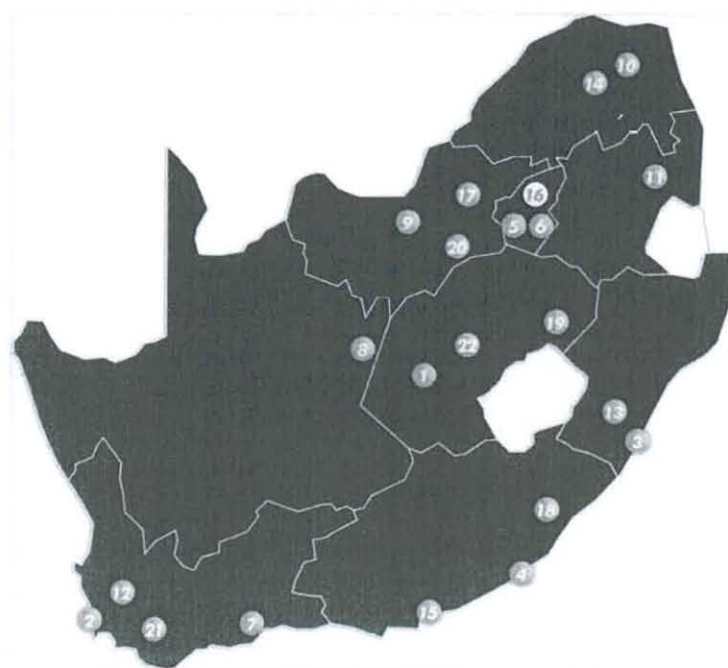
Connell Wagner is one of Asia Pacific's largest and most experienced multi-disciplinary engineering consultancies. It has a proud history spanning more than 75 years, approximately 4 200 employees, and a network of 49 offices in 12 countries across Australasia, South-East Asia, China, India and the Middle East. The company provides a broad range of professional technical services spanning diverse market sectors, namely buildings, industrial, transportation, urban development, water, international development, environment, energy, telecommunications and defence.

Africon is South Africa's largest multi-disciplinary engineering consultancy firms ranked amongst the world's "top 200 international design firms". The company, established in 1951, has a 58-year history, more than 1 900 employees and an office network extending across South Africa, the rest of Africa and the Middle East. Africon serves both the public and private sectors within the fields of transportation, property, municipal services, energy, and mining.

Ninham Shand is one of South Africa's leading, privately owned companies of consulting engineers and environmental scientists with a proud history spanning over 76 years. The company has an employee complement of almost 600 and a network of 19 offices spreading throughout South Africa and into Lesotho and Mozambique. Active in a wide variety of disciplines, Ninham Shand offers a comprehensive consulting service which includes water resources and supply, heavy engineering, purification, infrastructure services, structures and buildings, transportation and roads, and environmental science. Over the years, the company has been involved in a number of landmark projects and has won many prestigious awards.

Aurecon South African Offices

There are currently 22 local offices within South Africa, with some offices represented twice due to the previous Africon and Ninham Shand office locations.



- Offices**
- 1 Bloemfontein (2)
 - 2 Cape Town (2)
 - 3 eThekweni
 - 4 East London (2)
 - 5 Johannesburg
 - 6 Ekurhuleni
 - 7 George
 - 8 Kimberley
 - 9 Mafikeng
 - 10 Makhado
 - 11 Nelspruit
 - 12 Paarl
 - 13 Pietermaritzburg
 - 14 Polokwane
 - 15 Port Elizabeth (2)
 - 16 Tshwane (Head Office)
 - 17 Rustenburg
 - 18 Mthatha
 - 19 Hammismit
 - 20 Klerksdorp
 - 21 Stellenbosch
 - 22 Welkom

AURECON RSA OVERVIEW

Management

Paul Hardy, previously CEO and Chairman of Connell Wagner, is Aurecon's Global CEO, based in Melbourne, Australia. The former non-executive Chairman of Africon, Professor Jakes Gerwel, is Aurecon's non-executive Global Chairman.

Dr Gustav Rohde, past CEO of Africon, is the CEO of the Africa-Middle East-Europe (AME) Zone and Arnie Mohr, previously Managing Director of Ninham Shand, is Deputy Chairman of the Leadership Team, AME Zone. Anthony Barry, Connell Wagner's former COO, is now COO of Aurecon's Asia Pacific (APAC) Zone.

Shareholder Structure

Ownership of Aurecon will remain privately held by the current shareholders, with the vast majority comprising full-time managers in the new global business. In creating Aurecon, all three companies are considered equals in terms of their skills and capabilities.

