APPENDIX I

ADDITIONAL INFORMATION

APPENDIX I1 – LIMPOPO CENTRAL HOSPITAL FEASIBILITY REPORT 2018

APPENDIX I2 – MOTIVATION FOR NO LAYOUT ALTERNATIVES

APPENDIX I3 – CURRICULA VITAE OF EAPs

APPENDIX I4 – SIP STATUS CONFIRMATION

APPENDIX I1

LIMPOPO CENTRAL HOSPITAL FEASIBILITY REPORT 2018

New
LIMPOPO CENTRAL HOSPITAL

SIPDM: Gateway 4 Review

FEASIBILITY REPORT

Draft 1 Revision 1

November 2018

SAKHIWO
HEALTH SOLUTIONS

Project Information sheet

PROJECT NAME : LIMPOPO CENTRAL HOSPITAL

PROJECT TITLE : FEASIBILITY REPORT FOR SIPDM GATEWAY 4

PREPARED FOR : NATIONAL DEPARTMENT OF HEALTH

PREPARED BY : SAKHIWO HEALTH SOLUTIONS (PTY)LTD.

SIGNATURE SHEET			
Designation	**Name**	**Signature**	**Date**
National Department of Health			
Limpopo Department of Health			

Document Tracking Table

Date	Version	Author	Comment
30/10/2018	Draft 1	E Fleming	

Purpose of this document

This document is an updated feasibility report for the new Limpopo Central Hospital.. The report has been compiled by National Department of Health, assisted by Sakhiwo Health Solutions (SHS) for the Gateway 4 submission required by the Standard for Infrastructure Procurement and Delivery Management (SIPDM) process.

Terms of Reference for the Gateway 4 Review

(4.1.13.1.1) All major capital projects having an estimated capital expenditure equal to or above the threshold established in Table 2(SIPDM) shall have a gateway review of the end-of-stage 4 deliverable, prior to the acceptance of such deliverable. The review shall be initiated by the organ of state which intends implementing the project. The focus of such a review shall in the first instance be on the quality of the documentation, and thereafter on:

a) **deliverability** (the extent to which a project is deemed likely to deliver the expected benefits within the declared cost, time and performance envelope);

b) **affordability** (the extent to which the level of expenditure and financial risk involved in a project can be taken up on, given the organisation's overall financial position, both singly and in the light of its other current and projected commitments); and

c) **value for money**.

(4.1.6) Stage 4: Concept and viability or feasibility

4.1.6.2 A feasibility report shall as a minimum provide the following:

- a) details regarding the preparatory work covering:
  - 1) a needs and demand analysis with output specifications; and
  - 2) an options analysis;
- b) a viability evaluation covering:
  - 1) a financial analysis; and
  - 2) an economic analysis, if necessary;
- c) a risk assessment and sensitivity analysiS
- d) a professional analysis covering:
  - 1) a technology options assessment;
  - 2) an environmental impact assessment; and
  - 3) a regulatory due diligence; and

e) implementation readiness assessment covering:
    1) institutional capacity; and
    2) a procurement plan

Stage 4 is complete when the feasibility report or the concept report, as required, is accepted.

Acronyms

A&E	-	Accident and emergency
AIDS		Acquired Immune Deficiency Syndrome
ART	-	Anti-retroviral therapy
ARV		Anti-retroviral
ALOS	-	Average Length of Stay
BBEE	-	Broad based black economic empowerment
BER	-	Bureau of Economic Research
BUR	-	Bed utilisation rate
CCU	-	Critical care unit
CPI	-	Consumer price index
CSIR	-	Centre for Scientific and Industrial Research
CSSD	-	Central Sterile Service Department
DBB	-	Design, bid and build
DH	-	District Hospital
EMS	-	Emergency Medical Service
ENT	-	Ear, nose and throat
HC	-	High Care
HIS	-	Hospital information system
HIV/AIDS	-	Human Immune-deficiency Virus / Advanced Immune Deficiency Syndrome
HOD	-	Head of department
HPCSA	-	Health Professions Council of South Africa
HPTDG	-	Health Professional Training and Development Grant
ICT	-	Information and communication Technology
IDMS	-	Infrastructure Delivery Management System
IHPF	-	Integrated Health Planning Framework, Department of Health
IUSS	-	Infrastructure Systems Support Unit
L1	-	Level One
L2	-	Level Two
L3	-	Level Three
LDoH	-	Limpopo Department of Health
MDR	-	Multiple Drug Resistance TB
MMC	-	Medical Male Circumcision
MTEF	-	Medium Term Expenditure Framework
NDoH	-	National Department of Health
NHI	-	National Health Insurance
NHLS	-	National Health Laboratory Services
NTSG	-	National Tertiary Services Grant
OPD	-	Out-patient department
PACS/RIS	-	Picture archiving and communication system/Radiology information system
PDE	-	Patient day equivalent
PFMA	-	Public Finance Management Act
PHC	-	Primary Health Care
PPP	-	Public private partnership
PSC	-	Public sector comparator
SARS	-	South African Revenue Service
SCM	-	Supply Chain Management
StatsSA	-	Statistics South Africa
STP	-	Service Transformation Plan
TB	-	Tuberculosis
TOP	-	Termination of pregnancy
VAT	-	Value added tax
VFM	-	Value for Money
WHO	-	World Health Organisation
XDR	-	Extreme Drug Resistance TB
ZAR	-	South African Rand

CONTENTS

FIGURES

TABLES

DRAWINGS

PHOTOGRAPHS

PROJECT SCOPE

The **project scope** proposed, applied to the preferred Option two, includes:

1. The building of a new 488 bed central hospital, Limpopo Central Hospital (LCH), on a new site in Polokwane that will provide the tertiary care for the province and which will be the major teaching hospital for the University of Limpopo Faculty of Health Sciences and School of Medicine.

2. Provision in the new facility of:
    - 488 beds clinical care capacity for a wide range of highly specialised care;
    - mostly arranged in 28 bed wards (comprising some single-bed, double-bed, four bed and six bed units);
    - plus, specific intensive care units (ICU) and high care (HC) layouts;
    - maternal and child health (MCH) (Paediatrics and Obstetrics & Gynaecology) will be consolidated on the site separate to the adult component but sharing clinical and hospital support services.

3. Provision also of:
    - Mothers Lodge capacity of 24
    - Pregnant mothers lodge capacity of 18
    - Transit – waiting capacity of 12
    - Day procedure beds capacity of 12

4. Ringfencing beds at other hospitals to provide further tertiary clinical care and teaching capacity until this capacity can be created on the same site.

5. Support for a complete tertiary clinical care and academic complex core teaching capacity comprising 634 L3 beds including:
    - 488 x L3 beds at Limpopo Central Hospital delivering T1 and T2 care in most major clinical disciplines;
    - 90 x L3 beds at Pietersburg Hospital delivering T1 and T2 oncology, nephrology and urology care;
    - 36x L3 beds at Mankweng Hospital delivering T1 and T2 ophthalmic care;
    - 20 x beds at Thabamoopo Hospital delivering T1 and T2 mental health care.

6. Re-purposing the remaining Pietersburg Hospital capacity as a 320-bed regional (L2) hospital as the “Capricorn Regional Hospital” (will de facto provide limited L1 care to town population in these beds), including general specialist clinical services in surgery, orthopaedics, medicine, paediatrics, obstetrics & gynaecology.

7. Re-categorising the remaining 473 beds as “Mankweng District Hospital” (L1) (although it may de facto provide limited L2 care in Obstetrics & Gynaecology to the surrounding population in these beds).

8. The capital costs will be **R3,963,427,797** which include the following estimates:
    - new 488 bed L3 hospital with associated clinical support **R 3,529,228,394**
    - some demolition and new infrastructure at Pietersburg Hospital **R 279,799,402**
    - Immediate equipment requirements to support current L3 services **R 154,400,000**

9. The additional recurrent operating cost:
    - required to run the full service, when the services are functional, is expected to be in the order of R840m;
    - should be systematically introduced through the conditional grants for tertiary services (NTSG) and health professional training (HPTDG) from the 2019/20 FY;
    - should include investment in specialist clinical personnel (medical and nursing) at Pietersburg Hospital and the regional hospitals in the interim:
        - Medical Specialists of all grades;
        - Medical Registrars in key clinical disciplines;
        - Specialist Nurses in intensive care, theatre and midwifery;
    - should include investment in key heath technology equipment at Pietersburg Hospital in the interim:
        - replacement linear accelerator;
        - additional linear accelerator;
        - replacement magnetic resonance imaging machine (MRI);
        - picture archiving and communication system (PACS) for Pietersburg and Mankweng hospitals.

10. The procurement option proposed is the conventional Design-Bid-Build
11. The project will be managed from the project office of the Department of Health and guided by the Joint Steering Committee comprised of members form the National Department of Health, Limpopo Department of Health, University of Limpopo School of Medicine, Department of Higher Education

This document explains the process that has been followed to arrive at this recommendation, options considered, and detailed definitions and discussion on the need and impact of the development.

1 EXECUTIVE SUMMARY

1.1 Introduction

In support of the drive to improve health services and educate more health professionals, including doctors and associated clinical personnel, the project described herein proposes a new 488 bed central hospital to be built in Polokwane which will be part of an academic complex of hospitals including the new Limpopo Central Hospital (LCH), Pietersburg and Mankweng hospital. This will provide an additional 392 x number of tertiary beds.
The academic complex will provide a training platform for the new School of Medicine at the University of Limpopo1. The Limpopo Central Hospital will be built on a new site in Polokwane and will provide tertiary care for the province. The hospital will be the major teaching hospital for the University of Limpopo Faculty of Health Sciences and School of Medicine.

1.2 Background

Public health infrastructure is a fundamental pillar to building a successful national health insurance programme. However, according to the National Service Delivery Agreement, the current public health infrastructure cannot adequately support the service delivery needs of the country. Health facility planning, including providing new hospitals and clinics and upgrading established facilities, needs to be expedited to increase citizens access to a high standard of health care facilities[2]. The fact that there is a significant shortage of skilled practitioners and health care workers in South Africa exacerbates the situation. Currently, the existing medical schools are unable to produce the requisite number of health professionals. If the country is to meet the requirements of the NHI goals of more equitable access to high-quality health services for all South Africans, both the academic component and health service provisioning must be improved.
This proposal talks to the need for the development of additional Level 3 health services in Limpopo Province and specifically the plans for a new Central Hospital.

The **Needs Analysis**, outlined in this report, establishes the requirement for an academic complex in Polokwane to provide L3 services for the Limpopo Province and to support the new medical school.

In approaching the needs analysis for Level 3 (L3) beds in Limpopo the following five factors are considered

1. Burden of disease as a measure of L3 health service needs
2. The need for a suitable provincial platform for the development, retention and recruitment of specialists
3. The role of L3 care in the organisation and development of health services in the province
4. The need for geographical equity and symmetry in the provision of L3 health services and training of health professionals
5. The socio-economic impact for Limpopo communities of a L3 service

Analysis of the L3 service needs for the catchment area of Limpopo takes into account the current working environments of the existing Pietersburg Hospital and Mankweng Hospital and uses the model and data from the draft “10-year Infrastructure Health Facilities report”, October 2016. National and provincial strategies, objectives and initiatives aimed at improving the health profile of all South Africans are listed. Ultimately, the strategic outcomes were determined through interviews and workshops with the clinical task team consisting of clinical personnel from both Pietersburg and Mankweng hospitals as well as the University of Limpopo and through rigorous analysis of the demographic profile of the Limpopo Province including epidemiology, geographical features and the socio-economic factors.

[1] *Refer to the Feasibility Study for New School of Medicine at the University of Limpopo. July 2013*
[2] *Consolidated general report on national and provincial audit outcomes for 2014-15*

Current service demand for services is extrapolated from data presented in the 2000 MRC Burden of Disease report and on mortality (STATS SA 2017). Data available on the global epidemiology of disease, indicate disease patterns and burden similar in South Africa. Extrapolating from this information, it is possible to estimate the burden of disease and the need and unmet need for services.

Burden of disease (BoD)

References to BoD all quote mortality (causes of death). However, the 'burden' on the health service is more about morbidity (the prevention, diagnosis, treatment, rehabilitation and palliation of illness). Estimations of infrastructure needs depend on morbidity, the factors that predispose to that morbidity, and the severity and complexity of the management of the morbidity.

Unfortunately, the available morbidity data is not always useful for understanding need because it is reactive. It is collected (poorly) at facility level and relatively little is known about the population that never reaches the health service for diagnosis and treatment. Measurement of existing morbidity presenting in the system in no way reflects need. Mortality is sometimes used as a proxy but all that is learnt from mortality is the relative proportion of death from common causes. Other factors confound these difficulties further; patients self-refer outside of the 'planned' catchment, especially when they believe that they cannot be helped locally, or if they are migratory, working and living in different localities.

There is a risk of making the assumption that the unmet need for the service is catered for in Gauteng. This is not true, the majority of patients who cannot access a required tertiary service in Limpopo, are not referred to Gauteng, and simply do not receive the necessary care, with the resulting consequences to themselves, their families and society as a whole.

Data is available on the global epidemiology of disease. Many of these disease patterns and burden will be similar in South Africa. Extrapolating from this information, it is possible to estimate the burden of disease and the need and unmet need for services.

The need for a suitable provincial platform for the development, retention and recruitment of specialists

Medical science and technology advances rapidly and clinicians need to constantly update their clinical skills. Additional skilled personnel are needed to complement the existing specialist component in Limpopo. Recruitment of specialists in competition with the private sector is difficult even in urban centres and is more difficult for Limpopo. Branding is important for recruitment and at present the Limpopo brand is, for various reasons including previous disadvantage, less well valued than, for example, the Cape Town and Gauteng linked brands, as Limpopo also has to recruit in competition with better resourced public health facilities in other provinces, especially Gauteng.

Specialists staff demand respect and a challenging environment. This includes having adequate tools of the trade, including suitable tertiary facilities, the latest equipment and junior staff to assist with the work and to train. Specialists are also driven by the need for academic excellence through research, publishing, teaching and keeping up to date with the latest advances in their field, and opportunities to compete nationally and internationally. Providing quality services, doing outreach and teaching and research, as well as the opportunity for some remunerative work outside the public sector are essential. Failure to provide this platform, will inhibit the recruitment and retention of specialists.

Limpopo currently has 96 HPCSA registered specialists, 67 in the two tertiary hospitals and 28 in the regional hospitals. In the last 3 years as many specialists (23) as have been recruited have left the public service in Pietersburg hospital. There are many specialists for whom Limpopo is home. They are extremely eager to work in the tertiary academic service in their home province, but they are delaying the decision to move until there is material evidence of a clear commitment to an adequate service and academic platform on a level competitive with other South African Universities.
The optimal way to enhance clinical care is to train new graduates and update existing clinicians in the province. To do this requires a competent and well-staffed medical school, with progressive policies

that make training jobs (registrar posts) viable for young graduates. The numbers of students that may be trained and the disciplines and facilities in which they train are regulated by the Health Professions Council of South Africa (HPCSA). The number of undergraduates and post-graduate training posts will depend on the ability of the entire health service (not the new hospital alone) to accommodate them.

Role of level three services in the organization and development of health services

Clinical leadership and governance is vital in each of the core disciplines in medicine. There is a need for clinical guidelines, mentoring and monitoring throughout the health service, beginning at the tertiary level and supporting regional and primary health care. These levels of care are interdependent. Limpopo has a robust and strong primary health care service in all its 474 clinics, and 30 district hospitals.

Despite an increase in the number of junior doctors at these sites, these doctors lack some of the skills required at that level. The shortage of clinical leadership and strength in some key disciplines at the regional and tertiary hospitals results in failure to provide an appropriate referral service and a lack of supervision and nurturing for junior doctors. This also makes it less likely that patients will be referred to tertiary facilities outside Limpopo. The consequences of this on the cost-effectiveness of the health service are substantial. Patients receive incorrect care leading not only to the costs of preventable morbidity but also the costs of health care expenditure that is unnecessary and even at times harmful.

Need for geographical equity and symmetry in the provision of Level 3 services

The norms for the number of tertiary beds required per population have been defined by the NDOH as 0,13 per 1000 dependent population. Limpopo currently has 0,049 per 1000 and Gauteng has 0,42 per 1000. Although Gauteng provides limited tertiary services for Limpopo and perhaps more for Mpumalanga and North West, this remains a very asymmetric and inequitable distribution. Gauteng has 10 times more tertiary beds per capita than Limpopo Province.

- Gauteng (78% of 11million are dependent on public service) has 3,600 L3 beds
- Limpopo (93% of 5,8million are dependent on public service) has less than 250 L3 beds

To achieve a similar ratio to Gauteng, Limpopo would need 2,150 x L3 beds (a further capacity of 1,896 L3 beds). The proposed 488 bed hospital will provide perhaps a quarter of the need compared with Gauteng. There is no clinical discipline that does not need more capacity to care for patients who have complex, specialist medical care needs.

The expectation that if a service is not available in Limpopo, the patient will access that service in Gauteng does not hold true, for the reason elucidated above i.e. that the patient may not be identified to receive that care, as well as the fact that in reality services in Gauteng are highly gated, bed availability is scarce (Level 3 beds are probably used by Level 1 patients, due to the shortage of Level 1 beds) and it is currently nigh impossible to refer some patients to Gauteng. Many examples of this can be cited and stand as a sad testimony to the failure to adequately respond to the constitutional imperatives of Section 27.

Limpopo is a large province with 5 districts, the biggest of which is Vhembe in the far north, followed by Mopani in the far east. Distances to Polokwane are in excess of 200km, and then another 300km on to Gauteng. It is expensive for the health service to transport a patient to Gauteng, and extremely inconvenient for the patient, who may need to overnight in Polokwane on their way to Gauteng and back, resulting in 1 consultation costing them 4 nights if they live far from their referral hospital.

There is an urgent need to address this inequity while ensuring that the necessary T1 and T2 tertiary services are available in Limpopo Province. This can only be done through the expansion of the current infrastructure.

Socio-economic impact for patients

Good health is key to being economically active and being in poor health without receiving the care required impacts on the individual's dignity, self-worth and ultimately their ability to be an economically active member of society. The Limpopo population, relative to other provinces, comprises a greater proportion of young, old and female people. It is also significantly poorer than other provinces with an estimated 93% dependent on the public health service in the rural areas.

The provision of a central academic hospital, will not only provide for improved level 3 care to those patients who need the service, thus impacting on their lifespan, quality of life and productivity but it will also have a ripple effect throughout the health service, ensuring that patients at all levels of care receive a better service. It is estimated by clinicians that fewer than 20% of patients in Limpopo requiring level 3 care currently receive it. (Backlogs and other research based on known population epidemiology.)

The provision of this care in Limpopo will also increase access to care in Gauteng, by freeing up some services in Gauteng. Limpopo borders on Mpumalanga and has signed an MOU with Mpumalanga agreeing to provide comprehensive care (including referral to level 3 services) to those patients who live closer to Limpopo Health services, as well as to assist with backlogs in surgical and oncology care, where these services are not accessible.

1.3 History and Context

Pietersburg Hospital was built in 1932 and in 1942 a new hospital for whites was completed on the same grounds. The current multi-storey hospital was opened in 1960. The hospital was typical of apartheid, two separate hospitals on the same grounds, one for blacks and one for whites.

As part of a major reorganisation of health facilities after 1994 change to Pietersburg Hospital included:

- Demolition of overtly unacceptable prefabricated buildings, including patient care space
- Conversion of most of the old black hospital infrastructure into office and lecture space for the MEDUNSA satellite campus, which trained undergraduate and postgraduate students.
- Building of new wards and other infrastructure to compensate for the loss of clinical care space
- Building of core infrastructure for a new medical school in the adjacent vacant land to the north of the hospital. (This is now the Limpopo Department of Health, it has not been used as the Medical School)
- In the process the ward capacity was reduced from around 700 beds to just over 500 beds.

A college for Black students opened its doors on 1 August 1959 at Turfloop, known by locals as Mankweng, although its official designation was Sovenga – an acronym stringing together the names of the three groups assigned to the area (the Sotho, Venda and Tsonga). This evolved into the University of the North (UNIN) and (more recently) to **University of Limpopo (UL)**. For a period, UNIN and Medunsa were merged into a single UL, but this has been unbundled and the UL has now established its own medical school in the Faculty of Health Sciences.

Mankweng Hospital was commissioned on 1 July 1988 by the Lebowa Government. The vision for a medical school in the then Lebowa territory in the early seventies influenced the idea of building a hospital near the University of the North (now University of Limpopo). The vision of a medical school progressed only as far as a faculty of health sciences without doctor training.

Post 1998 development of health services in Limpopo Province

Health services in Limpopo have in the last 20 years expanded and developed, with currently plans to improve efficiency and close any gaps in the system. The first specialists were appointed at the beginning of 1998.

Hospital and health care hierarchy

After 1994 the implied hierarchy of hospitals was formalised into categories and finally Gazetted in March 2012[3]. The definitions of the health services to be delivered in hospitals was adopted at the National Health Council on 14 June 2013. The purpose of both is to develop structure in the health system that optimally uses scarce resources.

Table 1:Definitions of levels of hospital and levels of clinical care in hospitals

Hospital acute bed levels		
Abbrev	Type of Hospital	Distinction
L1	District	Medical officers
L2	Regional	9 basic specialities
L3	Tertiary	Diverse sub-specialities
L3	Central	Tertiary plus university
National Referral Unit	Central	Very few designated units

Specialist Clinical care	
Complexity of care	Description
D	Uncomplicated
R	Specialised, requires medical specialists and more technology
T1	Highly specialised, requires medical sub-specialists and more technology
T2	Complex, requires teams of medical sub-specialists and more technology
T3	Highly complex and requires scarce and expensive technology

While these distinctions are useful for planning and management of patients they are not absolute. Patients' conditions change in hospital (improve and deteriorate), clinician skills vary in respect of what each can safely and competently do, and the environment (infrastructure, technology and support team) dictate the de facto range of service. The 'bed mix' depends as much on the clinical staffing as it does on the infrastructure. However, infrastructure is built with the expectation that the appropriate staffing will be possible and affordable. Very few hospitals are 'pure'; most hospitals provide a hybrid of levels of care in the same facility.

Primary health care services

The province is divided into 5 districts, each with a district office overseeing primary health care services throughout a network of 470 primary health care clinics, 24 health centres and 30 district hospitals. Primary health care clinics offer comprehensive services and are all meeting the standards of the ideal clinics. A Good quality maternal and child health services is provided, with very high attendance rates at antenatal care and child health with marked improved outcomes. Clinics have also taken on the burden of HIV care, currently providing comprehensive ARV care to well over 300 000 people living with HIV.

The 30 district hospitals (6- 7 in each district) provide hospital care to the catchment population. They are adequately staffed and provide 24-hour comprehensive hospital care. Hospitals deal with large caseloads, especially of maternal, neonatal and paediatric care as well as trauma and chronic disease. Over the last five years with the added intervention of the District Clinical Specialist teams (DCST) Limpopo has seen a halving of paediatric mortality in hospitals, as well as sustained reductions in maternal and perinatal mortality. Limpopo is rigorous with collecting DHIS, PPIP and CHIP data, providing accurate information on key indicators, deaths and avoidable factors in Limpopo. Rates are declining, with Limpopo having the third lowest infant mortality in South Africa, when all data sources are compared and interpreted. (Commic report). Maternal mortality is still too high and over represented at district hospital, indicating the difficulty of referring patients to receive the correct level of care.

Limpopo has embarked on a turnaround strategy which will see a proper district health system developed with the district hospital being the centre of a geographical catchment and clinics falling within the catchment of the hospital, and no longer reporting to the district office. The district office staff will be reduced, with managers moved to the front line.

[3] *No. R. 185 2 March 2012. National Health Act, 2003. Regulations Relating to Categories of Hospitals*

Family Physicians will all be moved to this platform, with the plan to have 2 Family Physicians at each hospital to provide clinical leadership and governance and to stabilise the service and support young doctors regularly coming into the platform as part of their community service.

Regional hospital services

There are 5 regional hospitals, with 1 per district, except that Sekhukhune has two because of the revised provincial boundaries including Philadelphia hospital. Capricorn does not have a regional hospital, but two does have tertiary hospitals.

Each regional hospital provides services in the core specialist disciplines. For 22 years, specialists from Cuba have been the backbone of the specialist care provided in these hospitals as there have been too few South African specialists. All regional hospitals have specialist services in each core discipline mainly provided by 27 Cuban specialists. In South Africa the Cuban specialist colleagues are registered as medical officers, thus they are not counted in our specialist numbers but have been rendering services. Whilst the Cuban specialists have provided good clinical specialist services, their role in clinical leadership and outreach has not been as strong.

The province has recently prioritised the further development of specialist services at regional hospitals and has embarked on a plan to refurbish core infrastructure in maternity, neonatal, paediatrics, ICU, theatre and casualty, ensuring proper regional function, making them Mother and child centres of excellence (MCCE's) and improving the surgical facilities. Plans to create an environment to attract South African specialists is being put in place, however the best way to do this is **to train young doctors in our province**. There are currently only 28 South African specialists operating from these 5 hospitals, alongside the 37 specialists from Cuba.

Tertiary services

Tertiary clinical services and the academic service in Limpopo have developed at Pietersburg and Mankweng hospital in the last 20 years. Prior to 1994 Limpopo had no specialists and no specialist infrastructure.

Tertiary service development commenced at both Mankweng and Pietersburg hospitals in 1998 with the appointment of the first specialists and heads of department and as an academic satellite of the then MEDUNSA. In the subsequent years, services and departments have expanded with tertiary services having developed in all the main disciplines, and the extension to the development of some sub-specialty units. There are 68 South African specialists as well as 27 specialists from Cuba in the two tertiary hospitals. A full description is provided in the Annexure, but of note the following services are now provided

- Comprehensive Oncology services, with 1 Fulltime and 1 part time Oncologist, 4 Oncology registrars, all in their final year of training, and 2 Paediatric Oncologists.
- ENT has a stable Head of Clinical Department, providing comprehensive services, with 3 specialists, sending no patients to Gauteng. Backlogs are due to inadequate theatre time
- Dermatology have a stable Head of Clinical Department, Head of Clinical unit and specialist, providing comprehensive care in Limpopo.
- Paediatrics has a stable Head of Clinical Department and 4 Heads of Clinical Unit, with 6 additional specialists, 5 registrars who have completed their exams just finishing their dissertations. Sub-specialists units in Pulmonology with 8 ICU beds, Paediatric Oncology (32 Beds), Neonatal care (54 beds). Other sub-specialty services including Cardiology, Haematology, Nephrology, Endocrinology, Neurology, are well developed by competent general paediatricians. Few patients are referred and those are mainly for Complicated Paediatric, Neonatal and Cardiac Surgery.
- Paediatrics has trained 25 specialists in Limpopo, and many more have been fed to other institutions in the province. This has meant that specialists trained in Limpopo are working at our regional hospitals, tertiary hospitals and in private, 11 of 14 specialists at tertiary are trained

in Limpopo and 5 of the 9 paediatricians at regional hospitals are trained in Limpopo, with only 2 of the 8 paediatricians in private trained in Limpopo Province.

- A head of unit in nephrology has being appointed, having been sent to UCT for training. Limpopo has the largest renal dialysis unit in the country. A physician is undergoing training in Cardiology and will return in 2019.
- Obstetrics has last year recruited 6 Obstetricians and have sent to Obstetricians for sub-specialty training.
- A head of unit in neurosurgery is appointed, who is supported by 4 neurosurgeons from Cuba. All neurosurgery is now performed in Limpopo, except for a few long cases that are sent to Dr George Mukhari when we lack the theatre time and equipment to perform the surgery.
- The state of the art cardiac catheterisation laboratory which will open in the second Quarter of 2018/19 (operations have been delayed because of infrastructure challenges) and is supported by a cardiologist, 3 cardiothoracic surgeons, technical support staff, and with support from the private sector funded through CSI.

The platform would have been further developed had it not been for the disruption caused by the merger and then demerger of the two universities; the delay in the further development of the tertiary platform; the delay in the medical school initiation; as well as completely inadequate and grossly inequitable tertiary funding from the NDOH.

There is now a medical school with 60 students in their 3rd year, and increased intake of 80 in 1st year, and 40 students from Cuba coming in August 2018 to commence 5th year, with incremental numbers coming in the following year, and with NDOH wanting to increase this allocation.

There are countless specialists in Gauteng and other provinces, and in the private sectors, who call Limpopo home, wanting to return to Limpopo and help build the tertiary and academic service. The majority have however indicated that they will not yet jump until they are certain that the service will be adequately funded and planned, for the reasons already discussed above. Limpopo people have a strong allegiance to their roots and aspire to develop the province.

There is no doubt that a project like this will succeed, and become a beacon and benchmark for other services, having a ripple effect through the health services.

1.4 Background to the development of the central hospital

In 2008/9, strategic analysis identified the need to develop a new 630 bed academic hospital in the Limpopo Province to meet the operational obligations of the Limpopo Department of Health and Social Development (DHSD) following which, in 2010, both the business case and health brief were approved by the Limpopo Department of Health and the National Department of Health. Planning for the new central hospital, based on the identified needs, commenced. This included a masterplan of the new hospital on the new identified site donated by the local municipality as well as 1:200 concept designs.

When the Minister of Health announced in 2011 five flagship academic hospitals to be managed and planned for by the National Department of Health, the Limpopo Academic Hospital in Polokwane was one of these five hospitals. The programme for these new academic hospitals was subsequently transferred to the National Department of Health (NDoH), under which authority all academic hospitals resides. At this point, transactional advisors (TA) were appointed to independently investigate a Public Private Partnership(PPP) funding model to finance separately, each of the new hospitals.

The outcome of the feasibility study for the Limpopo Academic Hospital, managed by the TA, was a proposed project scope that included the procurement of a new 580 bed academic hospital in Polokwane on a greenfield site, as well as the provision of doctors' and nurses' accommodation. Oncology services were to remain at Pietersburg Hospital and Ophthalmology at Mankweng Hospital (both providing these currently as tertiary level services). However, the PPP model was ultimately

considered unfeasible[4] in 2013 and it was not until 2015/16 that the project planning process recommenced (still under the auspices of National Department of Health) for the new central hospital.

