

INSUFFICIENT AIRSPACE ... PLEASE LOAD AIRSPACE

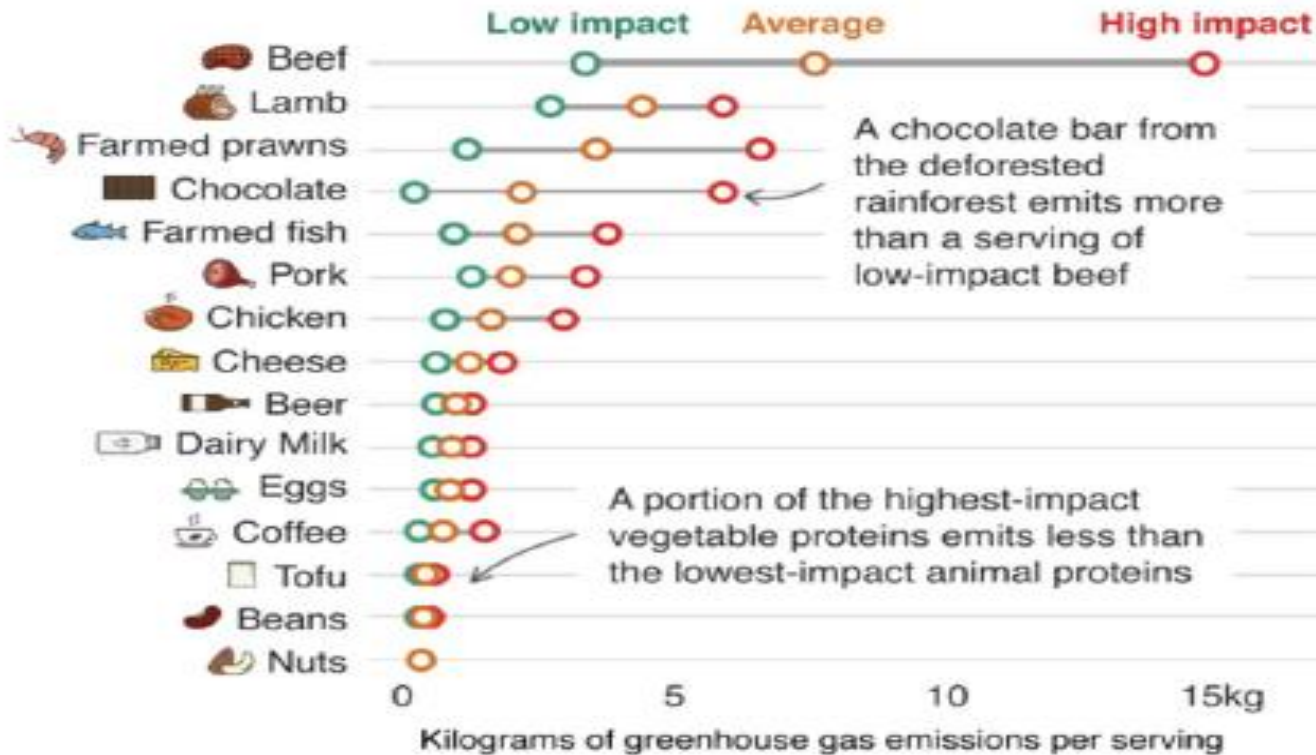


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South Africa

R PAPANICOLAOU & V DOMUN

KZN Waste Seminar: “2020 HINDSIGHT”

Did you know....Our Waste Space



Source: Poore & Nemecek (2018), Science

BBC



the fastest growing environmental pollutant, including CO₂

EWG Global Waste Management Outlook



We will deplete the known reserves of many resources **before** the end of this century.

UN TEE, US Geological Survey, BP, Warr et al, 2004



For every kg of waste that we discard, 70 kg are created upstream.

The Next Efficiency Revolution: Creating a Sustainable Materials Economy



Solid Waste actions have been **historically underrepresented** in emissions inventories

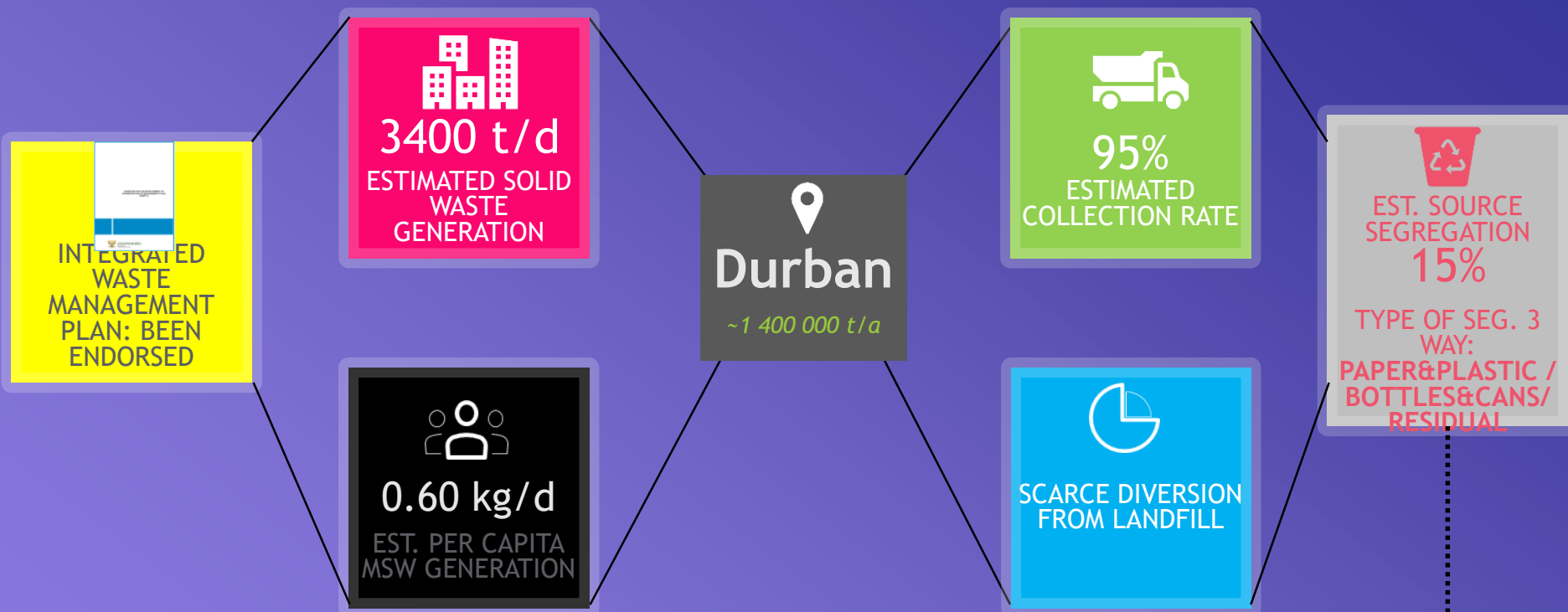


25% of the current global warming has been caused by methane.



Sustainable materials management can reduce the emissions gap to achieve the Paris targets in half.

Waste Management Context





Did you know....

- CSW transports some 700 000 t/a of General Waste
- Mileage covered ~ 220 million km/a ~1.5 x to Sun
- Fuel Bill ~ R60m/a
- Fuel Consumed ~ 4.8 million litres/a ~ 2 x Olympic Swimming Pools
- Tyres Rethread ~ 4300 No/a and Tyres New ~ 650 No/a
- Just saying....



DSW Shongweni Land Acquisition

- Landfill Footprint = 176Ha
- Landfill Bufferzone = 374 Ha
- Airspace Security = 90Years



"BANANA" SYNDROME

Residents kick up a stink over landfill

MATTHEW SAVIDES

EVERY day for two weeks at a



8 SUNDAY TRIBUNE NEWS JULY 7 2002

In polite society, there are certain things one does not do ... one does not urinate in Centre Court of the Pavilion on a Saturday morning. One does not spit in the boss' face.

It's not wise to insult the head of state; it's not clever for a restaurant manager to tell a customer to "shove it" when flies are found in his soup. And, in most societies, it is considered anti-social to defecate on a neighbour's doorstep.

Durban mayor Obed Mlaba knows all this. He also knows it would be folly for his council to dump the city's rotting garbage and quantities of sewage sludge in a giant new tip next to the rich folk of Musgrave Road. They wouldn't stand for it. And they have enough money to make his life a misery in the law courts.

There's little chance either that a major rubbish dump will ever be built next to the worthies of Forest Drive, La Lucia. Nor, for that matter, in the rarefied atmosphere of Mount Edgecombe Country Club Estate. But in the predominantly working class suburb of Clare Estate (a little way up the hill from Makro in Springfield Park), it's quite acceptable to do this sort of thing. Even in the "new" South Africa.

For 20 years, Clare Estate folk have had to put up with the stench of the city's rubbish on a daily basis. When we consign the detritus of our daily lives into black plastic council bags, our waste problems have come to an end. It has become someone else's problem.

Dump a matter of life or death

A Durban woman is going to court to attempt to close down or clean up the city's biggest garbage dump, reports **Tony Carnie**

city's biggest rubbish tip.

To be sure, the Durban Solid Waste department has tried quite hard to disguise the stink - just last year a long line of aerosol deodorisers was installed along a boundary fence to "freshen" the neighbourhood air.

But for Ms Sajida Khan, one of several long-standing residents of Clare Road, all the perfumes of Arabia will never take the vile smells away. Nor will they take away the pain she and her family have suffered after two family members were diagnosed with cancer.

Khan may lack conclusive proof that the disease is linked directly to

her fears were raised considerably when she uncovered evidence of at least six cancer cases among the 10 households in her immediate block.

Could it be that pollution from Durban's biggest dump site doesn't just smell? She wonders whether the lifeblood of some residents has been poisoned by toxic dumpsite fumes and pollution from the medical waste incinerator which operated at Bisasar Road for several years.

There is no easy answer to this very serious allegation. Yet it is one of the many questions Khan hopes to raise in the High Court shortly when she takes legal action against



Several shack settlements have been developed around Bisasar Road in recent years. Durban's poorest residents earn a living from scavenging in the dump. But the presence complicated efforts to resolve odour management from the site.

Water Affairs Minister Ronnie Kasrils, and the national departments responsible for water, ground and air pollution.

Within the next few weeks, further details of Khan's inquiries may surface in court. For the last five years she has been gathering a dossier of complaints and information concern-

The full contents of her 620-page dossier remain under legal wraps until the court hearing, but the history of complaints about Bisasar are common knowledge to many locals.

According to recent correspondence, Durban Solid Waste has failed to disclose the results of air quality monitoring reports despite persistent

water affairs and company outline to establish a buffer to minimise nuisance.

According to staff are required with a layer of lime odours. "contravened on



SAY NO to LANDFILL

Durban residents smell a rat

Down in the dumps, something stirs... By Jonathan Erasmus

RESIDENTS OF DURBAN'S HILL AND show-jumping belt have long contended with the far-reaching pang of horse manure. Now they believe the air is being caused by a nearby chemical dump.

In 11 statements seen by News24, residents claim the air is polluted with a "thick pungent gas and chemical smell" leading to "nausea, vomiting, headaches, coughing spasms, eye wheeze" and "generally feeling revelling". They say it has got worse over the past six months.

In a joint statement, Gail and Don Smith say: "The only comparison we can make is of a rotting rat - one that has been dead for a few days".

Resident Amy Fisher, a food critic, claims she developed red boils on her neck and torso as a result of the foul air. "The dump smells like rotten eggs, wet socks and diesel gas," she said.

The chemical dump site is operated by Enviroserve. It accepts industrial chemicals, rendered foodstuffs, contaminated soil and general waste.

Initially, residents say, they were told the smell was the fault of a nearby Denny Mushroom farm, under their own rubbish, along with Transnet's diesel pipeline (which runs through the area and "burst a while back" at the strained sewage farm. However after sustained complaints, Enviroserve agreed to erect an air monitoring tower in April.

Ward councillor Gillian Noyce, who also sits on the landfill's oversight committee, said she had received "thousands" of letters from angry residents but believed the site is both "simple" and "legal". She said that because the site was "running so well", the committee now met only every second month.

"There is an hope of the site being closed down. They do take chemical products from a variety of companies in the city and if you put all chemicals



Smell detectors Lauren Johnson (left) and Sarah Rossouw

together it is not unlikely that you will get a noxious gas," said Noyce.

But she conceded that Enviroserve "can be fairly sensitive, to save money" by failing to cover holes in which chemicals had been dumped, in order to expose more in and by using "ash from Richards Bay" to "suppress" or cover the waste instead of using "dry soil as required".

Lauren Johnson, a resident at the supermarket Plantations Estate, has emerged as the neighbourhood's "de facto smell organiser". She said she was compelled "to go to the bottom of the stomach" for the sake of her family's health and is now collating data shared daily by residents who smell the odour and then log the time, place and type of smell.