The requirements for Black Economic Empowerment (BEE) in South Africa have been recognised and incorporated into the final ownership model. Aurecon will assume a status as a level 4 contributor to Broad-Based BEE in South Africa.

Equity Ownership

Aurecon is deeply involved in the process of renewal and empowerment. An integral part of the people's effort is to realise their vision of peace, progress and prosperity; of a continent empowered from within by its own human resources; asserting its rightful place in the international family of nations.

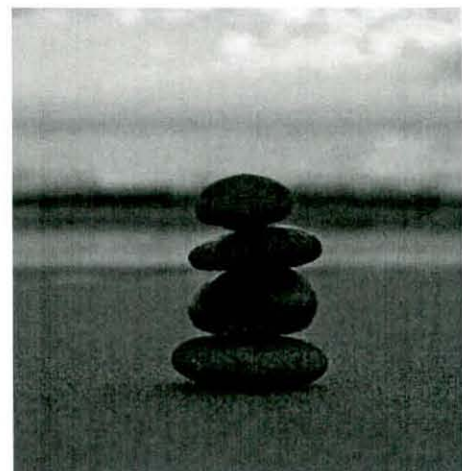
Aurecon, as a responsible corporate citizen, is committed towards South Africa's single most valuable asset: its people.

Outlook

Aurecon is currently focused on consolidating the strengths, skills and expertise of its three heritage companies in the global regions in which the Group currently has a presence.

The strategy for future growth involves bolstering Aurecon's presence in the Middle East, while seeking opportunities within developing economies throughout the African continent, APAC, the Indian subcontinent and beyond.

The establishment of Aurecon will enhance the provision of technical skills and expertise as well as improving service delivery capabilities across the globe.



Operating Markets

Aurecon will provide professional technical services on a broad range of integrated infrastructure projects to clients across two key zones: Africa-Middle East-Europe (AME) and Asia Pacific (APAC).

Vision and Mission

Aurecon's vision is to be established as a leading, vibrant and global company.

Aurecon's mission is to foster human development by deploying professional technical skills; and teaming with our clients for positive outcomes.

Integrated Technical, Advisory and Management Services

Aurecon offers engineering, scientific, management and advisory services, including

AURECON RSA OVERVIEW

technical and professional development training and international development.



Our in-house teams include a broad range of experts and specialist consultants who can work with you – through all phases of assessment, strategic planning, management, design and construction – to achieve your business and project outcomes.

Quality Management

Aurecon Africa-Middle East-Europe (AME) has implemented an integrated formal management system, which was compiled in compliance with the requirements of ISO 9001:2008 (Quality), ISO 14001:2004 (Environmental) and ISO/IEC 17025:2005 (Laboratory specific requirements). All Aurecon offices in South Africa have been certified to ISO 9001:2000, with the first certification dating back to 1998.

While current ISO certificates remain valid until October 2009, the company is already upgrading the certification to the latest revision of the standard, ISO 9001:2008. With PriceWaterhouseCoopers acting as the certification body, it is anticipated that this upgrade will be completed in July 2009. The company's Environmental Services Unit is certified to ISO 14001, with the scope of certification currently being expanded to include more Aurecon offices.



The Geostrada Engineering Materials Laboratory has been accredited by the South African National Accreditation System (SANAS) since 1991 and its schedule of accreditation covers approximately 80 tests. The Aspirata Microbiological and Chemical Laboratory has also been accredited by SANAS for ISO/IEC 17025 since 2007 and its schedule of accreditation covers approximately 15 tests.

Sustainability

Aurecon is a member of the Green Building Council of South Africa (GBCSA) and as such strives to produce work of the highest quality in terms of the designs, materials and technology used to reduce energy and resource consumption and create improved human and natural environments.



Skills Development

Aurecon places special emphasis on addressing the backlog of historically disadvantaged individuals in the engineering industry, and facilitating enhanced career development of these individuals. Aurecon offers bursaries and support for further studies at Universities and other Institutions of Higher Learning. A large number of in-service training opportunities are offered through learnerships. Young professionals are entered into Aurecon's Mentorship Programme and are linked to a mentor who is not their direct superior.

Technical training is provided to young entrants and technical specialists, who regularly attend a variety of short technical programmes.