The subsequent draft 10 Year Infrastructure Plan for Health Services (10YIP) (2016), initiated by the NDoH, and the National Tertiary Health Services Plan (NTHSP) reports necessitated a review of the provision of Level 1, 2 and 3 (tertiary) services in Limpopo with specific reference to the new academic hospital in Polokwane. A new review process was initiated inclusive of a need analysis and strategic planning, option analysis and procurement option analysis to determine affordability of the preferred options and procurement model. This document is a result on these investigations.

1.5 Future tertiary service provision for Limpopo Province

Output Requirements

Through the Needs analysis, the following project output requirements have been identified:

- Establishment of an optimal, fully functioning tertiary service for the Limpopo Province i.e.The provision of 688 level 3 (tertiary) beds for the province of Limpopo;
- The provision of an academic health complex to provide a clinical platform for training health professionals, in collaboration with the University of Limpopo, and for community oriented research. The hospital must be attached to a medical school as the main teaching platform;
- Improvement of capacity to manage the anticipated health service load;
- Establishment of the correct tertiary bed requirements that will support the referral pathways based on the population, demographics and burden of disease thereby enabling an efficient and cost-effective service delivery platform;
- The building of provincial health service delivery capacity by reducing out-referral of T1 and T2 patients to other provinces which incurs costs to the province and inconvenience to patients

Currently only 242 of the required 688 L3 beds are provided in the province of which 187 are at Pietersburg hospital and 55 are at Mankweng Hospital. While over the past 25 years the Limpopo health department has expanded its capacity in an attempt to provide tertiary health care, Limpopo has historically been dependent on hospitals in Gauteng for tertiary services particularly Dr George Mukhari and Steve Biko Hospitals and, in recent years, Charlotte Maxeke and Chris Hani Baragwanath Hospitals. A new clinical service plan for increased tertiary services in the province is therefore motivated for to address this need inclusive of the provision for sub specialties in surgery and medicine, obstetrics and gynaecology, paediatrics and neonatology, critical care and emergency medicine. The most important clinical service need being maternal and child care, trauma management and oncology.

As a holistic approach is important in order for government to anticipate and plan for the future, human resource requirements are included in the analysis and the infrastructure planning process to enable the province to commence building up the requisite specialists that will be essential for improved services and to determine affordability.

Infrastructure and how best the proposed tertiary health services can be accommodated physically in a functional layout to support the clinical needs is reviewed in four separate options under the **Options analysis.** These options were initially considered in the Business Case then reviewed in the feasibility study conducted for the PPP option in 2013 and are again reviewed in this document:

[4] *The 2013 feasibility documents are available, upon request, from NDoH.*

1.6 Options analysis

Infrastructure and how best the proposed tertiary health services can be accommodated physically in a functional layout to support the clinical needs is reviewed in four separate options under the **Options Analysis.** These options were initially considered in the Business Case then reviewed in the feasibility study conducted for the PPP option in 2013 and are again reviewed in this document:

Option 1: Consolidated specialist services – reconfiguration of existing hospital, no new hospital.

1. The existing Pietersburg hospital would be upgraded to a central hospital with a limited number of regional beds.
2. Mankweng hospital would be a regional hospital for Capricorn District with limited districts beds to accommodate the local population.

Option 2: Split specialist services and build a new 488-bed academic hospital.

1. A new 488 L3 bed central hospital, **Limpopo Central Hospital**, to be constructed on the new site;
2. Pietersburg Hospital to become a regional hospital, but still provide some tertiary services (90 x L3 beds). Oncology services to remain at Pietersburg (58 beds) as well as nephrology and urology beds (32beds) and the renal dialysis unit;
3. Mankweng hospital to become a district hospital with some regional services and limited tertiary beds. The existing 36 Ophthalmology tertiary beds to be remain at Mankweng Hospital.

The total tertiary service component for the Limpopo Academic Complex (not including psychiatry) will be 614 beds which is less than other estimates.

Option 3: New 688 bed academic hospital.

1. New central hospital, **Limpopo Central Hospital,** with 688 beds will be built on the new site and will provide all tertiary services in the region;
2. The tertiary beds will be relocated from Pietersburg and Mankweng hospitals.
3. Pietersburg Hospital to become a regional hospital with limited district beds and no tertiary beds;
4. Mankweng hospital to become a district hospital with limited regional beds and no tertiary beds.

Option 4: Do nothing – no change

The four options are quantified and evaluated. Advantages and disadvantages per option are considered. The options are compared in detail with respect to compliance, service delivery, academic teaching space, site constraints, departmental adjacencies, future expansion, functionality, flow, access, human resource efficiencies, management structure, construction and construction methods, cost and timelines.

Table 2: Time & Cost Comparison per Option

TIMELINES	Option 1	Option 2	Option 3
Construction Time	84 months	60 months	72months
Total estimated final project cost (INCL VAT15%)	**R 4,958,412,538**	**R 3,963,427,797**	**R 5,894,779,796**

An amount for equipment required immediately to support the existing tertiary services is included in the table below (Item “c”). This includes the Linacs for oncology and an MRI scanner plus the PACS/RIS

IT integration. In both Option 2 and 3, there is work to be carried out at Pietersburg Hospital to enable efficient regional services. This is also tabled.

The costs are allocated as illustrated below:

Table 3: Option cost comparison

	COMPARISON of COST ESTIMATES							
A	**Central Hospital**		**OPTION 1**		**OPTION 2**		**OPTION 3**	
	Building cost	R	1,806,138,390	R	1,566,355,576	R	2,224,005,621	
	Professional fees	R	307,043,526	R	266,280,448	R	309,080,955	
	Escalation	R	1,239,100,026	R	775,399,611	R	1,559,739,922	
	Health Technology	R	1,451,730,596	R	921,192,759	R	1,407,753,896	
	SUB TOTAL	**R**	**4,804,012,538**	**R**	**3,529,228,394**	**R**	**5,500,580,394**	
B	**Pietersburg Regional Hospital**	R	-	**R**	**279,799,402**	**R**	**279,799,402**	
C	**Immediate Equipment Requirements**	**R**	**154,400,000**	**R**	**154,400,000**	**R**	**114,400,000**	
	TOTALS	**R**	**4,958,412,538**	**R**	**3,963,427,796**	**R**	**5,894,779,796**	

The option analysis arrived at the same conclusion previously determined in both the Business Case and the PPP feasibility study i.e. to build a new central hospital providing the much-needed academic platform and tertiary services on the new site donated by the local authority.

Option one is not considered for several key reasons, outlined in the report:

- Although the existing Pietersburg Hospital site is large (14,8ha), it is substantially developed.
- There is insufficient space on the existing site to retain a Level 2 hospital and to construct a new Level 3 tertiary academic hospital as well as a new medical school with accommodation for both students and key hospital staff. The new site (Option two) allows for this with space to spare for future development.
- Both the time and cost for Option one would be higher than Option two.
- This is over and above the inconvenience (and risk) to patients while construction on the existing site is in progress.
- Service provision will be interrupted, construction and patient risks are higher.
- Option one will take longer to complete due to decanting and recanting of patients during construction and the unknown challenges when retrofitting an existing structure. This could lead to additional costs as well.

Option three, to build all 688 tertiary beds on the new site, is deemed unaffordable considering the current and future budget constraints. The fact that oncology services are already provided in Pietersburg hospital and ophthalmology in Mankweng Hospital was a deciding factor in reducing the new hospital to 488 beds, leaving the oncology and ophthalmology services at the existing hospitals.

Option four, do nothing approach, is discarded as it cannot provide the health services required and the hospital would be too small. None of the strategic objectives would be achieved.

Having determined the preferred option to be Option two, a 488-bed new hospital on the new site, **due diligence** was applied to investigate this option in detail to determine any legal or restrictive conditions that may exist that may be detrimental to the project. It was resolved that no restrictive conditions exist on the new site that prohibits the development of the proposed central hospital, medical school and student residences. The municipality has signed the Deed of Donation and registration of the property, zoned for a hospital, to the Limpopo Department of Works is in process; the geotechnical report on the site concludes that the site is suitable for construction of the proposed development of multi-storey buildings; bulk services are available; a Traffic Impact Assessment report has been completed for the new development whereby road infrastructure improvements have been identified that will be required to make the impact of the new development manageable. The Environmental Impact Assessment is outstanding and cannot be completed until the concept design is complete. No problems are anticipated.

A **masterplan** has been prepared that indicates the site split into two, clearly identifying the University occupying one section of the site and the hospital the other. Each will be separately managed but linked physically so that staff and students can move easily between the two. The new central hospital layout provides for the future provision of a new oncology department and an additional two hundred L3 beds. Ultimately, the oncology, nephrology and urology beds will be relocated from Pietersburg Hospital as will the L3 ophthalmology beds and services from Mankweng Hospital.

Option two includes a new 488 bed central hospital that will provide full tertiary services and teaching facilities supported by the required hospital and clinical support services. The disciplines and bed allocation to be provided in the new central hospital are outlined as well as the tertiary services and beds to be retained at Pietersburg and Mankweng hospitals. Several of the clinical tertiary services of the new (central) service are already provided in Pietersburg Hospital and will transfer to the new facility: cardio-thoracic surgery (paediatric and adult); dermatology; maxillofacial & oral surgery; neurology; neurosurgery; otorhinolaryngology; paediatric surgery; plastic & reconstructive surgery; pulmonology & allergology and vascular surgery plus supporting associated professions such as clinical psychology; dietetics; occupational therapy; physiotherapy and radiography.

Some clinical tertiary services will **not transfer to the new facility**, but will be a part of the 'complex' of tertiary services delivered in the province:

- Pietersburg Hospital: medical oncology; radiation oncology; medical physics; nuclear medicine; nephrology and urology
- Mankweng Hospital: Ophthalmology
- Thabamoopo Hospital: Psychiatry

The current gynaecology, obstetrics, paediatrics, internal medicine, orthopaedics and general surgery services that are not tertiary clinical services will also remain in Pietersburg Hospital to be staffed and used to provide regional clinical service capacity for Capricorn District. (Proposed new name Capricorn Regional Hospital).

Construction costs are tabled and illustrate that the major costs for the new 488 bed central hospital are for construction, as this is a green-field site, followed by equipment, given the expensive technology required for supporting tertiary services. Professional fees and provision for some escalations are included. Bulk Services and site-specific costs have been costed and are reflected as part of the External Works in the estimates.

Pietersburg Hospital still requires significant work to be carried out to make it suitable as part of the "Limpopo Academic Complex", and to ensure that it plays the part of proxy central hospital in the five years until the new hospital is commissioned. The estimated cost is R283,743,129.
All costs include VAT (15%) fees, escalation, commissioning and health technology. Estimates are based on comparative costs informed by the recently completed 530 bed, level one, Cecilia Makiwane Hospital (CMH) in Mdantsane, the recently completed Zola Hospital in Soweto, the upgrade of Frere Hospital in East London, and a 100-bed district hospital in rural Eastern Cape currently under construction. These comparative costs have been adjusted to suit an academic hospital in the cost estimation. The medical equipment costs are based on experience in similar projects, historical data and industry benchmarking. Comparative HT cost estimates have been drawn from the recently commissioned CMH.

Recurrent costs to operate the proposed beds for the new Central hospital are provided in a comparable cost-model, based on an anticipated staff establishment and associated services, and expressed as costs per hospital bed. Recurrent costs for tertiary services are applied to the Limpopo Academic Complex as a whole which will be a **central 'tertiary service complex'** with:

- Limpopo Central Hospital on its own campus with local operating expenses

- a remote tertiary campus with operating expenses located at Pietersburg Hospital (Capricorn Regional)
- a remote campus with operating expenses located at Mankweng Hospital (district hospital)
- a remote campus with operating expenses located at Thabamoopo Hospital

Included in the estimated recurrent costs are the human resource requirements for Option Two across all four hospitals for the tertiary services located at those facilities. The 2017 DPSA salary scales were used to derive an average cost to employer (CTE) for each post. The estimated costs other than CTE are expected to be comparable with other similar size tertiary hospitals. Since there is no pure L3 hospital, and even the new LCH is likely to function with mixed L3 and L2 beds initially, Greys Tertiary Hospital in Pietermaritzburg, which delivers a similar range of services, was used to obtain a distribution of other costs.

The recurrent cost of the full tertiary service will be an estimated R1bn to R1, 3bn per annum. This budget should be managed by the Limpopo Central Hospital.

The current funding for tertiary services (L3 beds) (LDOH 2015/16 APP) is:

• National Tertiary Services Grant (NTSG)	R 330,462m	51%
• Contribution of Limpopo DOH	R 311,741m	49%
2015/16 budget for current tertiary services	***R 642 203m***	

(Some specialist services in regional hospitals are included in the current budget)

The proportion of the estimated operating budget for the new hospital, for costs that are already incurred, is **in the order of R548m, which is around 40% of the estimated budget**.

An additional R750m per annum recurrent budget will be needed to operationalise the full central service (2018 costs and prices). If only 70% of the proposed posts are filled this amount will be in the order of R412m per annum (R960m – R548m).

While there are potential 'savings' from transfer of existing resources with the clinical functions, the services will be substantially more and more complex. In summary the additional funds required to operationalise these additional services will be in the order of: (2018 prices and Rand value)

• New funds for Limpopo Central Hospital	R565m (R420m to R750m)
• Capricorn regional hospital additional requirement	R285m
• **Total additional funding to the Limpopo budget**	**R840m per annum**

As the new central hospital and academic complex hospitals are to provide an academic platform for the University of Limpopo (UL) medical school, it is critical that the two are developed in parallel and through collaboration. The planning of the academic hospitals complex is to include the integration of the Medical School's courses and training, as well as those of the School of Health Sciences. The role of the central hospital and university in recruitment of specialists and sub-specialists, especially for this rural province, is paramount as it is easier to recruit health professionals to a well-constructed and equipped modern hospital and academic stimulation, as opposed to what exists presently.

Mechanisms for the provincial Department of Health, NHLS, and Higher Education Institutions (University of Limpopo and any others) to work together will include:

- Joint Agreement Governance Council (JAGC) for governing and regulating the relationship and interactions between the parties at a policy level (MEC and VC)
- Health Platform Committee (HPC), a multilateral structure comprising LDOH and all HEIs/NEIs training health science students in the province

- Joint Standing Advisory Committees (JSACs), for governing and regulating the relationship between the LDOH and UL bilaterally.

Procurement is based on the procurement option that is traditionally used by the department to procure new hospitals and is based on a Design-Bid-Build (DBB) model and will be funded by the fiscus.

Timelines

The key base date is the 30th June 2019. The critical timelines are listed below:

Table 4: Programmes: Upgrade of Pietersburg Hospital and the new Limpopo Central Hospital

PHASE 1 – POLOKWANE HOSPITAL UPGRADE BASELINE PROGRAM

Date	Activity	Responsible Party
6 Nov 2018	Referral to Gateway 4 Review	Steercom
7 Nov 2018	Gateway 4 Notice to NT and BFI	NDOH
9 Nov 2019	Appointment of Gateway Review Team	NDOH
6 Dec 2018	Gateway 4 Review	NDOH/LDOH/ Sakhiwo
20 Dec 2018	Preliminary Designs and costs to BFI	NDOH/Sakhiwo
14 Jan 2019	Gateway 4 Review Report	Gateway Team
22 Jan 2019	Gate 4 Acceptance	Steercom
22 Jan 2019	Design Development commences	Sakhiwo
31 Jan 2019	Quarterly Report to BFI	NDOH/Sakhiwo
28 Feb 2019	Comprehensive Project Plan to BFI	NDOH/Sakhiwo
28 March 2019	Gate 5 Acceptance	Steercom
28 March 2019	Detail Design commences	Sakhiwo
2 July 2019	Gate 6 Acceptance	Steercom
10 July 2019	Tender Docs to BSC	Sakhiwo/NDOH
9 Aug 2019	Tender Notice Date	NDOH BSC
10 Sept 2019	Tender Closing Date	NDOH BSC
21 Oct 2019	Tender evaluation and Tender Award	NDOH BEC/BAC
4 Nov 2019	Site handover	Sakhiwo
1 May 2021	Practical Completion	Sakhiwo
15 May 2021	Gate 7 acceptance	Steercom
31 July 2021	Commissioning complete	Sakhiwo LDOH/NDOH
	18 Months Construction Period	

PHASE 2 – NEW LIMPOPO CENTRAL HOSPITAL
BASELINE PROGRAM

Date	Activity	Responsible Party
6 Nov 2018	Referral to Gateway 4 Review	Steercom
7 Nov 2018	Gateway 4 Notice to NT and BFI	NDOH
9 Nov 2019	Appointment of Gateway Review Team	NDOH
6 Dec 2018	Gateway 4 Review	NDOH/LDOH/ Sakhiwo
20 Dec 2018	Preliminary Designs and costs to BFI	NDOH/Sakhiwo
14 Jan 2019	Gateway 4 Review Report	Gateway Team
22 Jan 2019	Gate 4 Acceptance	Steercom
22 Jan 2019	Design Development commences	Sakhiwo
31 Jan 2019	Quarterly Report to BFI	NDOH/Sakhiwo
28 Feb 2019	Comprehensive Project Plan to BFI	NDOH/Sakhiwo
25 June 2019	Gate 5 Acceptance	Steercom
25 June 2019	Detail Design commences	Sakhiwo
30 Oct 2019	Gate 6 Acceptance	Steercom
5 Nov 2019	Tender Docs to BSC	Sakhiwo/NDOH
6 Dec 2019	Tender Notice Date	NDOH BSC
3 Feb 2020	Tender Closing Date	NDOH BSC
16 March 2020	Tender evaluation and Tender Award	NDOH BEC/BAC
30 March 2020	Site handover	Sakhiwo
30 March 2025	Practical Completion	Sakhiwo
15 April 2025	Gate 7 acceptance	Steercom
15 Oct 2025	Commissioning complete	Sakhiwo LDOH/NDOH
	60 Months Construction Period	

NDOH is primarily accountable for overseeing and ensuring the success of the Central Hospital project. Management will be carried out through the project office at NDOH which will consist of a team of professionals skilled and experienced in health infrastructure projects.

1.7 Conclusion

There has been overwhelming evidence of the need for a comprehensive tertiary care facility in Limpopo since 1994. The need has only increased with provincial population growth and increasing pressure on Gauteng tertiary facilities, struggling to accommodate that province's own growth. The Limpopo population's demand for services is unlikely to be vastly different from that of Gauteng, which has **10 times more tertiary beds per dependent population than Limpopo**. Even with optimal staffing at district and regional hospitals there is absolutely no question of the need for the planned 488 L3 new hospital. The limiting factor will be the ability to attract medical specialists (and appropriate specialist nurses), a challenge which will be facilitated greatly by a well-staffed medical school in Polokwane

Additional to the immediate health benefit to the provincial population, the new Limpopo Central Hospital will be a positive contribution not only to the Limpopo Province but to the country, stimulating the economy both on a macro and micro level. Benefits will be in the form of employment opportunities, especially locally; the provision of goods and services; improvement of the skills of the students passing through the Medical School who, by virtue of their increased earning power, improved economic activity; *improving the number of health professionals in the region thereby improving the health of the people*

in that region which, in turn, due to its focus on preventive practice, reduces the burden of disease and the associated drain on the fiscus. This should particularly affect the maternity and neonatal mortality rates which in itself will increase longevity and the added benefits to the economy. The estimated total annual operational expenditure of approximately R1.3 billion, could create an additional R2.3 billion in new business sales, R0.9 billion in additional GGP, as well as 2 917 sustained employment opportunities.

The preferred **Option 2**, selected as it carries the least risks, is the most cost-efficient option and has the shortest timelines of the compared options is estimated to cost, in total, R3 962,690,100.

It is requested that NT approves that this project should proceed, and that National Treasury provides the budget required to continue to plan and implement the project, including construction and the additional operational costs that will be required for the optimum operation of this facility once completed.

2 DEFINITIONS AND NAMING CONVENTION

2.1 Hierarchy of facilities and services

South Africa's health services are organised in a hierarchy of care with community-based preventive services and primary health care in the periphery and hospital care in the centre. Hospitals (facilities) are variously designated but are organised into three levels of general 'beds' (and specialised institutions of various sorts):

- L1 hospital beds for care provided by medical officers
- L2 hospital beds for care provided by general specialist teams
- L3 hospital beds for care provided by highly specialised professional teams

A further 'categorisation' of hospitals has been gazetted[5].The categories designate the purpose of each hospital but do not prescribe the combination of levels of 'bed care' that may be provided in an hospital There is a policy of the National Health Council (NHC) that describes the services that each is expected to deliver. The nomenclature that is used is:

• District	L1 beds	D services
• Regional	L2 beds	R services
• Tertiary	L3 beds	T1 services
• Central	L3 beds	T1 and T2 services
• National Referral Units		T3 services
• Specialised		(TB and Psychiatry)

Few hospitals are purely on or the other category. Most provide a spectrum of services which depend on the demand, the infrastructure, technology and personnel skills that are available. The categories and service levels do, however, guide health systems planning.

2.2 Level 3 hospitals

Tertiary and Central hospitals should ideally comprise **entirely, or predominantly, level 3 hospital beds** for **tertiary service care** to be provided by highly specialised professional teams. The essential difference in categorisation between the two is that the Central hospitals are formally designated as **national resource** flagship hospitals of specific academic faculties of health sciences.

It is important that the naming of the facilities is standardised to avoid confusion. It is also important to use the correct wording because each term has a particular statutory connotation, and by implication, potentially a funding implication.

2.3 'Hospital' vs 'Complex'

- A single hospital campus should be named a 'Hospital'
- A combination of hospital campuses should be named a 'Hospital Complex'
- When referring to a single facility that facility's name should be used
- When referring to a combination of facilities the complex name should be used

[5] *GG R185_Categories_of_Hospitals_March_2012*

2.4 'Academic' vs 'Central'

- The National Health Act (NHA) and regulations have no definition for an "academic hospital" and the National Tertiary Health Service Plan (NTHSP) policy document says that such a thing does not exist
- The NHA refers to 'Academic Complexes' and defines them in Section 51 as follows:
    - *"academic health complexes, which may consist of one or more health establishments at all levels of the national health system, including peripheral facilities, and one or more educational institutions working together to educate and train health care personnel and to conduct research in health services"*
- The regulation on categories of hospitals (GG R185_Categories_of_Hospitals_March_2012) provides for **"Central Hospitals"** which:
    - *(a) must provide tertiary hospital services and central referral services and may provide national referral services;*
    - *(b) must provide training of health care providers;*
    - *(c) must conduct research;*
    - *(d) receives patients referred to it from more than one province;*
    - *(e) must be attached to a medical school as the main teaching platform; and*
    - *(f) must have a maximum of 1200 beds*

The new Limpopo Central Hospital (LCH) will meet the definition of a Central Hospital:

The financing implication of getting this right is that Central Hospitals are the financial responsibility of National government budget, not the provincial equitable share (PES). This also affects the post definitions and staff rotations. In practice the national budget heavily subsidises central hospitals, through conditional grants, but does not carry the full cost because some of the clinical care is provided to patients for conditions for which the PES is responsible. The details of these implications are elaborated on in the section on Operational Expenditure.

Several facilities are involved in the health service developments in Polokwane.
The following nomenclature is proposed:

A. LIMPOPO CENTRAL HOSPITAL (LCH)
To refer to the new 488 bed hospital to be built in Polokwane juxtaposed to the new University of Limpopo (UL) Medical School[6]

B. CAPRICORN REGIONAL HOSPITAL (CRH)
To refer to the existing 'Pietersburg Hospital' in Polokwane

C. MANKWENG DISTRICT HOSPITAL (MDH)
To refer to the existing 'Mankweng Hospital' adjacent to the Turfloop Campus of UL

D. LIMPOPO ACADEMIC HEALTH COMPLEX (LAHC)
To refer to the collective of:

- Limpopo Central Hospital
- Capricorn Regional Hospital
- Mankweng District Hospital
- Thabamoopo aspecialist Hospital
- Any other facility deemed fit for training

[6] *Designed to meet the criteria:*
provides tertiary hospital services and central referral services;
(b) provides training of health care providers;
(c) conducts research;
(d) receives patients referred to it from Limpopo, (but also neighbouring provinces and Zimbabwe/Botswana);
(e) attached to UL medical school as the main teaching platform; and
(f) will have far less than 1200 beds

2.5 Tertiary services (T1; T2 and T3) definitions

The National Tertiary Health Service Plan (NTHSP) provides detailed definitions of the **services** expected in the various levels of **hospital (facilities) beds**:

a.) ***Regional/Secondary Services (R)*** *are services that are more specialist than is generally available at District hospitals and which are provided in Regional Hospitals (and may also be provided at provincial tertiary and central hospitals). These services require the permanent presence and input of a general specialist in each of the EIGHT core specialties, with Emergency Medicine being an evolving specialty that has now established it as a core specialty:*

- *Medicine*
- *Surgery*
- *Psychiatry*
- *Obstetrics & Gynaecology*
- *Orthopaedic Surgery*
- *Paediatrics*
- *Anaesthetics*
- *Diagnostic Radiology*
- *Emergency Medicine*

The Regional/Secondary service package provides access to high care, short term ventilation and limited CT scanning and aims to have at least two full time specialists per core specialty. Access should also be provided to basic services for ear nose and throat (ENT), Ophthalmology and Urology. Regional/Secondary hospitals should provide this set of services to a defined, regional drainage population (in general serving more than one district in non-metro areas and more than one sub-district in metro areas), limited within provincial boundaries and should receive referrals from and provide clinical support to several district hospitals.

b.) ***Provincial Tertiary Services (T1)*** *are rendered by more specialists than is generally available at Regional hospitals and which are provided in Tertiary and Central hospitals. Some large regional hospitals, due to distance and disease burden might render components of T1. T1 services are centred on a strong core of specialists in the main specialties, supported by other specialist and sub-specialist services. T1 services receive referrals according to a nationally agreed referral plan, mostly confined to provincial boundaries but which may also serve patients from areas beyond provincial boundaries, and tertiary hospitals must aim to provide these services.*

c.) ***Central Referral Services (T2)*** *represents a set of highly specialist services, delivered in sub-specialties that require unique, highly skilled and scarce personnel, may require unique and expensive technologies, and that are invariably linked to a Health Sciences Faculty. These services will be provided at a small number of sites nationwide according to a nationally agreed referral plan, serving a population purely based on access and which will therefore extend beyond the boundaries of the province within which they are located. These services are generally provided by Central Hospitals and some T2 services may be provided at Tertiary Hospitals or by means of outreach/telemedicine programmes from the central hospital to tertiary and/or regional hospitals.*

d.) ***National Referral Services (T3)*** *are services that will be provided in super-specialist national referral units only, each linked to a Central Hospital according to a nationally agreed referral plan, serving a population purely based on access and which will therefore extend beyond the boundaries of the province within which they are located. This limited number of services represents the final link in the referral chain. These services will be provided at a few carefully selected locations nationally where the personnel and technology required for the extremely specialist in nature and expensive services can be optimally concentrated.*

*e.) **Specialised Psychiatric Services (SP)** are services that may be provided in general hospitals (usually acute psychiatric wards only) but are mostly provided at specialised facilities designed for care of mentally ill patients. These services may be R, T1, T2 or T3 depending on complexity of care, multi-disciplinary nature and/or the supporting infrastructure and services required.*

3 SCOPE OF THIS REPORT

This report interrogates in detail the options considered to achieve the service level requirements for the provision of an academic hospital in the Limpopo Province. The objective is to establish whether the preferred method of procurement, applied to the identified preferred option, is affordable, allocates risk optimally and achieves the best value for money.

To this end, the report is divided into:

a) Needs Analysis which outlines the strategic concept, establishing the needs, operational requirements and output specifications for the hospital;
b) Solution Option Analysis identifying possible solutions that address the needs analysis outcome and identifies the preferred option that best suits these requirements.
c) Project Due Diligence is applied to evaluate the preferred option, to assess the site issues of a legal, regulatory, technical nature and to identify issues that may have a negative effect on the procurement of the preferred option in order to mitigate any challenges prior to construction commencement;
d) Financial Implications outlining both the projected Capex and Opex implications;
e) Procurement methods were then evaluated for affordability, optimum risk allocation and value for money.
f) Socio-economic Valuation outlines the estimated socio-economic impact of the project in respect of investment returns.
g) Procurement plan is mapped out with timelines for the achievement of the Project.

4 NEEDS ANALYSIS

The objective of the Needs Analysis is to develop an output specification for the project to establish the service needs and user requirements for the central hospital services and the academic platform within the Limpopo Province and to determine the budget availability. Human resources requirements are addressed, and the required operational budget determined.

4.1 Strategic context

The Vision of the National Department of Health is "a long and healthy life for all South Africans". The Mission statement is "to improve health status through the prevention of illness, disease and the promotion of healthy lifestyles, and t consistently improve the health care delivery system by focusing on access, equity, efficiency, quality and sustainability.[7] The legislative mandate of the Department of Health is derived from the Constitution, the National Health Act,61 of 2003, and other legislation passed by Parliament.

4.1.1 Constitutional obligations

Section 27(1)(a) of the Constitution of South Africa (Act 108 of 1996) gives every person the right of access to health care services, including reproductive health care. Section 27(2) states that the state *"must take reasonable legislative and other measures within its available resources, to achieve the progressive realisation of each of these rights."* This phrasing allows government to take fiscal and financial constraints into account but requires that available services improve over time.

The Constitution's emphasis on equality, in Section 9, requires that government, individuals and other institutions may not discriminate either directly or indirectly based on a range of different factors, including race, ethnic or social origin, age and disability. The prohibition of indirect discrimination requires that government focus its attention on those who are disadvantaged, including those disadvantaged in terms of access to services. This then requires that government allocate resources to upgrade services in provinces, such as Limpopo, which have poorer and mainly African populations and historically poor services available.

The National Development Plan, Vision 2030[8], calls for reform of the public health system to focus, among others, on ensuring a larger and better-trained health workforce, and improvements in maternal and infant health care. Targets for 2030 include an infant mortality rate of 20 per 1,000 live births, an under-five mortality rate of less than 30 per 1,000, and a maternal mortality rate of 100 for every 100,000 live births.

The development of the proposed new Limpopo Central Hospital responds to the 'progressive realisation' of access to health care services.