"We're collecting this information, seeking advice from environmentalists as well as legal input to assess our options," said Johnson.

Her colleague, Sarah Rossouw, said some residents were in denial.

"Some remain quiet in the hope of protecting their property values and tell those complaining that it's simply their imagination," said Rossouw who has had to double the usage of her asthma pump in recent months.

In the past year-and-a-half, Hillcrest has been affected twice by leaks in Transnet's diesel pipeline, spilling more than 200,000 litres of fuel into gardens and fields. The contaminated soil is dug up and added to the dump.

Complaining the matter, the local sewage farm is known to dig up regularly. The residents also fear the likelihood of a new 200ha general refuse landfill site being built next to the chemical dump.

Enviroserve's assistant manager Clive Kidd said that from "time to time" they do have "problems with fugitive emissions" but "never at a level that would cause health or environmental concerns".

He said the air monitoring station will sample concentrations of non-methane compounds, hydrogen sulphide, aldehyde and ammonia compounds.

"It is possible that the current climatic conditions are also causing similar challenges at other odour source points... including farms, compost sites, fuel pipelines and spill areas, sewage works, illegal dumps and industrial areas," said Kidd.

He dismissed Noyce's assertions that they couldn't use ash and that the pits were "left open".

"I don't know where that comes from. Our licence allows for ash which doesn't come from Richards Bay and there is no benefit for us to leave pits open," he said.

City spokesman Thelani Mthethwa said the matter was "none of our business" and "will remain and address the matter".

FINGERS POINTED AT DUMPSITE

Concern over Hillcrest stench

Desiree Treweek

RESIDENTS of Plantations Estate in Hillcrest say they are experiencing nausea, headaches and coughing spasms because of "bad" air from the Shegweni waste disposal facility.

But a resident who lives less than a kilometre from the dump and has been there for 20 years, said he and his family had experienced "no such symptoms" and the Plantations residents had "probably not thoroughly investigated" to get to the root cause of the stink.

Residents submitted 11 written statements describing the smell from the dump as "pungent", "chemical" and "bad".

The smell is not confined to Hillcrest, though, with residents from Gillies to Hobbs Hill and Waterfall also complaining about a similar smell.

Plantations Estate residents, who have been the most vocal, have accused the owner and operator of the chemical facility - Enviroserve - of not disclosing that chemicals are being dumped there.

They said the stench started in June last year and has worsened since January.

"Over the past three or four months my family have been coughing, seemed to have developed asthma problems and are all suffering from headaches. We have been totally stumped to what it is," said resident Lauren Johnson.

"I have taken my daughter to doctors, who keep on telling us they are not sick. Only recently have I realised that these issues started around the same time that we started smelling this pungent smell at home," she said.

Another resident, Karen Norman-Smith, said when the "offensive odour" was around, "we like to close all windows and doors, yet the smell permeates our homes". Norman-Smith said she be-

lieved waste. He said some of the "more challenging" waste received in the recent months included expired food waste and contaminated soil.

Kidd said while the site did not accept medical waste, it did accept "waste" from a licensed medical waste treatment facility, and that this has been classified as "general waste".

All incoming wastes are analysed and pre-treated prior to disposal as required, to ensure that there are no harmful chemical reactions during disposal. From time to time, we do have problems with fugitive emissions generated by the site, but never at a level that would cause health or environmental concerns," he said.

In a statement sent to the residents of Plantations last week, Kidd said there was a "possibility" that the site could be responsible for the odours.

"As earthworks is allowed to remove both hazardous and general waste streams, we acknowledge the possibility that odours from the site could be seeping into neighbouring communities.

Other sources

"This could be due to the calm weather conditions and inversion layers experienced at this time of the year.

"The reported odours could also be attributed to a number of other sources in the area who operate industrial combustion," said Kidd.

He said Geocon, an "independent specialist" working on behalf of the Shegweni air quality management programme, placed an air quality monitoring station in Plantations in April.

The sampling device was removed about 10 days later for analysis. This was one of many such sampling devices that would be erected to ascertain the root cause of the odours.

"We have agreed with the residents of the estate to convene a meeting as soon as the

data, Dave Smith, who lives on a free-standing property, said that industries in the area closer to Plantations needed to be "investigated".

Smith, a member of the Shegweni air quality monitoring programme committee, said Enviroserve was "blatant" by the committee if they did anything wrong.

"If I have had to phone the site to complain in the last two years, it is a lot," he said, "and being so close, my family and I should also be affected, but we are not."

Smith said that sometimes there would be smell from the site, but that this was because, a by-product of captured sewage.

He said Enviroserve had complied with requests made by the monitoring committee.

While eThekweni Municipality has acknowledged that there has been a "significant" increase in the number of air quality complaints in the area, they have also said the bulk of the complaints have been lodged "directly with the affected parties".

"The complaints lodged with the city related primarily to an odour nuisance and these did not give an indication of health effects directly related to the air quality issues," said eThekweni Municipality spokesman Thelani Mthethwa.

There were "a number of potential sources in this area which might be contributing to the problem and this includes a landfill site".

Mthethwa refused to answer questions about allegations that the sewage works, situated close to Plantations, had been experiencing pumping problems, leading to raw sewage flowing into the umkhomoti river.

In December 2014, one of Transnet's pipelines ruptured in Hillcrest, spilling about 200,000 litres of diesel into Greenvale Village, another apartheid housing complex, about 1km from Plantations. But from this site is accepted

Programme Planning Out The Window

	Year	1	2	3	4	5	6	7	8	9	10	
	Total Budget	Jul15-Jun16	Jul16-Jun17	Jul17-Jun18	Jul18-Jun19	Jul19-Jun20	Jul20-Jun21	Jul21-Jun22	Jul22-Jun23	Jul23-Jun24	Jul24-Jun25	
Existing Landfill Sites												
Shongweni												
Waste Managment Licence	100,000	100,000										
Land Purchase	27,500,000		27,500,000									
Consultant Appointment + Supervision	12,500,000	1,200,000	1,000,000	1,000,000	1,300,000	900,000	1,500,000	1,500,000	2,100,000	500,000	1,500,000	
Infrastructure Development + Cell 1	30,000,000			20,000,000	10,000,000							
Cell 2	18,000,000						18,000,000					
Leachate Treatment Plant	10,000,000							10,000,000				
Cell 3	20,000,000								20,000,000			
Future development works	15,000,000										15,000,000	
Sub-Total Carried Over	133,100,000	1,300,000	28,500,000	21,000,000	11,300,000	900,000	19,500,000	11,500,000	22,100,000	500,000	16,500,000	-

Note : All amounts are estimated for planning purposes

[illegible][illegible]

Landfill Sites – Capacity Overview

<i>eThekwini Catchment Area</i>	<i>Central</i>	<i>West</i>	<i>North</i>	<i>South</i>	<i>New West</i>
Landfill Site	Bisasar Road	Mariannhill	Buffelsdraai	Lovu	Shongweni
<u>Focus Area</u>					
Design Airspace Capacity (m3)	25,000,000	4,400,000	45,000,000	9,660,000	54,800,000
Remaining Airspace (m3) - Approx	140,000	399,500	39,097,000	8,979,335	54,800,000
Tonnage Received (t/day) - Average	1000	1350	2135	770	3000
5Year Airspace Development	0	0	4,000,000	2,100,000	4,000,000
10Year Airspace Development	0	0	8,100,000	6,200,000	7,000,000
Remaining Useful Life (Years)	0.5	1.0	51	32	90

Closure

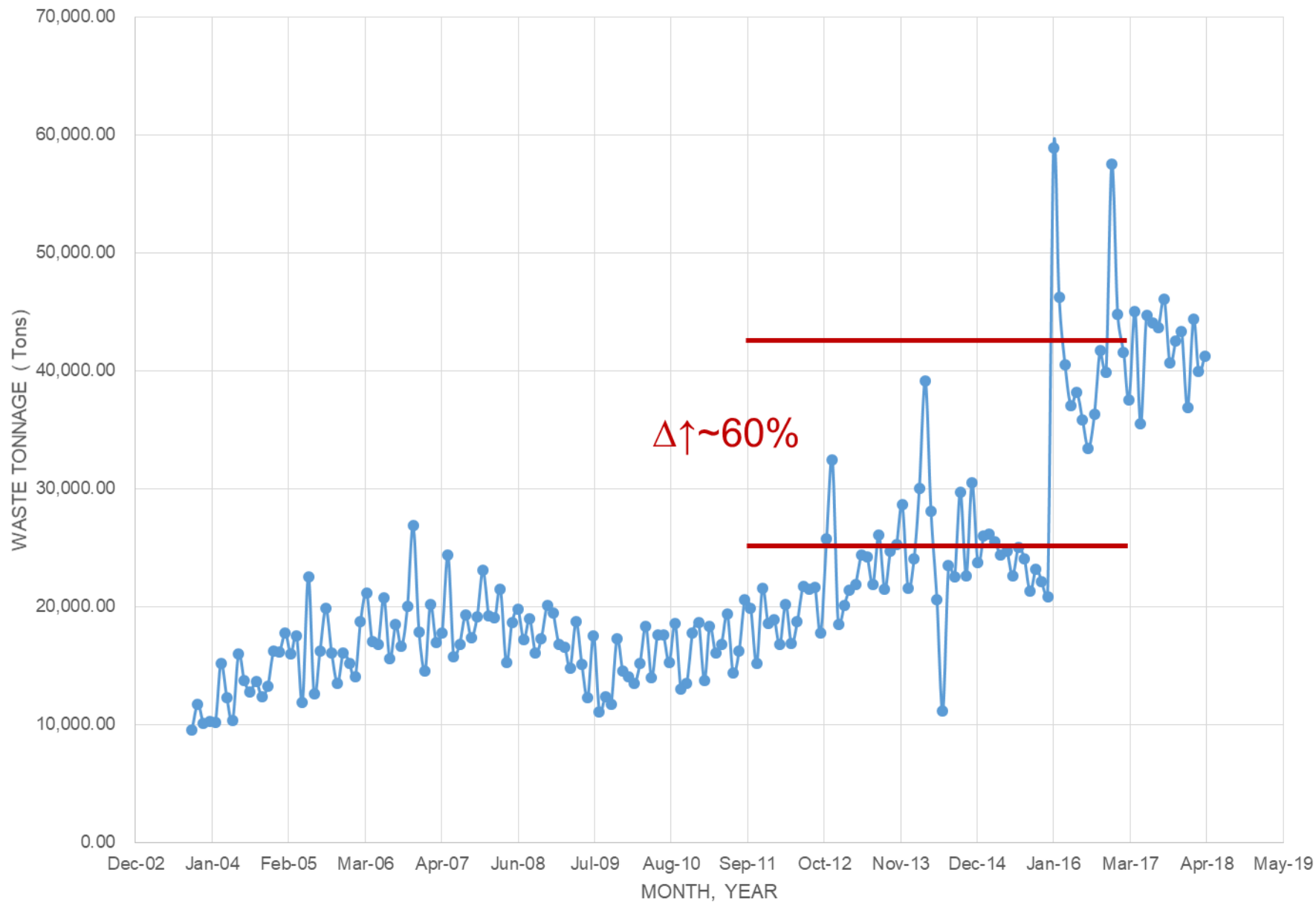
Expansion

New

REAL TIME CRISIS

- Mariannhill + Bisasar Landfill Site – Imminent Closure
- Projections show only some 1.5years Left for Central and Western catchments
- Even if DSW Shongweni – still 4.5years away!
- Transport Cost some R370 000/day (-R88/ton)
- Collection Negatively Affected
- Illegal Dumping – Pollution onto receiving environment

MARIANNHILL LANDFILL SITE - OVREALL WASTE TREND



Maximise
Compaction
?

Waste
Diversion

Or "Please
Call me"???

**Insufficient airspace! Please dial
*101*DSW# to load airspace or
recharge with waste
diversion/beneficiation?**

OK

Landfill
Mining

Waste
Beneficiation

Increase
Permitted
Height ?

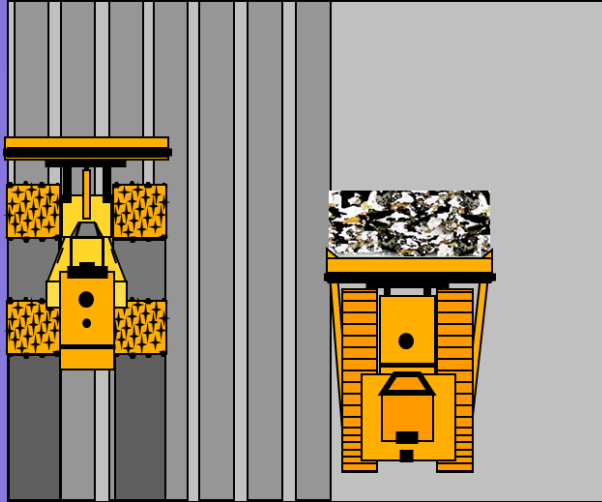
80-20 Rule

HOW ? LET US TRY...