SOUTH AFRICAN PROJECTS

Engineering design and supervision for the Peter Mokaba Stadium, Polokwane, Limpopo Province

The new Peter Mokaba stadium in Polokwane, Limpopo Province, has 45 000 permanent seats. The current construction value is R860 million and construction will be completed by end June 2009. Aurecon is responsible for all the engineering services, including civil, structural, geotechnical, traffic, electrical, and electronic, HVAC as well as fire and wet services on this project.



Aurecon, in partnership with Iliso Consulting, received a commendation in the category "Projects with a Value Greater than R5 million", for the Fairlands Office Complex project at the annual CESA/Glenrand MIB Engineering Excellence Awards in August 2008.

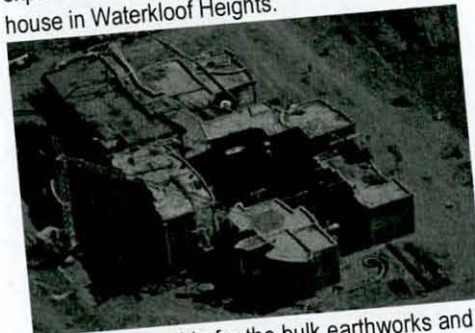
Department of Foreign Affairs Building Public-Private Partnership, Tshwane, Gauteng

The construction of the Department of Foreign Affairs building in Soutpansberg Road in Pretoria has been awarded to a Design and Construct Consortium with Concor as the main contractor. Aurecon, together with Iliso Consulting and LMA, were responsible for the civil and structural design of these new facilities which consist of a new office building and large conference centre of approximately 140 000 m², a new guest house also in Soutpansberg Road (3 600 m²) and the upgrading and expansion of the Foreign Affairs existing guest house in Waterkloof Heights.

RMB properties office complex in Fairlands, Johannesburg, Gauteng

The RMB office complex is the new corporate head offices for Wesbank and FNB Home Loans in Fairlands, Johannesburg. Aurecon's scope of services included structural, civil, geotechnical, facade, fire and wet services engineering for this 140 000 m² prestigious office development.

The development comprised two basement parking levels (80 000 m²) forming a podium for two separate office blocks and a shared facilities building. Each office block, one each for Wesbank (25 000 m²) and FNB Home Loans (16 000 m²), comprise three floors of open plan office space with entrance and central triple volume atrium spaces. Each tenant is housed in their own office block with dedicated main entrances. Each office block has access to the common shared facility placed centrally between the two offices, which houses a multi-purpose area, staff canteen, retail stores, display areas and landscaped recreational areas. Externally, provision is made for parking, a gate house and a utilities area.



Iliso is responsible for the bulk earthworks and all on-site services including roads and stormwater. Aurecon is responsible for the structural design of 80% of the main building, all structural steel bridges, balconies and roofs and all the facade engineering. The total value of the project is approximately R1.3 billion and the completion date is March 2009.

SOUTH AFRICAN PROJECTS

Gardener Ross Golf and Country Estate, Tshwane, Gauteng

Aurecon was appointed as infrastructure consultants for this prestigious US\$55 million Gardener Ross Golf and Country Estate. Situated in the Tshwane metropolitan area, this development boasts the only Ernie Els-signature golf course in Gauteng, as well as one of the best club houses, a wellness centre, a convenience retail development and a large number of exclusive residential dwellings.

Work on the development commenced in August 2004 and, going forward, will certainly be a big boost for the local economy by contributing to job creation in the Gauteng region. Phase 1 of the development was completed in October 2005, while phases 2 and 3 were completed end of October 2006. As part of the construction implementation programme, Aurecon also conducted a CETA registered pilot programme encompassing social training and HIV/AIDS education.



Val de Vie Winelands Lifestyle Estate, Berg River, Western Cape

This prestigious exclusive resort is situated on the banks of the Berg River between Paarl and Franschhoek in the Western Cape. It is surrounded by the Simonsberg and Drakenstein Mountains and bordered by vineyards and orchards.

Aurecon was appointed as principal civil, structural and electrical engineers. Aurecon also acted as the Health and Safety agent and was responsible for all contract management, administration and site supervision duties for this development.

The development includes two world-class polo fields, polo pavilion, stables, gym, wine cellar, luxury guest house, conference centre, residential stands, equestrian centre and sports facilities. The project was completed by June 2007.



Pinnacle Point Beach and Golf Resort, Mossel Bay

Set on the edge of the Indian Ocean, Pinnacle Point Beach and Golf Resort is situated at the gateway to the Garden Route. It consists of four hundred hectares of prime land, of which one hundred hectares comprise the nature reserve. The resort is home to indigenous wildlife, birdlife and 264 varieties of fynbos. Pinnacle Point consists of an 18-hole championship golf course incorporating three separate residential components – 120 golf lodges, 114 golf villas and 406 freehold erven. The development also consists of a 50-room hotel, casino and a wellness centre.