4.1.2 Review of legislation regarding the supply of health services

4.1.2.1 National Health Act, 2003 (Act 61 of 2003)

The **National Health Act, 2003** (Act 61 of 2003) (NHA) is the enabling legislation that provides for the development and execution of health services in the country. Any restrictions and standards are set in the Act, together with the Regulations and guidelines issued in terms of the Act. All other Health legislation is subordinate to the NHA.

[7] *Department of Health Strategic Plan 2015/16 – 2019/20*
[8] *National Planning Commission 2011. National Development Plan. Vision for 2030.*

It must also be recognised that the NHA is subordinate to the major financial legislation, such as:

- Public Finance Management Act, 1999 (Act No. 1 of 1999) – PFMA
- annual Division of Revenue Act - DORA), and to the
- Public Service Act, 2003 (Act No. 103 of 1994) (PSA), which regulates the personnel of the entire Public Service.

The Preamble to the NHA recognises *"the socio-economic injustices, imbalances and inequities of health services of the past"* and endeavours to address them, such as increasing capacity for service delivery to previously disadvantaged communities.

Section 2 lists the Objects of Act, and states that the aim is *"to provide uniformity in respect of health services across the nation".* Subsection 2(c) outlines the objective of:

(a) "protecting, respecting, promoting and fulfilling the rights of the people of South Africa to the progressive realisation of the constitutional right of access to health care services, including reproductive health care;
(b) the people of South Africa to an environment that is not harmful to their health or wellbeing;
(c) children to basic nutrition and basic health care services contemplated in section 28(1)(c) of the Constitution; and
(d) vulnerable groups such as women, children, older persons and persons with disabilities."

Chapter 7 of the NHA obliges the National Health Council to develop policy and guidelines in respect of "human resources planning and academic health complexes". The five subsections of this Section address:

48. Development and provision of human resources in national health system
49. Maximising services of health care providers
50. Forum of Statutory Health Professional Councils
51. Establishment of academic health complexes
52. Regulations relating to human resources

Of specific importance to the Limpopo Academic Hospital project is Section 51; "Establishment of academic health complexes". This section states that *"The Minister may, in consultation with the Minister of Education, establish —*

(a) Academic health complexes, which may consist of one or more health establishments at all levels of the national health system, including peripheral facilities, and one or more educational institutions working together to educate and train health care personnel and to conduct research in health services; and
(b) Any co-ordinating committees that may be necessary in order to perform such functions as may be prescribed."

Limpopo Academic Hospital (Complex)

- Limpopo Central Hospital
- Pietersburg (Capricorn) Regional Hospital
- Mankweng District Hospital
- Thabamoopo Specialised Hospital
- Any other facility deemed fit for training

Section 52 provides for regulations relating to human resources, and empowers the Minister may make regulations regarding human resources within the national health system in order to (amongst others)—

(a) "ensure that adequate resources are available for the education and training of health care personnel to meet the human resources requirements of the national health system;
(b) ensure the education and training of health care personnel to meet the requirements of the national health system"

4.1.2.2 Other legislation (Acts and Regulations)

There are many other Acts and regulations that govern the health sector and the services provided. Specific legislation address areas such as:

- Hospitals
- Pharmacies and medicines
- Human tissue
- Mental Health etc.

It is within this legislative framework that the recommendations of this project are framed.

4.1.2.3 Hospital licensing

A licence is required from the provincial health department for the erection of a private hospital. There is no similar requirement for a public hospital. The decisions on erection of public facilities is taken during national and provincial planning and must consider the budget cycle and long-term recurrent implications of the facility. However, the standards applied to private facilities by Regulation 158 are generally applied to public facilities too.

4.1.2.4 Standards – Office of Health Standards Compliance (OHSC)

The South African national health system comprises both public and private sector entities that are concerned with the financing, provision or delivery of health services.

The Office of Health Standards Compliance (OHSC) is an independent body established in terms of the National Health Amendment Act of 2013 to ensure that both public and private health establishments in South Africa comply with the required health standards. The OHSC is charged with:

1. Monitoring and enforcing compliance by health establishments with norms and standards prescribed by the Minister of Health in relation to the national health system.
2. Ensuring consideration, investigation and disposal of complaints relating to non-compliance with prescribed norms and standards for health establishments in a procedurally fair, economical and expeditious manner.

The new hospital will be monitored like any other hospital by the OHSC and must comply with the standards set.

4.1.2.5 NHI evolution

Although government has persevered since 1994 to ensure that everyone in this country has equitable access to necessary healthcare services there are still serious challenges, mainly caused by a skewed healthcare financing system. But large numbers of people continue to die prematurely and to suffer unnecessarily from poor health. Treatable conditions are not being treated on time and preventable diseases are not being prevented.

Without total redefinition of the financing mechanism for the country's health system the burden of disease in the country will not be reduced because the majority of the population, and the section suffering the greatest ill health, will not access good quality healthcare.

The National Health Insurance (NHI) is a financing system that aims to ensure that all citizens of South Africa (and legal long-term residents) are provided with essential healthcare, regardless of their employment status and ability to make a direct monetary contribution to the NHI Fund.

The NHI will offer all South Africans and legal residents access to a defined package of comprehensive health services. The state is committed to offering as wide a range of services as possible.

The supplier (service provider) side of the health system will be paid by the Fund for services provided to the public. The intention is to shift from fee-for-service (FFS) to diagnostic related group (DRG) method of payment. This means that the new hospital must be efficient so that the DRG payments are sufficient to cover the costs incurred.

4.1.2.6 Matters regulating health practitioners

Health services are not only labour intensive, they run 24 hrs a day every day of the year, and many of the personnel are highly trained, scarce and expensive people to employ.

The NHA and the PSA (together with relevant labour legislation) are critical to the successful deployment of an optimal health workforce. **Salaries, benefits and conditions of service** are determined through collective bargaining under the auspices of the Department of Public Service and Administration (DPSA), through statutory bargaining structures.

It has already been noted that Chapter 7 of the NHA provides for **human resources planning for health**. For the health professions (there are well over 100 health professions registerable with the three main health councils (HPCSA, SANC and SAPC)), statutory health professional councils are established to oversee:

i. the scopes of practice of the registered professions;
ii. common educational and training requirements of health care providers;
iii. new professions to be regulated;
iv. targets, priorities, norms and standards relating to the equitable distribution of health care providers;
v. development, procurement and use of health service technology;
vi. perverse incentives within the registered professions;
vii. the recruitment, evaluation and registration of foreign health care professionals;
viii. effective co-ordination of the objectives and responsibilities of the various statutory health professional councils;
ix. responsibilities of health care providers in promoting and maintaining public health;
x. inter-professional communication and relationships.

Professional practice, standards and conduct are regulated by independent statutory health professional councils:

- Health Professions Council of South Africa (HPCSA) – which has 11 Boards:
  - Dental Therapy and Oral Hygiene
  - Dietetics and Nutrition
  - Emergency Care
  - Environmental Health
  - Medical and Dental
  - Medical Technology
  - Occupational Therapy, Medical Orthotics, Prosthetics and Arts Therapy
  - Optometry and Dispensing Optometrists
  - Physiotherapy, Podiatry and Biokinetics
  - Psychology
  - Speech, Language and Hearing Professions
- South African Pharmacy Council (SAPC)
- South African Nursing Council (SANC)

There is also a Health Ombudsman to whom any member of the public may appeal any matter related to anything in the health sector, including professional conduct.

4.1.2.7 Teaching and training of health professionals

The new hospital, having been determined to be the teaching flagship for the University of Limpopo, must provide the infrastructure that allows teaching activities. It must not be confined to the initial targets

of a small number of undergraduate medical students but **must anticipate a full Health Sciences Faculty that trains medical, dental, associated health professions and nursing students at both under- and post-graduate levels.**

The environment for teaching and training of health professionals is complex. It is described in Part 3[9] of the National Tertiary Health Services Plan, which contains a "National Plan for Teaching and Training Health Science Students". This document notes that:

> *Educating trainees through to the production of competent professional graduates, and then developing them as professionals, is critical to the sustainability of the health system. Training is complex and for all professions involves a degree of experiential learning on the "service platform". Furthermore, trainees are of necessity educated across provincial boundaries, making this a function that demands close national cooperation and coordination between higher education institutions and all health departments. There is furthermore a need to align academic activities with the full spectrum and continuum of health services.*
>
> *Planning the expansion of health sciences education and the development of health professionals and para-professionals through higher education and the college sector requires close collaboration between the national Departments of Health and Higher Education and Training, to ensure that priority health skills needs are addressed, and output of appropriate health professionals is realised to meet the country's health and education needs. Historically the two departments have worked separately, and this has produced a disjuncture that has compromised efficiency and effectiveness. There is also a need to collaborate with the Department of Science and Technology to optimise research opportunities.*
>
> *There is a policy gap in terms of the training of health sciences students. While health role-players should be involved primarily in defining the need and the training parameters, the HEIs lead the development of the curricula and ensure quality and outcome competencies. Provincial health departments play a significant role in the clinical training of health sciences students and accommodate students on the health service platform. The collective and individual roles and responsibilities need to be clearly unpacked within an agreed and shared vision, underpinned by a quantified health human resources plan for the country. Definitions and funding streams need to be concluded. There is a need to establish national governance at ministerial and officials level, with the DGs as critical players. The partnership relationship consists of two primary parties, Health and Higher Education, each with its peripheral structures, the provincial health departments, and HEIs, and there are many important secondary role-players.*

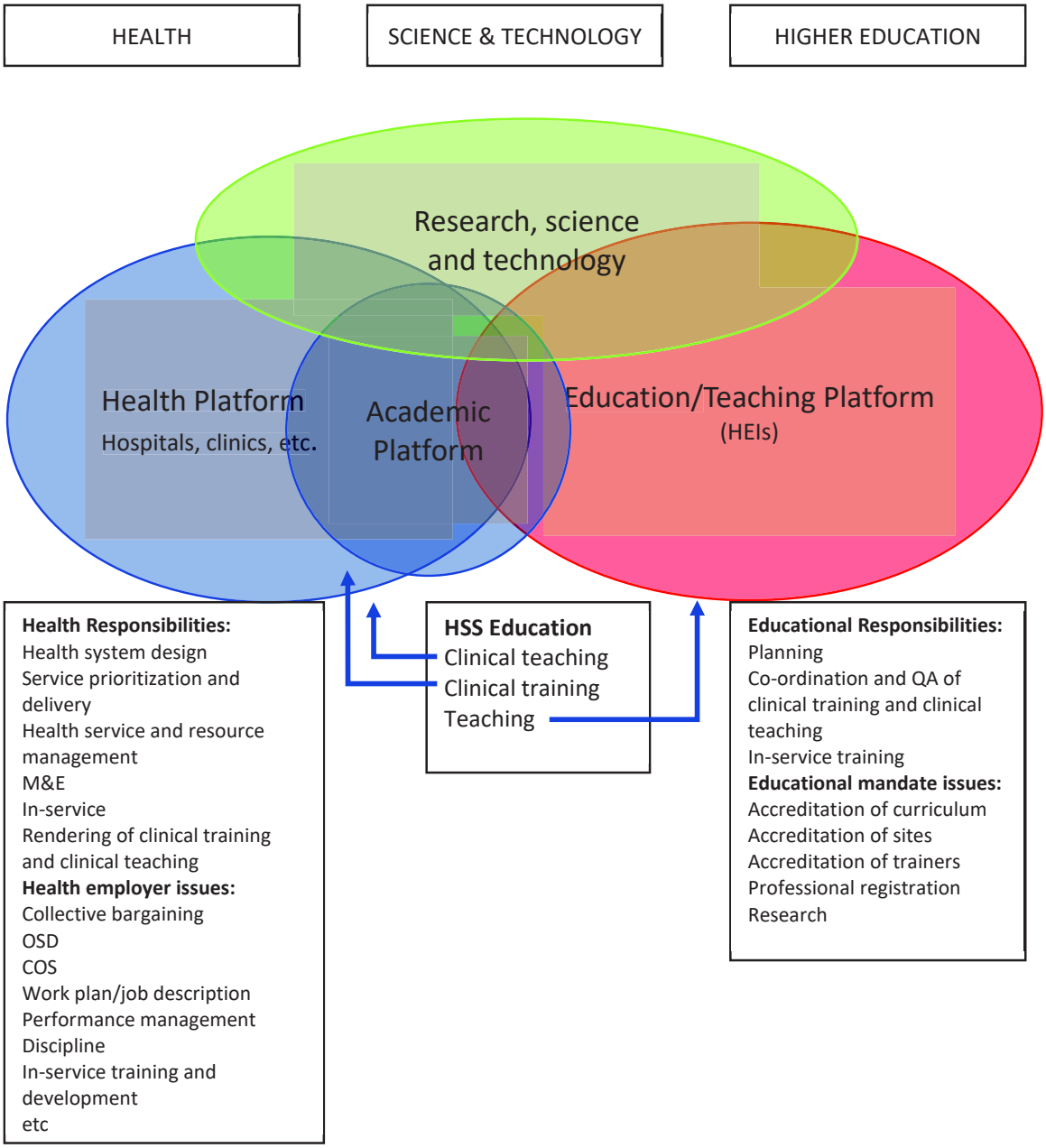
The Joint Health Sciences Education Committee (JHSEC) established by the Ministers of Health and of Higher Education and Training must manage the complex relationships.

The joint mission of the role-players in health sciences education is to ensure:

- the sustainable production, development, education and training
    - of appropriate numbers
    - of qualified and competent health professionals
    - across the continuum of healthcare
    - as well as the capacity to produce and develop new knowledge
    - to meet the demands of the South African health system (competent to address national - and international - goals for health outcomes and the attainment of the ideal community and individual health status)

[9] *National Tertiary Health Services Plan and Clinical Teaching and Training of Health Professionals (2013)*

Figure 1: Complex and integrated relationships between the primary role players



It would be wise to establish a Steering Committee comprising at least the following role-players to manage the development of the academic complex (hospitals and faculty):

- National Department of Health (NDOH)
- Limpopo Provincial Department of Health (LPDOH)
- Health Professions Council of South Africa (HPCSA)
- South African Nursing Council (SANC)
- Council on Higher Education (CHE)
- Department of Higher Education (DHET)
- Affected Higher Education Institutions and Nursing Education Institutions (HEIs/NEIs)
- University of Limpopo (UL)

4.1.2.8 Funding of health services

The legislation applicable to health funding are the laws of the national and provincial legislatures as they pertain to annual national and provincial budgets.

Provincial funding of primary and secondary health care in South Africa is sourced primarily out of the provincial equitable share (PES). The health component accounts for the second largest share (27%) of the equitable share formula, and the formula for the health component includes as variables the proportion of the population that does not have medical aid cover, a risk-adjusted capitation index, and patient load data from the District Health Information System. The medical aid coverage component would favour Limpopo. The risk-adjusted capitation index would, arguably, not favour Limpopo as much as it should do as the risk is based on medical aid data. Because of the high contribution of Group 1a as a cause of death highlights the poor socio-economic conditions in the province. These would result in a different – and higher-risk – morbility and mortality pattern, especially among children. This bias against Limpopo would be further exacerbated by the relatively high share that young children constitute of the population when compared to other provinces. In terms of outputs, Limpopo also has a share of hospital patient-days (9%)[10] that is lower than its share of the country's population. **This lower share arguably reflects in part unmet need**. Some other components of the equitable share formula – in particular the small poverty share – favour poorer provinces such as Limpopo. There is, however, not explicit weighting for rurality.

More important for our purposes is the funding of tertiary services. These are funded primarily through conditional grants from the national sphere. In 2017/18 there were five conditional grants for health, namely Comprehensive HIV, AIDS and TB (R17 558 million in 2017/18); Health facility revitalisation (R5 654 million), Health professions training and development (HPTDG) (R2 632 million), and Human papillomavirus vaccine (R200 million), and National Tertiary Services Grant (NTSG) (R11 676 million). The NTSG and HPTDG are most relevant for our purposes. The table below shows that in 2017/18 Limpopo was allocated only 5% of the HPTDG and only 3% of the NTSG. With these allocations, yet more than a tenth of the country's population, it is clear that **Limpopo is under-provided with tertiary services in both relative and absolute terms.**

Table 5: Provincial distribution of key national conditional grants, 2017/18

Province	HPTDG		NTSG	
	R million	% of total	R million	% of total
Eastern Cape	226 566	9%	890 973	8%
Free State	165 973	6%	1 018 025	9%
Gauteng	919 432	35%	4 110 484	35%
KwaZulu-Natal	331 944	13%	1 696 266	15%
Limpopo	131 726	5%	366 314	3%
Mpumalanga	108 014	4%	110 103	1%
Northern Cape	86 300	3%	340 032	3%
North West	119 194	5%	267 538	2%
Western Cape	542 700	21%	2 876 410	25%
South Africa	**2 631 849**	**100%**	**11 676 145**	**100%**

Source: Division of Revenue Bill 2017: 41.

The availablity of the LCH in terms of facilities, technology and staff will make visible a need or demand for services that clearly exists but that currently has little chance of being satisfied. The case is made later that Limpopo cannot fund any increase in services and that additional recurrent funding must come from the central fiscus, thriugh conditional grants, for new tertiary services and professional training.

[10] *National Treasury. 2017. Division of Revenue Bill 2017: 80.*

4.1.3 Strategic objectives for construction of the Limpopo Central Hospital

Rationale

One of Governments' major goals is to 'provide a long and healthy life for all South Africans'.
This is consistent with the vision and mission statements given in the National Department of Health Strategic Plan for 2015/16 – 2019/20 whose five main strategic goals include:

1. Prevent disease and reduce its burden, and promote health;
2. Make progress towards universal health coverage through the development of the National Health Insurance scheme, and improve the readiness of health facilities for its implementation;
3. Re-engineer primary healthcare by: increasing the number of ward-based outreach teams, contracting general practitioners, and district specialist teams; and expanding school health services;
4. Improve health facility planning by implementing norms and standards;
5. Improve financial management by improving capacity, contract management, revenue collection and supply chain management reforms.

These goals are incorporated in the National Development Plan (NDP) which is a 15-year plan of government highlighting the 2030 vision. Added to the five goals is the aim to successfully manage and work towards the prevention of HIV & AIDS and tuberculosis (TB), reduce maternal and infant child mortality.

While the Limpopo Department of Health (LDOH) shares the NDOH's vision, its mission is committed to providing quality health care services that are accessible, comprehensive, integrated, sustainable and affordable. The department adheres to the values and ethics that uphold the Constitution of the Republic of South Africa through honesty, integrity, fairness, equity, respect, dignity and caring. The recently signed and approved strategic provincial document, "Overview of the Strategic Direction of the Limpopo Department of Health" April 2018 clearly outlines the intentions of the province going forward and its commitment to addressing the current challenges within Limpopo.

The challenges in the province are not dramatically different to those set out in the NDP. However, there are different epidemiological, budget and skills constraints which affect the service provision within the province. The cost of malaria being just one of them along with inappropriate staffing and outdated business processes that require new and innovative solutions. Limpopo's health infrastructure is aged, inadequately maintained and much is inappropriate. The capital budget cannot keep up with demand and prioritisation is more critical than ever. Reforms of the healthcare delivery model are making poor progress and some initiatives are hampering service integration. Collectively these deficiencies have led to unacceptable health outcomes. Maternal mortality and neonatal deaths are at intolerable levels. The Limpopo provincial department of health is currently embarking on a process of radical transformation, with activities set in motion to support the identified focus areas including the organisation of an integrated district health system, and the increasing requirement for a strong tertiary centre, with academic support from an expanded health sciences faculty and medical school. The province is seriously committed to the improvement of patient care and the health of the people of Limpopo[11].

The development of the Limpopo Academic Complex aims to provide an efficient, flexible, well-balanced and fully functional academic health complex to enhance the servicing of the health needs of the province.

T**here are three key strategic objectives for constructing a new central hospital in Limpopo**:

1. Provision a new, Level 3, 488 bed central hospital in Polokwane to serve the Limpopo Province;
2. Provision of a training platform for healthcare professionals;

[11] *Refer to the document: "Overview of the Strategic Direction of the Limpopo Department of Health" April 2018*

3. Optimisation of the service platforms and referral pathway in Limpopo and improved service delivery.

These decisions have all been taken and various Presidential and Ministerial statements to this effect have been made over the last few years.[4]

A. Provision of additional Level 3 services in Limpopo

The draft 10 Year Infrastructure Plan for Health Facilities (10YIPHF), October 2016, determined that there is a deficit of Level 2 (L2) beds and 400 Level 3 (L3) beds in the Limpopo Province with an oversupply of district beds. The method for determining this uses specialist personnel as a proxy for the clinical care level of bed capacity. This is impacting on the existing infrastructure and compromising service delivery. Pietersburg and Mankweng hospitals, the tertiary referral hospitals for Limpopo, are de facto delivering district and regional services in Level 1 (L1) and Level 2(L2) beds to the detriment of building tertiary clinical capacity in L3 beds. The essential problem is that there is insufficient support infrastructure for specialist diagnosis and care at a tertiary level. Mankweng and Pietersburg hospitals are in relatively poor condition requiring significant upgrades. As a consequence, the provision of dedicated tertiary care infrastructure is regarded as a priority if equitable, effective health provision is to be achieved. The Department must provide a quality, fully serviced hospital facility that will enable its doctors, nurses and allied medical professionals to deliver the required L3 public health services to patients in Limpopo. This will require appropriate buildings and infrastructure, health technology and management services at a level suitable for effective service delivery. Critical is the inclusion of facilities that will enable clinical training and research.

B. Provision of training for healthcare professionals

Government in 2002 requested medical schools to enrol an additional 220 medical students in 2012 to increase the number of doctors. This figure increased to 425 in 2013. Currently, South Africa has 2074 students from rural areas and disadvantaged backgrounds studying medicine in Cuba because there is not enough capacity to train the doctors required to support an effective health system in South Africa.[12] While South Africa has certain capacity to train skilled practitioners to provide the highest professional standards, there is a need to sustain and augment this capacity. To achieve the NHI goals of more equitable access to high-quality health services through increased social solidarity within healthcare funding and services, several processes are required:

- The run-down and dysfunctional public health care infrastructures must be resuscitated and extended;
- The efficiency and effectiveness of management practices must be significantly enhanced.
- Priorities will have to be set in an accountable and transparent manner to ensure that resources are used more effectively and efficiently than at present in the public and private healthcare sectors.
- Tens of thousands of additional skilled and motivated healthcare workers must be trained and retained.

The lack of key clinical staff has severally compromised the ability of the Department of Health to deliver key programmes (including HIV, tuberculosis, child health, mental health, and maternal health) and has resulted in a wide range of poor or absent clinical services.

The decision of the de-merger of Medunsa from the University of Limpopo created an opportunity to establish a School of Medicine in Limpopo Province which added a ninth school of medicine in South Africa and was the first new school of Medicine to be established since 1976. A new Central Hospital in Limpopo will provide an additional training platform and full T2 Tertiary service for the clinical teaching staff, medical registrars and undergraduate students. There is an increased likelihood too of students remaining in the province where they are trained after graduation.

[12] *Department of Health. 20 Year Review. 1994-2014*

The new medical school had an initial enrolment intake of 60 undergraduate medical students in 2015 with an additional intake of 20 per year up to a maximum of 200 first year students. The enrolments are to plateau at 1117 in 2023.[13] Teaching has already commenced, utilising the Current faculty of Health Sciences and other university facilities. Doctors, nurses and allied health professionals are being trained and need to have the comprehensive teaching platforms across the levels of care provided at hospitals within an acceptable distance from the University. Pietersburg and Mankweng Hospitals are being used by the UL for teaching, and provide good clinical material and opportunities for teaching, however the lack of infrastructure and equipment for full tertiary services, as well as the lack of appropriate academic infrastructure for undergraduate and postgraduate learning, make the training platform sub-optimal and inferior to those in other provinces. This is addressed and considered in the planning of the proposed options. What is clearly evident is that appropriate clinical teaching facilities are required if comprehensive T1 and T2 tertiary services are to be provided at LCH. The overall aim will be:

- Affiliation with the medical school as the main teaching platform with promotion of the integration of the central referral services, health science training and research with provision of multidisciplinary services
- Establishment of an central hospital to provide an improved clinical platform for teaching and training health professionals in collaboration with the University of Limpopo, to meet the healthcare professional development targets and needs of the Medical School;
- Provision of training for health care providers and for training of students in medicine, nursing, pharmacy, physiotherapy, oral and dental hygiene, speech therapy
- Improvement of the capacity to manage the anticipated health service load related to the quadruple burden of disease thereby reducing mortality and morbidity rates within the province;
- Increase of clinical specialist capacity by improving opportunities for research and registrar training in Limpopo, thereby improving recruitment and retention of clinical skills and expertise.

C. Optimisation of the Healthcare Service Platforms and Referral Pathway in Limpopo

The referral pathway between related hospitals was analysed to ascertain whether the referral system is functioning as it should and to determine the correct distribution of L1, L2 and L3 beds that will be affected by the new L3 services. Limpopo has a relative oversupply of district beds, a shortage of regional beds and a calculated gap of 400 x L3 beds. [14] This analysis included a review of service provision at the hospitals that are most directly affected by the redistribution of beds to accommodate the increased tertiary services at a new LCH include:

- Mankweng Hospital – currently providing combined district/regional hospital care with tertiary services in ophthalmology, neonatalogy, general surgery, burns and plastic surgery
- Pietersburg Hospital – currently providing combined regional/tertiary hospital services (including an oncology centre with linear accelerator) with limited district services ;
- Sheshego and other district hospitals – currently providing district hospital care.

The redistribution of beds per service level is essential to correct the referral pathways and ensure that the health system functions as it should to improve equitable access to healthcare and provide access at the most peripheral appropriate level of care with efficient inward referral to specialised care i.e. provision of a dedicated tertiary service platform and a proficient referral system for the district and regional hospitals. All district and regional hospitals must be fully functional to avoid inappropriate in-referral of level 2 patients.

[13] *A Feasibility Study for New School of Medicine at the University of Limpopo. July 2013*
[14] *The draft 10 Year Health Infrastructure Plan*

The objectives therefore is:

- Establishment of the correct bed requirements that will support the referral pathways based on the population, demographics and burden of disease
- Establishment of an optimal, fully functioning tertiary service for the Limpopo Province, without undermining access to district and regional services;
- Establishment of the correct bed requirements that will support the referral pathways based on the population, demographics and burden of disease;
- Development of an affordable inpatient and outpatient referral pathway to encourage access at the most appropriate level of care, commencing most peripherally with potential for inward referral and outreach to the peripheral levels of care thereby ensuring an efficient and cost-effective service delivery platform;
- The building of provincial health service delivery capacity by reducing out-referral of T1 and T2 patients to other provinces which incurs costs to the province and inconvenience to patients.
- Development of an affordable inpatient and outpatient referral pathway to encourage access at the most appropriate level of care, commencing most peripherally with potential for inward referral and outreach to the peripheral levels of care thereby ensuring an efficient and cost-effective service delivery platform
- Affiliation with the medical school as the main teaching platform
- Establishment of an academic hospital to provide an improved clinical platform for teaching and training health professionals in collaboration with the University of Limpopo, to meet the healthcare professional development targets and needs of the Limpopo Medical School;
- Provision of training for health care providers and for training of students in medicine, nursing, pharmacy, physiotherapy, oral and dental hygiene, speech therapy
- Provision of space for research;
- Promotion of the integration of the central referral services, health science training and research with provision of multidisciplinary services
- Improvement of the capacity to manage the anticipated health service load related to the quadruple burden of disease thereby reducing mortality and morbidity rates within the province;
- Increase of clinical specialist capacity by improving opportunities for research and registrar training in Limpopo, thereby improving recruitment and retention of clinical skills and expertise;
- Improvement of provincial health service delivery capacity thereby reducing out-referral of T1 and T2 patients to other provinces which incurs costs to the province and inconvenience to patients.
- Alignment with the Limpopo Department of Health strategic direction outlined in the report "Overview ***of the Strategic Direction of the Limpopo Department of Health***" April 2018 signed 14th May 2018 (Annexure 3).

The ultimate outcome will be the improvement of healthcare services to the Limpopo population and a healthier nation.

4.2 Geographical definition of the Limpopo Province

The composition of the Limpopo Province, population and socio-economic factors are discussed in detail under Annexure 1.

4.3 Clinical service requirements

The clinical needs for the province are discussed under Annexure 2: “Clinical Feasibility”.

The result of the study is the identification of the tertiary service need for the Limpopo Province, analysis of existing services followed by a gap analysis and the determination of what is required to provide a full tertiary service with a suitable academic platform in line with the curriculum of the medical school.

4.3.1 Proposed Services and Facilities to meet the Health Service Gap

Selected Clinical Departments and Disciplines

Professionals in clinical disciplines work together in a tertiary setting, and the more so, the more complex patient care becomes. Provision should be made for all of the major disciplines, and specifically for sufficient capacity in those disciplines where the epidemiology shows great need. Table 10 shows the full list of departments proposed, clinical and support. Figures 15 and 16 show the proposed organisational structure of the hospital and its clinical departments. Details are provided in a separate Annex.[15]

Where it is applicable, indication is shown of those disciplines to be accommodated at other hospitals in the ‘complex’.

It is proposed that seven Clinical Departments be accommodated in the complex, six of these (partly or totally) in the new facility; only Psychiatry totally off site.