Back to Basics – Maximise Compaction

Maximise
Compaction
?



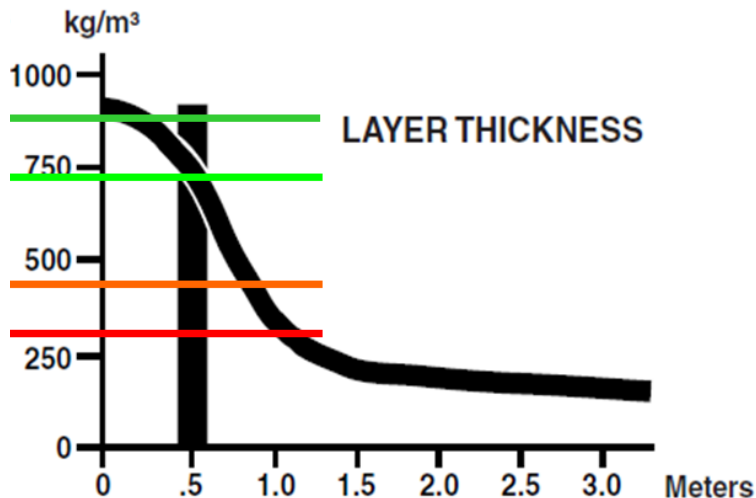
- Thick layers only compact the surface
 - Subsequent passes only compact the surface
 - Waste below the surface compacts slightly but remains spongy
- Thin layers, blend, bind, shred, compact uniformly
 - Subsequent passes keep binding together



Landfilling Systems Best Practice

Maximise
Compaction
?

- Dozer Spread / Pushes & Compactor only blades uneven areas !
- Dozer must lead to spread into layers & allows for “pre – compaction”
- Tandem Systems Operation – “Husband & Wife” ...push & compact
f (density, Maint, Fuel, Cycle times, compliance)
- *Improvement ~ 8% increased compacted density i.e sweat existing airspace*



Type of Run		Tons in layers	Tons / hr	Density	Fuel
DSW method	Day 1	128.34	138.82	605.66	57.66
826H solo	Day 2	128.42	106.46	642.20	49.20
% of DSW method			-23.31	6.03	-14.67
Systems	Day 4	129.68	149.89	654.95	66.20
% of DSW method			7.97	8.14	14.81
Systems =					
826H	compact				
D7R	Push / Spread				



Perhaps it's time to turn to Pedigree light dog food



Landfill Pressures

- South Africa's most reliable waste management option = Landfill ?

Rubbish Habits | Landfills are reaching saturation point as the country simply ditches 90% of its waste without recycling




DOING HIS BIT: A waste picker wades through the rubbish with his bag of pickings at Mamelodi landfill in Johannesburg, South Africa. POOR: Landfill sites all over the country are fast becoming too full to accept more waste.

PHOTO: JACQUES CORREIA

'Throwaway nation' trash crisis looms

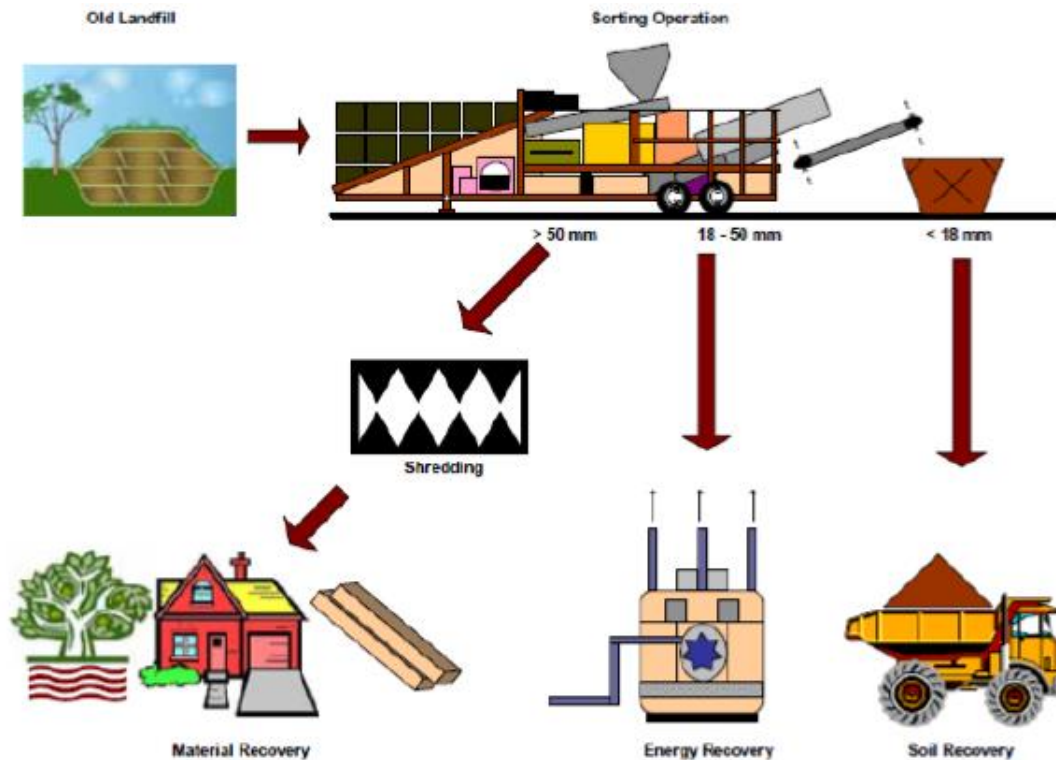
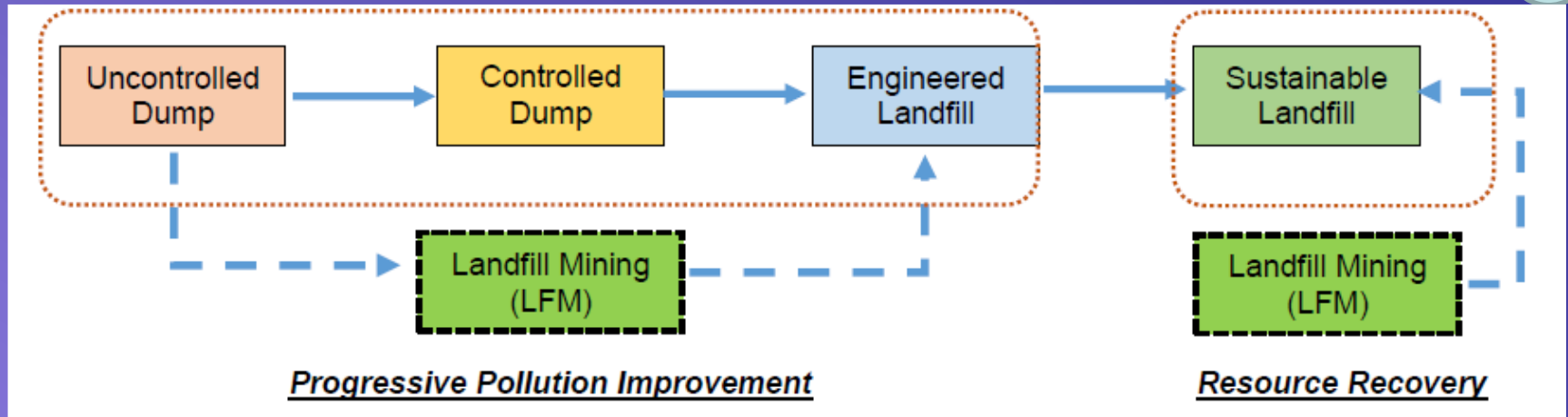
Landfill Mining - LFM

- 
- A cartoon character with brown hair, glasses, and a suit, standing with one hand on his chin and looking thoughtful. Above his head are three green question marks.
- LFM is not new – dates back to 1953
 - Rehabilitation of dumpsites – moving progressively towards environmental protection
 - Energy recovery from mined waste
 - Recyclable and or resource recovery for reuse
 - Conservation of landfill airspace
 - Redevelopment of landfill sites

✓ INVESTIGATE AIRSPACE SWOP TO
BUFFESDRAAI LANDFILL ?

LFM Process

Landfill
Mining



LFM Costs

- LFM cost variables f (*economic performance it generates*)
- Project Cycle Cost: Extracting, sorting, processing & recovering – extensive
- Technical, Environmental and Safety Challenges

Description	Unit of measure	Description	Unit of measure	Description	Unit of measure
Upfront Regulatory Aspects		Haulage		Waste Mang & Air Emissions License	
Environmental Impact Assessments / Approvals	Sum	Haul to Buffelsdraai - 160km return	m ³	Environmental Mang Prog - Audits	m ³
Specialist Works	Sum			Dealing with Leachate	m ³
		End Disposal		Dealing with Landfill Gas	m ³
Earthworks - Construction		Final Disposal - Process Safely	m ³	AEL Specials	m ³
Site Preparation	sum	Covering	m ³		
Preliminary & General - Skilled Supervision	m ³	Increased Leachate Mang	m ³	Contingency	%
Preliminary & General - Normal Supervision	sum	Increased AEL Measures	m ³		
Excavate - Special Specification	m ³	Liner expansion for additional waste	m ³		
Cover & Access Applications	m ³	Capping and Rehabilitation	m ³		
Liner Remediation	m ³				

LFM Costs

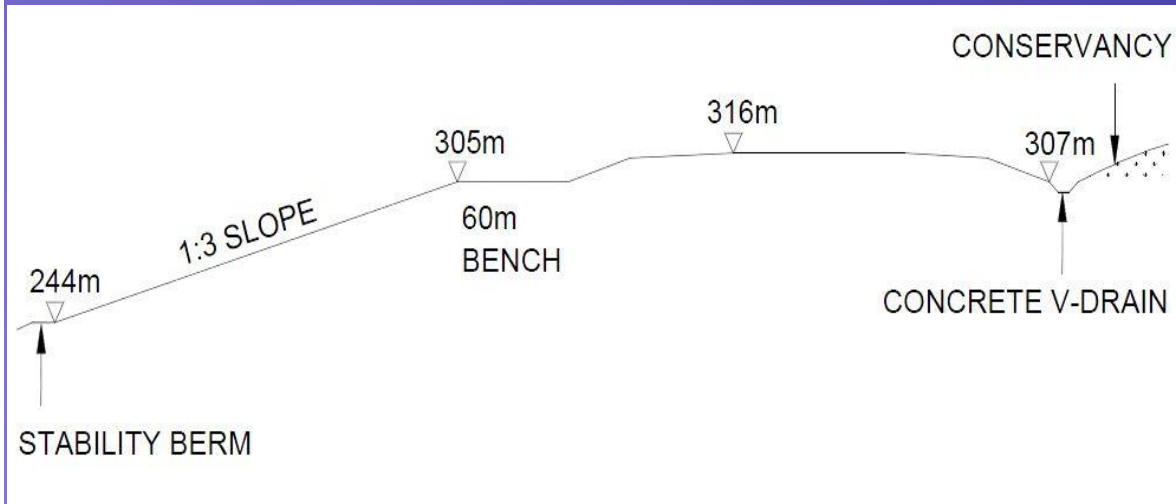
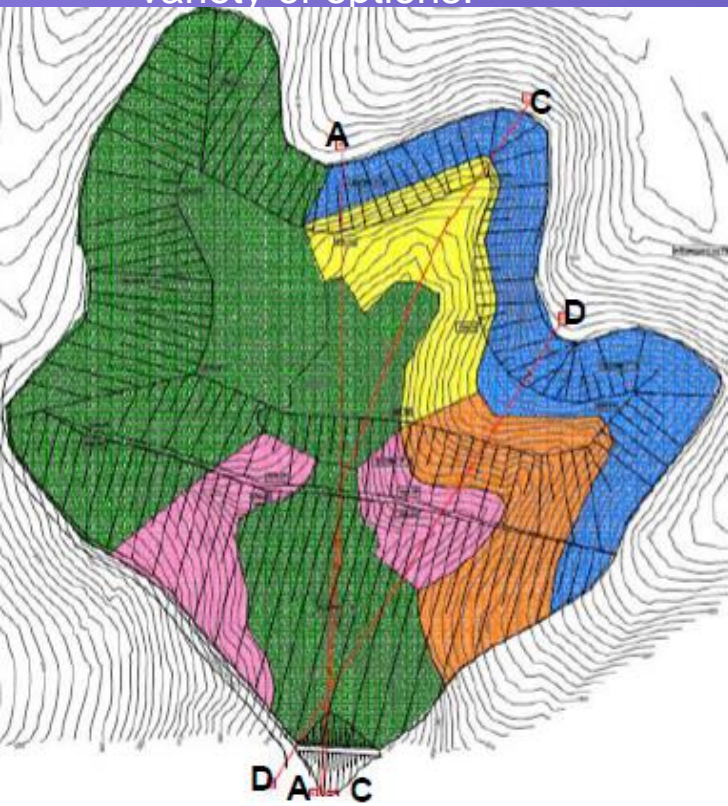
- Life Cycle Costing shows LFM not economically viable with current market – Risk
- So, the Airspace direct Swop shows that it will be cheaper for the city of Durban to peruse the DSW Shongweni Landfill ! ~ 10+x cheaper!
- Further increases in Operating costs (R/km/ton) ~ 30%
- Substantiated the Capital Investment for the DSW Shongweni Landfill

This only re-affirms that Landfilling is still the best practical and feasible option

Increasing Permitted Height

Increase
Permitted
Height ?