All developments are sensitively integrated with the surrounding nature reserve. The golf course includes dramatic cliffside holes and was designed by renowned golf architect Peter Matcovitch, who describes this course as "the most dramatic golf course site I've ever encountered anywhere in the world!"

Aurecon was appointed as principal civil, structural and electrical engineers for the entire

SOUTH AFRICAN PROJECTS

development. This included the drafting of the tender documentation and doing contract administration for the golf course. Aurecon was also responsible for the design of a 3,7 Mℓ wastewater treatment works. The civil services contracts, as well as the golf course, club house and main entrance facility were completed in 2006. The water treatment works were completed in October 2005.

Nondela Drakenberg Mountain Estate

Nondela Drakensberg Mountain Estate is a golf and country estate situated approximately 80 km south-west of Harrismith. The 18-hole Ernie Els signature golf course is surrounded by approximately 300 luxury mountain lodges. These are located on large erven, and with building work allowed on a small footprint only, the environmental impact is kept to a minimum. Equestrian facilities may be provided in the future.

As part of the development, 5 km of provincial road was upgraded to an all-weather surfaced standard, and a new school was constructed for the local community.



Aurecon was responsible for all engineering work in association with Allan Sutton Consulting Engineers, who were responsible for the design of the new Kopanong Dam.

Samrand mixed-use development site, Centurion, Gauteng

Aurecon was appointed by the Malaysian developer Samrand to assist in the planning, design and construction supervision of a 700 ha mixed-use development in Centurion, Gauteng. The site is situated north of the premises of the Development Bank of South Africa, alongside the N1 highway. Apart from all geotechnical investigations and design of

conventional municipal services, Aurecon also carried out extensive traffic surveys and traffic engineering studies.



The final development comprised the following:

- Light industrial and commercial facilities (258 ha)
- Office and commercial facilities (19 ha)
- Small-scale light industrial and commercial facilities (39 ha)
- Residential golf estate (188 ha)
- Exhibition centre (40 ha)
- Service station (5 ha)
- Community centre (4 ha)
- Retail (14 ha)
- Hotel (2 ha)
- Flagship building (1 ha)
- Open space (70 ha)

Also included in the project was the construction of a new interchange from the N1 freeway. Aurecon was also appointed for, inter alia, the detailed design and construction supervision of the new interchange.

Northgate Celebration mixed-use development, Johannesburg, Gauteng

Aurecon was appointed to do the preliminary and detailed designs for the new Celebration mixed-use development in Johannesburg. The Celebration site is bordered by Northumberland Avenue to the east, Aureole Avenue to the north, Valley Road to the west and Olienhout Avenue to the south. The development will be constructed in five zones as follows:

- School
- Village centre comprising retail, commercial and residential zones (similar to Melrose Arch)
- Residential (freehold and possible sectional title)
- Residential/commercial buildings
- Retail above the existing Sasol parking lot

SOUTH AFRICAN PROJECTS

The project started construction in 2007 and will be phased, depending on demand, to 2010.



Aurecon was responsible for the design of all civil engineering and structural services. This included electrical bulk services, wet services and facade engineering. The value of the services is worth R322.5 million.

Woolworths Distribution Centre

This new 87 000 m² Gauteng Distribution Centre for Woolworths will serve the entire country outside the Western and Eastern Cape. Aurecon is the structural, civil, geotechnical and transportation engineers for the project.



A major earthworks contract is needed to create a level platform of 1 km long. The main building has concrete columns and a structural steel roof with clear internal spans of 40 m. Wide racking aisles and a 12.5 m racking height are being used with FM2 floor tolerances as per concrete society TR 34. Freezer room areas, chilled areas, peri-ambient and ambient storage areas are being provided as well as a tray-wash area. External aprons are a combination of concrete surface beds and interlocking pavers.

Preparation of a National Transport Master Plan for South Africa, 2005-2050

The primary objective of this project was the development and formulation of a framework National Transport Master Plan (NTMP) that will enable decision-making by the National Department of Transport (NDoT) with respect to the relevant multi-modal and integrated transport infrastructure and services planning.

South Africa's nine provinces are each responsible for its own transport infrastructure and services planning. The respective municipal, provincial and national spheres are all subjected to, and hampered by, significant problem areas and constraints. The need was identified for an overall framework to address all problem areas and constraints, while at the same time providing guidance with respect to how transport infrastructure and services should be planned, in accordance with available and changing land-use, and decision-making with regard to transport infrastructure and services, within the available national legislative framework.