Table 6: List of recommended Departments (Clinical and Support) for LCH

CEO OFFICE
Executive
Quality Assurance & Clinical Performance Improvement Division
OFFICE OF CLINICAL DIRECTOR
Clinical Analysis
Executive
CLINICAL DEPARTMENTS
DEPARTMENT OF ANAESTHETICS & CRITICAL CARE MEDICINE
Dept Anaesthetics & Critical Care Medicine
Anaesthetics
DEPARTMENT OF MEDICINE
Dept of Medicine
Cardiology (& Cath Lab)
Dermatology
Endocrinology
Medical ICU
Neonatology
Nephrology (Pietersburg)
Neurology
Paediatric Cardiology
Pulmonology

[15] *Annex LCH Organisation v1.1 Functions 180102*

Rheumatology

DEPARTMENT OF OBSTETRICS & GYNAECOLOGY

Dept Obstetrics & Gynaecology
Gynaecology
Obstetrics

DEPARTMENT OF PAEDIATRICS

Dept Paediatrics
General Paediatrics
Neonatology
Paediatric Cardiology
Paediatric ICU
Paediatric Pulmonology
Paediatric Surgery

DEPARTMENT OF SURGERY

Dept of Surgery
Cardiothoracic Surgery
Cranio/Maxillo Facial/Oral Surgery
Emergency & Trauma Unit
Neurosurgery
Ophthalmology (Mankweng)
Orthopaedics
Otorhinolaryngology
Plastic and Reconstructive Surgery
Specialised General Surgery
Surgical ICU
Urology (Pietersburg)

DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Psychiatry & Mental Health (Thabamoopo)

DEPARTMENT OF RADIOLOGICAL SCIENCES

Dept Radiological Sciences
Diagnostic & Intervention Radiology
Medical Oncology (Pietersburg)
Radiation Oncology & Nuclear Medicine (Pietersburg)

NURSING

NURSING SERVICES DEPARTMENT

Division: General Medical Wards (64/243) and OPDs
Division: Nursing Service Financial Analysis and Reporting, Operational Support & Clin Nursing Research & Training
Division: Paediatric (118), Midwifery, Obstetrics & Gynaecology Nursing (96) [214]
Division: Surgical Wards (148) and OPDs &, Emergency, Intensive & High Care (62) [210]
Division: Theatres, Theatre Sterilising and Supply & CSSD
Nursing Management

ASSOCIATED HEALTH SERVICES

ASSOCIATED HEALTH SERVICES DEPARTMENT

Audiology & Speech Therapy Division
Dietetics Division
Head of Associated Health Services Department
Hospital Social Work Division
Medical Physics
Nuclear Medicine Radiography
Occupational Therapy Division
Optometry Division
Orthotics & Prosthetics Division
Physiotherapy Division
Podiatry Division
Radiation Therapy
Radiography & Imaging Division

PHARMACY DEPARTMENT

Pharmacy Dispensaries
Pharmacy Management

Pharmacy Medical & Surgical Consumable Stores
Pharmacy Medicine Bulk Stores

SUPPORT DEPARTMENTS

ADMINISTRATIVE SUPPORT

Administration

FINANCIAL MANAGEMENT

Financial Management

SUPPLY CHAIN MANAGEMENT

Supply Chain Management

OPERATIONS MANAGEMENT

Operations Management

HUMAN RESOURCES MANAGEMENT

Human Resources

INFORMATION & COMMUNICATION TECHNOLOGY

ICT Management

Figure 2: Proposed Organisation for LCH showing all Departments

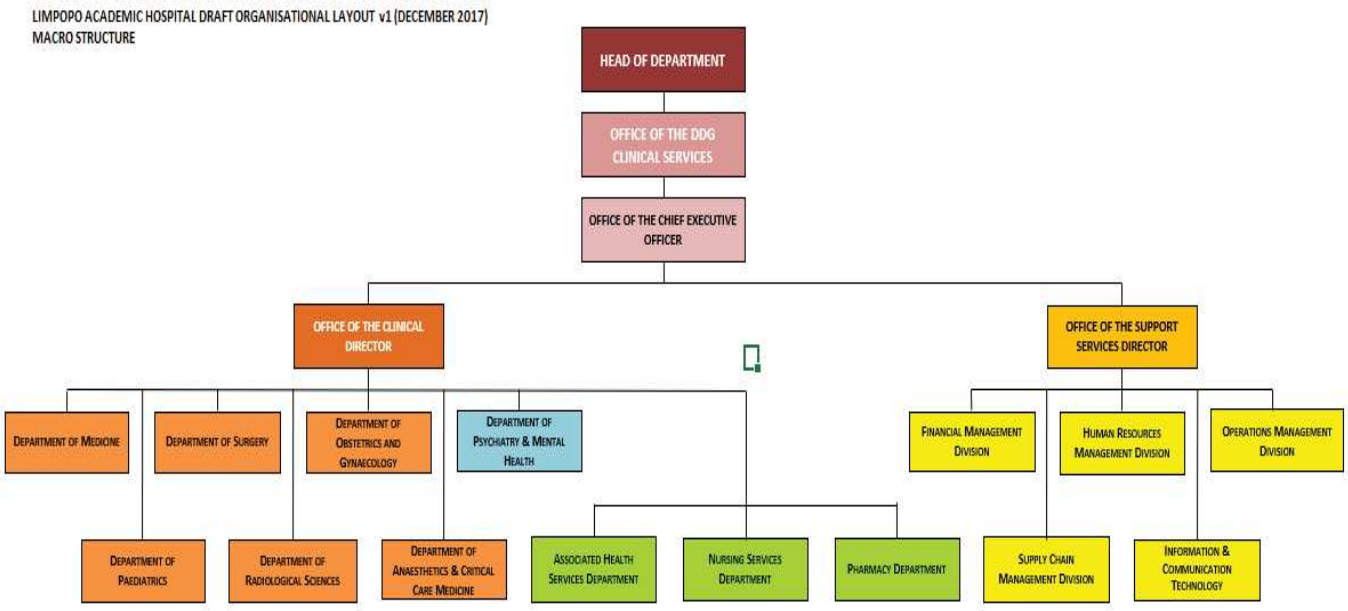
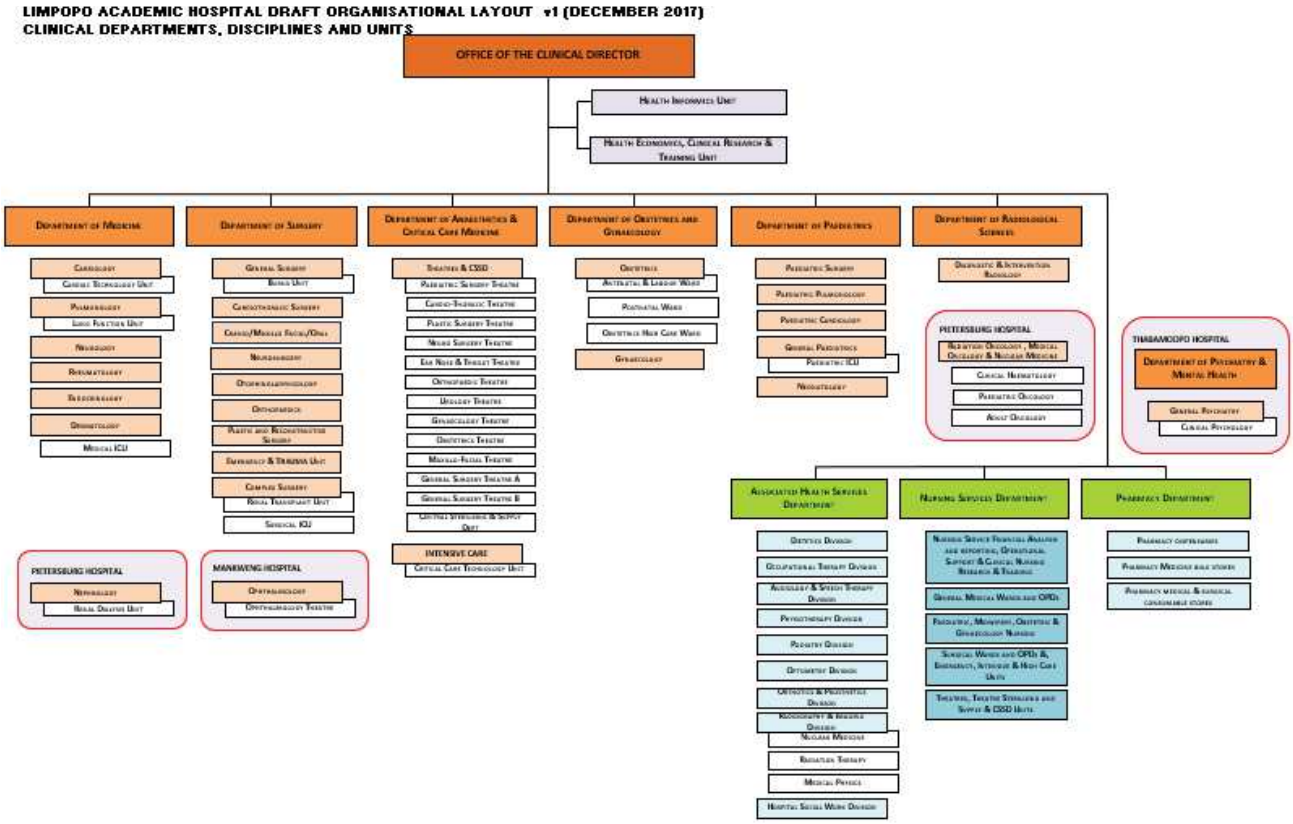


Figure 3: Proposed Organisation for LCH showing details of only the Clinical Departments



4.3.2 Clinical services plan

Most of the patients seen in LCH services will be referred and will have clinically difficult conditions to manage.

The most important issues with the clinical services are:

1. Maternal and child care unit
2. Trauma management
3. Oncology
4. Operating theatres

Maternal and child care unit

Maternal survival in pregnancy and childbirth as well as neonatal survival are a top priority. It is proposed that the tertiary services related to pregnancy, childbirth and care of the neonate are accommodated in a comprehensive unit. Obstetrics and Paediatrics (including Neonatology) should be in a contiguous clinical space.

Trauma management

The amount of trauma seen in the province justifies a comprehensive trauma management capability. Minor trauma will still be seen in other hospitals, but complex and multiple trauma will be referred to LCH. There needs to be a Trauma Unit which provides Critical Care and has direct access to comprehensive radiology and to all operating theatres.

Oncology

The oncology management programmes of a wide range of cancers needs to be expanded. Cancers are generally diagnosed through comprehensive diagnostic radiology techniques, supported by a laboratory service (histology and other pathology tests). Some cancers are operable, either for total or partial excision and this means that surgeons need adequate theatre space and time to perform the necessary procedures. Some cancers respond to radiation, some to chemo-therapy and some to both.

While oncology services are to remain located at Pietersburg Hospital, most of the patients will also be cared for in disciplines at the new LCH. The implication is that there must be a dedicated patient transport system between the two hospitals to allow for comprehensive multi-disciplinary clinical care.

Operating theatres

A major constraint in the current services is the unavailability of theatre time. If referrals are to be curtailed then there must be fully-equipped, discipline-specific operating theatres for each discipline so that theatre availability is not a constraint to clinical care.

Academic

While a health department is not obliged to build to accommodate a medical school, the bed numbers have an impact on the proposed Medical School. The UL will have to work with LDOH and HPCSA to systematically utilise sufficient service platform as their teaching platform. The following is required by HPCSA:

- Undergraduate students:
    - A ratio of 5 beds per student to be provided in the Limpopo Academic Complex Hospitals spread between the different level facilities. e.g. 1 bed at tertiary level, 2 beds at regional level and 2 beds at district level.
- Basic specialist students (Registrars):
    - A minimum ratio of 11 beds per student to be provided in the Limpopo Academic Complex Hospitals spread between the different level facilities e.g. 8 tertiary beds (minimum), 2 regional and 1 district bed.

- Sub specialty students (Senior Registrars) will require a higher number of tertiary beds.

4.3.3 Proposed services and facilities to close the identified service gap

The gap in infrastructure for rendering L3 (tertiary)care can be met by the selection of Option 2 with the following components:

- **Limpopo Central Hospital –** Construction of a new 488 L3 bed hospital.
- **Mankweng Hospital –** Retain the existing 36 Ophthalmology tertiary beds at Mankweng Hospital.
- **Pietersburg Hospital –** Leaving oncology services at Pietersburg (58 beds) as well as nephrology and urology beds (32) along with the renal dialysis unit. This totals 90 beds.
- **Thabamoopo Hospital –** making 20 beds available for tertiary psychiatry.

The total tertiary service component for the Limpopo Academic Complex (not including psychiatry) will be 634 beds which is less than other estimates:

- Independent analysis indicated that 688 tertiary beds are required in the Limpopo Province
- the Draft 10 Year Infrastructure Health Plan indicated a shortage of 400 tertiary (L3) beds which, added to the existing 187 L3 beds at Pietersburg Hospital, and the 55 L3 beds currently at Mankweng Hospital, totals 642 L3 (tertiary) beds

4.4 Space requirements

The project will result in the construction of the new modernised and world class facility. The building should be designed to ensure optimum flow, efficient maintenance and operational cost, and should have a life span in excess of 20 years.

4.4.1 Space norms and standards

The design of the new hospital will apply national and departmental policies and standards including but not limited to:

- The infrastructure unit systems support (IUSS) standards-be used where available for the standardization of design and technical standards, and where these are not yet developed, corresponding international standards to be applied;
- National Health Act and relevant regulations;
- Building standards, regulations and applicable code;
- Occupational Health and Safety Act and relevant regulations;
- Environmental policies;
- Municipal by-laws and regulations;

4.4.2 Clinical space requirements

To achieve effective delivery of the services outlined in the previous chapters, there are particular space requirements that must be provided in line with the current Department's space norms and standards:

- Inpatient wards inclusive of intensive care and high care facilities;
- Emergency and trauma care centre;
- Oncology facilities;

- Operating theatres and day surgery theatres;
- Out-patient department and specialist clinics;
- Forensic pathology services;
- Laboratories (National Health Laboratory Services and Blood Transfusion Services);
- Imaging;
- Pharmacy;
- CSSD;
- Mortuary space

The disciplines are listed in the previous table to be included in the hospital.

4.4.3 Ward configuration

4.4.3.1 Standard ward configurations

The standard wards will be to IUSS standards and shall have:

- Combination of four bed, two bed and single bed units;
- En-suite patient toilet and showers to each bed unit;
- Nurses station;
- Unit managers office;
- Doctors office/consulting room;
- Clean utility;
- Cleaners station;
- Sluice;
- Dirty utility;
- Stores for clean linen, equipment, medicine, medical and surgical supplies and kit;
- Staff rest room with lockers;
- Staff toilet;

These wards willy apply to:

- Medical
- Surgical
- Orthopaedics;
- Gynaecology wards.

4.4.3.2 Special ward configurations

A number of specialities require wards that have unique space requirements:

- Obstetrics;
- Paediatrics;.
- Oncology;
- Burns;
- Day ward;
- Intensive Care;
- High Care

The IUSS guideline documents outline the requirements which shall be applied to the design and planning.

4.4.4 Non-clinical space requirements

Hospital support spaces are required to facilitate efficient service provision and compliment the clinical services:

- Admissions and records;
    - Medical records and cashiers office;
    - Hospital archives
- Waiting areas;
- Administration and management
    - Offices – single and open plan offices to accommodate administrative staff;
    - Boardrooms;
    - Meeting rooms;
- Academic facilities
    - Meeting rooms for clinical teaching;
    - Offices- single and open plan for doctors, specialists and registrars;
    - Lecture hall
    - Student facilities.
- Facility management;
    - Laundry and linen service;
    - Kitchen (Catering) services;
    - Cleaning services;
    - Mortuary;
    - Security service;
    - Grounds;
    - Housekeeping;
    - Portering and transport services;
    - Bulk stores;
    - Clinical and hospital engineering workshops;
    - Emergency vehicle parking and EMS facilities;
    - Car parking – public, staff, visitors and service vehicles;
    - Transport service:
        - Office
        - Transit waiting area;
        - Drivers overnight.
    - Staff amenities – change and rest rooms, overnight on-call facilities;
    - Retail space – cafeteria;
    - Transit accommodation for patients waiting for transport;
    - Lodger mothers and pregnant mothers waiting accommodation.
    - Courier and mail service;
    - Reprographics services;
    - Television services; and
    - Fleet management
    - Waste management service.

4.4.5 Additional considerations

- Building engineering service and utilities to conform to the approved IUSS health facility guides on building engineering services. This service will include:
    - Air conditioning plant;
    - Vertical transport systems;
    - Utility supply from the site boundary to the facility and internal reticulation of utility within the facility.
    - Health technology (HT) for effective diagnosis, treatment and care of patient, as well as training and research functions. HT and related services shall conform to the draft IUSS health facility guides on health technology. HT commissioning, lifecycle and maintenance, and training such be part of the project.
- Fixed furniture and equipment;
- Information and communication technology (ICT) infrastructure and related services:

    - Open structured cabling network with a performance and bandwidth capable of carrying data, voice and video;
    - Communication and telephony systems;
    - Cabinets;
    - Outlet; and
    - Co-ordination with power supplies to switches routers, firewall, servers, etc.
- Non-hospital information management systems, including:
    - Requisition and booking of services e.g. radiology, linen, food, pathology;
    - Requisition for supplies e.g. stationary, dry dispensary items;
    - Helpdesk procedures;
    - Procurement procedures; and
    - Asset management.
- Security infrastructure;
- Parking, access to site, site roads and public transport

4.5 Medical equipment requirements

The project must provide appropriate and essential medical equipment to deliver medical, surgical, critical care and high care services during the project's operational life. In addition, the equipment must accommodate training and research functions associated with an academic institution. Medical equipment will be provided, at the least, for:

a) Diagnostics and imaging;
b) Operating theatre units;
c) ICU/critical care and casualty;
d) General and specialist surgery;
e) Internal medicine monitoring and diagnostics;
f) Paediatrics, obstetrics and gynaecology; and
g) Allied disciplines.

5 SOLUTION OPTION ANALYSIS

The Solution Option Analysis aims to critically assess the range of technical solution options that can meet the needs and output specification identified in the Needs Analysis and Clinical Service Feasibility study, found in Annexure 2 appended. This analysis includes the legal, technical and financial issues per option to enable the NDOH to choose a preferred option solution.

Four options were initially considered in the Business Case and were reviewed subsequently in the feasibility study conducted for the PPP option in 2013. These options are reviewed again in this report:

Option 1: Consolidated specialist services – reconfiguration of existing hospital, no new hospital.

1. The existing Pietersburg hospital would be upgraded to a central hospital with a limited number of regional beds.
2. Mankweng hospital would be a regional hospital for Capricorn District with limited districts beds to accommodate the local population.

Option 2: Split specialist services and build a new 488-bed academic hospital.

1. A new 488 L3 bed central hospital, **Limpopo Central Hospital**, to be constructed on the new site;
2. Pietersburg Hospital to become a regional hospital, but still provide some tertiary services (90 x L3 beds). Oncology services to remain at Pietersburg (58 beds) as well as nephrology and urology beds (32beds) and the renal dialysis unit;
3. Mankweng hospital to become a district hospital with some regional services and limited tertiary beds. The existing 36 Ophthalmology tertiary beds to be remain at Mankweng Hospital.

The total tertiary service component for the Limpopo Academic Complex (not including psychiatry) will be 614 beds which is less than other estimates.

Option 3: New 688 bed academic hospital.

1. New central hospital, **Limpopo Central Hospital,** with 688 beds will be built on the new site and will provide all tertiary services in the region;
2. The tertiary beds will be relocated from Pietersburg and Mankweng hospitals;
3. Pietersburg Hospital to become a regional hospital with limited district beds and no tertiary beds; and
4. Mankweng hospital to become a district hospital with limited regional beds and no tertiary beds.

Option 4: Do nothing – no change

Option 2 has been selected as the preferred option in this document. The option of building a new 488 bed central hospital on a new site donated by the local municipality meets the requirements of the province to support the provision of tertiary health services and to support the training of health professionals. Existing tertiary services, oncology and ophthalmology, are to remain at Pietersburg and Mankweng hospitals respectively.

5.1 Option 1: Consolidated specialist services – reconfiguration of existing hospital, no new hospital.

1. The existing Pietersburg hospital would be upgraded to a central hospital with a limited number of regional beds.
2. Mankweng hospital would be a regional hospital for Capricorn with limited districts beds to accommodate local population, predominantly regional beds and some tertiary beds.

5.1.1 Pietersburg Hospital

Bed Count

- The total bed count for Pietersburg Hospital will be 748 which, less the 442 existing useable beds, indicates 306 new tertiary beds to be built;
- 62 of the existing tertiary beds (oncology) are accommodated in dilapidated prefabricated buildings that must be demolished i.e. the 504 existing useable beds at Pietersburg hospital will be reduced to 442 after their demolition;
- The 442 existing beds (504 less 62) will require extensive upgrade and reconfiguration to convert the wards to facilities for teaching as teaching space will be required per ward.

Reconfiguration of the existing infrastructure

Of the two hospitals, Pietersburg Hospital will require the major share of construction work. If Pietersburg Hospital is to function as the main tertiary, teaching facility for Limpopo, to function optimally, the hospital will need to be reconfigured and departments relocated.

- The theatres are insufficient and the existing poorly laid out. A new theatre suite must be built with the full component of theatres and support facilities commensurate with a tertiary, academic hospital's requirement. This will also require a reconfiguration and expansion of the CSSD;
- The existing radiology department will need to be re-planned and expanded to include a new MRI, a panorex and mammography. The existing building and equipment are in a poor state and require major upgrade and equipment replacement..This area should be relocated into a new core block to make it more functional.
- The accident and emergency will need to be re-planned and expanded with a trauma ICU included and ward included.
- The ICU beds will have to be more than doubled in number and the existing relocated to the ground floor close to the theatres;
- The outpatients department will need to be significantly increased – the area existing is already too small and expansion in this area difficult. This will mean outpatients will need to be split and scattered throughout the hospital. The alternative would be to relocate the administration and chemotherapy outpatients to allow for expansion of Outpatients;
- The records/file room is already too small for the existing hospital and will need to be expanded as will the waiting areas which are already congested. This can be relieved by creating adequate sub waiting areas throughout outpatients at the various discipline's consulting rooms. Existing sub waiting areas need to be revised as they are deep within the building with no natural light or ventilation. This is essential as currently patients are compromised in the existing sub waiting.
- The oncology outpatients and haematology area is very overcrowded and needs to be expanded – there is no space to expand this department. The oncology department is already fragmented and services scattered on the site. There is space to relocate this unit close to the oncology radiation unit and build on. This would keep all the oncology services together and provide the much needed additional space in outpatients.

- Additional parking is required on site and the existing parking will need to be formalised. There is a lack of space for the public parking and drop off areas are congested. A suggested solution would be to purchase the site opposite the trauma unit and convert the area to parking? The problem is that the main building and entrance are squashed into the corner of the site which leaves little room for the public areas i.e. parking and circulation.
- Access to the site needs to be re-planned to alleviate the congestion of the surrounding roads. The security and entrances to the site will have to be upgraded and circulation re-planned;
- Roads need to be planned and upgraded;
- The support services such as the bulk services, laundry and kitchen will need to be upgraded though the space provision is adequate;
- The mortuary will need to be expanded to accept and store more bodies;
- The bulk services need replacement as the existing are in a very poor shape (refer to reports annexed). Reports on these services support the replacement of the bulk services on site.
- Currently there are no comprehensive drawings of existing underground services and each time a fault needs to be traced and worked on, services have to be shut down. The cost implications of replacing the bulk services requires decommissioning of the existing as well as the building of the new systems;
- Signage and wayfinding will need to be re-planned and significantly upgraded.
- A number of existing buildings will have to be demolished and rebuilt to enable the hospital to be re-planned and the required new departments located in more optimal positions. This is especially true where the new core block must be placed central to the hospital, accessible to both the wards and the outpatients which will require demolition of a number of existing buildings;
- Re planning of the whole site will require that departments be relocated or upgraded to be fit for purpose. This will require a comprehensive decanting plan and the erection of temporary decanting structures to accommodate services that need to continue while construction on site is ongoing. This will mean considerable disruption and discomfort to both patients and the staff. The lack of adequate space on site will add to this problem;
- Not all the staff and students will be able to be accommodated comfortable on site. The existing accommodation on site is distributed within the hospital complex and will need to be relocated to make way for the expansion required;
- There are a number of heritage buildings on site that may not be demolished. These occupy space that should be utilised for the main core block. The retained heritage buildings will therefore need to be repurposed and retrofitted which is a compromise and not the optimal solution for efficient service provision;
- The current road network needs to be upgraded by the local authority- Van Warmelo Street is to be upgraded to 4 lanes with the re-alignment of Van Warmelo Street into Hospital Street. This means that the re-alignment will cut across the south-eastern corner of the existing hospital. About 10% of the existing site area will be lost as a result of the re-alignment;.
- It is proposed that a new core block be built with OPD, theatres, emergency centre, radiology and allied services to make the facility efficient. A number of existing buildings will need to be demolished and relocated in order to achieve this. The clinical engineering department will have to be relocated and rebuilt as it is centrally placed in a critical space (adjacent to theatres) and will need to make way for the expansion of the core.

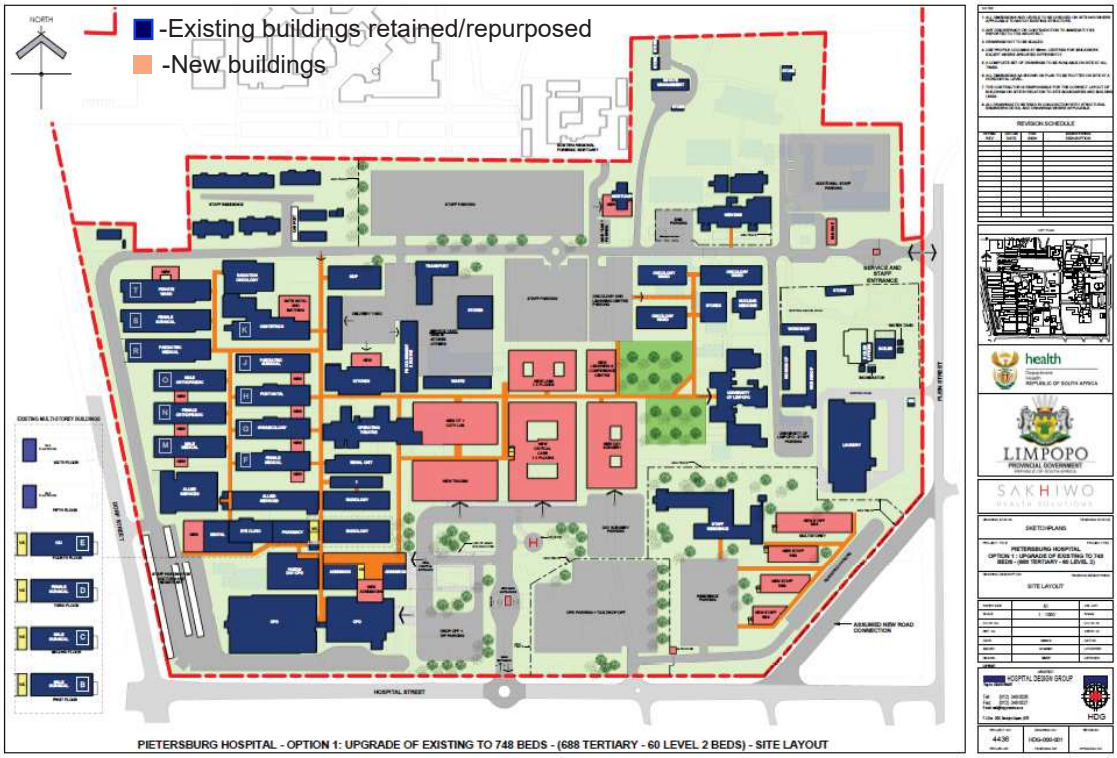
Option 1 Masterplan

The existing site was surveyed and a high-level condition assessment (by the professional consulting team) was completed of the existing Pietersburg hospital site and hospital buildings. The staff residences, unless they could be used for the reconfigured hospital, were excluded from the condition assessment. The survey drawing is appended under “Drawing 1”.

Photograph 1: Pietersburg Hospital Aerial view of the existing site and the proposed areas for expansion

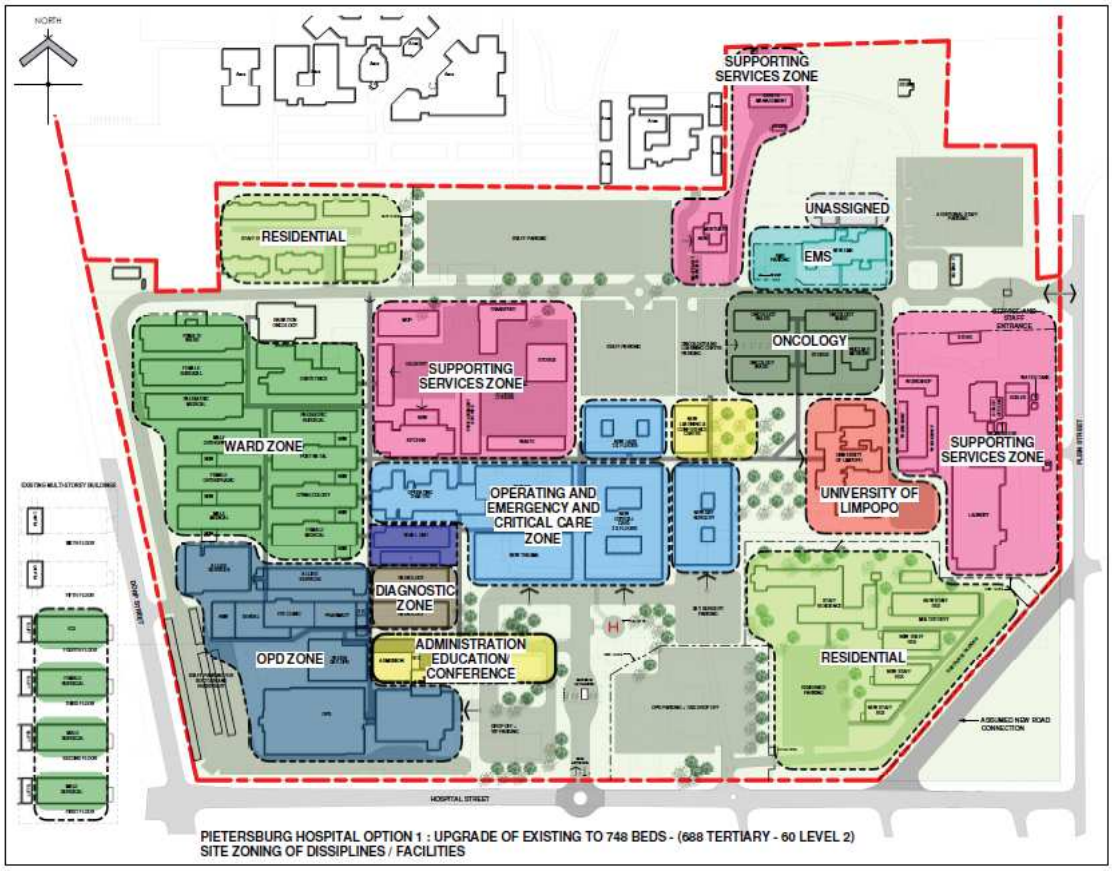
The architects prepared a masterplan layout to determine the upgrading and additions required to make the existing hospital site layout suitable to provide adequate, efficient tertiary services as required. The schedule of accommodation (Annexure 2) compiled by the health planner formed the basis for the planning scope.