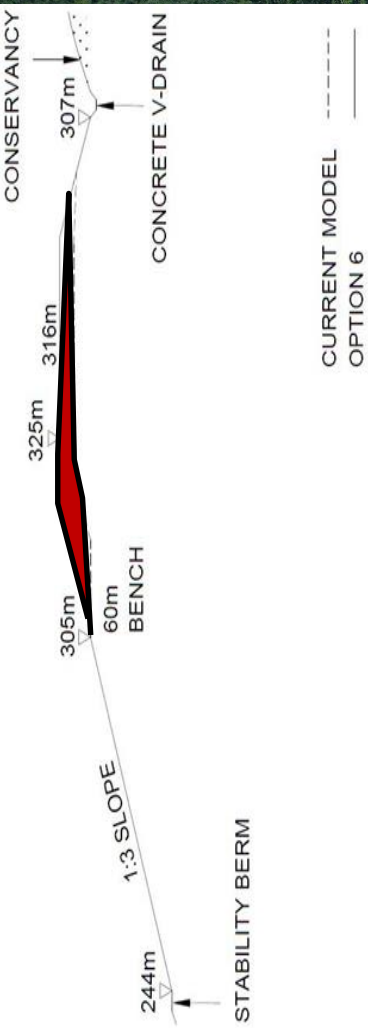
- The objectives of the investigation were thus:
 - To evaluate the impact that the closure of the Bisasar Road Landfill Site has had on the waste volumes received by the Mariannahill Landfill Site.
 - To assess the impact that this influx of waste will have on the available airspace at Mariannahill, and hence the expected time to reach capacity.
 - To explore the possibility of increasing the available airspace of the landfill through a variety of options.



Current Model

Summary of Options

Increase
Permitted
Height ?



OPTION	FINAL LEVEL	EXTENSION INTO CONSERVANCY	ADDITION TO LIFESPAN	ANTICIPATED CLOSURE
Current	316m	-	-	October 2018
1	316m	-	9 months	July 2019
2	316m	5m	9 months	July 2019
3	316m	10m	9 months	July 2019
4	320m	-	13 months	November 2019
5	320m	10m	14 months	December 2019
6	325m	-	17 months	March 2020
7	325m	10m	20 months	June 2020
8	314m/325m	-	16 months	February 2020

Findings: Increase Height

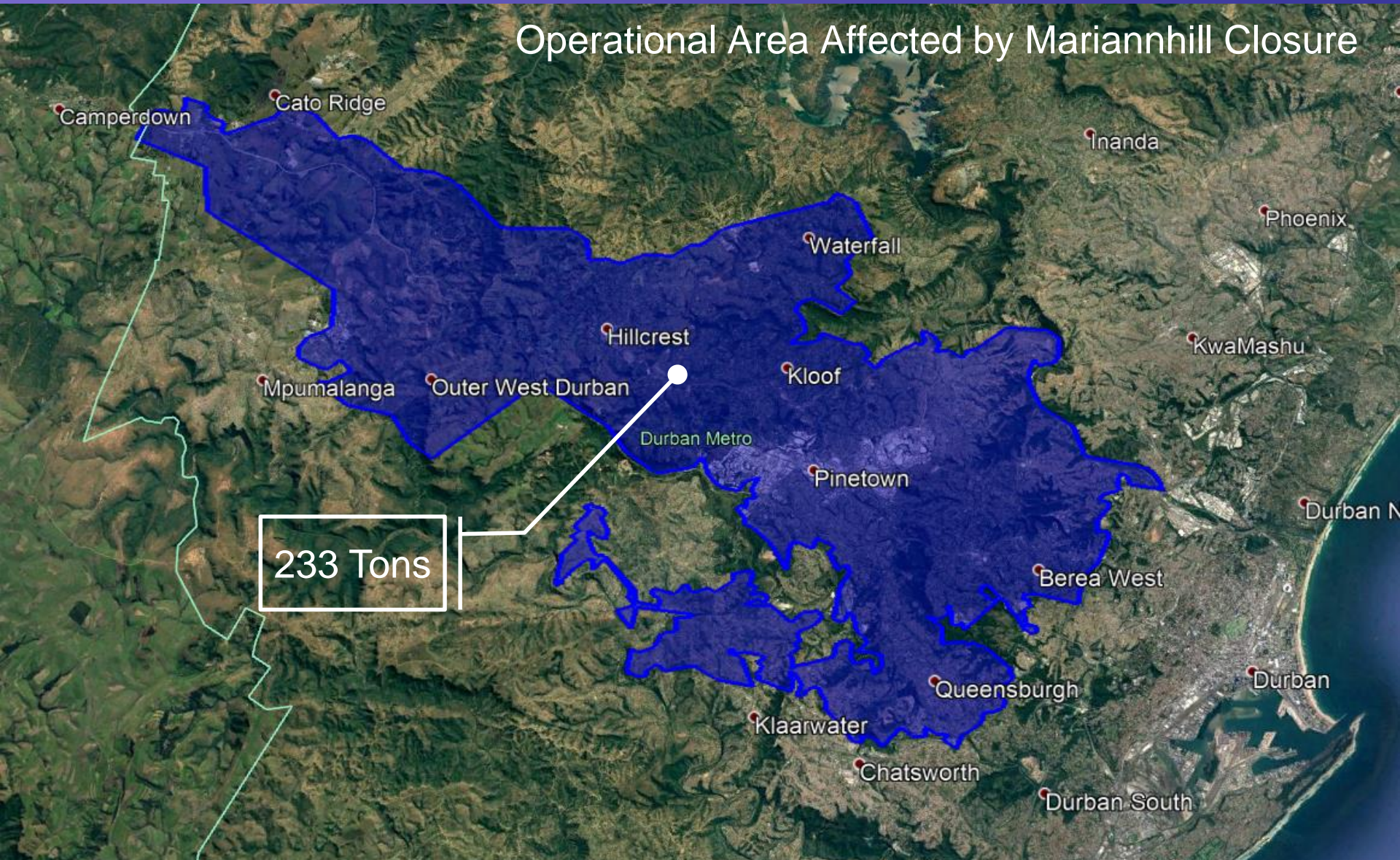
Increase
Permitted
Height ?

- Option 7 was recommended which entails raising the height of the waste body to 314m and 325m, without expanding the waste footprint.
- The life increases by 16 months, taking the expected closure from October 2018 to February 2020, bearing in mind that the original anticipated closure date was 2024. ~ 930 000m³ Benefit
- Approval from the Department of Water Affairs for the final level of the landfill to increase to 325m required???
- 2DFE Results showed
 - Stable when No Seismic Loading BUT
 - Unstable With Seismic
 - Shear Strength Reduction < 1.0
- Requires Further localised lab testing
- Cost Vs Benefit Vs Risk – Not Viable!



Transfer Stations Perspective and Plan

Operational Area Affected by Mariannhill Closure

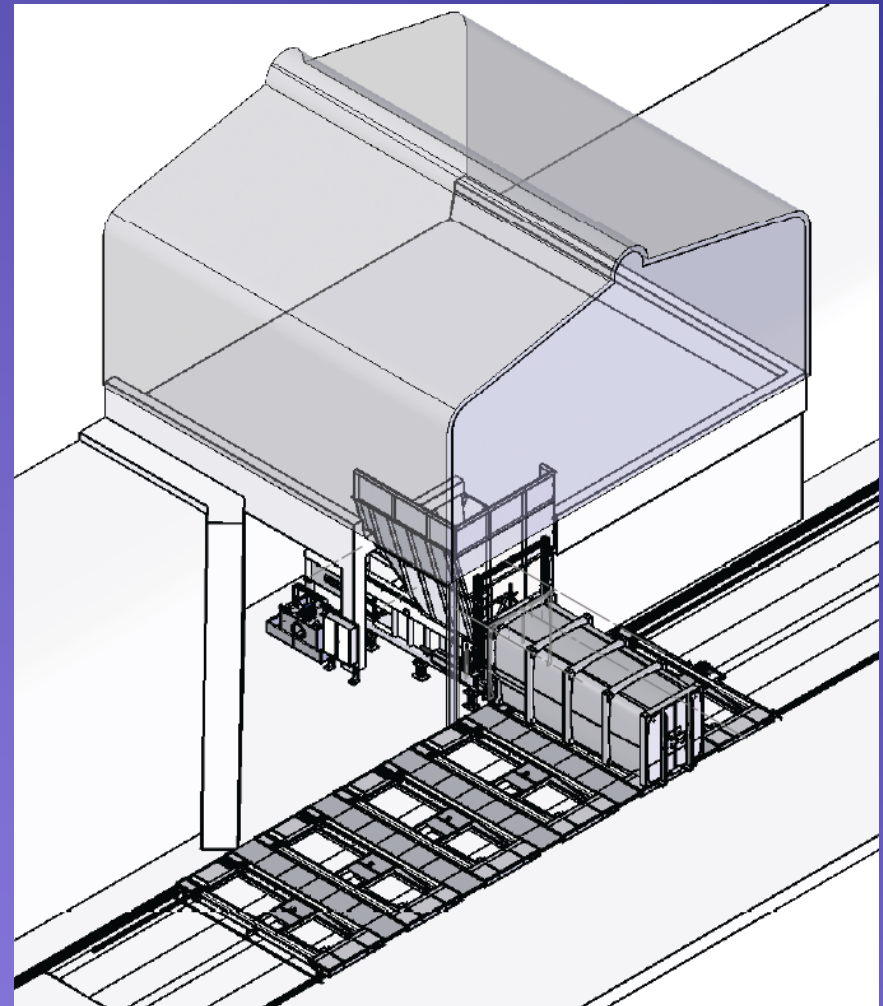


Transfer Stations Rapid Upgrade Plan

Waste
Diversion

Upgraded Existing Transfer Station

- Fully Automated Compaction Cycle
- Single chute with a 6 Container automated bogey system
- Theoretical through put of +/-140 tons/hour (50% compacting, 50% container handling)