The purpose of the NTMP was ultimately twofold: This NTMP served as the required mechanism through which the NDoT provided a national framework in terms of which transportation systems planning, implementation, maintenance, operations, investments and monitoring decisions were to be made. The NTMP also served as an action plan that provided the NDoT with a time frame that indicated the actions required for addressing transportation systems planning, implementation, maintenance, operations, investments and monitoring decisions, and also indicated the time frame across which these actions had to take place. Aurecon provided:

- Data collection and synthesising of information
- Status quo overview
- Transport planning
- Transport economics
- Socio-economics
- Macro-economics
- Transport modelling
- Traffic and travel demand forecasting
- Scenario development
- Statistical analysis
- Spatial and land-use planning
- Financing, policy and investment
- Institutional restructuring
- Environmental planning
- Transport policy and legislation

SOUTH AFRICAN PROJECTS

Extensions and Upgrading of the International Terminals at OR Tambo International Airport, Kempton Park, Gauteng

The growth in international traffic required that the international terminals of OR Tambo International Airport be upgraded. The project started in 1996 with the upgrading and extension by some 75 m to the north of the existing terminal building. This entailed the construction of a basement, arrivals and departure levels, mezzanine levels and roof offices as well as the addition of three holding lounge nodes that extended some 40 m onto the airside apron. During the full duration of the construction works, the terminal was kept operational and all tenants had to be accommodated. A baggage sorter was installed as well as 102 check-in desks with three new baggage carousels in the arrivals hall.



This project was later extended to the south by demolishing the old existing domestic terminal building and replacing it with a new central terminal building some 225 m long by 70 m wide with a double basement for baggage handling and six floor levels above.



Aurecon was responsible for the structural support work for the baggage handling system in the double basement, the atrium roof lights, all the façade steelwork, and the wet services within the central terminal building. Additionally, Aurecon was also responsible for the HVAC design up to the tender stage. High priority was given throughout to keep the airport a neat and

safe environment in order for the public not to experience it as a construction site.

Cargo Hub Development at Polokwane International Airport, Polokwane, Limpopo Province

The Department of Transport in the Limpopo Province wanted to develop a cargo hub at Polokwane International Airport. The cargo hub will stimulate air freight in the province, as currently no cargo is being transported via plane from the province.

The project consists of the following infrastructure:

- International cargo terminal 5 000 squares (phase 1)
- Taxing ways and apron areas
- 300 serviced industrial stand
- Fuel farm

Aurecon has been appointed to provide all services associated with this cargo development. The project is due for completion in February 2010, with the value of services standing at R25 million.



Improvements to National Route 1 Section 21 Between the Brakfontein and Flying Saucer Interchanges

The South African National Roads Agency Limited (SANRAL) decided to upgrade the freeway network surrounding Johannesburg and Pretoria in the Gauteng Province of South Africa. The project is known as the Gauteng Freeway Improvement Project (GFIP). The network was constructed between the mid 1960s to the mid 1980s. After many years of use, the network has become very congested. The works were divided into approximately six work packages. Aurecon tendered on a number of the packages and won work package D1; improvements to N1 route Section 21 from Brakfontein Interchange to the Flying Saucer

SOUTH AFRICAN PROJECTS

Interchange.

The section is approximately 10 km long and is heavily trafficked. The scope of the road works includes adding an additional lane and the widening of existing lanes in both freeway directions as well as the upgrading of three interchanges. The structural work consists of the widening of six existing bridges and the construction of four new bridges. One of the new bridges is a 250 m long incrementally launched bridge.

The Value of the road works is approximately R42.63 million and the work is due for completion in September 2010.

Independent Engineer for the N4 Platinum Toll Highway

Aurecon was appointed to act as Independent Engineer on the Platinum Toll Highway, which includes the portion of the N1 between Pretoria and Bela-Bela, as well as the N4 between Pretoria and Skilpadhek on the border with Botswana.