Drawing 1: Layout proposal for Option 1 (Refer to Drawing 2 under annexures)



Although the existing Pietersburg Hospital site is large, (14,8ha) it is substantially developed. There is insufficient space (only 7.5ha) on this site to retain the existing hospital and to construct a new Level 3 tertiary academic hospital, a new medical school and accommodation for both students and key hospital staff and provide the required parking commensurate with this size hospital.

Drawing 2: Option 1: Pietersburg Hospital upgrade : Zoning layout



Major enabling works and the decanting of patients and services will be required as this project will have to be constructed without interrupting the existing service provision. This will have an effect on both the timelines for the project completion and potential risks. Added to this, a number of prefabricated buildings that have been on site since before 1994, are in a very poor state and have to be demolished. Some of these buildings have asbestos roofing which requires specialized removal which takes more time to demolish than regular buildings, requiring specialist to do this work.

This, the state of the bulk services which need to be replaced, the poor state of the existing facilities, and the fact that some areas are no longer fit for purpose, are key factors influencing the decision to rather build a new central hospital on the greenfield site chosen.

5.1.2 Mankweng Hospital

Mankweng will become a district hospital with some regional capacity in Option 1.
No tertiary beds will remain in Mankweng Hospital

Photograph 2: Aerial view of Mankweng Hospital site

It must be noted that, under this Option 1, district beds currently at Pietersburg hospital will have to be accommodated elsewhere. Seshego hospital, which is the closest district hospital, is not large enough to take additional district beds; unless additional capacity is constructed on site. This requirement must be factored in to the future strategic planning of the province.

5.1.3 Option 1: Cost Estimate

Pietersburg Hospital: Conversion to a full tertiary hospital

The conversion of Pietersburg Hospital would include 688 x L3 beds (tertiary) and 60 x L2 beds (regional). This would mean an additional 306 new L3 beds (688 less the 442 existing beds) and the upgrade of 382 existing beds to L3 beds.

To determine a cost for the extension of Pietersburg Hospital, the following process was followed:

- The existing infrastructure on the Pietersburg Hospital site was surveyed to determine the size of the various facilities on site, inclusive of clinical and non-clinical buildings:
- The required areas per department for a 688-bed tertiary hospital was determined (Schedule of accommodation is annexed;
- Buildings that would need to be demolished were identified including those that would need replacement;
- A gap analysis was compiled, and new building areas identified;
- The infrastructure to be retained and upgraded was identified and areas determined;
- These areas were then quantified and costed separately as illustrated in the table below:

The total cost for the conversion of Pietersburg Hospital to a full central hospital is R4,680,885,124 added to which is a sum of R153,662,304 for equipment required in support of the current tertiary services at Pietersburg Hospital. This includes 2 x Linacs for oncology to replace the two existing Linacs which are very overdue for replacement. One is not functioning at all and the second linac is overburdened. The cost also includes an MRI, essential for tertiary services, and the integration of the PACS/RIS IT.

Table 7: Option 1: Total Cost Estimate

NEW LIMPOPO ACADEMIC COMPLEX HOSPITAL		
OPTIONS	OPTION 1	
ESTIMATED PROJECT COST	PIETERSBURG	IMMED. EQUIP
SUMMARY	306 BEDS (NEW)	(PIETERSBURG)
NEW BUILDINGS	382 BEDS UPGR	
BUILDING WORKS	432,113,650	
EXTERNAL WORKS (INCLUSIVE OF BULK SERVICES)	132,545,228	
ELECTRICAL & MECHANICAL INSTALLATIONS	232,214,118	
DEMOLITIONS	4,742,824	
ENABLING AND DECANTING	38,783,175	
PRELIMINARIES AND GENERAL (14.5%)	217,833,285	
SUB TOTAL CURRENT CONSTRUCTION COST	**1,058,232,280**	
UPGRADE OF EXISTING	661,899,520	
SUB TOTAL CURRENT CNSTRUCTION AND UPGRADE	**1,720,131,800**	
CONTINGENCIES	86,006,590	
TOTAL ESTIMATED CURRENT CONSTRUCTION COST	**1,806,138,390**	
PROFESSIONAL FEES (17%)	307,043,526	
SUB TOTAL CURRENT PROJECT COST	**2,113,181,916**	
PRE CONTRACT ESCALATION PROVISION	377,189,632	
CONTRACT ESCALATION PROVISION	861,910,394	
TOTAL ESTIMATED FINAL PROJECT COST	**3,352,281,943**	
TOTAL ESTIMATED COMMISSIONING AND HEALTH TECHNOLOG	1,451,730,595	154,400,000
TOTAL ESTIMATED FINAL PROJECT COST	**4,804,012,538**	**154,400,000**
TOTAL ESTIMATED COST PER OPTION	**4,958,412,538**	
ALL FIGUIRES INCLUDE FOR VAT 15%		

This option was difficult to quantify, and the true estimate will only be determined at the end of the project due to the unknown factors apparent only when actually upgrading existing facilities. For example, unknown founding conditions and the implications of unknown services underground etc.

- Pietersburg hospital requires 306 new beds including ICU beds, additional theatres and CSSD, additional radiology area, day ward, additional outpatient area, a poly trauma unit with ICU, additional pharmacy area (or a new pharmacy), additional management and administration area, additional transit ward, formalized parking areas, upgrading of the existing bulk services and replacement, new road bypass and new electrical substation to boost supply. 382 existing beds will need to be upgraded to L3 standards and academic teaching spaces added. The balance of beds will need minor upgrading;.
- 62 oncology beds housed in old, prefabricated buildings, will need to be demolished and replaced;
- The existing buildings are old at Pietersburg hospital and a number of existing prefabricated buildings will need to be demolished aside from those buildings that will need to be demolished and rebuilt elsewhere to make space for the new core block requirements;
- The reports indicate that the bulk services need replacing on site – a major undertaking as the old will have to be located, flushed and sealed before new can be laid in place;
- The estimate is conservative and it is assumed that there will be significant additional costs that can only be identified once work commences on the existing structures. **This is a major risk**.
- There will be major enabling work and decanting of both patients and services with this option.

5.1.4 Option 1: Timelines

Table 8: Option 1: Estimated Timelines

ESTIMATED TIME LINE FOR PROJECT		OPTION 1
Order of Magnitude Estimator - IUSS		PIETERSBURG
MILESTONE	**STAGE**	
Approval and clinical design brief	5	
Approval of operational cost and HR requirement	6	
Request for service(RFS) to Implementing Agent	7	
Appointment of Consultants	8	
Confirmation of Brief/Scope	9	Aug-18
Concept design approval	10	Oct-18
Design development with report	11	Jul-19
Project execution plan approved	12	Sep-19
Tender and technical documentation completed	13	Nov-19
Tender advertising		Jan-20
Tender closing	14	Mar-20
Tender award		May-20
Contract start date		Jun-20
Site handover/Access date		Jun-20
Completion		May-27
Commissioning of facility		**Jan-28**
Construction period		84 months
Commissioning period		9 months

The construction will take 84 months. This is due mainly to the need for the demolition of a number of existing prefabs and buildings as well as the provision of enabling works, decanting and recanting of patients after commissioning. Work will have to be phased with partial completion and handover occurring as and when the phases are commissioned.

5.2 Option 2: Split specialist services and build a new 488-bed academic hospital

1. A new 488 L3 bed central hospital, Limpopo Central Hospital (LCH), to be constructed on the new site;
2. Pietersburg Hospital (PRH) to become a regional hospital, but still accommodate some tertiary services (90 x L3 beds). Oncology services to remain at Pietersburg (58 beds) as well as nephrology and urology beds (32 beds) and the renal dialysis unit;
3. Mankweng hospital (MDH) to become a district hospital with some regional services and limited tertiary beds. The existing 36 Ophthalmology tertiary beds to be remain at Mankweng Hospital.
4. Thabamoopo Hospital allocate 20 beds to tertiary psychiatry.

The total tertiary service component for the Limpopo Academic Complex (not including psychiatry) will be 634 beds which is less than other estimates.

5.2.1 Option 2: Bed distribution per hospital

Table 9: Limpopo Academic Complex: Proposed bed distribution per discipline: Option 2

HOSPITAL	MDH*		CRH**		THABA***	LCH****	L2&L3			L3	
LEVELS OF CLINICAL CARE	L1	L3	L2	L3	L3	L3					
TOTAL HOSPITAL BED NUMBERS	509		442		386	488					
CLINICAL DISCIPLINES/BEDS PER LEVEL	473	36	352	90	20	488	986			634	
Surgery (all disciplines)	62	36	70	16		110	232	334	L2&L3 SURG	162	194
Burns						16	16	33,9%		16	30,6%
Orthopaedics	60		70			16	86			16	
Oncology (Paed & Adult) (Med & Radiation)				58			58	230	L2&L3 MED	58	158
Medicine (all disciplines)	58		72	16		84	172	23,3%		100	24,9%
Paediatrics	46		36			78	114	262	TOTAL L2/L3 MCH	78	150
Gynaecology	50		22			16	38	26,6%		16	23,7%
Obstetrics Antenatal	36		22			28	50			28	
Obstetrics Postnatal	52		22			28	50			28	
Neonatal (nursery)	52		10				10			0	
Neonatal (ICU)						40	40	132	TOTAL L2/L3 HC&ICU	40	132
Obstetric HC						10	10	13,8%		10	13,8%
Paediatric HC						10	10			10	
Paediatric ICU						10	10			10	
High Care (HC)	4		8			16	24			16	
Intensive Care (ICU)	6		12			26	38			26	
Psychiatry	20		8		20		28	28	L2&L3 PSY	20	20
Sub-acute/Step-down	27							2,8%			3,2%
DEMOLISH (Wards L and Q)			62								

* Mankweng District Hospital
** Capricorn Regional Hospital (Pietersburg Hospital)
*** Thabamoopo
**** Limpopo Central Hospital

5.2.2 Service provision in the new central hospital

The new hospital would provide a full service supported by the required hospital and clinical support services:

- Clinical spaces
  - **488 x L3 inpatient beds** inclusive of intensive care and high care facilities (refer to the table above)
    - A polytrauma unit
    - Operating theatres for each discipline
    - Day surgery theatres
    - Out-patient department and specialist clinics
    - Associated services
    - Laboratories, in particular NHLS and SANBS;
    - Diagnostic Radiology
    - Pharmacy
    - CSSD
    - Mortuary

- Hospital support services
  - Facilities Management Services
    - Kitchen
    - Laundry
    - Security
    - Hazardous and household waste storage facilities;
    - Portering
    - Bulk Services
    - Cleaning
    - Grounds and gardens maintenance service
    - Clinical and hospital engineering workshops.
    - Transport
    - Workshops
    - Information and communication technology
    - Waste management
    - Telephone services
    - Courier and mail service;
    - Reprographics services;
    - Building and estate maintenance service;
    - Accommodation management
    - Fleet management
- Administration facilities
- Parking, site roads and public transport;

5.2.3 Option 2: New site masterplan of New Limpopo Central Hospital

The site is clearly split into two with the University occupying one section of the site and the hospital on the other. Each will be separately managed but linked physically so that staff and students can move easily between the two.

Figure 4: University site and new hospital site zoning

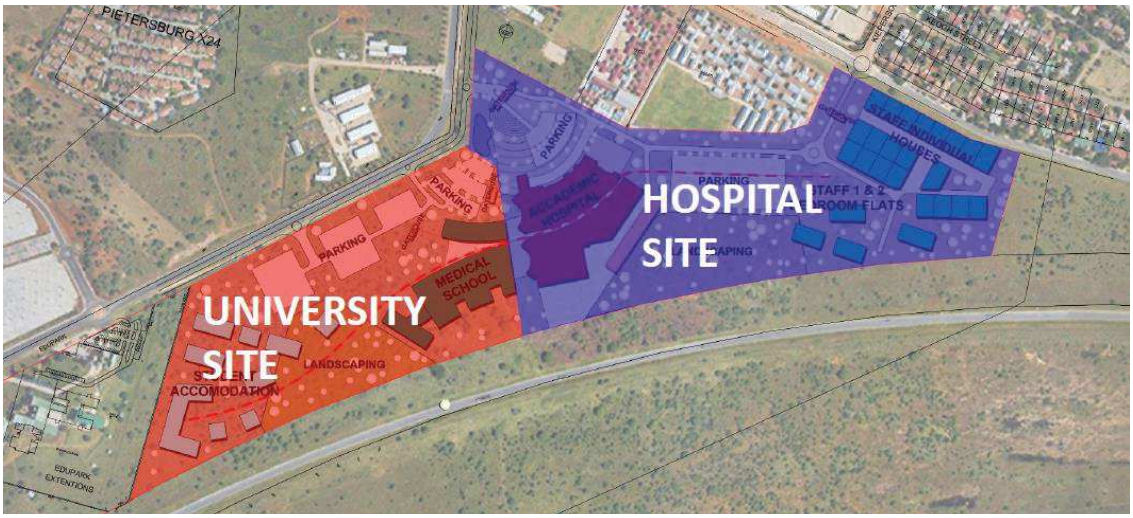


Figure 5: Site Masterplan

The design of the new central hospital will provide for 488 beds with provision for a new oncology department and an additional 200 x L3 beds in the future. Ultimately, the oncology, nephrology and urology beds will be relocated from Pietersburg Hospital as will the L3 ophthalmology beds and services from Mankweng. All 688 bed tertiary services will be concentrated finally in the new central hospital.


FUTURE STUDENT HOUSING
STAFF HOUSING
LIMPOPO CENTRAL HOSPITAL
FUTURE MEDICAL SCHOOL
ERF 6804
EDUPARK
REMAINDER OF ERF 6861 PIETERSRUS PC FXT 30
ERF 6861 PORTION 1
ERF 6860
SITE PLAN
1 : 2000
3D PERSPECTIVE VIEW 1
3D PERSPECTIVE VIEW 2
3D PERSPECTIVE VIEW 3
New
Limpopo Central Hospital Masterplan
health
LIMPOPO
PROVINCIAL GOVERNMENT
SAKHIWO
LIMPOPO CENTRAL HOSPITAL
HDG
HOSPITAL DESIGN GROUP

5.2.4 Pietersburg Hospital: Option 2

Pietersburg Hospital will be re-categorised as a Regional Hospital[16] and will be developed with:

- L1 beds (for the town population)
- L2 beds for Capricorn District, and
- 90 beds 'loaned' to the Limpopo Central Hospital for L3 (tertiary) care in:
  - Radiation Oncology (Adult and Paediatric)
  - Medical Oncology
  - Paediatric oncology
  - Nuclear Medicine
  - Urology
  - Nephrology
  - Additionally, 20 day-beds for the renal unit

The facility is an older facility than Mankweng Hospital. Although it is Gazetted as a 700-bed facility it has currently only **504 'useable beds'**. The hospital will be reconfigured:

- Prefabricated Wards (L and Q), accommodating Radiation Oncology (Adult and Paediatric), must be demolished due to the poor state of the buildings. This will mean that 62 bed capacity will be demolished;
- Oncology will remain at Pietersburg Hospital although it is a part of the tertiary service. Since the wards currently occupied by Oncology will be demolished, other (permanent) wards, nearer to the linear accelerator, have been identified for loan to "LAH Complex";
- Both linacs will be replaced, and preferably a second procured;
- The Dialysis Unit of the Urology Division will remain at Pietersburg Hospital although it is a part of the tertiary service. The Unit will remain where it is currently located. The 20 machines will be loaned to "LAH Complex";
- Both Urology and Nephrology tertiary beds (32) will remain at Pietersburg Hospital
- This will render 90 of the remaining capacity at Pietersburg Hospital unavailable to the District and Regional services;
- The L1 and L2 capacity of the Pietersburg Regional Hospital will be 320 beds.

Table below lists the remodelling of the hospital infrastructure that is required.

Table 10: Remodelling of Pietersburg Hospital Infrastructure

Pietersburg Hospital	
PRESENT CAPACITY	504
Lose/demolish - Ward L (Paediatric Oncology)	29
Lose/demolish - Ward Q (Adult Oncology)	33
DEMOLISH	62
Total Physical Beds left	442
Loan to LCH Complex - ONCOLOGY	58
Loan to LCH Complex – SURGERY (Urology)	16
Loan to LCH Complex – MEDICINE (Nephrology)	16
Total L3 beds loan to LCH Complex	90
Total L1 and L2 beds remaining	320

Of the non-ward infrastructure capacity, Pietersburg Hospital has 7 theatres:

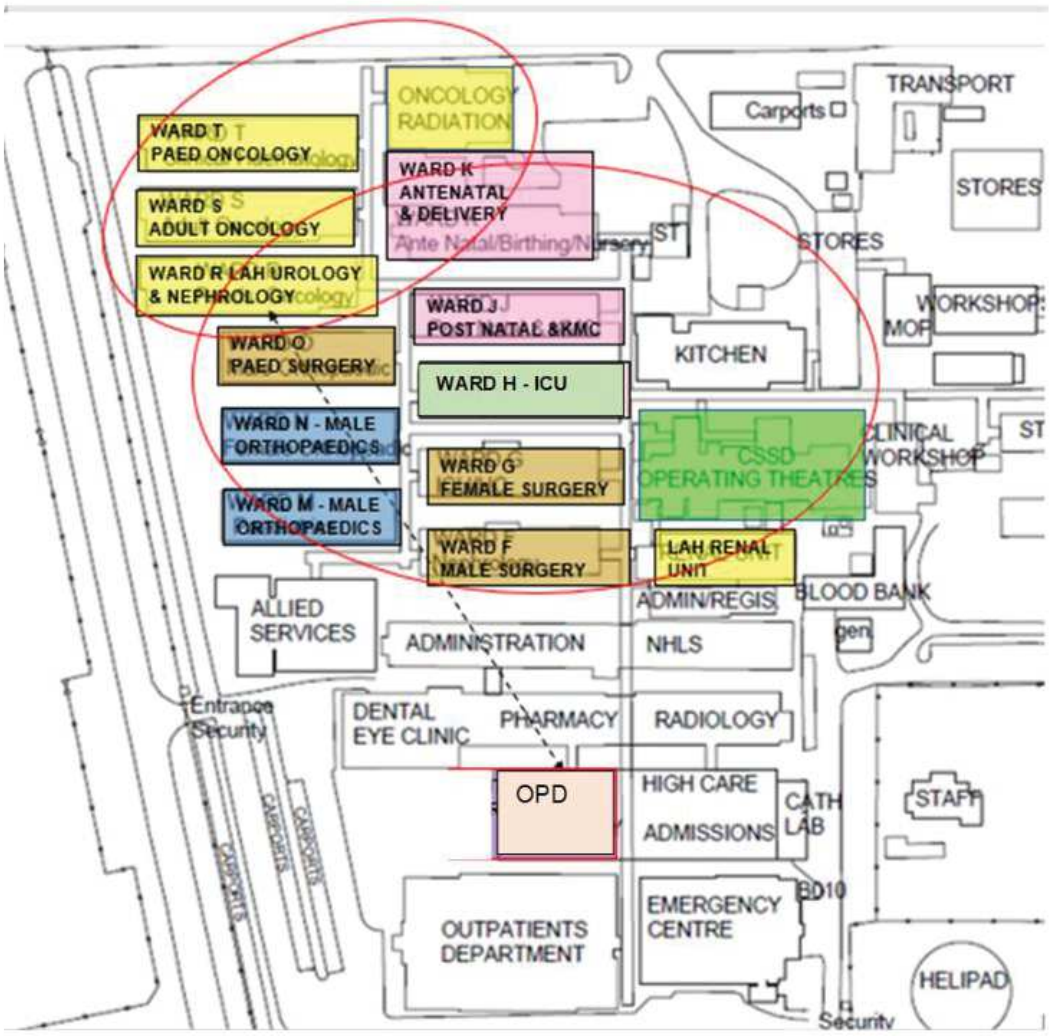
- 1 dedicated Obstetrics theatre
- 1 dedicated Emergencies theatre

[16] *Policy Guideline Defining Tertiary and Secondary/Regional Services (Endorsed by the NHC-TC on 14 June 2013)*

- 5 theatres shared by other disciplines:
  - Maxillo-facial
  - Plastics & Reconstructive
  - Neurosurgery
  - Ear, nose and throat (ENT)
  - Orthopaedics
  - Specialised surgery (Vascular and Gastro-Intestinal)

The seven theatres are all still useable and will remain in use for Pietersburg Regional Hospital and the Urology Department of the "LCH Complex".

Figure 6: Portion of site plan of Pietersburg Regional Hospital showing proposed location of disciplines



To ensure that Pietersburg Hospital is a suitable equipped and functioning regional facility, there are a number of projects already in planning that need to be initiated and completed. These projects are outlined below.

The costing for the projects are added in the cost estimate to both Option 2 and Option 3

Project	
1	MAIN THEATRE UNIT
	Upgrade the main operating theatre unit and build new entrance, recovery and holding area
	Upgrade CSSD
2	RELOCATE INTENSIVE CARE UNIT
	Relocate ward F (female medical) to ward T (existing private ward)
	Relocate ward G (gynaecology) to ward F
	Upgrade ward G to accommodate ICU beds and high care
	Relocate ICU beds and high care beds into upgraded ward G
3	PAEDIATRIC INTENSIVE CARE UNIT
	Upgrade high care area (vacated) for paediatric ICU
4	NEW 48 BED NEONATAL UNIT
	Build new 48 bed Neonatal unit
5	Equipment required immediately: 2 x Linacs, an MRI scanner and PACS/RIS IT integration (this is itemised separately in the table and is included in Options 1,2 and 3)

5.2.5 Mankweng Hospital infrastructure: Option 2

Mankweng Hospital will be re-categorised as a (large) District Hospital[17] with 36 tertiary beds, and the accompanying theatre capacity, 'loaned' to the Limpopo Central Hospital for tertiary Ophthalmology and teaching. No infrastructure changes are required.

- The Ophthalmology Division will remain at Mankweng Hospital and will occupy 36 (L3) beds, leaving a capacity of 473 district (L1) beds.
- The Polytrauma Unit (with 12 ICU beds and 8 high care beds) will remain owing to the need for trauma care in the whole province
- The 12 bed Burns Ward to also remain as a less complex care facility
- The neonatal unit will remain as is at Mankweng Hospital as these services are required
- The 7 theatres will remain:
    - 2 x ophthalmology theatres (loan)
    - 1 x emergency theatre
    - 1 x obstetric theatre
    - 2 x general theatre
    - 1 x orthopaedic

[17] *Policy Guideline Defining Tertiary and Secondary/Regional Services (Endorsed by the NHC-TC on 14 June 2013)*

5.2.6 Option 2: Total cost estimate

Table 11: Option 2: Total Cost Estimate

NEW LIMPOPO ACADEMIC COMPLEX HOSPITAL			
OPTIONS	OPTION 2		
ESTIMATED PROJECT COST	NEW SITE	PIETERSBURG	IMMED. EQUIP
SUMMARY	488 BEDS (NEW)		(PIETERSBURG)
NEW BUILDINGS			
BUILDING WORKS	704,892,500	15,870,000	0
EXTERNAL WORKS (INCLUSIVE OF BULK SERVICES)	209,071,771	2,760,000	0
ELECTRICAL & MECHANICAL INSTALLATIONS	388,889,192	8,569,800	0
DEMOLITIONS	0	0	0
ENABLING AND DECANTING	0	0	0
PRELIMINARIES AND GENERAL (14.5%)	188,913,752	17,617,471	0
SUB TOTAL CURRENT CONSTRUCTION COST	**1,491,767,215**	**44,817,271**	**0**
UPGRADE OF EXISTING	0	94,300,000	0
SUB TOTAL CURRENT CNSTRUCTION AND UPGRADE	**1,491,767,215**	**139,117,271**	**0**
CONTINGENCIES	74,588,361	6,955,864	0
TOTAL ESTIMATED CURRENT CONSTRUCTION COST	**1,566,355,576**	**146,073,135**	**0**
PROFESSIONAL FEES (17%)	266,280,448	24,832,433	0
SUB TOTAL CURRENT PROJECT COST	**1,832,636,024**	**170,905,567**	**0**
PRE CONTRACT ESCALATION PROVISION	252,117,102	18,600,954	0
CONTRACT ESCALATION PROVISION	523,282,509	15,589,460	0
TOTAL ESTIMATED FINAL PROJECT COST	**2,608,035,635**	**205,095,981**	**0**
TOTAL ESTIMATED COMMISSIONING AND HEALTH TECHNOLO	921,192,759	74,703,421	154,400,000
TOTAL ESTIMATED FINAL PROJECT COST	**3,529,228,394**	**279,799,402**	**154,400,000**
TOTAL ESTIMATED COST PER OPTION		**3,963,427,797**	
ALL FIGUIRES INCLUDE FOR VAT 15%			

5.2.7 Option 2: Timelines

Table 12: Option2: Estimated Timelines

ESTIMATED TIME LINE FOR PROJECT		OPTION 2			
		ORIGINAL PROGRAMME		REVISED PROGRAM	
Order of Magnitude Estimator - IUSS		NEW	Pietersburg Regional Upgrade	NEW	Pietersburg Regional Upgrade
MILESTONE	**STAGE**				
Approval and clinical design brief	5				
Approval of operational cost and HR requirement	6				
Request for service(RFS) to Implementing Agent	7				
Appointment of Consultants	8				
Confirmation of Brief/Scope	9	Nov-18	Dec-18	Nov-18	Nov-18
Concept design approval (Gateway 4 Feasibility)	10	June-18	March-19	Jan-19	Jan-19
Design development with report (Gateway 5)	11	Oct-19	July-19	Jun-19	Mar-19
Project execution plan approved	12	Oct-19	July-19	Jul-19	Apr-19
Tender and technical documentation(Gateway 6)	13	Nov-19	July-19	Oct-19	Jun-19
Tender advertising		Dec-19	Aug-19	Oct-19	Jul-19
Tender closing	14	Feb -20	Sept-19	Nov-19	Aug-19
Tender award		March-20	Oct-19	Jan-20	Oct-19
Contract start date		March-20	Nov-19	Feb-20	Nov-19
Site handover/Access date		March-20	Nov-19	Feb-20	Nov-19
Completion		March-25	May-21	Jan-25	May-21
Commissioning of facility		**Oct-25**	**July-21**	**Jul-25**	**Aug-21**
Construction period		60 months	18 months	60 months	18 months
Commissioning period		6 months	3 months	6 months	3 months

5.3 Option 3: New 688 bed academic hospital

1. New central hospital, **Limpopo Central Hospital,** with 688 beds will be built on the new site and will provide all tertiary services in the region;
2. The tertiary beds will be relocated from Pietersburg and Mankweng hospitals.
3. **Pietersburg Hospital** to become a regional hospital with limited district beds and no tertiary beds;
4. **Mankweng Hospital** to become a district hospital with limited regional beds and no tertiary beds.

5.3.1 New 688 bed Limpopo Central Hospital

The site proposed for the new tertiary hospital is large enough to accommodate a new 688 bed tertiary facility. This would provide for all the provinces L3 beds in one facility which is the optimal solution from a service provision perspective as all the L3 services will be accommodated together facilitating close interaction between the disciplines.

The **new Limpopo Central Hospital** will have 688 tertiary (L3) beds which will be allocated as illustrated in the table below:

Table 13: Example bed distribution for 688 bed new Limpopo Central Hospital

Clinical Discipline		Limpopo Central Hospital
Anaesthesiology		
SURGERY		**218**
Burns Unit	16	
Plastic & Reconstructive	12	
Trauma	18	
Specialist surgery	24	
Maxillofacial Surgery (Specialist)	8	
Cardiothoracic Surgery	16	
Neurosurgery	24	
Otorhinolaryngology (ENT)	24	
Orthopaedic	24	
Urology	16	
Ophthalmology Complex	36	
OBSTETRICS		**80**
Ante Natal	30	
Post Natal	30	
Critical Care	20	
GYNAECOLOGY	20	**20**
INTERNAL MEDICINE		**142**
Cardiology Complex and interventional	28	
Pulmonology	12	
Rheumatology	14	
Neurology	14	
Endocrinology	10	
Dermatology	12	
Nephrology	16	
Clinical Haematology		
Medical Oncology (Adult)	36	
RADIOLOGICAL SCIENCES		
Diagnostic and Interventional Radiology		

Clinical Discipline		Limpopo Central Hospital	
Radiation Oncology			
Medical Physics			
Nuclear Medicine			
PAEDIATRICS			
Neonatal		**40**	**40**
Paediatric Surgery		**28**	**118**
Paediatric Cardiology		18	
Paediatric Pulmonology		12	
General Paediatrics		28	
Paediatric Oncology		32	
CRITICAL CARE			**70**
Paediatric ICU		**28**	
Medical ICU		18	
Surgical ICU		24	
	Total Beds	**688**	**688**

5.3.2 Service provision for the new central hospital

The new hospital would provide a full service supported by the required hospital and clinical support services:

- Clinical spaces
  - **688 x L3 inpatient beds** inclusive of intensive care and high care facilities (refer to the table above)
    - A polytrauma unit
    - Operating theatres for each discipline
    - Day surgery theatres
    - Out-patient department and specialist clinics
    - Associated services
    - Laboratories, in particular NHLS and SANBS;
    - Diagnostic Radiology
    - Radiation oncology
    - Pharmacy
    - CSSD
    - Mortuary

- Hospital support services
  - Facilities Management Services
    - Kitchen
    - Laundry
    - Security
    - Hazardous and household waste storage facilities;
    - Portering
    - Bulk Services
    - Cleaning
    - Grounds and gardens maintenance service
    - Clinical and hospital engineering workshops.
    - Transport
    - Workshops
    - Information and communication technology
    - Waste management
    - Telephone services
    - Courier and mail service;

  - Reprographics services;
  - Building and estate maintenance service;
  - Accommodation management
  - Fleet management
- Administration facilities
- Parking, site roads and public transport;

Pietersburg Hospital would be re-categorised as a Regional Hospital[18] and will be developed with both L1 beds (for the town population) and L2 beds for Capricorn District.