Transfer Stations Plan

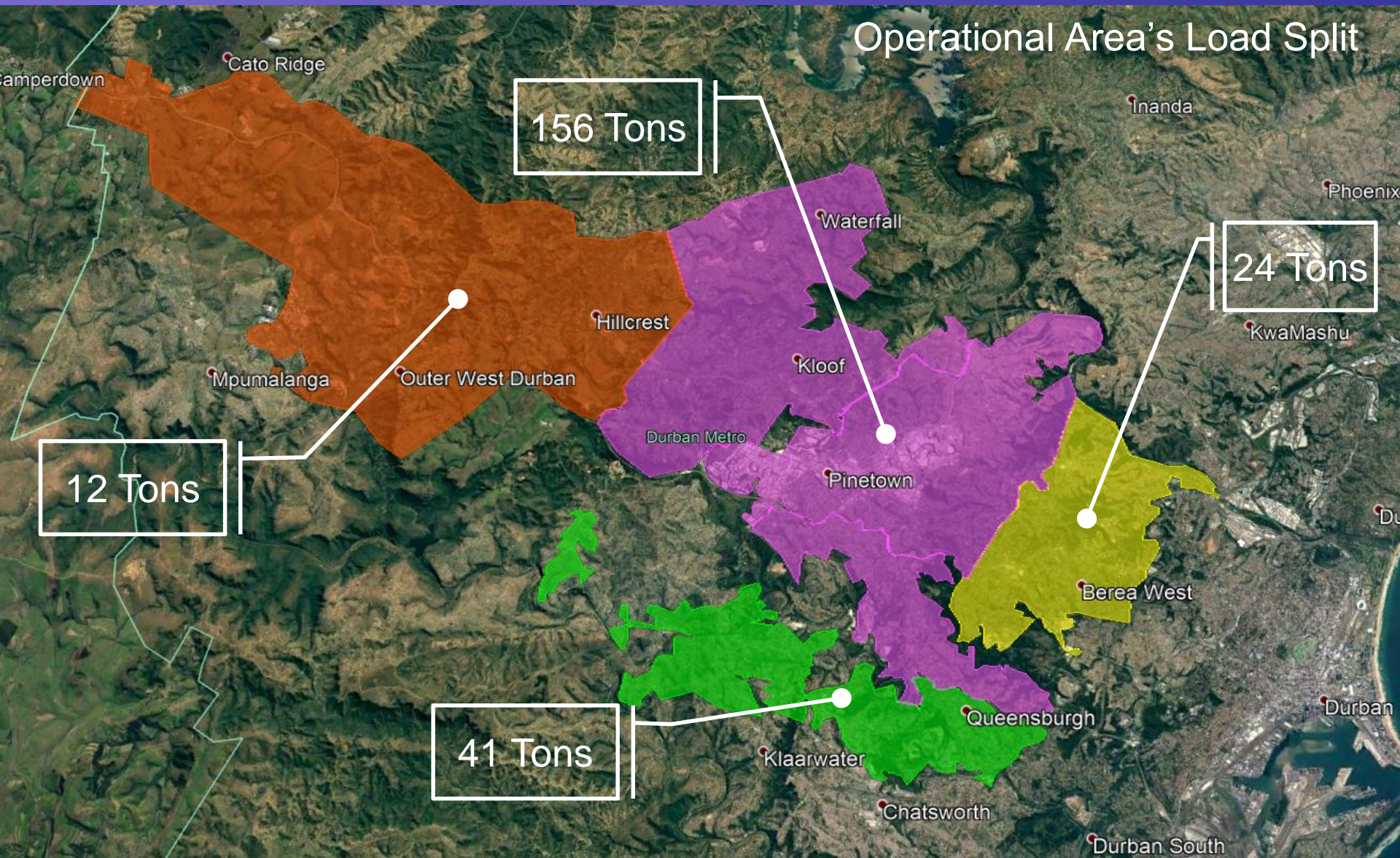
Waste
Diversion

- Assuming 100% goes to Clermont TS

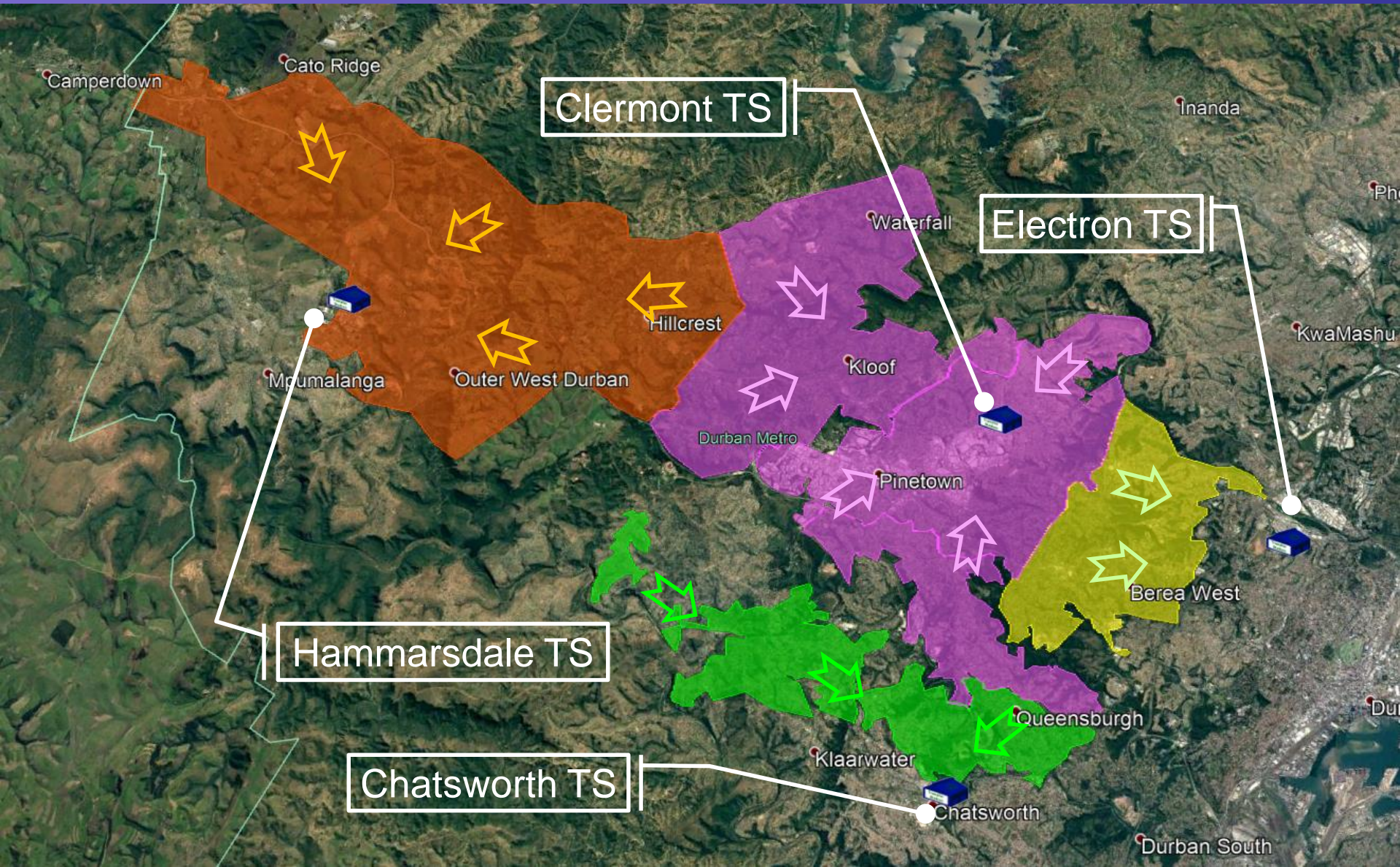
Anticipated Waste in Flow to Clermont TS



Transfer Stations Perspective and Plan




Transfer Stations Perspective and Plan



- [illegible]

Accelerating Lining Development



Lining
Acceleration

- The only practical contingency plan was to “accelerate” Lovu & Buffelsdraai Landfill Lining Programmes
- To provide interim relief whilst the quest for airspace is being sought
- Objective was to further ensure lining configuration to maximise airspace

Lovu Acceleration

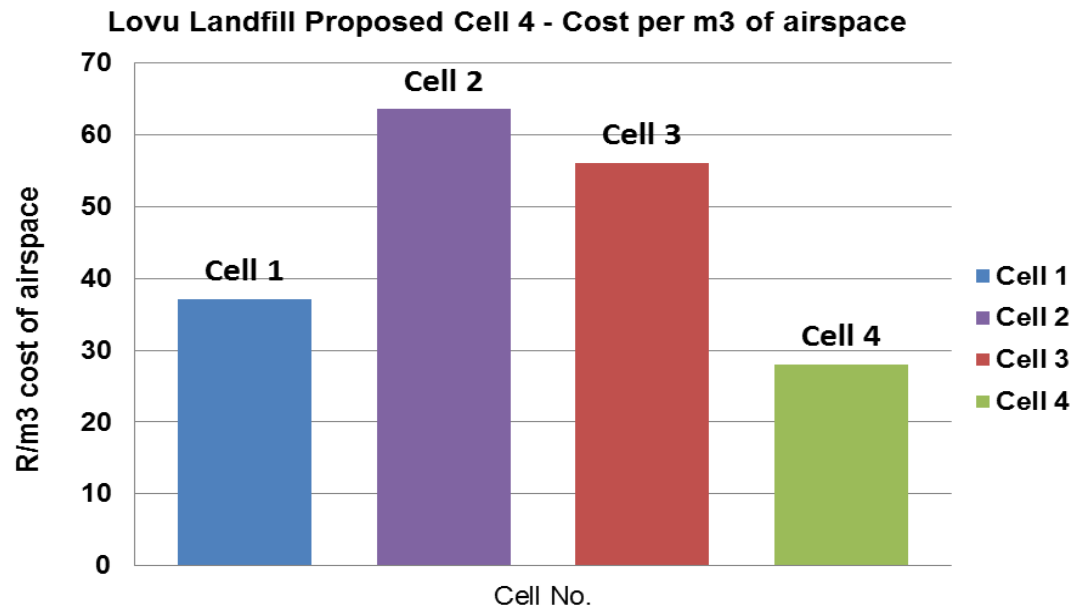
Original Plan

Current Plan

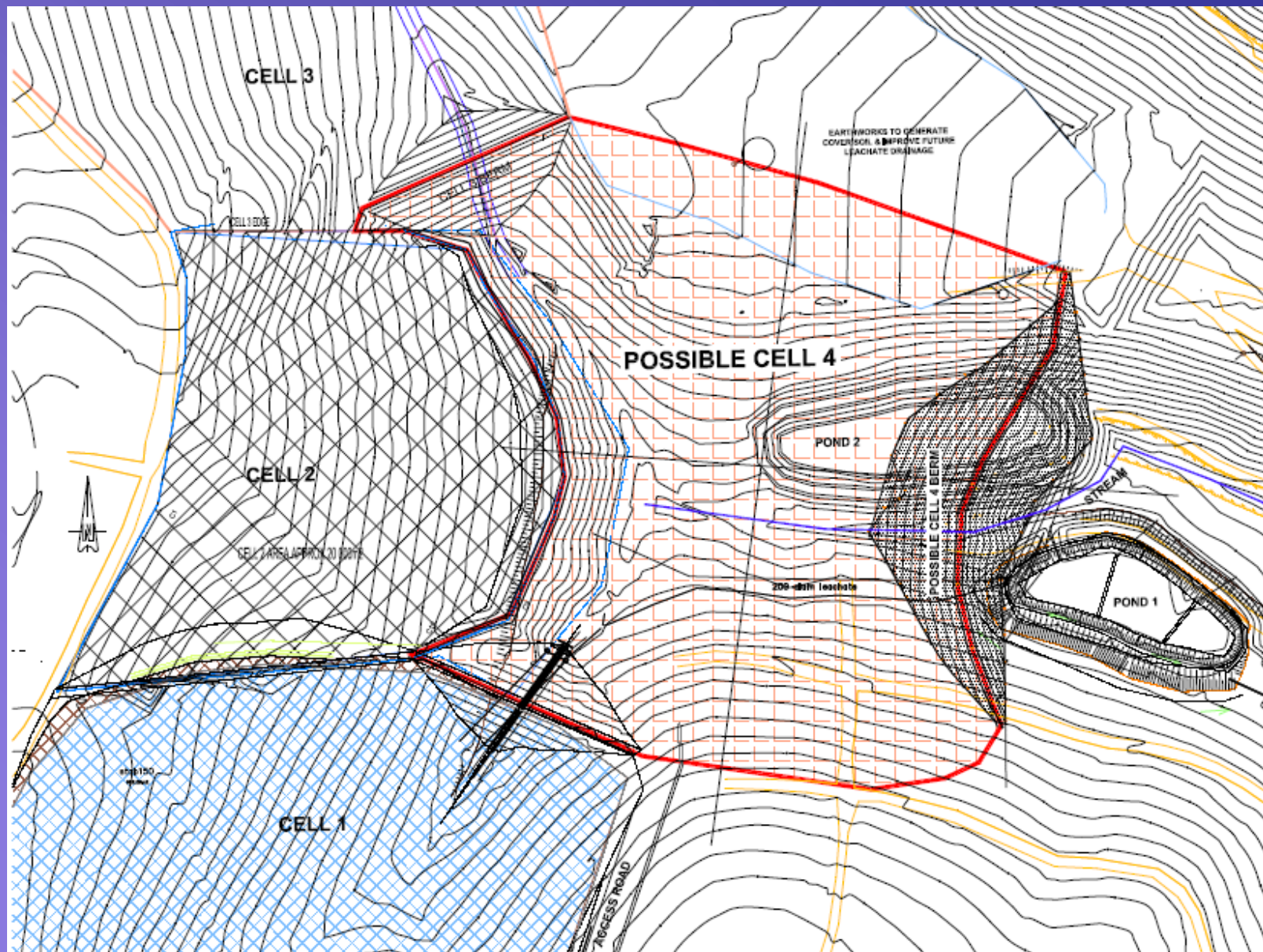
Cell	Status	Approx. Volumes (m ³)				FML (m ²)	Status	Approx. Volumes (m ³)				FML (m ²)
		Cumulative Volume	Volume for Phase only	less 10% for cover	TOTAL			Cumulative Volume	Volume for Phase only	less 10% for cover	TOTAL	
Cell 1	Built	380 000	380 000	342 000	342 000	31 800	Built	380 000	380 000	342 000	342 000	31 800
Cell 2	Built	550 000	170 000	153 000	495 000	20 500	Built	550 000	170 000	153 000	495 000	20 500
Cell 3	Underway	730 000	350 000	315 000	657 000	34 000	Underway	730 000	350 000	315 000	657 000	34 000
Cell 4	Planned	1 080 000	350 000	315 000	972 000	42 000	Proposed	1 550 000	820 000	738 000	1 395 000	32 000

Cell 4 life at Original plan = 1.4 years

Cell 4 life at Proposed plan = 3.2 years



Lovu Landfill Cell 4 Lining Summary



Buffelsdraai

REHABILITATED CELLS 1A-2E

CELL	AREA (m ²)	AIRSPACE AVAILABLE (m ³)
1A	27 350	} 1 222 900
2A	68 300	
2B	51 500	
2C	31 950	
2D	31 550	
2E	25 020	973 000
TOTAL	236 700	2 195 900

Buffelsdraai Landfill extension to advance waste management

Durban is one of the rapidly urbanising cities globally, proving the significant need of safe and efficient waste disposal, **Nonhlanhla Mkhabela** and **Themba Khumalo** report.