Aurecon's duties included coordinating the tender process, advising on a preferred bidder, auditing preliminary and detailed designs, including various engineering disciplines, environmental aspects and socio-economic development, reviewing construction control, including review of an Incident Management System (IMS), Management Information System (MIS), quality assurance, toll systems, operation and maintenance, financial auditing and legal issues. Services included:

- Reviewing preliminary and detailed designs
- Reviewing environmental aspects
- Socio-economic development

- Reviewing construction quality control, including review and audit of an Incident Management System (IMS), Management Information system (MIS) and quality assurance
- Toll systems operation and maintenance
- Financial auditing
- Reviewing legal issues

Upgrading of 14 km of National Road N2 Section 9 from Tsitsikamma to Witelsbos, Garden Route

Aurecon won the prestigious *Mail & Guardian* "Greening the Future" Merit Award in 2008 for this project, a 14 km section of a strategic and scenic national road through South Africa's garden route and the last section of the N2 to be upgraded to toll road standards. A 4 km section passes through indigenous forest, with associated environmental challenges. The design called for vertical reinforced earth walls at the high fills and a retaining system at the deep cuts to minimise the impact of the road on the forest. A massive Yellowwood tree became the environmental signature of the project and a 20 m span bridge is being constructed to protect its roots and drainage patterns.



Three new bridges and 14 major culverts were being constructed. The initial design of this project started in September 1998 and ended in August 1999. In 2005 and 2006 designs were refined and the documentation and tender process took place, while construction started in January 2007.

Gautrain Rapid Rail Link, Gauteng

The Gautrain Rapid Rail Link is a state-of-the-art rapid rail network planned in Gauteng. The rail connection comprises of two links, including a link between Tshwane (Pretoria) and Johannesburg and a link between

SOUTH AFRICAN PROJECTS

Johannesburg International Airport and Sandton. Apart from the three anchor stations on these two links, seven other stations will be linked by approximately 80 km of rail along the proposed route. It supports the operation of a fast transit system capable of operating at 160 km/h. Aurecon has been extensively involved in the development of this unique rail system.



Sedibeng Sewer Scheme: Regional Programme Coordination and Gauteng Water Sector Support

The National and Gauteng Provincial Treasuries, Department of Water Affairs and Forestry (DWAf), Sedibeng District and Emfuleni and Midvaal Local Municipalities, the Gauteng Department of Local Government and the Department of Economic Development have embarked on the Sedibeng Regional Sanitation Scheme Project. This R860 million scheme aims to replace three ageing existing water treatment works with a brand-new large treatment works to be situated in the Vanderbijlpark area. More significantly, the scheme aims to eliminate over 50 ageing pump stations and ensure that sewers will not flow downhill to the new works.

Aurecon's main objectives for the assignment were to help ensure that DWAf's contribution and support were effectively managed; to assist the Emfuleni Local Municipality with collating and managing information on the project and to oversee the day-to-day water sector preparations and progress with implementation of the approved bulk infrastructure projects.



Aurecon, in collaboration with DWAf, sought to manage and coordinate the objectives, key performance areas and deliverables of the assignment in a multi-tier approach. This approach extended for the entire life cycle of the project, from the project inception to the close-out report and presentations.

Eradication of the Bucket Sanitation System for the Department of Provincial and Local Government

A budget of R1.2 billion has been allocated for bucket sanitation system eradication under the Municipal Infrastructure Grant (MIG) programme that is coordinated by the Department of Provincial and Local Government (DPLG). A further R400 million has been made available in the 2007/08 financial year for bucket eradication projects.



Municipalities are responsible for delivering services including provision of sanitation and are tasked with delivering sanitation in place of the bucket system. Many of the municipalities, however, are experiencing serious capacity constraints and other systemic blockages to delivering sanitation services. The DWAf together with DPLG and the 56 municipalities involved have determined the current backlogs within the affected municipalities, the status of delivery and the constraints to delivery.

The intention of this project is to deploy experts in the field of water and sanitation to provide

SOUTH AFRICAN PROJECTS

hands-on technical assistance to facilitate the eradication of the bucket sanitation systems.

Moreleta Spruit Outfall Sewer, Tshwane, Gauteng

Growth in the City of Tshwane Metropolitan Municipal (CTMM) area is especially evident in the east, where tremendous pressure is being experienced with regard to overloading of existing infrastructure, including sewer networks. This can be attributed to the mushrooming of residential townhouse complexes and the insatiable need of the current market for more affordable homes. The existing Moreleta Spruit outfall sewer system had insufficient capacity to handle the increased flow resulting in regular spillage of raw effluent during periods of peak flow. The overflow of the system caused pollution of the natural environment with the associated health risk and nuisance to residents living along the Moreleta Spruit. The CTMM appointed Aurecon to conduct the feasibility study and preliminary design of the outfall sewer system to determine the most viable refurbishment and upgrading alternative.