The main changes are required at Pietersburg Hospital. The facility is an older facility than Mankweng Hospital. Although it is Gazetted as a 700-bed facility it has currently only **504 'useable beds'**. The hospital will be reconfigured:

- Prefabricated Wards (L, and Q), accommodating Radiation Oncology (Adult and Paediatric), must be demolished due to the poor state of the buildings. This will mean that 62 bed capacity will be demolished
- This will reduce the Pietersburg Hospital infrastructure from the current 504 beds to **442 beds**
- Upgrades will be required in the theatres, the wards, radiology, outpatients, emergency, pharmacy, intensive care, wards and maternity will need to be reconfigured.

Mankweng Hospital would be re-categorised as a (large) District Hospital[19] with no L3 beds but a number of L1 and L2 beds. Tertiary ophthalmology will be moved to the new central hospital. Few infrastructure changes are required.

- The 482 current useable beds will remain
- The Polytrauma Unit (with 12 ICU beds and 8 high care beds) will remain owing to the need for trauma care in the whole province
- The 12 bed Burns Ward to also remain as a less complex care facility
- The neonatal unit will remain as is at Mankweng Hospital as these services are required
- The 7 theatres will remain:
  - 2 x ophthalmology theatres (loan)
  - 1 x emergency theatre
  - 1 x obstetric theatre
  - 2 x general theatre
  - 1 x orthopaedic

5.3.3 Option 3: Cost estimate

To ensure that Pietersburg Hospital is a suitable equipped and functioning regional facility, there are a number of projects already in planning that need to be initiated and completed. These projects are outlined below.

Project	
1	MAIN THEATRE UNIT
	Upgrade the main operating theatre unit and build new entrance, recovery and holding area
	Upgrade CSSD
2	RELOCATE INTENSIVE CARE UNIT
	Relocate ward F (female medical) to ward T (existing private ward)

[18] *Policy Guideline Defining Tertiary and Secondary/Regional Services (Endorsed by the NHC-TC on 14 June 2013)*
[19] *Policy Guideline Defining Tertiary and Secondary/Regional Services (Endorsed by the NHC-TC on 14 June 2013)*

	Relocate ward G (gynaecology) to ward F
	Upgrade ward G to accommodate ICU beds and high care
	Relocate ICU beds and high care beds into upgraded ward G
3	PAEDIATRIC INTENSIVE CARE UNIT
	Upgrade high care area (vacated) for paediatric ICU
4	NEW 48 BED NEONATAL UNIT
	Build new 48 bed Neonatal unit
5	Equipment required immediately: 2 x Linacs, an MRI scanner and PACS/RIS IT integration (this is itemised separately in the table and is included in Options 1,2 and 3)

Table 14: Option 3 Cost Estimate

NEW LIMPOPO ACADEMIC COMPLEX HOSPITAL			
OPTIONS	**OPTION 3**		
ESTIMATED PROJECT COST	**NEW SITE**	**PIETERSBURG**	**IMMED. EQUIP**
SUMMARY	**688 BEDS**		**(PIETERSBURG)**
NEW BUILDINGS			
BUILDING WORKS	1,031,329,200	15,870,000	
EXTERNAL WORKS (INCLUSIVE OF BULK SERVICES)	239,338,000	2,760,000	
ELECTRICAL & MECHANICAL INSTALLATIONS	579,202,312	8,569,800	
DEMOLITIONS	0		
ENABLING AND DECANTING	0		
PRELIMINARIES AND GENERAL (14.5%)	268,231,079	17,617,471	
SUB TOTAL CURRENT CONSTRUCTION COST	**2,118,100,591**	**44,817,271**	
UPGRADE OF EXISTING	0	94,300,000	
SUB TOTAL CURRENT CNSTRUCTION AND UPGRADE	**2,118,100,591**	**139,117,271**	
CONTINGENCIES	105,905,030	6,955,864	
TOTAL ESTIMATED CURRENT CONSTRUCTION COST	**2,224,005,620**	**146,073,135**	
PROFESSIONAL FEES (17%)	309,080,955	24,832,433	
SUB TOTAL CURRENT PROJECT COST	**2,533,086,576**	**170,905,567**	
PRE CONTRACT ESCALATION PROVISION	488,531,717	18,600,954	
CONTRACT ESCALATION PROVISION	1,071,208,205	15,589,460	
TOTAL ESTIMATED FINAL PROJECT COST	**4,092,826,498**	**205,095,981**	
TOTAL ESTIMATED COMMISSIONING AND HEALTH TECHNOLO	1,407,753,897	74,703,421	114,400,000
TOTAL ESTIMATED FINAL PROJECT COST	**5,500,580,394**	**279,799,402**	**114,400,000**
TOTAL ESTIMATED COST PER OPTION		**5,894,779,796**	
ALL FIGUIRES INCLUDE FOR VAT 15%			

5.3.4 Option 3: Timelines

Table 15: Option 3: Timelines

ESTIMATED TIME LINE FOR PROJECT		OPTION 3	
Order of Magnitude Estimator - IUSS		NEW Central Hospital	Pietersburg Regional Upgrade
MILESTONE	**STAGE**		
Approval and clinical design brief	5		
Approval of operational cost and HR requirement	6		
Request for service(RFS) to Implementing Agent	7		
Appointment of Consultants	8		
Confirmation of Brief/Scope	9	Aug-18	Aug-18
Concept design approval	10	Nov-18	Oct-18
Design development with report	11	Aug-19	Feb-19
Project execution plan approved	12	Oct-19	Mar-19
Tender and technical documentation completed	13	Jan-20	May-19
Tender advertising		Feb-20	Jun-19
Tender closing	14	Apr-20	Aug-19
Tender award		Jun-20	Oct-19
Contract start date		Jul-20	Nov-19
Site handover/Access date		Jul-20	Nov-19
Completion		Jun-26	May-21
Commissioning of facility		**Mar-27**	**Aug-21**
Construction period		72 months	18 months
Commissioning period		9 months	3 months

5.4 Option 4: Do nothing

To do nothing means that the status quo will remain i.e.:

- the referral system will be dysfunctional and there will continue to be an under provision of both regional and tertiary beds/services in the province. Patients will still be referred out of the province where the required tertiary services are not available and they will have to compete with patients from other provinces for beds as Mpumalanga refers to Limpopo hospitals adding continued strain on the resources as there are insufficient L2 and L3 beds.
- The fees expended to date will be fruitless expenditure.
- The teaching platform will be incomplete as the full spectrum of services will not be supplied.. This will be exasperated by the fact that state of the tertiary hospital, Pietersburg, is in a poor condition and outdated. Major upgrade to this facility is essential.
- The province will continue to experience a lack of key specialists as working conditions continue to be inadequate and in a poor condition.
- The risks will continue without sufficient resources in place

Table 16: Current Service provision to remain at Pietersburg Hospital

PIETERSBURG HOSPITAL	Current Services	
Clinical Discipline	**Clinical Department**	**Total**
ANAESTHESIA		**7**
SURGERY		**196**
	General Surgery	132
	Orthopaedics	64
	Urology	
PAEDIATRICS		**61**
EMERGENCY MEDICINE		**0**
INTERNAL MEDICINE		**61**
	Internal Medicine	61
	Psychiatry	0
OBSTETRICS		**43**
GYNAECOLOGY		**29**
FORENSIC PATHOLOGY		
RADIOLOGY		
CRITICAL CARE (Adult & Paeds)		**20**
	ICU	16
	High Care	4
SUB-TOTAL		**287**
ONCOLOGY		**96**
	Adult Oncology	33
	Paeds Oncology	29
	Clinical Haematology	0
NUCLEAR MEDICINE		0
INTERNAL MEDICINE	Nephrology	0
		504

Of the non-ward infrastructure capacity, Pietersburg Hospital has 7 theatres:

- 1 dedicated Obstetrics theatre
- 1 dedicated Emergencies theatre
- 5 theatres shared by other disciplines:
  - Maxillo-facial
  - Plastics & Reconstructive
  - Neurosurgery
  - Ear, nose and throat (ENT)
  - Orthopaedics
  - Specialised surgery (Vascular and Gastro-Intestinal)

Surgical procedures are limited by the lack of theatre time and all disciplines compete for theatre space which is inefficient and compromises service delivery. Outpatients will remain limited in space therefore limiting the opportunity to provide a broad spectrum of L3 specialist services

Mankweng Hospital has 509 beds (Gazetted), 482 declared 'useable beds', of which the majority are used to deliver L1 care, a few provide L2 care and about 50 beds could be deemed to be L3. The infrastructure is sound and the community dependent on the hospital is extensive and growing (between 260,000 to 280,000).

- The Ophthalmology Division will remain at Mankweng Hospital and will occupy 36 (L3) beds,
- The Polytrauma Unit (with 12 ICU beds and 8 high care beds) will remain owing to the need for trauma care in the whole province
- The 12 bed Burns Ward to also remain

5.5 Evaluation of the options

The four options are evaluated in this section taking into consideration:

- Level of service distribution (L1, L2 and L3 tertiary services)
- Capital cost
- Health Technology cost
- Construction Time

An advantages and disadvantages table follow. This compares Option 1 and Option 2. Option 4, “Do nothing” is excluded as there will be no change to the hospital. Nothing will happen on site therefore existing services will continue as they are with no interruption.

The advantages and disadvantage of each option are tabled with respect to:

- Compliance
- Service delivery
- Space provision
- Academic teaching spaces
- Departmental adjacencies
- Functionality
- Flow
- Access and security
- Parking
- Form and materials
- Bulk services
- Heritage buildings
- Construction
- Lifecycle costs
- Human Resources
- Management
- Operational
- Future extension

The financial aspects are discussed in more detail and the option analysis summary.

5.5.1 Comparison tables

Table 17: Evaluation of Options: Services & Timelines

A	INFRASTRUCTURE	Option 1	Option 2	Option 3	Option 4
1	**Mankweng Hospital**	**No changes**	**No changes**	**No changes**	**No Changes**
2	**Pietersburg Hospital**	**306 new L3 beds** Build additional: o administration o theatres, o polytrauma unit, o X-Ray facilities, o neonatal unit, o wards, o ICU, o pharmacy, o increase OPD, o New oncology unit o Expand cath lab			**No Changes**
		Upgrade existing: o theatres, o laundry, o kitchen, o mortuary, o move ICU, o upgrade OPD, o replace Linac, o demolish 62 beds	Upgrade existing: o theatres, o laundry, o kitchen, o mortuary, o move ICU, o upgrade OPD, o replace Linac, o demolish 62 beds	Upgrade existing: o theatres, o laundry, o kitchen, o mortuary, o move ICU, o upgrade OPD, o replace Linac, o demolish 62 beds	
3	**New Limpopo Central Hospital**	**No new hospital**	**488 new L3 beds**	**688 new L3 beds**	**No new hospital**
B	**TIMELINES**	**Option 1**	**Option 2**	**Option 3**	**Option 4**
	Construction	**84 months**	**60 months**	**72 months**	**NIL**

Table 18: Cost Comparison

NEW LIMPOPO ACADEMIC COMPLEX HOSPITAL								
OPTIONS	OPTION 1		OPTION 2			OPTION 3		
ESTIMATED PROJECT COST	PIETERSBURG	IMMED. EQUIP	NEW SITE	PIETERSBURG	IMMED. EQUIP	NEW SITE	PIETERSBURG	IMMED. EQUIP
SUMMARY	306 BEDS (NEW)	(PIETERSBURG)	488 BEDS (NEW)		(PIETERSBURG)	688 BEDS		(PIETERSBURG)
NEW BUILDINGS	382 BEDS UPGR							
BUILDING WORKS	432,113,650		704,892,500	15,870,000	0	1,031,329,200	15,870,000	
EXTERNAL WORKS (INCLUSIVE OF BULK SERVICES)	132,545,228		209,071,771	2,760,000	0	239,338,000	2,760,000	
ELECTRICAL & MECHANICAL INSTALLATIONS	232,214,118		388,889,192	8,569,800	0	579,202,312	8,569,800	
DEMOLITIONS	4,742,824		0	0	0	0		
ENABLING AND DECANTING	38,783,175		0	0	0	0		
PRELIMINARIES AND GENERAL (14.5%)	217,833,285		188,913,752	17,617,471	0	268,231,079	17,617,471	
SUB TOTAL CURRENT CONSTRUCTION COST	**1,058,232,280**		**1,491,767,215**	**44,817,271**	**0**	**2,118,100,591**	**44,817,271**	
UPGRADE OF EXISTING	661,899,520		0	94,300,000	0	0	94,300,000	
SUB TOTAL CURRENT CNSTRUCTION AND UPGRADE	**1,720,131,800**		**1,491,767,215**	**139,117,271**	**0**	**2,118,100,591**	**139,117,271**	
CONTINGENCIES	86,006,590		74,588,361	6,955,864	0	105,905,030	6,955,864	
TOTAL ESTIMATED CURRENT CONSTRUCTION COST	**1,806,138,390**		**1,566,355,576**	**146,073,135**	**0**	**2,224,005,620**	**146,073,135**	
PROFESSIONAL FEES (17%)	307,043,526		266,280,448	24,832,433	0	309,080,955	24,832,433	
SUB TOTAL CURRENT PROJECT COST	**2,113,181,916**		**1,832,636,024**	**170,905,567**	**0**	**2,533,086,576**	**170,905,567**	
PRE CONTRACT ESCALATION PROVISION	377,189,632		252,117,102	18,600,954	0	488,531,717	18,600,954	
CONTRACT ESCALATION PROVISION	861,910,394		523,282,509	15,589,460	0	1,071,208,205	15,589,460	
TOTAL ESTIMATED FINAL PROJECT COST	**3,352,281,943**		**2,608,035,635**	**205,095,981**	**0**	**4,092,826,498**	**205,095,981**	
TOTAL ESTIMATED COMMISSIONING AND HEALTH TECHNOLOG	1,451,730,595	154,400,000	921,192,759	74,703,421	154,400,000	1,407,753,897	74,703,421	114,400,000
TOTAL ESTIMATED FINAL PROJECT COST	**4,804,012,538**	**154,400,000**	**3,529,228,394**	**279,799,402**	**154,400,000**	**5,500,580,394**	**279,799,402**	**114,400,000**
TOTAL ESTIMATED COST PER OPTION	**4,958,412,538**		**3,963,427,797**			**5,894,779,796**		
ALL FIGUIRES INCLUDE FOR VAT 15%								

Option 2 is considerable less than both Option 1 and 3. This is due mainly to:

- the fact that the construction period is less than the two other options which has a marked effect on escalation calculations;
- There is no decanting in this project and no enabling work required.

Estimates are based on comparative costs informed by the recently completed 530 bed, level one, Cecilia Makiwane Hospital (CMH) in Mdantsane in East London. Other comparative projects this team has been part of, include the recently completed Zola Hospital in Soweto, the upgrade of Frere Hospital in East London, a 100-bed district hospital in rural Eastern Cape currently under construction and upgrades to the Nelson Mandela Academic Hospital. These comparative costs have been adjusted to suit the academic hospital.

The medical equipment consultants (medical equipment specialists) based on experience in similar projects, historical data and industry benchmarking. Comparative HT cost estimates have been drawn from the recently commissioned CMH of which Sakhiwo is the procurement agent. CMH is the most recent South African new hospital of a comparable size (530 beds) to the new academic hospital except for the fact that the academic hospital is a level three hospital and the equipment required more sophisticated. The total HT costs at CMH will finally be in the order of R360 million in current day terms (procured between March 2017 and today). These current costings have been applied proportionately to the bed number and increased to allow for the more sophisticated equipment of an academic hospital which will make the HT costs higher. Specific additional equipment has been allowed for based on actual costs determined.

High level cost estimates are applied to the cost estimates.

5.5.2 Financial appraisal

Option 1

This option was difficult to quantify, and the true estimate will only be determined at the end of the project due to the unknown factors apparent only when actually upgrading existing facilities. For example, unknown founding conditions and the implications of unknown services underground etc.

- The existing buildings are old at Pietersburg hospital and a number of existing prefabricated buildings will need to be demolished aside from those buildings that will need to be demolished and rebuilt elsewhere to make space for the new core block requirements;
- The reports indicate that the bulk services need replacing on site – a major undertaking as the old will have to be located, flushed and sealed before new can be laid in place;
- The estimate is conservative and it is assumed that there will be significant additional costs that can only be identified once work commences on the existing structures. **This is a major risk**.
- There will be major enabling work and decanting of both patients and services with this option.

Table 19: Option 1: Possible Cost savings

Component	Detail	Cost Saving
Medical equipment savings	The existing hospital has equipment already that could be retained. New equipment could be rolled out in a phased approach	Savings will be determined 1 year from commissioning and a gap analysis is completed to list new equipment required
Operating cost reduction	There will be one hospital to manage and less duplication of services	
One management team	There will be minor duplication of management personnel as everything is on the one site	Savings in salaries for administration staff

Option 2

- The new site is a greenfield site and is easier to quantify as there are very few "hidden" costs and no structures to demolish. No decanting and enabling work either.
- Pietersburg Hospital upgrade will include the demolition of 62 oncology beds, the renovation of 90 beds, upgrading of the theatres, relocation of the ICU, conversion of ward space to a new neonatal ward and replacement of two linacs;
- Costs are based on 1:200 (complete) designs. These designs are for an academic hospital with central hospital services allowing additional spaces for the required teaching areas. This was work-shopped with the clinicians of the LDOH and UL. The level of drawings achieved allowed for a reasonably accurate elemental estimate by the QS, based on the measured drawings and schedule of accommodation. Further refinement will mainly relate to design changes in addressing the downscaling the original designs to 488 beds and amendments following the next Gateway Review in terms of the IDMS and the IUSS norms and standards

Table 20: Option 2: Possible Cost savings

Component	Detail	Cost Saving
Lifecycle costs	As a new hospital, the maintenance costs on both the building and HT equipment will be lower over the 20-year cycle– later replacement cost cycles by 2 or 3 years on HT	The costs over 20 years is lower
Site	Simplified site issues through construction on a Greenfields site	
Risk	Avoidance of risks rising from uncertainties in respect of current site existing underground services – poorly maintained infrastructure and a lack of infrastructure plans of the existing site	
Construction period	The construction period is reduced as there are no decanting requirements and no existing patients to consider. This will reduce the preliminaries and escalation costs	There is a R1 billion saving due to the time period being less
Demolition	There are no structures on the new site to demolish	

Option 3

- There will be no work carried out on Mankweng hospitals.
- The new site is a greenfield site and is easier to quantify as there are very few "hidden" costs and no structures to demolish. No decanting and enabling work either.
- Pietersburg Hospital upgrade will include the demolition of 62 oncology beds, the renovation of 90 beds, upgrading of the theatres, relocation of the ICU, conversion of ward space to a new neonatal ward and replacement of one linac;
- Costs are based on 1:200 (complete) designs. These designs are for an academic hospital with central hospital services allowing additional spaces for the required teaching areas. This was work-shopped with the clinicians of the LDOH and UL. The level of drawings achieved allowed for a reasonably accurate elemental estimate by the QS, based on the measured drawings and schedule of accommodation. Further refinement will mainly relate to design changes in addressing the additional 88 beds (600 in the original design) and amendments following the next Gateway Review in terms of the IDMS and the IUSS norms and standards

Table 21: Option 3: Possible Cost savings

Component	Detail	Cost Saving
Lifecycle costs	As a new hospital, the maintenance costs on both the building and HT equipment will be lower over the 20-year cycle – later replacement cost cycles by 2 or 3 years on HT	These costs are relative
Site	Simplified site issues through construction on a Greenfields site	
Risk	Avoidance of risks rising from uncertainties in respect of current site existing underground services – poorly maintained infrastructure and a lack of infrastructure plans of the existing site	
Demolition	There are no structures on site to demolish	
One management team	NO duplication of the management teams	

5.5.3 Risk comparison

The following risks have been calculated per calendar day (excluding VAT) per option:

Table 22: Risk calculations pre and post contract with preliminary costs per option

RISKS:			COSTS PER CALENDAR DAY - EXCL VAT 15%
Option	**Amount**	**Calendar days**	**Cost per Day (10 months x 30 days = 300 days)**
1. PRE-CONTRACT ESCALATION			
OPTION 1	165,987,773	300	553,292.58
OPTION 2	140,574,123	300	468,580.41
OPTION 3	151,397,733	300	504,659.11
2. RISKS: CONSTRUCTION: CONTRACT ESCALATION (EXTENSION IN CONTRACT PERIOD)			
OPTION 1	634,596,894	2,160	293,794.86
OPTION 2	368,769,293	1,440	256,089.79
OPTION 3	533,733,784	1,800	296,518.77
3. RISKS: CONSTRUCTION: TIME BASED PRELIMINARY COSTS			
OPTION 1	205,036,000	2,160	85,432
OPTION 2	258,050,000	1,440	161,281
OPTION 3	253,184,000	1,800	126,592

Option One has the greatest risk of exceeding both the design and construction timelines. This is due to many factors: Unknown structural elements and challenges that emerge as construction progresses: decanting of patients and services taking longer than expected; staff issues that arise as construction occurs around patients; delays due to strikes. This is apart from the significant risks to the delivery of services while construction is underway and the risk to lives.

5.5.4 Maintenance cost estimate over 20-year lifecycle of buildings

Table 23: Comparison of maintenance costs over the 20year lifecycle of the buildings

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	TOTAL
OPTION 1																				
54,131,714	57,379,617	60,822,394	64,471,737	68,340,041	72,440,444	76,786,871	81,394,083	86,277,728	91,454,391	96,941,655	102,758,154	108,923,643	115,459,062	122,386,606	129,729,802	137,513,590	145,764,406	154,510,270	163,780,886	**1,713,310,926**
OPTION 2																				
44,120,076	46,767,281	49,573,317	52,547,716	55,700,579	59,042,614	62,585,171	66,340,281	70,320,698	74,539,940	79,012,336	83,753,077	88,778,261	94,104,957	99,751,254	105,736,330	112,080,509	118,805,340	125,933,660	133,489,680	**1,589,356,929**
OPTION 3																				
50,216,385	53,229,368	56,423,130	59,808,518	63,397,029	67,200,851	71,232,902	75,506,876	80,037,289	84,839,526	89,929,897	95,325,691	101,045,233	107,107,947	113,534,424	120,346,489	127,567,278	135,221,315	143,334,594	151,934,669	**1,847,239,411**

5.5.5 Advantages and disadvantages

The advantages and disadvantages are listed under Annexure 6.

Option 2 is shown to be the more cost effective over the twenty years. The key advantages of preferred **Option 2** which led to its selection include:

- The cost of this option is R1 billion less than all the other options;
- The timeframe for completion of this project is over a year shorter than the other options;
- The site is a greenfield site and does not carry as great a number of risks as **Option 1**;
- The departmental relationships will be optimally designed in the new layout with flows re patient/staff and services optimally arranged to maximum benefit and efficiency
- The building will be a new building on a new site;
- The maintenance lifecycle of the buildings will require less maintenance in the first five years after construction – this will be a considerable saving;

5.5.6 Timeline option comparison

The table below illustrates the timelines per project, per option. It clearly illustrates that the strategic objective of improving tertiary services through the provision of additional 634 x Level 3 beds is achieved within an earlier timeframe in Option 2. The reality of this is that these services will commence 18 months to 2 years earlier in Option 2 compared to Options 1 or 3.

Table 24: Timeline comparison per Option 1,2 and 3

ESTIMATED TIME LINE FOR PROJECT		OPTION 1	OPTION 2(Revised)		OPTION 3	
Order of Magnitude Estimator - IUSS		PIETERSBURG	NEW Central Hospital	Pietersburg Regional Upgrade	NEW Central Hospital	Pietersburg Regional Upgrade
MILESTONE	**STAGE**					
Approval and clinical design brief	5					
Approval of operational cost and HR requirement	6					
Request for service(RFS) to Implementing Agent	7					
Appointment of Consultants	8					
Confirmation of Brief/Scope	9	Aug-18	Nov-18	Nov-18	Aug-18	Aug-18
Concept design approval	10	Oct-18	Jan-19	Jan-19	Nov-18	Oct-18
Design development with report	11	Jul-19	Jun-19	Mar-19	Aug-19	Feb-19
Project execution plan approved	12	Sep-19	Jul-19	Apr-19	Oct-19	Mar-19
Tender and technical documentation completed	13	Nov-19	Oct-19	Jun-19	Jan-20	May-19
Tender advertising		Jan-20	Oct-19	Jul-19	Feb-20	Jun-19
Tender closing	14	Mar-20	Nov-19	Aug-19	Apr-20	Aug-19
Tender award		May-20	Jan-20	Oct-19	Jun-20	Oct-19
Contract start date		Jun-20	Feb-20	Nov-19	Jul-20	Nov-19
Site handover/Access date		Jun-20	Feb-20	Nov-19	Jul-20	Nov-19
Completion		May-27	Jan-25	May-21	Jun-26	May-21
Commissioning of facility		**Jan-28**	**Jul-25**	**Aug-21**	**Mar-27**	**Aug-21**
Construction period		84 months	60 months	18 months	72 months	18 months
Commissioning period		9 months	6 months	3 months	9 months	3 months

5.5.7 Summary and recommendation

Option 4

The existing Pietersburg hospital was designed as a predominantly single storey facility spread out over the site and was not designed as a tertiary facility. Critical adjacencies are not in place and the rectification of these discrepancies needs to occur if the hospital is to function as a tertiary service. The hospital has reached a stage in its lifecycle where major refurbishment is required if the provision of health services is to continue optimally. To do nothing will mean that the provision of the required tertiary services from the hospital will be unachievable and therefore this option is not considered in the final analysis.
The hospital is already congested, this will continue.

Option 1

Option 1 is considered the most expensive option.

- Considering **only** the cost of the upgrade of Pietersburg hospital in Option 1, R5,2million, and comparing it to Option 2, including the upgrade of Pietersburg and Mankweng hospitals, option 1 is only slightly less than of Option2 (R9million) which, in view of the disadvantages, is significant. Add to this the increased risks of Option 1, makes this option not viable.
- Generally, any upgrade to an existing facility that exceeds 60% of the cost of building the same facility new, is considered uneconomical. In this instance, 99% is considered excessive.
- In anticipation of the question “why is the upgrade of Pietersburg so high”? There are a large number of existing buildings on the Pietersburg Hospital site that will have to be upgraded. A number, such as the laundry, are larger than would be required in a new, replicated service. These are counted in the total square meterage which makes the total higher than that of a new facility especially taking into account new additions and relocated services as well. There are also a number of buildings that are poorly placed in relation to other departments and therefore need to be replaced/relocated. This will leave buildings that will have to be repurposed so that they are not left vacant to decay. The survey of the site correctly identified and measured the buildings on site to enable a quantification of what is required for the upgrade of Pietersburg Hospital.
- Although the existing Pietersburg Hospital site is large, (14,8ha) it is substantially developed. The available development area on the Pietersburg Hospital site is approximately 7.5 ha while the area on the new site is 33 hectares. There is insufficient space on the existing Pietersburg hospital site to retain a Level 2 hospital and to construct a new Level 3 tertiary academic hospital as well as a new medical school and accommodation for both students and key hospital staff.
- The condition of the existing hospital is in a state where most of the facilities have to be repaired, rehabilitated or replaced. As a result of the current condition of the hospital, many facilities have to be demolished which will mean that these facilities at the hospital will not be operational whilst the new facilities are being constructed. Facilities not being demolished will require extensive renovation and rebuild with extensive enabling work required to be done in order to keep these facilities operational. This will be extremely disruptive and, in some instances, almost impossible. The time and cost to construct the hospital will be significantly extended and increased because of the need to maintain operations during construction. This will be exasperated by the need to create enabling temporary works and to decant patients in order to keep the hospital operational during construction. There will undoubtable be interference with the existing service provision at the hospital and the risks to patients will be significant.
- Construction time will be longer due to the fact that patients will have to be moved (decanted) during construction and then recanted (or relocated). The additional time adds to the escalation provisions and ultimately the cost of the project.
- A phased approach will be required which will have both time and cost implications. Time to construct the hospital will be significantly much longer than a green fields project and certain facilities will not be operational during the time of the construction.
- The existing infrastructure is poorly laid out and relationships compromised. Demolition of existing buildings will be required to accommodate redesign. Additional teaching space required will have to be retrofitted in many of the areas. The integrity of existing structure can only be determined

once the construction commences and there are risks when reshaping, relocating existing services.

With respect to bulk services:

- Water reticulation of the whole hospital site is in a very bad state and have to be replaced;
- Plumbing and sewer reticulation are in very bad state with blocked sewers. The current on-site sewer network will not be able to handle the extra flow and have to be replaced. The Bulk services are in a poor state of repair with frequent leaks and services at the hospital must be closed to repair leaks or breakdowns;
- Estimated electrical demand for the hospital would be 3000kVA with the current capacity at 1250kVA resulting in a shortfall of 1750kVA, with Polokwane Municipality indicating that there is no reserve capacity in the vicinity of the hospital for the additional demand required. The nearest point to site where sufficient bulk electricity is available is at the Delta substation which is approximately 4,6 km away. An underground link service will have to be installed from Delta substation to the Hospital which will be extremely expensive;
- The current road network will have to be upgraded - Van Warmelo Street is to be upgraded to 4 lanes with the re-alignment of Van Warmelo Street into Hospital Street, which means that the re-alignment will cut across the south-eastern corner of the existing hospital. About 10% of the existing site area will be lost as a result of the re-alignment;

Finally, the maintenance of existing buildings is increased because of the age of the building – this will have a long-term effect on the operational budget specifically the maintenance.

Important to note is that development of the Mankweng Hospital site to accommodate a new tertiary facility on the existing hospital site will be problematic because of the rural nature of the area in which the hospital is situated. Added to this will be the same problems of construction while services continue on site, phasing of the project, decanting and enabling work etc.

Development on either of the existing sites carries the disadvantage of locating and managing two separate hospitals on one site. There will be no benefit in management or administrative costs as the tertiary and regional beds will be separate units with different staff requirements and funding streams.