For that reason, eThekweni Municipality is moving expeditiously and leading by example to ensure that no waste ends up in the ocean or affecting the environment. A budget of R15 million is being reserved, over a course of two financial years for the extension of the Buffelsdraai Landfill site for this very purpose.

The Buffelsdraai Landfill is one of many of the City's conservancy projects that landed its spot in the climate and clean air hall of fame after winning an Honorary Climate and Clean Air Award in 2017. The project reduces emissions of methane and provides safe waste disposal.

Deputy Head for Plant and Engineering in the Durban Cleaning and Solid Waste Unit, Logan Moodley, said the site, which began operations in 2008 with a 75-year design life, is one of the few existing landfill sites which provide for safe waste disposal for a majority of the City's general waste.

Expanding on the landfill extension, Moodley said the project has been designed and submitted through the Supply Chain Management (SCM) process.

"It is planned to span over two financial years as work mainly involves large earthworks and specialist lining. Pending the SCM process, it is anticipated that work can commence towards early-mid 2020," he explained.

Situated in ward 59 near Verulam, the Buffelsdraai Landfill services areas along the north of Umgeni River through to areas adjacent to the King uShaka International Airport in uThungah.

Moodley asserted that the ever-changing waste patterns demand for the augmentation of the site.

"Of recent, the change of waste dynamics in the industry has necessitated for the City to ensure adequate landfill airspace is provided to meet the growing demands of the City. As a result, the Buffelsdraai landfill is one of the few existing landfills that is required to be accelerated in its lining development to meet this need," he said. Failure to bank safe waste disposal would perceptibly lead to a negative impact on the environment and the financial implications



A budget of R15 million has been reserved for the extension of the Buffelsdraai Landfill site. This is because eThekweni is one of the rapidly urbanising cities globally, proving the significant need of safe and efficient waste disposal.

Pictures: BUSISWA C

to the City be compounded by the need for alternative waste management, added Moodley.

The Municipality's Climate Protection Scientist Zama Khuzwayo said the work done at the Buffelsdraai Landfill is crucial.

"Not many cities have been able to achieve what the City of Durban has done through the reforestation project.

The project demonstrates numerous adaptation and mitigation co-benefits." In 2010, eThekweni

Municipality set up the Buffelsdraai Landfill Site Community Reforestation Project where 62 500

indigenous trees were planted with the objective of creating a carbon sink in the site and creating a climate neutral City.

Khuzwayo said many of the City's conservancy initiatives have received international recognition.

"The Buffelsdraai and Marlanhill landfill conservancy projects demonstrate the potential

that well-managed waste collection reduces waste burning that emits black carbon and other toxic pollutants into the atmosphere."

The project of waste to energy is spearheaded by the Durban Solid Waste Unit in partnership with the Environmental Planning and Climate Protection Department.

Ward 59 Councillor Bongani Majola said over the years, the Buffelsdraai Landfill has brought much value to the

area and played a significant role in changing local residents' lives.

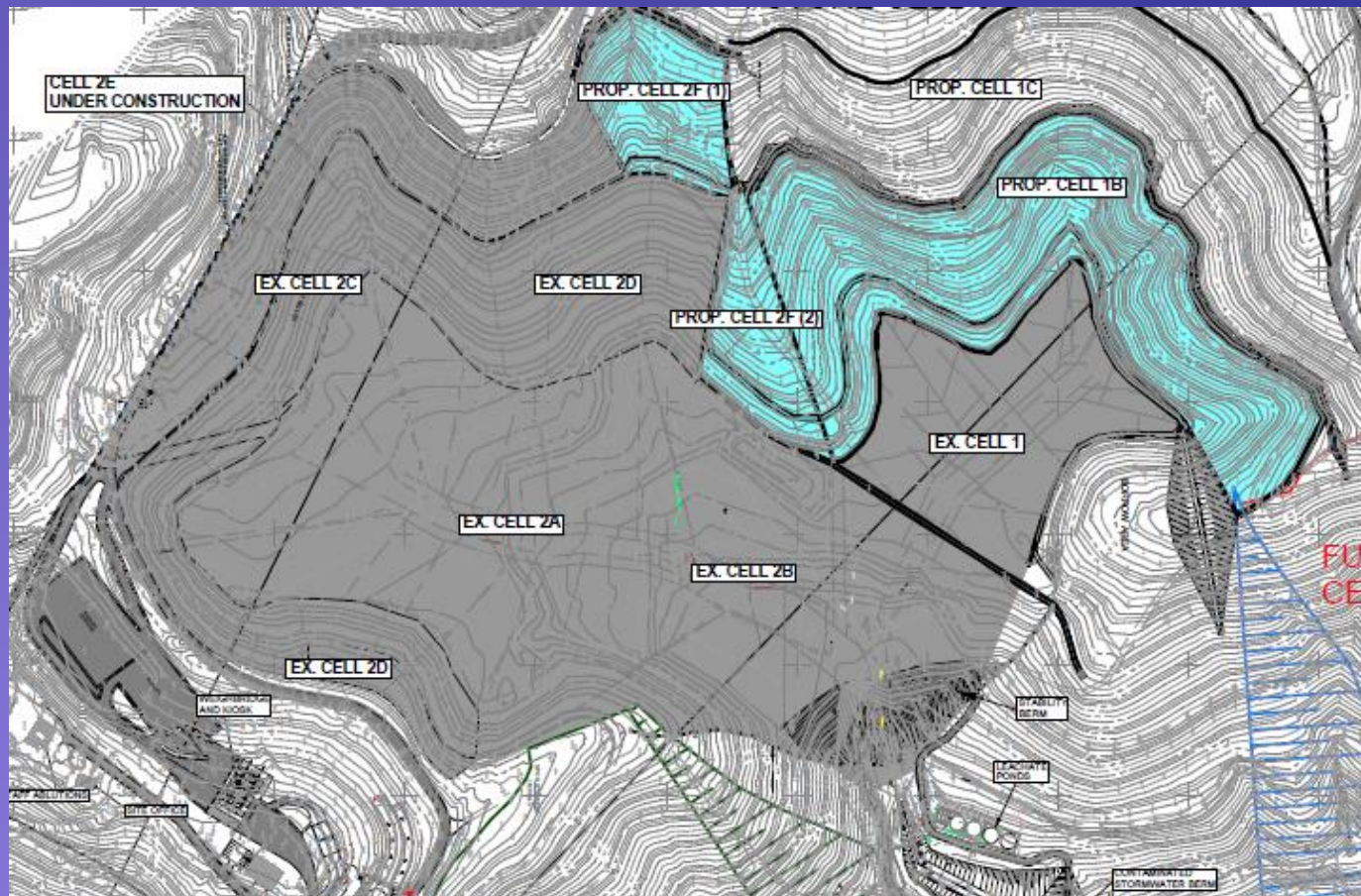
He described the site as a learning space for other cities and countries, a reputation that Durban has earned in the global arena.

"It encourages recycling projects from which locals can make income. It has also become a benchmark for other cities who learn from us how they can better manage their waste.

C40 Cities have visited the site as part of a learning

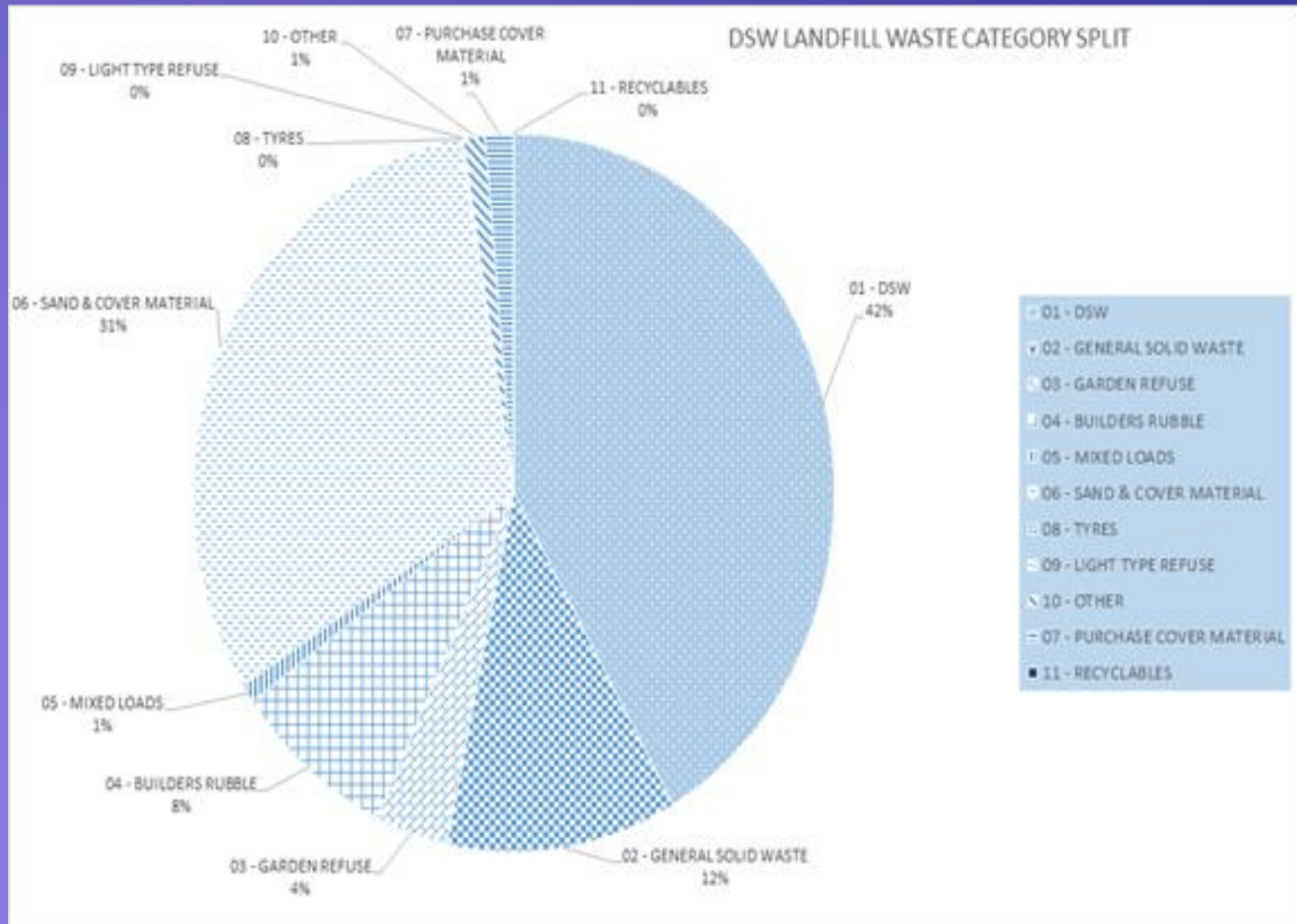
exchange. Early this year, hosted delegates from Mpumalanga Province were working on drafting their climate change initiative," said Councillor Majola.

Locals also benefit from the provision of temporary job opportunities as contractors are always encouraged to work in close liaison with the ward councillor in sourcing local labour intensive work.