The project would ultimately culminate in the construction and upgrading of an estimated 30 km outfall sewers ranging in diameter between 450 mm and 1 200 mm.

Mokolo Crocodile River (west) Water Augmentation Project: Technical Module

The Mokolo Crocodile River (west) water augmentation scheme will provide water to strategic users in the Lephalale area, such as Sasol, Eskom and various coal mines. The client required a feasibility study to determine the best option for transferring water from the

Crocodile River to the growth hot spots around Lephalale, 130 km to the north. The objective of this feasibility study was to determine the optimum solution for the timely water supply of the required quantities of water to the various proposed developments of the coalfields in the Lephalale area. The purpose of the technical module was to perform the technical analysis associated with this project and to formulate clear recommendations on how to achieve the above.



Aurecon's role in the project included the project management and coordination of the team; large diameter pipeline design; geotechnical investigations; confirmation of user water requirements; risk assessment and the drafting of a mitigating plan; considering international obligations in terms of international water courses and reporting. Other firms are responsible for the design of dams, weir and pump stations, topographical surveys and the management of river abstraction.

Design and Construction Supervision for Berg River Dam and Supplement Scheme Including Gated Outlet Works, Spillway, River Abstraction Works, Pump Stations and Pipelines

The Berg Water Project will augment the water supply of the Western Cape region and specifically that of the City of Cape Town. The brief involved a dam-type selection study, in which clay core rockfill, composite RCC gravity/clay core rockfill and concrete faced rockfill dams were evaluated.

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The outlet works comprised a dual wet and dry well multi-level intake tower 63 m high with a 5.5 m diameter concrete outlet conduit. One of the features of the outlet works will be their ability to mimic the periodic natural floods that are necessary to mitigate the impact on the ecology and geomorphology in and around the river. It is possible to cater for a flood up to 200 m³/s, which will be released through the outlet works over a similar period to the natural occurring floods. The releases will take place through multi-level selector gates, an isolating gate (hydraulically operated bonneted slide gate) and a flow control gate (hydraulically operated radial gate).

The spillway comprises a 40 m long side channel with splitters and an aeration gallery, a discharge chute and deflector bucket and an 18m deep unlined plunge pool. The maximum discharge capacity is 740 m³/s. The plunge pool will also be used as energy dissipater for the flood releases from the outlet works. Model studies were undertaken of both the spillway and the outlet works.

The supplement scheme comprises an abstraction works on the Berg River 10 km downstream of the dam, two pump stations with capacities of 6 and 4 m³/s respectively and two steel pipelines of 1 500 mm diameter with a total length of 12.4 km. The abstraction works includes a series of sediment traps that can be hydraulically flushed to replenish deposited sand, gravel and boulders to downstream river reaches.

Vaal River Eastern Sub-system Augmentation Project (VRESAP)

The Vaal River Eastern Sub-system Augmentation Project is an emergency water transfer scheme. Water is abstracted from the Vaal Dam and pumped to the Knoppiesfontein

division structure over a distance of 115 km. From the division structure the water gravitates to the Bosjesspruit and Trichardsfontein Dams near Secunda. The primary bulk consumers served by the project are Eskom and Sasol.



Athlone Wastewater Treatment Works

This project included the upgrading and extension of existing 120 M³/d wastewater treatment works. The project firstly entailed the refurbishment of the existing 120 M³/d treatment works. This included the complete mechanical refurbishment of the works as well as the upgrading including inlet works screens, screenings washing, degritting sedimentation tanks, diffusers in bioreactors, sludge thickening (gravity and DAF) as well as the addition of clarifier capacity.

Secondly, it involves the addition of about 40 M³/d capacity to the existing works through the addition of an activated sludge process stream which makes provision for biological phosphorous removal. The project was completed during 2008 and the value of services is R30 million.

Sidwadweni Regional Rural Water Supply Scheme

This project is in keeping with the government's goal of providing potable water to all. The Nqadu Dam, situated in a beautiful private forest estate 25 km north of Umtata, was earmarked as a potential source of water supply to approximately 11 000 households (65 000 people) in 36 rural villages in the area.

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After Aurecon had promoted the scheme and produced a business plan, the OR Tambo District Municipality, Department of Water Affairs and Forestry (DWAF) and Consolidated Municipal Infrastructure Programme (CMIP) all vigorously supported the project.

This multi-disciplinary project involves the combined efforts of national and local government, civil, mechanical, electrical, social and environmental consultants, and land surveyors, as well as the leaders of the beneficiary communities. Value of services is R55 million, and the project was completed in 2008.