Option 2

From a clinical perspective Option 2 is considered more feasible:

- The full spectrum of T1 and T2 Tertiary disciplines (not including nephrology, oncology and ophthalmology) will be located in one, appropriately equipped specialist facility and the departmental co-dependency will be more integrated as a consequence. This will effectively support the academic requirements;
- There is sufficient space on site for both the academic hospital and the new school of medicine with room for future expansion;
- Having the central tertiary services located in a dedicated specialised hospital is more effective within the referral system, providing a dedicated academic centre for the Limpopo Province ;
- The hospital will provide a comprehensive set of specialist-led services that will include key referral specialties, not available at regional hospitals, such as cardiology, pulmonology, ENT, infectious diseases, paediatric surgery and plastic surgery;
- The scarcity of specialist skills in the province is of concern. A new central facility will better address this challenge by providing facilities that are current and equipped with the latest technology available- this will help to attract the skills required;
- As it is a new hospital optimum departmental relationships and patient flow can be achieved in the design which will result in improved client experience and improved health service provision. Departments will be designed to suit current requirements;
- The opportunity to provide a more efficient patient, public and staff flow will also enhance the service provision within the new facility
- Tertiary services are funded by a separate budget – having the tertiary services concentrated in one facility makes management of that budget more cost effective as the challenge of having Level 2 services occupying expensive Level 3 funded beds is alleviated;
- In a new facility, Tertiary care will be managed in appropriate spaces, with appropriate equipment and afforded care from the appropriately skilled staff at the correct cost;

- Planning, budgeting and management of both patient care and staff is better facilitated;
- The L3 services at the current Pietersburg Hospital are fragmented and scattered (Oncology specifically) and the departmental relationships not optimum. The existing infrastructure needs fairly significant upgrade to accommodate L3 services. Building the additional L3 service requirements on the existing hospital site can only be accommodated by scattering services over the site due to lack of space. The site will become severally congested. A new site will allow for a compact design with optimum inter disciplinary relationships and flow, enhancing efficiency of both staff and patient care;
- A better planned and equipped new hospital should attract more specialist skills that can be part of the outreach to surrounding hospitals, enhancing health care generally;
- Relocating the L3 services to the new academic hospital will ensure that the Pietersburg Hospital can be a dedicated L2 facility with the appropriate level of L2 clinically skilled staff which, from a budget perspective, will be more cost effective. Not only will the impact of duplication of services will be minimised but the L2 deficiency in the province will be addressed, which in turn, will assist in rectifying the dysfunctional referral system in Limpopo;
- Limpopo Province has a shortage of Level 2 services therefore it makes more sense to increase the L2 services at Pietersburg rather than L3 as presently L3 funded beds are occupied by L2 beds which has a cost implication as well as an effect on service delivery.
- Upgrading and L3 additions to the Pietersburg site will compromise service delivery from both a cost and efficiency point of view;
- Equitable access of the population in demarcated catchment areas to L1, L2 and L3 acute hospital services. This will result in logistical efficiency by ensuring the shortest and fastest routes to facilities;
- The configuration will result in an integrated and efficient service delivery platform with minimum inter-hospital transfers;
- The interdependencies between disciplines will not be compromised and there will not be a duplication of scarce skills and expensive equipment;
- The configuration supports the development of formal and scheduled outreach and support services between levels of care;
- The proposal provides a very favourable teaching and training platform adjacent to the new medical school which will be directly linked to the hospital.;
- The proposed configuration will enhance the efficient and transparent management of the NTSG;
- The proposed configuration complies with the norms and guidelines of the NTSHP;
- As this is a greenfield project, the project will be delivered faster as construction time will be shorter. There will be no enabling works required and no disruption to patients and existing service provision. This is a major factor to consider as the risks involved in decanting patients (Option 1) is high. Escalation will be reduced and preliminaries less.
- As the buildings will be new, there will be reduced maintenance costs during the initial years after construction is complete;
- Both the original business case signed by the province and NDOH, as well as the feasibility prepared by the TA thereafter, concluded that a new central hospital be built on the donated site adjacent to the new medical school. Planning has progresses far and the site investigations detailed. The masterplan is complete, and the concept layouts need to be revised to suit the lower number of beds. This outs this option ahead of Option 1 and Option 3. Option 2 will be completed a whole year before Option 1 or 3. This means escalation is reduced, therefore the costs.
- This is the politically preferred option;

The disadvantages for Option 2:

- There will be an increase in human resources and operational costs – the unfunded budget will need to be sourced and planned for early, prior to operation of the new facility;
- Duplication of hospital support services (laundry, mortuary and laboratory) will occur as it will not be feasible to share these services.

A review of the costs per option has been made with the objective of better project affordability and lower risk. It was observed that the greenfield scenario offers significant benefit in terms of VfM against redevelopment on the existing site and accordingly Option 2 was adopted as the baseline for all further options analysis.

6 PROJECT DUE DILIGENCE

The project due diligence investigates the issues in the preferred solution option (Option 2) to confirm that it can be legally procured, that the site is available and free of encumbrances, that the BEE output specifications are feasible and that any issues (of a legal, regulatory, technical or other nature) that have the potential to negatively affect procurement of the preferred option are identified timeously and mitigated before the Project can start.

The Options Analysis was conducted with the objective of selecting the preferred solution option on the basis of its response to the needs of the LCH and tertiary services requirements. The preferred option is a new central hospital on a greenfield site as opposed to the other possible options being the status quo, refurbishment/upgrading of existing facilities and the construction of a new tertiary academic hospital on the existing Pietersburg Hospital site. The preferred option uses the donated site for the development of a new central hospital providing for all the required tertiary health services except oncology and ophthalmology which would be provided out of the existing Pietersburg and Mankweng Hospitals respectively.

The due diligences confirm the following with respect to option 2 (preferred option):

a) use right and availability;
b) site ownership;
c) suitability of the extent of the site;
d) suitability of the topography of the site;
e) site access;
f) heritage issues;
g) availability of bulk utility services;
h) environmental issues; and
i) geotechnical issues.

6.1 Legal issues

It is important to establish legal certainty relative to the project by ensuring that all legal requirements are identified and addressed.

6.1.1 Procurement

Section 217(1) of the Constitution states that: Procurement by organs of states must occur within a system that is fair, equitable, transparent, competitive and cost-effective. Section 38 of the PFMA mirrors this section.

Section 217(2) of the Constitution provides that there should be an implementation of policies providing for categories of preference in the allocation of contracts and the protection or advancement of person, or categories of persons disadvantaged by unfair discrimination. Section 217(3) of the Constitution further states that the national legislation was to be enacted to prescribe a framework within which policies referred to in section 217(2) must be implemented.

6.1.2 Regulatory framework

The Project is governed by a regulatory framework determined by the following pieces of legislation, the:

a) Constitution
b) National Health Act

c) Regulation 16 of the Treasury Regulations promulgate din terms of section 76(4) of the Public Finance Management act ("Treasury Regulation 16")
d) Public Service Act (PSA)
e) Development facilitation Act, Act no.67 of 1995 ("DFA")
f) National Environmental Management Act, Act No. 25 of 1995 ("Heritage Resources Act")
g) State Information Technology Agency Act, act No. 88 of 1998 ("SITA Act"); and
h) Government Immovable Asset Management Act, act No. 19 of 2007 ("GIAMA").

The Constitution

- The Constitution is the founding basis for the existence and executive functioning of the organs of state which includes provincial departments as contemplated in its section 239.
- Section 41(1) of the Constitution provides that all spheres of government must not assume any function except those conferred to them in terms of the Constitution.
- As stated above the mandate of the Department is derived partly from the constitution, which states, in section 27 that everyone has the right to have access to health care services, including reproductive health care and that the state must take reasonable legislative and other measures, within its available resources to achieve the progressive realisation of, inter alia, the right to health care services. Schedule 4 Part A OF THE Constitution lists the functional areas of concurrent national and provincial competence, and includes health services as such an area of concurrent national and provincial legislative competence.
- The Department, in terms of section 125 of the Constitution , can inter alia, prepare, initiate and implement provincial legislation and in light of the fact that health services are listed as an area of concurrent national and provincial legislative competence, it is possible for the department to enact legislation dealing with health services. It appears that the Department has not enacted a provincial legislation in respect of health services, however, there is a national legislation, National Health Act, which is applicable in respect of health services.

National Health Act

- The National Health Act states that it is to provide a framework for a structured uniform health system within the Republic, taking into account the obligations imposed by the Constitution and other law on the national provincial and local governments with regard to health services and to provide for matters connected therewith.
- The institutional function of the Department (through the head of department) is to, inter alia, provide health services, to control the quality of health facilities, provide, maintain equipment, vehicles and health care facilities in the public sector.

NEMA

- The NEMA requires institutions to subject a listed activity to either the basic assessment or scoping and Environmental Impact assessment ("EIA") process, depending on the type and scope of the listed activity. This Project entails building of a new Limpopo Central Hospital, which is a listed activity in terms of NEMA.
- In terms of NEMA the Department must appoint an Environmental Assessment Practitioner ("EAP") to manage the application for Environmental Authorisation. The EAP must determine which process to follow either basic assessment or scoping and EIA or request an Exemption. The EAP must be independent and objective and have expertise in conducting Environment Impact Assessments ("EIA").

Heritage Resources Act

- The Heritage Resource act provides, inter alia, that any person who intends to undertake a development, which is listed in section 38 of the Heritage Resources Act, must at the very earliest stage of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. This Project constitutes a development which is listed in section 38 of the

Heritage Resources Act and therefore the department will have to notify the responsible heritage resources authority about this Project.

- The responsible authority must if there is a reason to believe that heritage resource will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report or notify the person concerned that this section does not apply.

SITA Act

The SITA Act states that a department that wishes to acquire a service contemplated in the SITA Act must either acquire that service from the State Information Agency (Pty) Ltd ("Agency") in accordance with business and service level agreements concluded as contemplated by the SITA Act or procure that service through the Agency in accordance with the SITA Act if the Agency indicates in writing that it is unable to provide the service itself.

GIAMA

GIAMA states that the department managed by the Minister responsible for Public Works is the custodian in relation to immovable assets that vest in the national or provincial government.

GIAMA also states that a custodian acts as the caretaker in relation to an immovable asset of which it is the custodian.

BBBEE

The construction industry is one the sectors that have seen significant growth in the presence of black market participants in the past few years however there still remains a general lack of access to finance by black enterprises. The construction sector in particular is demanding of capital and this lack of access remains a constraining factor, especially in view of the prevailing lack of capital accumulation in black industry.

The **Construction Industry Charter** was promulgated in 2009 in terms of the B-BBEE Act. This makes it possible to standardize measurement and evaluation of B-BBEE credentials of industry participants. The current regulations pertaining to B-BBEE requirements will be adhered to.

6.2 Land issues

6.2.1 The Site

The following criteria were considered in the selection of the site:

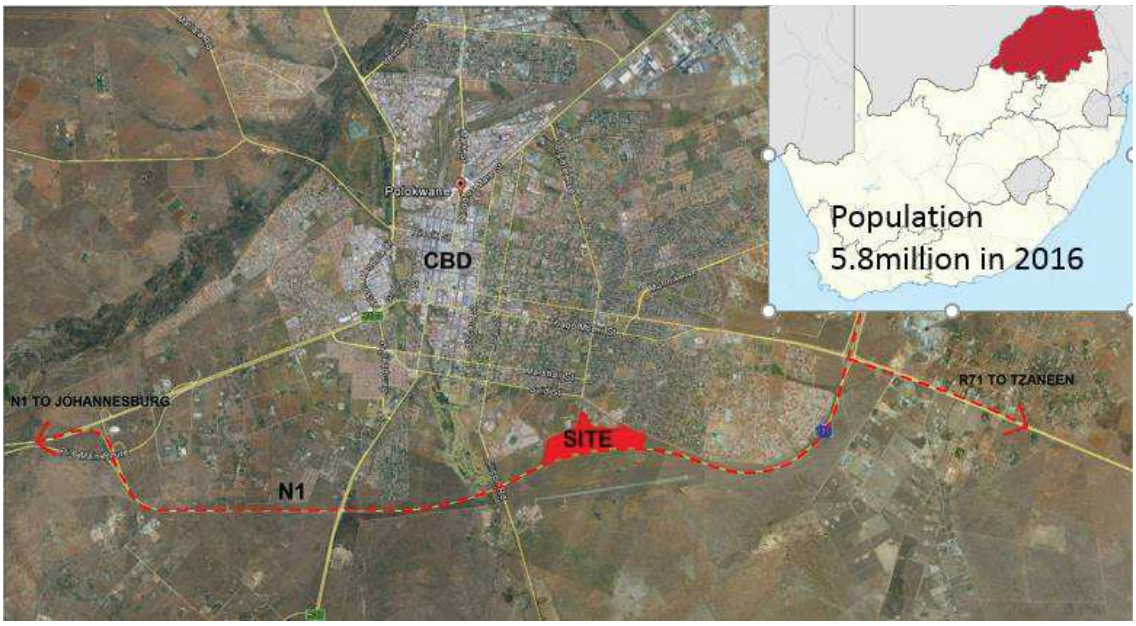
- Accessibility from major arterial routes'
- Proximity to both Pietersburg Hospital and Mankweng Hospital;
- Developable land/area of 50 hectares;
- Availability in the short term in order to proceed with planning well knowing that the site will have the right zoning and costs; and
- Certainty of tenure of the land.
- Current Title Deed No. T55889/2000

There do not appear to be any restrictive conditions that exist in the title deed to prohibit the development of the proposed LCH.

The site of the proposed academic hospital, Remainder Erf 6861 Polokwane, is located in the southern part of Polokwane town, directly northeast of the Peter Mokaba Stadium. The site is bordered by Edupark Avenue to the north-west, the N1 National Roads/Bypass R71 to the south-east. The site

incorporates a previous road reserve (Webster Road extensions) but includes a 4.0m wide servitude for a water supply pipe.

Photograph 3: The new Limpopo Central Hospital site



The new site selected is partly developed – a section is used for the Edupark Campus incorporating the Business School of the University of Limpopo. The remaining area is considered both to be large enough and to offer significant benefits for use for the Academic Hospital Complex (the new school of medicine and the new central hospital).

Ownership

The site is currently owned by the Municipality of Polokwane who have resolved to donate the sites for the purpose of the Medical School and an Academic Hospital. The University of Limpopo have already taken transfer of the portion for the medical school. The process for the entering into the Deed of Donation and transfer of the Academic Hospital and accommodation portion to the Limpopo Department of Public Works has commenced**.**

Municipal zoning

The current zoning of the site allows for the development of the Academic Hospital.

Town and urban planning

The proposed new central hospital was identified as the highest development priority for the Limpopo Province as there is a growing need for services in the area. Polokwane is the capital of Limpopo and is acting as a major service centre for its urban population, surrounding areas and the whole of Limpopo Province.

Restrictive site conditions

No restrictive conditions exist that prohibits the development of the proposed central hospitals, medical school and student residences.
In terms of the Polokwane Municipality's Town Planning Scheme, the building height limit is 5 storeys, the maximum coverage is 60%, the bulk is limited to the site area. The minimum number of car parking

spaces is 8/100m² of Gross Leasable Floor area. A building setback of 16.0m exists along the national (N1) road boundary and a 3.0m building setback along Edupark Avenue.

These limitations can be relaxed at the discretion of the Municipality. However, the concept design indicates that the hospital will be compliant with these restrictions.

Site Availability

The site is currently a green field vacant piece of land that has been earmarked for the development of a new academic hospital. The site is available for the new hospital development.

Consolidation

While the entire site compromises two erven with one of the erven having a pipe servitude running across it, it is proposed that the new hospital be developed on the Northerly of the two erven and there will be no construction crossing the boundaries of the two erven.

Heritage status

No heritage impact assessment is required, as the site does not fall within the provisions of the National Resources Act, 1999. There are no existing buildings and as far as can be established, the site has no cultural or historical value. There are no known sites of archaeological value adjacent or in close proximity to the site. The site has no established links to the known heritage sites that fall within the Polokwane Municipality.

Environmental Impact Assessment (EIA) – 2010

A basic environmental scoping report was conducted to identify any environmental issues on site and to map out the environmental approval process that will be required for the Project. The environmental assessment of the proposed Limpopo academic hospital did not identify any fatal flaws. The environmental impacts identified during the assessments are considered to be manageable and can be mitigated. In terms of the EIA Regulations and activities listed in Government Notices (GN) No. R. 386 (requiring a Basic Assessment process) and (GN) No R. 387 (requiring a Scoping and EIA process) of 2006 the Scoping and EIA process is required for the proposed development.

6.2.2 Technical site issues

6.2.2.1 Topography

There is a consistent slope of between 1:30 and 1:40 on the site - the highest point being the eastern corner and the lowest being in the western corner. The site topographical features are suitable for the development.

6.2.2.2 Geotechnical site investigation report (2010)20

The geotechnical report on the site for the proposed academic hospital, medical school and student residences concluded that the site was suitable for construction of the proposed development of multi-storey buildings. However due cognisance must be given to a number of adverse geotechnical characteristics (refer to the Geotech report for more detail) and precautionary measures will be required when designing the foundations of the buildings on site. An additional allowance must be made for foundations in the estimate of cost.

[20] *Extracted from the Feasibility Study for New School of Medicine at the University of Limpopo. July 2013*

Scope of the geotechnical investigation

According to the scope of work provided in the AGES report, the geotechnical investigation was undertaken for "design and construction purposes'. The aims of the investigation were:

- to determine and describe the succession of soil and rock materials occurring beneath the site
- to assess the mechanical properties of the soil- and rock material covering and underlying the study area with regard to the founding of multi-storey masonry structures that will incorporate a basement level
- to evaluate site excavatability
- to determine the suitability of the natural soil materials for use as compacted fill beneath parking areas and access road.

The nature of the investigation and the recommendations provided in the AGES report area based on the following premises:

- multi-story masonry structures will be built
- founding will generally take place at a depth of between 3 and 4.5 m beneath the natural ground surface
- square footings with a founding load of approximately 360 kPa will be utilized

The field investigations involved the following activities:

- The excavation of 26 Trial Pits using a on a rough grid spacing of approximately 75 to 100m. 8 of the Trial Pits were located on the adjacent erf.
- The drilling of 4 vertical rotary core boreholes to depths of approximately 15m each

The layout of the proposed buildings and associated infrastructure was not available at the time that the AGES geotechnical investigation was undertaken. The investigation points were placed to describe the general soil and rock conditions across the site. Likewise, the recommendations provided in the report are generic and not specific to any building or part of the site.

The geotechnical investigations were limited to the section of the site earmarked for the Hospital and Medical School

The site was found to be underlain at a relatively shallow depth by weathered gneisses and schists of variable mineralogical composition and occasional narrow dolerite dykes. The individual lithological units were found to be variable, which is typical of the banded nature of the metamorphic gneissic rock. The variability of the rock types is reflected int eh weathering profile. Zones of softer and harder materials were found to occur over short distances (a scale of meters0. Localized zones of highly weather schist exhibiting a very soft to soft rock consistency were encountered within the more competent weathered gneiss. The orientation of these zones followed the near-vertical fabric orientation of the bedrock.

The weather gneiss bedrock, which occurred from a depth of approximately 3m, was found to exhibit UCS-values in excess of the foundation requirements of 0.36 MPa for the multi-story building sand the report recommends that pad footings can be found on/within the weathered gneiss. However, it is stated that the footings should not be placed on the highly localized lenses of softer weathered schist and that these should preferably be bridged by means of reinforcement or thicker slabs.

The upper layers of topsoil were found to be compressible and this could lead to differential settlement under foundation loading or when saturated. The following foundation options for the placement of foundations within the upper soil layers are recommended in the AGES report:

- Stiffened strip footings/ stiffened- or cellular raft foundations
- Lightly reinforced footings placed on compacted soil rafts where the natural soil is removed to a distance of 1.0 m beyond the perimeter of the structures, and to a depth of 1.5 times the widest foundation or to weathered bedrock and replaced with a compacted topsoil mixture

- Lightly reinforced footings placed on compacted soil fills where the natural soil is removed to a width and depth equal to 1.5 times the maximum foundation width or to weathered bedrock, and replaced with a compacted topsoil mixture

The report recommends the in-situ inspection of the foundation trenches by an engineering geologist or geotechnical engineer.

Recommendation for further investigations

There was sufficient information provided in the geotechnical reported compiled by AGES, for the design of the foundations for the previously proposed hospital layout. However, in order to be more specific with foundation solutions which are appropriate for a revised proposed structural layout and ground conditions, some additional information may be required. This includes the proposed footprint and design loadings of the structures, which are missing from the report that has been reviewed but should happen as a matter of course during the design stage of the project.

Additional testing will be required for the excavated material from the basements, as it may be possible to make use of this in the pavement layers.

Given the local variability in the founding conditions and the presence of isolated zones for softer weathered schist within more competent bedrock, verification of the geotechnical conditions during construction is considered necessary. The identification of soft zones beneath the foundations may require the implementation of a modified foundation design such as increasing the foundation depth, increasing the foundation size or bridging of the weaker zones.

Further geotechnical investigations will require for the design of infrastructure in the north eastern section (proposed doctors and nurses residences) and the south western section of the site (students' residences, etc.). Investigation for the near-surface conditions by means of TLB excavated trial pits will be suitable for light structures. However deeper investigations involving core drilling are recommended for multi-story buildings.

6.2.2.3 Electrical Service connection

Electrical Load Estimates

- The typical electrical load demand of a fully air conditioned facility of this nature is 100VA/m2.
- The initial expected total electrical demand of the facility is therefore estimated to be 5700 kVA.
- It is recommended that 20% additional capacity be allowed for future growth of the facility.
- The recommended ultimate total maximum demand to be allowed for the Limpopo Central Hospital with the 20% growth allowance is 6840 kVA.
- The site has one owner and according to the regulations only one connection may therefore be provided to the site.
- The total capacity of the Bulk Electrical Supply to the site is therefore recommended at 12000kVA.

Capacity electrical power available from the supply authority: City of Polokwane

- The capacity of the local electrical supply to the area of the Peter Mokaba stadium, which is the nearest large facility in the vicinity of the Limpopo Academic Hospital site, is insufficient to cater for the Hospital site electricity demand.
- The nearest point form where 12000kVA electrical power could be provided by City of Polokwane is from their Beta Substation on the corner of Suid & Kerk Streets.

Integrity of available electrical power

- Beta substation has four 20 000kVA of which one transformer must act as a standby transformer in the event of the loss of a transformer or related switchear in the substation. This

is required to enable City of Polokwane to provide firm electrical service connections to consumers. Alternative swtiching can be done in a short period of time should a loss of any section in the substation be suffered. The above requirement was checked and found to be in order for a firm connection to the Hospital site.

- Another one of the four 20 000kVA transformers in Beta substation has already been allocated to the Hospital site when the Peter Mokaba stadium was developed. The present load on this transaformer is 4 000kVA which leaves 16 000kVA avaialble for capaity for future connetions. Sufficient capacity therefore exists for the 12 000kVA conennection to the hosptial site.
- Three 11kV supply circuit breakers have been allocated in Beta Substation for the Hosptial connection of which two can carry the total load reqruiement of 12 000kVA. The third circuit breaker will be a standby to the other two circuit breakers in the event of the loss of any of the two breakers. This is required for a firm connection.
- The three ciruit breakers will supply power to three individual 11kV feeder ables to the Hospital site. Two ables can carry the total load with the third as the standby cable in the event of a loss of a cable.
- Beta Substation has sufficient spare capacity to cater for the required demand and a firm electrical service connection can be provided.

Cable Routes from Beta substation to site

- There are three (3) proposed underground cable routes from Beta Substation to the Hospital site.
- All routes were checked on site and found to be suitable with similar obstacles' on all the routes.

11kV Switchgear requirements in Beta substation and the LCH site boundary station

- The existing feeder circuit breakers in Beta Substation must be provided with additional cable protection tripping facilities for the connection as part of the service connection installation.
- The service connection at the Hospital site must be done in a site boundary 11kV switching station. The station must have a Council chamber and a Consumer chamber.
- Three (3) incoming 11kV circuit breakers must be provided in the Council chamber to accept the three (3) 11kV supply cables.
- Two (2) additional 11kV feeder circuit breakers with metering facilities must be)installed in the Council chamber as dual supplies to the Consumer chamber 11kV switchgear arrangement. One (1) supply can take the total load of 12 000kVA and the other supply will act as a 100% standby to ensure a firm connection on site.
- The Consumer station switchgear arrangement must be developed In such a way so as to provide connections to the Hospital, the Medical School and housing. The Consumer chamber arrangement will be owned, managed and maintained by the main consumer onsite which will be the Hospital.

6.2.2.4 Bulk Services[6]

Services Reports are available. The following is highlighted:

- Potable water
  - The existing 300mm diameter bulk water main which is located alongside the southern boundary of the site does not have adequate capacity to provide the hospital with a continuous, reliable supply. However, the municipality has confirmed that they have constructed a new 315mm diameter water main in Webster Street. The new supply pipe will have adequate capacity and pressure to accommodate the hospital.
  - To make sufficient provision for the hospital's internal water reticulation, a storage tank with a volume equivalent to 48 hours demand must be constructed to accommodate emergency fire flow. Booster pumps will be required to provide the sufficient pressure.

  - Boreholes can provide an emergency water supply, but it will be necessary to obtain a water use license from the Department of Water Affairs. Furthermore, this water will require treatment to potable standard If used for domestic purposes
- Sewerage
  - The nearest municipal sewer with sufficient capacity to accommodate the proposed complex is located to the south of and parallel to Van Zyl Slabbert Street, approximately 600m to the north of the site.
  - It will be necessary to construct a new 600m long link pipeline to connect the hospital to the 450mm diameter municipal bulk sewer located in Van Zyl Slabbert Street.
  - There is adequate capacity at the municipal treatment works and in the municipal bulk sewer to accommodate the wastewater discharge from the hospital.
  - A treated grey water system may be installed on site for irrigation purposes as long as this system is maintained by the hospital
- Power supply
  - The main power supply to the site shall be obtained from the Beta substation located in Suid Street. Sufficient capacity is available in this substation to allow for a 12MVA connection to the site. Power shall be fed to the site via suitably sized cables at 11kV from a substation that needs to be constructed on the site boundary from where an internal 11kV ring will be constructed to feed both the hospital building as well as all the other future developments on site. The initial estimated load for the hospital building alone is 6MVA. This will be refined and recalculated during design development.
- Storm water
  - Upstream storm water will need to be accommodated and routed through the site.
  - Storm water discharge from the site will have to be attenuated to pre-development levels to ensure that the downstream infrastructure can continue to accommodate runoff from the site.
  - Sustainable Urban Drainage System principles are recommended to limit the impact of the post-development runoff on the downstream watercourses
  - Storm water management will incorporate attenuation ponds on the western side adjacent to Edupark Avenue and be designed for the 1:100 year flood.

6.2.2.5 Traffic Impact Assessment (TIA)

The TIA has been completed for the new development. Road infrastructure improvements have been identified that will be required in order to make the impact of the new development manageable. The main access road to the Central Hospital will be from Edupark Avenue. Edupark Avenue and Webster Street will be upgraded to a dual carriageway with a median in the middle. Two traffic circles will be constructed in terms of the academic hospital development plan and will facilitate the intersecting roads and allow for the smooth flow of traffic.

Parking

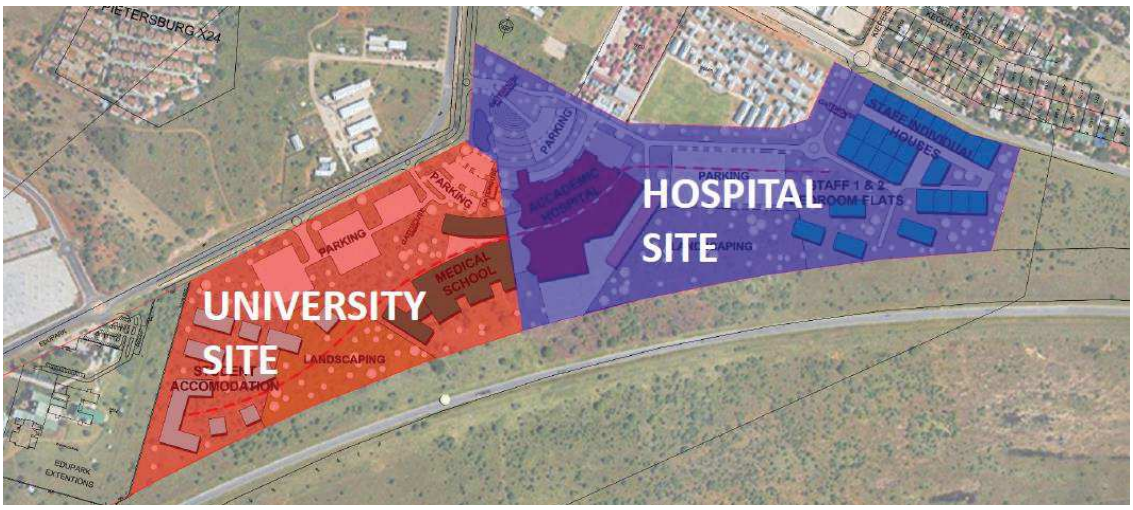
There is sufficient area on site for public and staff parking however. A total of 732 parking bays will be required for the project 75% of which could be situated at ground level and 25% accommodated in parking garages. Any access and exit ramps to structured parking and roadways should be simplified and narrowed down with only widening provided at the gate area. The final layout will be determined by the design process.

6.3 Masterplan: New Limpopo Academic Hospital

The site is clearly split into two with the University occupying one section of the site and the hospital on the other. Each will be separately managed but linked physically so that staff and students can move easily between the two.

The detail design will be refined and detailed in consultation with all stakeholders from LDOH, NDOH, NT, UL and both the clinical and non-clinical staff from the affected hospitals and the academic faculty.