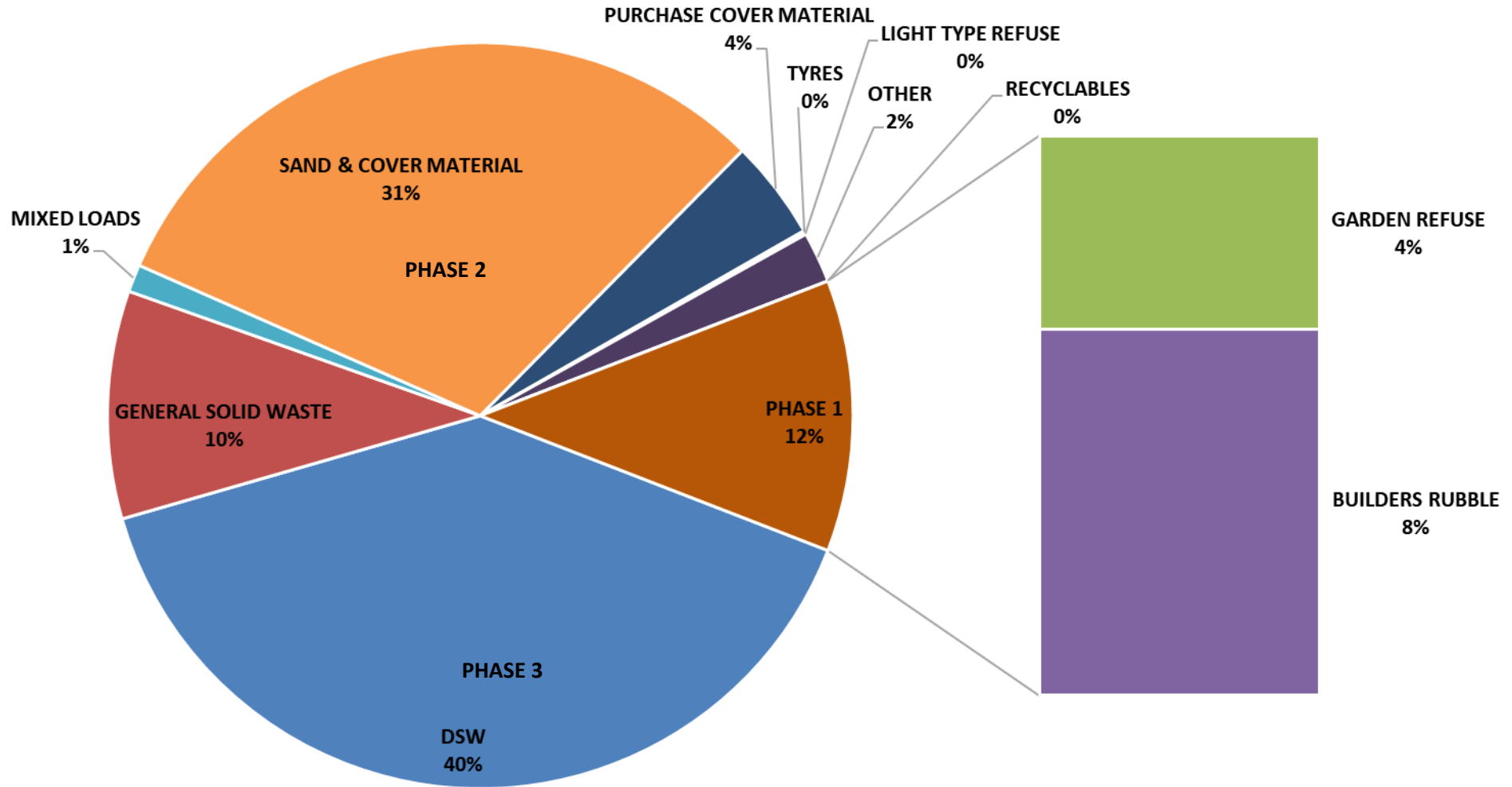


Cell 2F + Cell 1B ~ 1 500 000m³

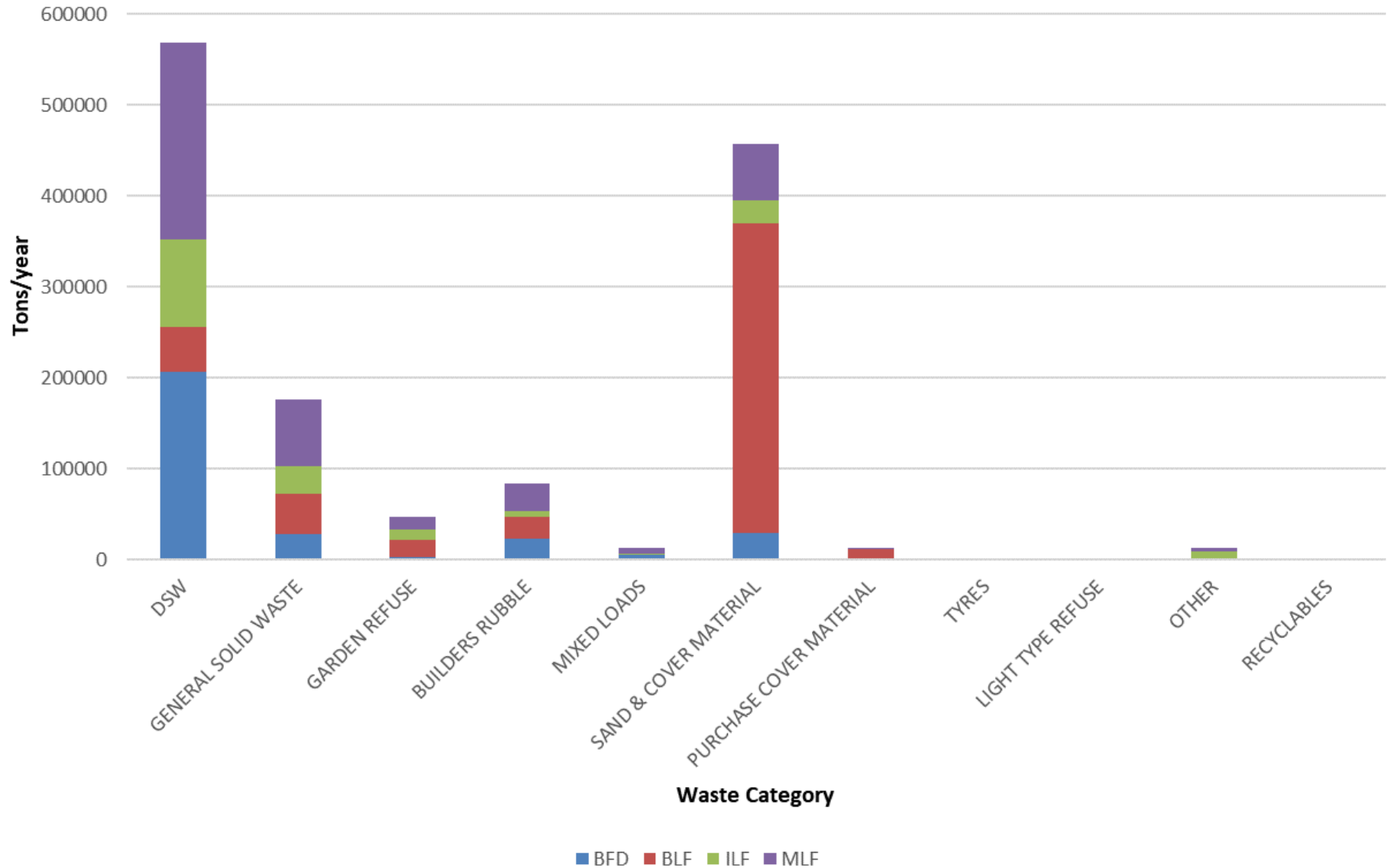
Waste Beneficiation – Quick Wins



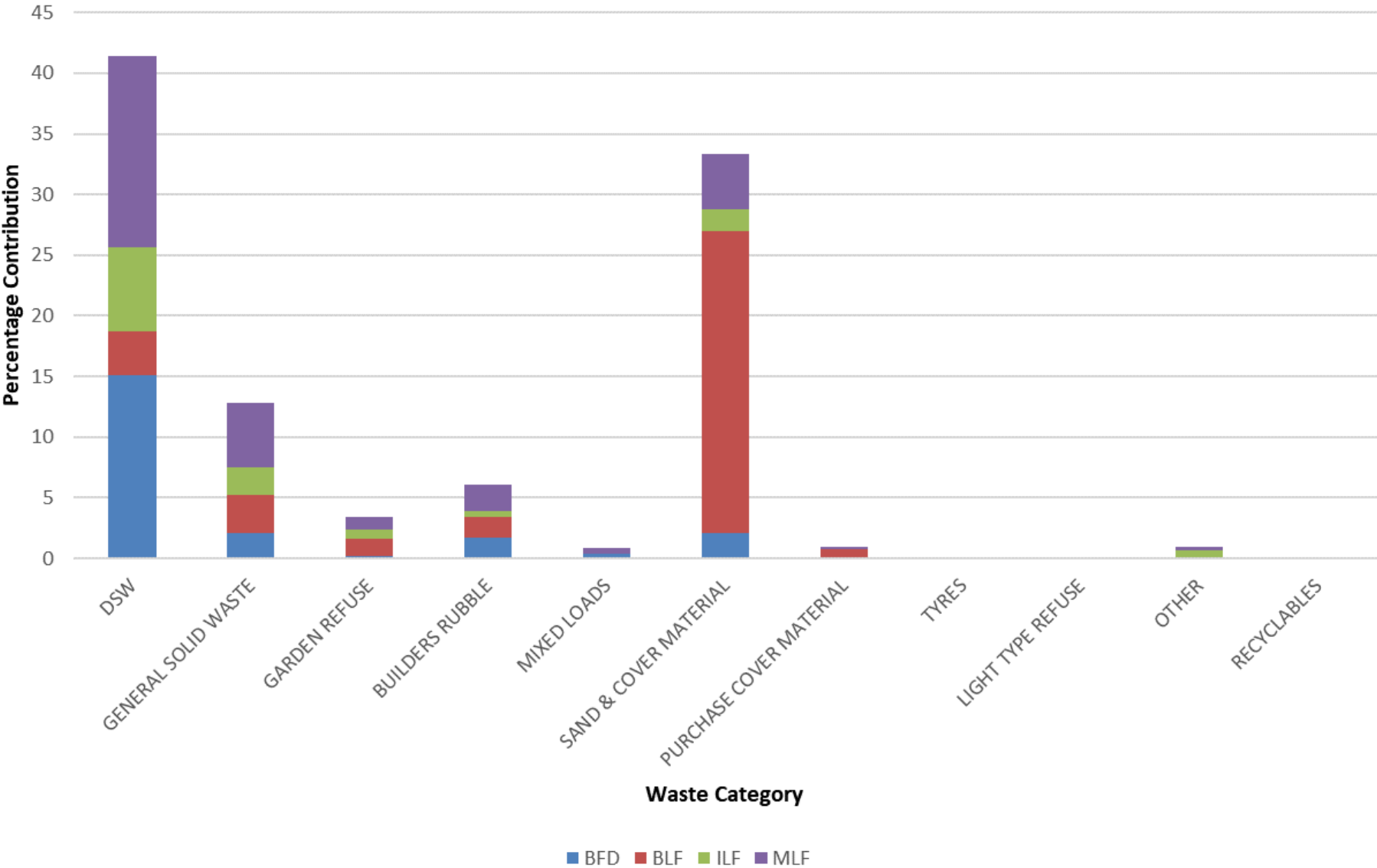
Waste to Landfill Category Breakdown

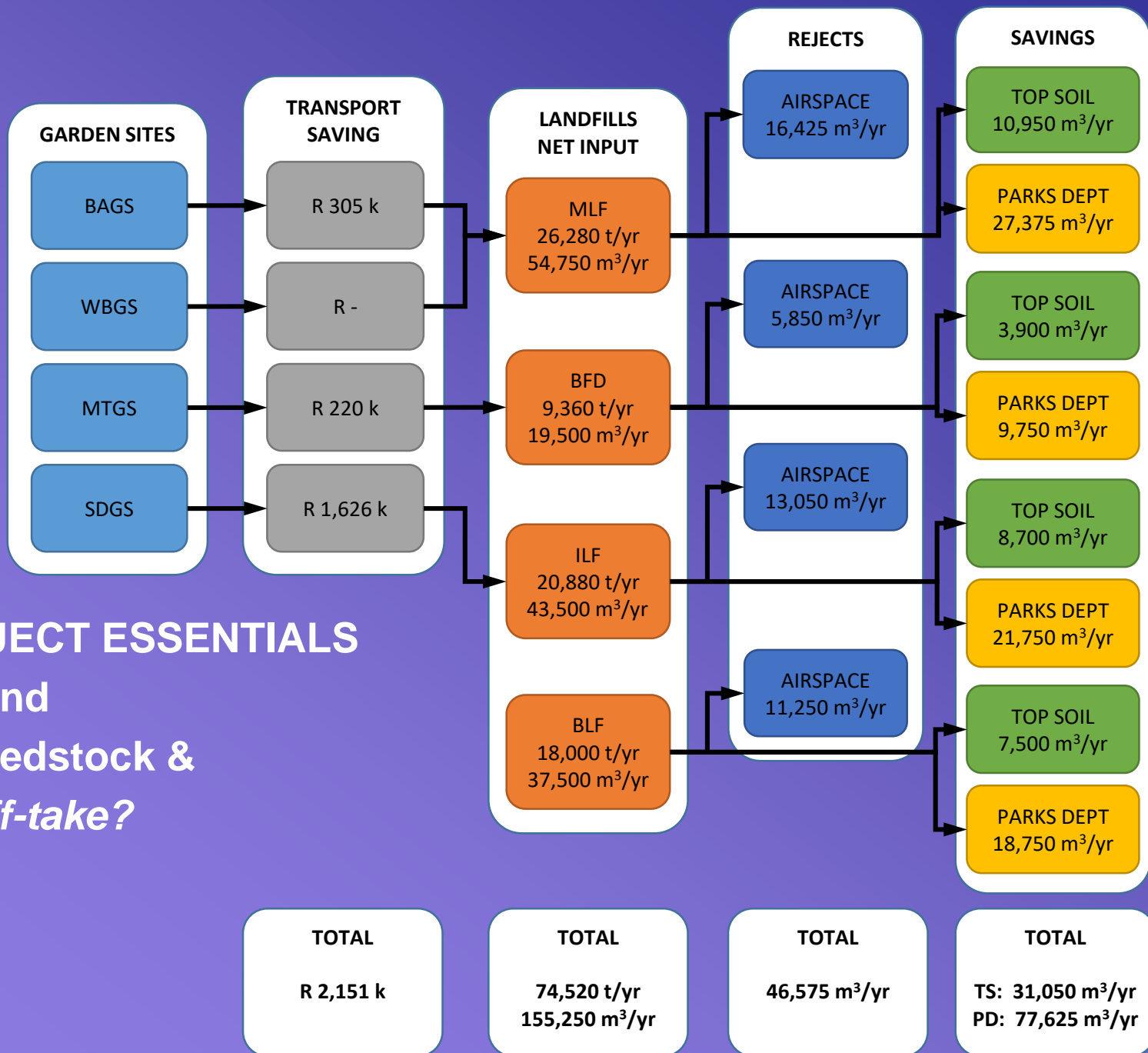


Waste Category's Landfill Site Contributions



Waste Category's Landfill Site Contributions





PROJECT ESSENTIALS

- ❖ Land
- ❖ Feedstock &
- ❖ *Off-take?*

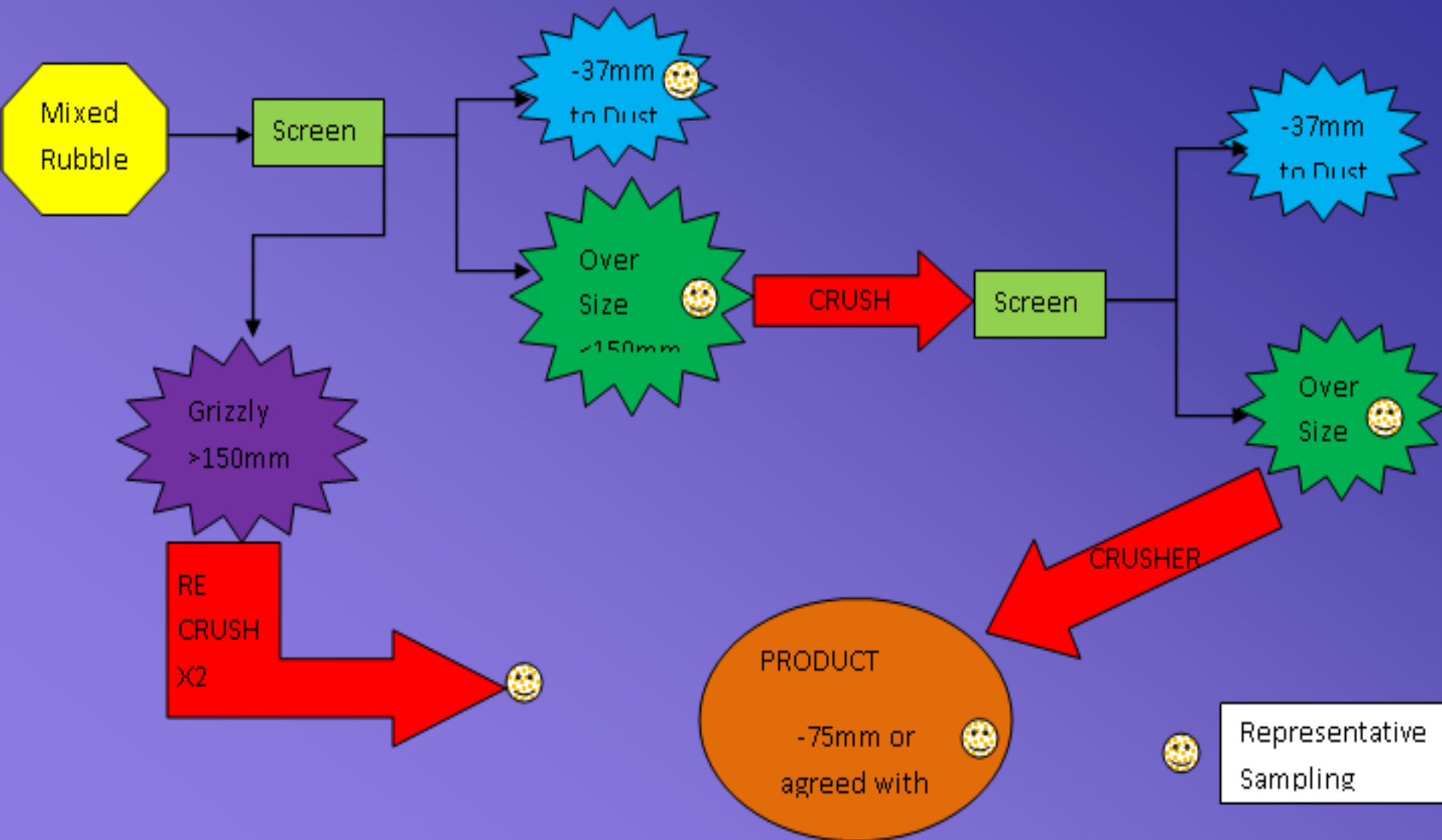


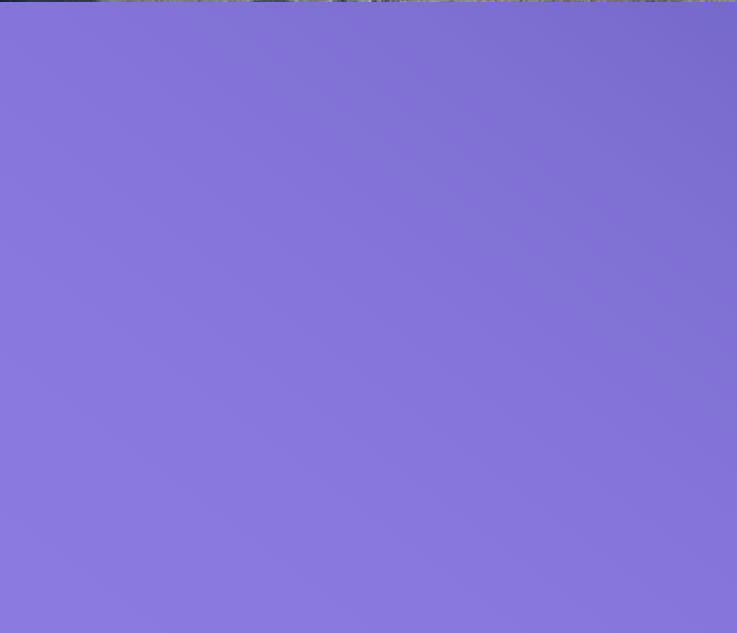
Pilot Study Results

Test/Substrate	INPUT	OUTPUT				
	CGR RAW	DAT 6weeks	DAT 8-10weeks	TTW 8-10weeks	DAT 16-20weeks	TTW 16-20weeks
Solid						
MC (%)	37.14 ± 3.17	56,60	52,71	66,36	54.24 ± 2.90	59.28 ± 3.22
TS (%)	62.86 ± 3.17	50,80	45,82	32,2	45.76 ± 2.90	40.72 ± 3.22
VS (%)	96.37 ± 0.75	90,65	90,81	82,1	87.20 ± 8.68	71.73 ± 2.42
RI ₇ (mg.O ₂ /g DM)	7,77	60,50	N.D	N.D	6,987	9,823
Total C (%)	49,6	N.D	41,35	38,65	22,04	29,04
Total N (%)	0,55	N.D	1,15	1,31	0,96	1,65
C : N	90,19	55,70	36,16	29,71	22,96	17,6
Eluate						
TS (g/l)	4.08 ± 0.02	5,77	6,29	13,13	11.78 ± 0.26	12.55 ± 0.14
VS (g/l)	3.04 ± 0.02	3,96	1,97	3,63	7.55 ± 0.29	8.61 ± 0.14
pH	5,45	7,07	7,13	7,13	6,93	7,27
Cond (mS/cm)	1,653	1,62	2,14	1,76	1,23	2,69
COD (mg/l))	4253	7698,43	4610,81	8128,22	10080	11270
BOD ₅ (mg/l))	1101	506,30	642,25	515,5	348	474
NH ₃ -N (mg/l))	12,74	12,00	40,32	30,66	29,4	50,12
NO _x -N (mg/l))	6,86	10,73	685,37	9,31	8,96	14,56
Total C (%)	0,083	N.D	N.D	N.D	0,6	0,67
Total N (%)	0,0183	N.D	N.D	N.D	0,07	0,09
C : N	4,54	N.D	N.D	N.D	8,57	7,44



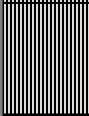

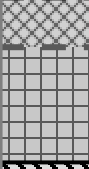

Roads Rehab / C&SW Rubble R&D

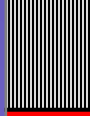


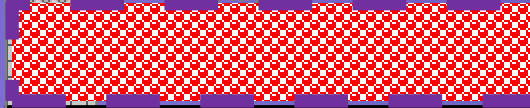



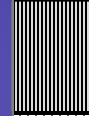



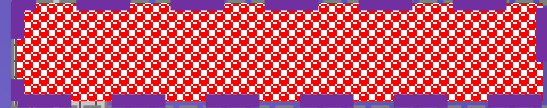



Bisasar Road Capping