Detailed Design and Contract Administration for Hydro Power Generation Options on the As River, Bethlehem, Free State Province

Bethlehem Hydro appointed Aurecon to undertake the detailed design and project management duties for two mini hydro stations, one on the farm Merino along the As River and the other attached to the Sol Plaatje Dam, near the town of Bethlehem in the eastern Free State Province. Water from the Lesotho Highlands Water Project flows into the As River, providing a constant flow of approximately 24 m³/s within the river. The head at the Merino Site is approximately 14 m while that at Sol Plaatje is approximately 10 m. The installed capacity of the turbines is respectively 2.5 MW and 3.2 MW.



The layout of the power station for the Sol Plaatje Dam differed significantly from that conceptualised at feasibility study stage, achieving increased efficiency and generation output. Value of services is R3.2 million, with the project completed during 2008.

Bulk Earthworks, Stormwater and Civil Engineering Services for Phase 2 of the Nkomati Nickel Mine, Baberton, Mpumalanga

This project was the second phase of an expansion project. The aim was to produce nickel concentrate on-site at a plant. To this end, supporting civil engineering infrastructure and bulk earthworks were required. A tip for the crusher, an overland conveyor and plant terraces needed to be constructed with all appurtenant infrastructure such as roads, stormwater management structures, water and sewer reticulation. The site presented a challenge in that it was very steep, soil conditions were poor and rainfall was very high.



Aurecon's scope of work included the detailing of all designs, bill of quantities of all works and design and input during construction for:

- Bulk Earthworks
- Stormwater Design
- Civil Engineering Services
- Retaining Wall
- Roads

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- Geotechnical

Professional Engineering Services for the Development of the New Khumani Iron Ore Mine at Sishen

Aurecon was contracted to supply the bulk earthworks, roads, bulk water supply and civil engineering services for the new Khumani Iron Ore Mine (BKM Project) at Sishen. The main components of Aurecon's scope of work included the following:

- Bulk earthworks and layer works for the crusher tip
- Workshop platform
- Overland conveyor
- Stacker and reclaimer prisms at the ROM and product load-out and plant
- Bulk water supply and booster pump station
- Access roads
- Municipal services
- Stormwater attenuation dams



Aurecon developed and produced conceptual designs and the subsequent conceptual design drawings; developed detailed designs and subsequent detailed design drawings for construction, compiled schedules of quantities and provided assistance with special conditions of contract.

Development of a Compliance Monitoring Framework and Conducting Technical Audits of Licensed Electricity Generators in South Africa

Aurecon, in association with EirGrid PLC, Shanahan Engineering and Enzani Technologies, was appointed by the National Energy Regulator of South Africa (NERSA) to undertake the development of a compliance monitoring framework and conduct technical

audits of licensed electricity generators in South Africa. The development of the Compliance Monitoring Framework (CMF) is envisaged as a tool to be used by NERSA in future assessments of power stations to measure levels of compliance with the Grid Code and other statutory documents. The CMF is also designed to bring to light any areas of focus which may need to be included in the current Grid Code, or clauses in the Grid Code which may be redundant. In addition, the CMF makes provision for future legislation to be included. The technical audits, utilising the CMF, will provide the Energy Regulator with a broad overview of the current status of selected power stations in terms of their compliance across various dimensions, which would greatly assist NERSA in assessing current capacity, maintenance and refurbishment needs and planning for the short, medium and long-term. The project was divided into three phases: inception, analysis and reporting.

Aurecon was tasked with asset and project management, technical audits and the transfer of skills and training.



Electrical Design and Construction Supervision for the Upgrade of Runways, Taxiways and Hardstands at the Waterkloof Air Force Base, Pretoria, Gauteng

Aurecon was appointed for the design and construction supervision services required to upgrade the runways, taxiways and hardstands at the Waterkloof Air Force Base in Pretoria. The aim of the project is to upgrade the facility to the same international standards as OR Tambo International Airport, and that this facility complies with the CAT II standards. The

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intention is that the airport must be able to accommodate modern aircraft like the Airbus A400M and in emergencies, wide-bodied aircraft like the Airbus A380. All runway lighting, including approach lighting, precision approach path indicators (PAPIs), threshold lights, end lights, edge lights, centre line lights and touchdown zone lights for the runways must be evaluated, upgraded or replaced as required. Additionally, taxiway edge lights, a visual docking system, Apron floodlights and illuminated signs will be upgraded or replaced. The Civil Aviation Authority authorised all upgrades.