Proposed Capping Details

Key	Thick-ness	Description
	200	Topsoil
	450	Compacted clay soil 0,5m/y allowable leakage.
	150	Geofabric filter layer Foundation & gas drainage layer 26-50mm stone.
		Shaped & compacted waste.

Key	Thick-ness	Description
	150	Topsoil with compost etc
	450 MIN	Compacted clay//silt soil 0,5m/y allowable leakage.
		Geofabric layer
		
		Shaped & compacted waste

Key	Thick-ness	Description
	100	Topsoil with compost etc
	300	Compacted soil with max. particle size of 20mm.
		GCL
	150	Cover soil to waste.
		
		Compacted MSW.

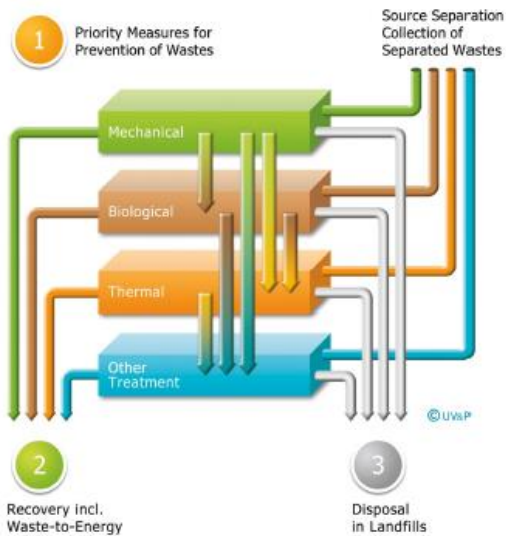
FROM THE "MINIMUM REQUIREMENTS"

PROPOSED CAPPING SYSTEM ALTERNATIVES

Concluding Remarks

- Landfill Airspace regarded as a “critical asset” for city of Durban
- Airspace security has already been risked
- Solutions investigated are short term & not sustainable
- Cost Benefit of Height Increase Vs Global Stability Failure – Not Viable
- Back to Basics for Best Practice Waste Disposal is essential
- Landfill Mining at current not economically viable
- Low Hanging Fruit Options are a MUST
- Landfills still needed as first line of defense – bleed In waste beneficiation with local off takes

DURBAN'S PROPOSED IWMP OUTLOOK



Concept for sustainable MSW Management



INVESTMENT, JOBS AND INCLUSIVE GROWTH

"We must give priority to the urgent and necessary work required to ensure the stability of electricity supply. This means that we must both accelerate the introduction of new electricity generation"

*"We need to take **decisive measures to reduce our carbon footprint**, in line with our international commitments, in a manner that is sustainable and ensures a just transition for workers and communities that may be affected by a shift to a lower carbon economy."*

INSUFFICIENT AIRSPACE – PLEASE LOAD AIRSPACE



THANKS

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