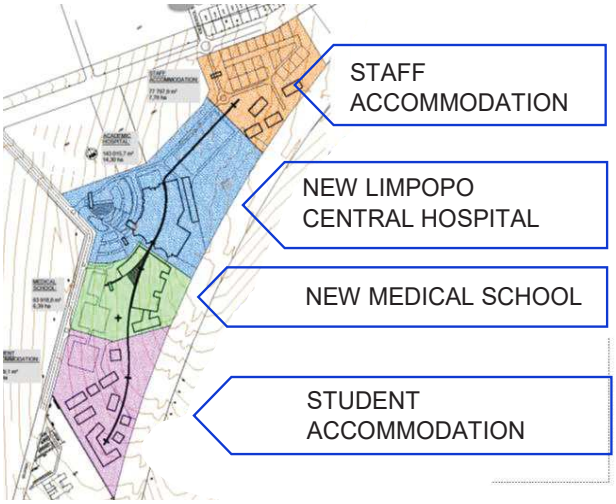
Figure 7: University site and new hospital site zoning



Future provision of tertiary services

The design of the new central hospital will provide for the future provision of a new oncology department and an additional 200 x L3 beds. Ultimately, the oncology, nephrology and urology beds will be relocated from Pietersburg Hospital as will the L3 ophthalmology beds and services from Mankweng. All 688 bed tertiary services will be concentrated finally in the new central hospital.

Figure 8: Major zones on the new hospital site



The master plan indicates four clear zones:

1. Staff accommodation
2. The new Limpopo Central Hospital
3. The new Medical School
4. Student accommodation

A concept plan has been completed to ensure that all the requirements can be accommodated on the new site with provision for expansion (illustrated in the masterplan below). Specific attention has focused on the hospital components (clinical, clinical support and hospital support services), circulation and parking on site, access, the medical school, staff and student accommodation.

Figure 9: Site Masterplan

A concept layout, 1:200 drawings for the 630-bed proposal (approved Business Case 2008) were completed and approved by the clinical task team in 2011. However, these will need to be reviewed and changes made as the new proposal is for 488 beds.

7 FINANCIAL IMPLICATIONS

7.1 Construction costs (Capex)

The following table illustrates the cost estimate for Option 2, the preferred option, and illustrates the costs affected by this option inclusive of:

- The new Central Hospital on the new site;
- The required upgrade of Pietersburg Regional Hospital;
- The immediate equipment required to support the existing tertiary services at Pietersburg hospital.

Table 25: Option 2: Total Cost Estimate

NEW LIMPOPO ACADEMIC COMPLEX HOSPITAL			
OPTIONS	OPTION 2		
ESTIMATED PROJECT COST	NEW SITE	PIETERSBURG	IMMED. EQUIP
SUMMARY	488 BEDS (NEW)		(PIETERSBURG)
NEW BUILDINGS			
BUILDING WORKS	704,892,500	15,870,000	0
EXTERNAL WORKS (INCLUSIVE OF BULK SERVICES)	209,071,771	2,760,000	0
ELECTRICAL & MECHANICAL INSTALLATIONS	388,889,192	8,569,800	0
DEMOLITIONS	0	0	0
ENABLING AND DECANTING	0	0	0
PRELIMINARIES AND GENERAL (14.5%)	188,913,752	17,617,471	0
SUB TOTAL CURRENT CONSTRUCTION COST	**1,491,767,215**	**44,817,271**	**0**
UPGRADE OF EXISTING	0	94,300,000	0
SUB TOTAL CURRENT CNSTRUCTION AND UPGRADE	**1,491,767,215**	**139,117,271**	**0**
CONTINGENCIES	74,588,361	6,955,864	0
TOTAL ESTIMATED CURRENT CONSTRUCTION COST	**1,566,355,576**	**146,073,135**	**0**
PROFESSIONAL FEES (17%)	266,280,448	24,832,433	0
SUB TOTAL CURRENT PROJECT COST	**1,832,636,024**	**170,905,567**	**0**
PRE CONTRACT ESCALATION PROVISION	252,117,102	18,600,954	0
CONTRACT ESCALATION PROVISION	523,282,509	15,589,460	0
TOTAL ESTIMATED FINAL PROJECT COST	**2,608,035,635**	**205,095,981**	**0**
TOTAL ESTIMATED COMMISSIONING AND HEALTH TECHNOLO	921,192,759	74,703,421	154,400,000
TOTAL ESTIMATED FINAL PROJECT COST	**3,529,228,394**	**279,799,402**	**154,400,000**
TOTAL ESTIMATED COST PER OPTION	3,963,427,797		
ALL FIGUIRES INCLUDE FOR VAT 15%			

7.2 Operational costs (Opex) – Limpopo Central Hospital

The operating expenses (recurrent) of a hospital such as the new LCH are generally made up of five parts. 'Compensation of employees' is by far the largest expense, comprising between 65% and 72%, and 'goods & services' comprising between 18% and 25%[21]:

The ratios and breakdown of the expenditure largely depend on the scope of the activities of the hospital and the staff structure. The following process was used to quantify the operating expenses:

- Draft an **organisational structure** (compliant with guidelines from NTHSP and in direct response to the perceived and expressed clinical demands/needs)[22]
    - All clinical functions (across the complex) were included
    - Components of the organisation form the structure of the 'cost centres'
- Estimate the staff complement required for a functional establishment[23] (based on anticipated workload and compared with similar hospitals)[24]
- Attribute a cost of compensation cost to each proposed post:
    - 2017 DPSA tables used
    - Notch jobs add 38% for benefits
    - Package staff no additional cost
    - Assume limited overtime if all posts filled
- Finally add the other components of the operating expenses based on historical distributions of other hospitals

The points of departure for estimating recurrent costs are based on Option 2:

- The Limpopo Central Hospital will be part of a **central 'tertiary service complex'** with:
    - its own campus with local operating expenses
    - a remote campus with operating expenses at Pietersburg Hospital
    - a remote campus with operating expenses at Mankweng Hospital
    - a remote campus with operating expenses at Thabamoopo Hospital
- The Pietersburg/Polokwane Hospital will be a **regional hospital** with:
    - its own campus with local operating expenses
    - and will host, but not have the budget for, Limpopo Academic Hospital functions
- The Mankweng Hospital will be a **regional hospital** with:
    - its own campus with local operating expenses
    - and will host, but not have the budget for, Limpopo Academic Hospital functions
- The Thabamoopo Hospital will be a **regional hospital** with:
    - its own campus with local operating expenses
    - and will host, but not have the budget for, Limpopo Academic Hospital functions

A comparable cost-model based on the costs per hospital bed was applied to establish the budget required to operate the proposed beds for the new Central hospital.

7.2.1 Personnel expenditure

The new Limpopo Central Hospital will require new posts and associated goods, services, etc. However, several of the tertiary functions of the new (central) service are already provided in Pietersburg Hospital and will **transfer to the new facility**:

- Cardio-Thoracic
- Cardio-Thoracic Surgery (Paediatric and Adult)
- Dermatology
- Maxillofacial & Oral Surgery

[21] *Sample survey of tertiary hospital expenditure in the country*
[22] *Annex LCH Organisation v1.1 Functions 180102*
[23] *Annex LCH Phasing-in of Clinical Services Staffing v2.1 180102 (Estab/SumTables)*
[24] *Grey's Hospital in Pietermaritzburg is most similar (size and scope)*

- Neurology
- Neurosurgery
- Otorhinolaryngology
- Paediatric Surgery
- Plastic & Reconstructive Surgery
- Pulmonology & Allergology
- Vascular Surgery

Plus supporting associated professions such as:

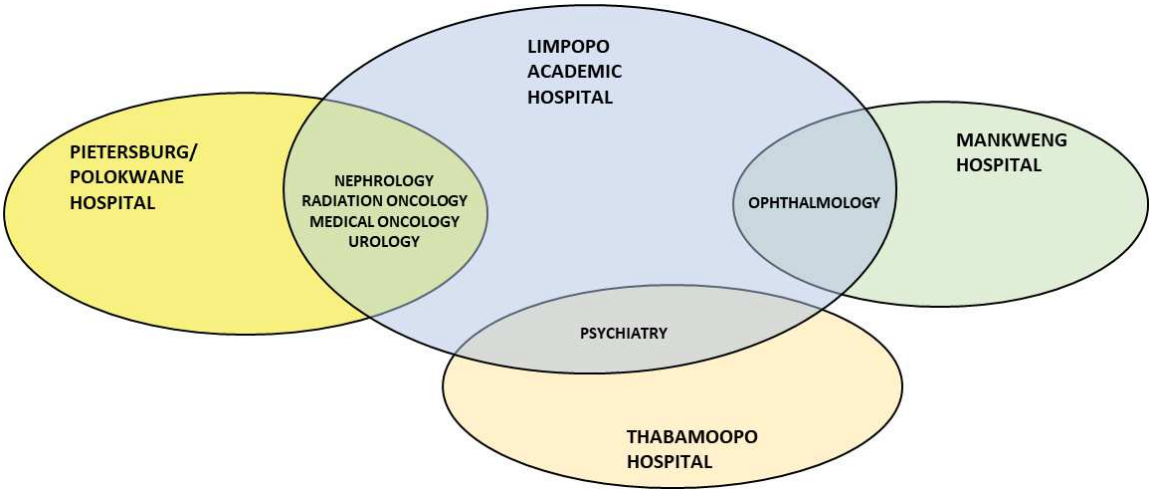
- Clinic Psychology
- Dietetics
- Occupational Therapy
- Physiotherapy
- Radiography

To complicate matters, some of these functions will **not transfer to the new facility**, but will be a part of the 'complex' of services delivered:

- Pietersburg Hospital
  - Medical Oncology
  - Radiation Oncology
  - Medical Physics
  - Nuclear Medicine
  - Nephrology
  - Urology
- Mankweng Hospital
  - Ophthalmology
- Thabamoopo Hospital
  - Psychiatry

In some cases, the functions are clear and wholly transferrable but in others the separation is less obvious.

Figure 10: Schematic of the relationship between the academic complex hospitals



1. The first step was to draft a detailed organogram with a full post establishment to establish the budget required to operate the proposed beds for the new Central hospital and the tertiary beds of the other hospitals in the (634-bed) Academic Health Complex.

2. The second step was to establish which of the existing posts closely match posts in the model organisation and establishment, then to remove these COE costs with associated operating expenses as 'savings' (costs already incurred).

3. The third step was to estimate the new cost of running the remaining (442-bed) regional hospital (Capricorn Regional) and to remove the already funded portion of those operating expenses.

7.2.2 Cost of Employment (COE)

The detailed organogram that was used is illustrated in section 3.10 "Proposed Services and Facilities to meet the Health Service Gap". A full post establishment was created for all departments, divisions and units and posts numbers compared with other tertiary and central hospitals around the country for a 'reality check'.

Costs were calculated for each post (total cost to employer – TCE):

- depending on whether the post is a package post or not
  - for clinical OSD package posts the relevant commuted overtime cost was added
  - for non-package posts 38% add-on costs were added to accommodate benefits

Human Resource requirements
The human resource requirement for Option 2 were compiled for all relevant hospitals providing L3 services. The 2017 DPSA salary scales were applied to each post and quantified accordingly.

The first table below outlines the total calculated COE and cost for the **Limpopo Academic Complex** comprising of the new central hospital, Pietersburg and Mankweng hospitals as well as the costs for the psychiatric services at Thabamoopo Hospital.
Thereafter, **each hospital is tabled separately**.

Table 26: Limpopo Academic Complex Hospitals: Human Resource Requirements and Cost

Post Location	ACADEMIC COMPLEX	
DEPARTMENT & DIVISION	**POSTS**	**TCE**
ADMINISTRATIVE SUPPORT	**2**	**1,455,457**
Administration	2	1,455,457
ASSOCIATED HEALTH SERVICES DEPARTMENT	**151**	**75,969,271**
Audiology & Speech Therapy Division	9	4,445,896
Dietetics Division	10	4,653,232
Head of Associated Health Services Department	2	1,262,264
Hospital Social Work Division	19	7,577,657
Medical Physics	11	6,145,087
Nuclear Medicine Radiography	7	3,843,577
Occupational Therapy Division	8	4,030,095
Optometry Division	3	1,189,405
Orthotics & Prosthetics Division	10	4,523,353
Physiotherapy Division	9	4,728,821
Podiatry Division	2	699,598
Radiation Therapy	24	13,427,773
Radiography & Imaging Division	37	19,442,514

CEO OFFICE	**18**	**9,709,805**
Executive	3	2,729,233
Quality Assurance & Clinical Performance Improvement Division	15	6,980,571
DEPARTMENT OF ANAESTHETICS & CRITICAL CARE MEDICINE	**48**	**39,962,867**
Anaesthetics	40	34,745,086
Dept Anaesthetics & Critical Care Medicine	8	5,217,781
DEPARTMENT OF MEDICINE	**96**	**75,573,241**
Cardiology (& Cath Lab)	15	12,068,593
Dept of Medicine	18	9,534,738
Dermatology	8	7,312,421
Endocrinology	8	7,078,300
Medical ICU	5	4,526,249
Neonatology	2	1,506,486
Nephrology (Pietersburg)	16	12,896,321
Neurology	10	9,119,951
Paediatric Cardiology	2	1,506,486
Pulmonology	6	4,621,747
Rheumatology	6	5,401,951
DEPARTMENT OF OBSTETRICS & GYNAECOLOGY	**47**	**37,683,894**
Dept Obstetrics & Gynaecology	10	5,977,698
Gynaecology	11	9,630,350
Obstetrics	26	22,075,846
DEPARTMENT OF PAEDIATRICS	**96**	**77,145,403**
Dept Paediatrics	18	9,534,738
General Paediatrics	26	21,244,597
Neonatology	14	12,717,566
Paediatric Cardiology	12	11,187,800
Paediatric ICU	5	4,526,249
Paediatric Pulmonology	6	5,548,534
Paediatric Surgery	15	12,385,921
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH	**4**	**4,014,632**
Psychiatry & Mental Health (Thabamoopo)	4	4,014,632
DEPARTMENT OF RADIOLOGICAL SCIENCES	**43**	**38,953,591**
Dept Radiological Sciences	1	1,997,747
Diagnostic & Intervention Radiology	23	19,977,308
Medical Oncology	9	8,247,167
Radiation Oncology & Nuclear Medicine (Pietersburg)	10	8,731,369
DEPARTMENT OF SURGERY	**203**	**169,844,412**
Cardiothoracic Surgery	13	11,921,525
Cranio/Maxillo Facial/Oral Surgery	12	10,799,218
Dept of Surgery	18	9,534,738
Emergency & Trauma Unit	15	12,666,602
Neurosurgery	19	16,464,263
Ophthalmology (Mankweng)	12	10,898,396
Orthopaedics	21	18,678,695
Otorhinolaryngology	14	12,282,424
Plastic and Reconstructive Surgery	14	12,282,424
Specialised General Surgery	39	32,911,639
Surgical ICU	5	4,526,249

Urology	21	16,878,239
FINANCIAL MANAGEMENT	**32**	**9,693,389**
Financial Management	32	9,693,389
HUMAN RESOURCES MANAGEMENT	**31**	**10,273,736**
Human Resources	31	10,273,736
INFORMATION & COMMUNICATION TECHNOLOGY	**27**	**2,955,986**
ICT Management	27	2,955,986
NURSING SERVICES DEPARTMENT	**1057**	**329,709,906**
Division: General Medical Wards (64/243) and OPDs	301	84,479,275
Division: Nursing Service Financial Analysis and Reporting, Operational Support & Clinical Nursing Research & Training	8	5,061,127
Division: Paediatric (118), Midwifery, Obstetrics & Gynaecology Nursing (96) [214]	307	92,688,384
Division: Surgical Wards (148) and OPDs &, Emergency, Intensive & High Care (62) [210]	325	104,534,011
Division: Theatres, Theatre Sterilising and Supply & CSSD	113	41,389,578
Nursing Management	3	1,557,532
OFFICE OF CLINICAL DIRECTOR	**8**	**4,756,705**
Clinical Analysis	6	3,301,248
Executive	2	1,455,457
OPERATIONS MANAGEMENT	**456**	**77,129,862**
Operations Management	456	77,129,862
PHARMACY DEPARTMENT	**33**	**16,159,681**
Pharmacy Dispensaries	13	6,239,974
Pharmacy Management	2	1,693,809
Pharmacy Medical & Surgical Consumable Stores	8	3,644,172
Pharmacy Medicine Bulk Stores	10	4,581,726
SUPPLY CHAIN MANAGEMENT	**25**	**6,852,640**
Supply Chain Management	25	6,852,640
Grand Total	**2377**	**987,844,477**

Table 27: New Limpopo Central Hospital: Human Resource Requirements and Cost

Post Location: NEW LIMPOPO CENTRAL HOSPITAL		
DEPARTMENT & DIVISION	**POSTS**	**TCE**
ADMINISTRATIVE SUPPORT	**2**	**1,455,457**
Administration	2	1,455,457
ASSOCIATED HEALTH SERVICES DEPARTMENT	**106**	**51,363,428**
Audiology & Speech Therapy Division	9	4,445,896
Dietetics Division	10	4,653,232
Head of Associated Health Services Department	2	1,262,264
Hospital Social Work Division	19	7,577,657
Occupational Therapy Division	8	4,030,095
Orthotics & Prosthetics Division	10	4,523,353
Physiotherapy Division	9	4,728,821
Podiatry Division	2	699,598
Radiography & Imaging Division	37	19,442,514
CEO OFFICE	**18**	**9,709,805**
Executive	3	2,729,233

Quality Assurance & Clinical Performance Improvement Division	15	6,980,571
DEPARTMENT OF ANAESTHETICS & CRITICAL CARE MEDICINE	**48**	**39,962,867**
Anaesthetics	40	34,745,086
Dept Anaesthetics & Critical Care Medicine	8	5,217,781
DEPARTMENT OF MEDICINE	**80**	**62,676,921**
Cardiology (& Cath Lab)	15	12,068,593
Dept of Medicine	18	9,534,738
Dermatology	8	7,312,421
Endocrinology	8	7,078,300
Medical ICU	5	4,526,249
Neonatology	2	1,506,486
Neurology	10	9,119,951
Paediatric Cardiology	2	1,506,486
Pulmonology	6	4,621,747
Rheumatology	6	5,401,951
DEPARTMENT OF OBSTETRICS & GYNAECOLOGY	**47**	**37,683,894**
Dept Obstetrics & Gynaecology	10	5,977,698
Gynaecology	11	9,630,350
Obstetrics	26	22,075,846
DEPARTMENT OF PAEDIATRICS	**96**	**77,145,403**
Dept Paediatrics	18	9,534,738
General Paediatrics	26	21,244,597
Neonatology	14	12,717,566
Paediatric Cardiology	12	11,187,800
Paediatric ICU	5	4,526,249
Paediatric Pulmonology	6	5,548,534
Paediatric Surgery	15	12,385,921
DEPARTMENT OF RADIOLOGICAL SCIENCES	**24**	**21,975,055**
Dept Radiological Sciences	1	1,997,747
Diagnostic & Intervention Radiology	23	19,977,308
DEPARTMENT OF SURGERY	**170**	**142,067,777**
Cardiothoracic Surgery	13	11,921,525
Cranio/Maxillo Facial/Oral Surgery	12	10,799,218
Dept of Surgery	18	9,534,738
Emergency & Trauma Unit	15	12,666,602
Neurosurgery	19	16,464,263
Orthopaedics	21	18,678,695
Otorhinolaryngology	14	12,282,424
Plastic and Reconstructive Surgery	14	12,282,424
Specialised General Surgery	39	32,911,639
Surgical ICU	5	4,526,249
FINANCIAL MANAGEMENT	**32**	**9,693,389**
Financial Management	32	9,693,389
HUMAN RESOURCES MANAGEMENT	**31**	**10,273,736**
Human Resources	31	10,273,736
INFORMATION & COMMUNICATION TECHNOLOGY	**27**	**2,955,986**
ICT Management	27	2,955,986
NURSING SERVICES DEPARTMENT	**844**	**269,817,970**

Division: General Medical Wards (64/243) and OPDs	88	24,587,340
Division: Nursing Service Financial Analysis and Reporting, Operational Support & Clinical Nursing Research & Training	8	5,061,127
Division: Paediatric (118), Midwifery, Obstetrics & Gynaecology Nursing (96) [214]	307	92,688,384
Division: Surgical Wards (148) and OPDs &, Emergency, Intensive & High Care (62) [210]	325	104,534,011
Division: Theatres, Theatre Sterilising and Supply & CSSD	113	41,389,578
Nursing Management	3	1,557,532
OFFICE OF CLINICAL DIRECTOR	**8**	**4,756,705**
Clinical Analysis	6	3,301,248
Executive	2	1,455,457
OPERATIONS MANAGEMENT	**456**	**77,129,862**
Operations Management	456	77,129,862
PHARMACY DEPARTMENT	**33**	**16,159,681**
Pharmacy Dispensaries	13	6,239,974
Pharmacy Management	2	1,693,809
Pharmacy Medical & Surgical Consumable Stores	8	3,644,172
Pharmacy Medicine Bulk Stores	10	4,581,726
SUPPLY CHAIN MANAGEMENT	**25**	**6,852,640**
Supply Chain Management	25	6,852,640
Grand Total	**2047**	**841,680,576**

Table 28: Mankweng Hospital: Human Resource Requirements and Cost

Post Location: MANGKWENG HOSPITAL		
POSTS PER DEPARTMENT	**POSTS**	**TCE**
ASSOCIATED HEALTH SERVICES DEPARTMENT	**3**	**1,189,405**
Optometry Division	3	1,189,405
DEPARTMENT OF SURGERY	**12**	**10,898,396**
Ophthalmology (Mankweng)	12	10,898,396
NURSING SERVICES DEPARTMENT	**70**	**20,475,796**
Division: General Medical Wards (64/243) and OPDs	70	20,475,796
Grand Total	**85**	**32,563,598**

Table 29: Pietersburg Hospital: Human Resource Requirements and Cost

Post Location: PIETERSBURG HOSPITAL		
POSTS PER DEPARTMENT	**POSTS**	**TCE**
ASSOCIATED HEALTH SERVICES DEPARTMENT	**42**	**23,416,437**
Medical Physics	11	6,145,087
Nuclear Medicine Radiography	7	3,843,577
Radiation Therapy	24	13,427,773
DEPARTMENT OF MEDICINE	**16**	**12,896,321**
Nephrology (Pietersburg)	16	12,896,321
DEPARTMENT OF RADIOLOGICAL SCIENCES	**19**	**16,978,536**
Medical Oncology	9	8,247,167
Radiation Oncology & Nuclear Medicine (Pietersburg)	10	8,731,369
DEPARTMENT OF SURGERY	**21**	**16,878,239**
Urology	21	16,878,239
NURSING SERVICES DEPARTMENT	**143**	**39,416,139**
Division: General Medical Wards (64/243) and OPDs	143	39,416,139
Grand Total	**241**	**109,585,671**

Table 30: Thabamoopo Hospital: Human Resource Requirements and Cost

Post Location: THABAMOOPO HOSPITAL		
POSTS PER DEPARTMENT	**POSTS**	**TCE**
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH	**4**	**4,014,632**
Psychiatry & Mental Health (Thabamoopo)	4	4,014,632
Grand Total	**4**	**4,014,632**

Table 31: Summary of all human resource costs for the Limpopo Academic Complex

Post Location: ACADEMIC COMPLEX		
POSTS PER DEPARTMENT	**POSTS**	**TCE**
LIMPOPO ACADEMIC	**2047**	**841,680,576**
Administrative Support	2	1,455,457
Associated Health Services Department	106	51,363,428
CEO Office	18	9,709,805
Department of Anaesthetics & Critical Care Medicine	48	39,962,867
Department of Medicine	80	62,676,921
Department of Obstetrics & Gynaecology	47	37,683,894
Department of Paediatrics	96	77,145,403
Department of Radiological Sciences	24	21,975,055
Department of Surgery	170	142,067,777
Financial Management	32	9,693,389
Human Resources Management	31	10,273,736
Information & Communication Technology	27	2,955,986
Nursing Services Department	844	269,817,970
Office of Clinical Director	8	4,756,705
Operations Management	456	77,129,862
Pharmacy Department	33	16,159,681
Supply Chain Management	25	6,852,640
MANKWENG	**85**	**32,563,598**
Associated Health Services Department	3	1,189,405
Department of Surgery	12	10,898,396
Nursing Services Department	70	20,475,796
PIETERSBURG	**241**	**109,585,671**
Associated Health Services Department	42	23,416,437
Department of Medicine	16	12,896,321
Department of Radiological Sciences	19	16,978,536
Department of Surgery	21	16,878,239
Nursing Services Department	143	39,416,139
THABAMOOPO	**4**	**4,014,632**
Department of Psychiatry & Mental Health	4	4,014,632
Grand Total	**2377**	**987,844,477**

Thabamoopo Hospital is included as it will provide psychiatric tertiary services and as such is funded within the NTSHG.

The total calculated human resource cost (TCE) for tertiary services in Limpopo Province will be in the region of **R 987 844 477**:

- new Limpopo Central Hospital R 841 680 576
- Pietersburg Hospital R 109 585 671
- Mankweng Hospital R 32 563 598
- Thabamoopo R 4 014 632

In all cases 2017 Rand values and 2017 negotiated salaries are used.

7.3 Quantification of the remaining operating expenses

The remaining operating expenses were based on known historical patterns for hospitals that provide a similar scope of services.

As described earlier, the operating expenses (recurrent) of a hospital such as this are generally made up of five parts. 'Compensation of employees' is by far the largest expense, comprising between 65% and 72%, and 'goods & services' comprising between 18% and 25%:

Two budget scenarios were calculated using different ratios of COE to other costs, and then using 100% occupied establishment and 70% occupied establishment (to generate a range of reasonably expected operational requirements). Details are provided in the annexures.[25]

In all cases 2017 Rand values and 2017 published DPSA salaries are used.

Table 32: Scenarios of ratios of COE to other costs

	Scenario 1	Scenario 2
• compensation of employees	72%	68,5%
• goods & services	18%	20,5%
• medical lab (NHLS & SANBS)	4%	4,2%
• medicines	4%	0,1%
• maintenance	0,5%	4,5%
• capital equipment	1,5%	0,7%

7.3.1 Tertiary services cost at the New Central Hospital

The estimated costs shown in the following tables are comparable with Greys Tertiary Hospital in Pietermaritzburg, which delivers a similar range of services through 488 beds. (Greys 2017/18 operational budget was R 1,11bn.)

Table 33: Recurrent cost of services to be provided at the new Limpopo Central Hospital

Scenario 1
LIMPOPO CENTRAL HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	841 680 576
GOODS & SERVICES	17,9	209 834 016
MEDICAL LAB NHLS	4	46 890 283
OTHER	0,1	1 172 257
MEDICINE	4	46 890 283
MAINTENANCE	0,5	5 861 285
CAPITAL EQUIPMENT	1,5	17 583 856
HOUSEHOLDS	0,2	2 344 514
GRAND TOTAL		**1 172 257 070**

Scenario 2
LIMPOPO CENTRAL HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	68,5	841 680 576
GOODS & SERVICES	20,5	251 889 808
MEDICAL LAB NHLS	4,2	51 606 692
OTHER	0,1	1 228 731
MEDICINE	4,5	55 292 885
MAINTENANCE	0,7	8 601 115
CAPITAL EQUIPMENT	1,3	15 973 500
HOUSEHOLDS	0,2	2 457 462
GRAND TOTAL		**1 228 730 768**

Some of these costs are already incurred at the other hospitals in the complex (discussed later).

[25] *Annex Persal extracts and graphs*

7.3.2 Tertiary services cost at Pietersburg Hospital

The costs shown the following tables are those costs that will be incurred at Pietersburg Hospital for the rendering of tertiary services as a part of the academic complex. This is specifically for:

- the **Medical Oncology Division** will also be an academic division of Department of Medicine for the University of Limpopo
- the **Radiation Oncology Division** will also be an academic division of Department of Radiological Sciences for the University of Limpopo
- the **Nephrology Division** will also be an academic division of Department of Medicine for the University of Limpopo
- the **Urology Division** will also be an academic division of Department of Surgery for the University of Limpopo

This portion of the budget should be ring-fenced out of the hospital budget and managed by the Limpopo Academic Hospital.

Table 34: Recurrent cost of tertiary services to be provided at the Pietersburg Regional Hospital

Scenario 1
PIETERSBURG HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	109 585 671
GOODS & SERVICES	17,9	27 320 105
MEDICAL LAB NHLS	4	6 105 051
OTHER	0,1	152 626
MEDICINE	4	6 105 051
MAINTENANCE	0,5	763 131
CAPITAL EQUIPMENT	1,5	2 289 394
HOUSEHOLDS	0,2	305 253
GRAND TOTAL		**152 626 283**

Scenario 2
PIETERSBURG HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	68,5	109 585 671
GOODS & SERVICES	20,5	32 795 712
MEDICAL LAB NHLS	4,2	6 719 121
OTHER	0,1	159 979
MEDICINE	4,5	7 199 059
MAINTENANCE	0,7	1 119 854
CAPITAL EQUIPMENT	1,3	2 079 728
HOUSEHOLDS	0,2	319 958
GRAND TOTAL		**159 979 082**

Some of the medicines used are extremely expensive, such as clotting factors for haemophilia and rabies vaccine, amongst others.

7.3.3 Tertiary services cost at Mankweng Hospital

The costs shown the following tables are those costs that will be incurred at Mankweng Hospital for the rendering of tertiary services as a part of the academic complex. This is specifically for the Ophthalmology Division, which will also be an academic division of Department of Surgery for the University of Limpopo.

This portion of the budget should be ringfenced out of the hospital budget and managed by the Limpopo Academic Hospital.

Table 35: Recurrent cost of tertiary services to be provided at the Mankweng Hospital

Scenario 1
MANGKWENG HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	32 563 598
GOODS & SERVICES	17,9	8 118 223
MEDICAL LAB NHLS	4	1 814 128
OTHER	0,1	45 353
MEDICINE	4	1 814 128
MAINTENANCE	0,5	226 766
CAPITAL EQUIPMENT	1,5	680 298
HOUSEHOLDS	0,2	90 706
GRAND TOTAL		**45 353 200**

Scenario 2
MANGKWENG HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	68,5	32 563 598
GOODS & SERVICES	20,5	9 745 310
MEDICAL LAB NHLS	4,2	1 996 600
OTHER	0,1	47 538
MEDICINE	4,5	2 139 214
MAINTENANCE	0,7	332 767
CAPITAL EQUIPMENT	1,3	617 995
HOUSEHOLDS	0,2	95 076
GRAND TOTAL		**47 538 099**

7.3.4 Tertiary services cost at Thabamoopo Hospital

The costs shown in the following tables are those costs that will be incurred at Thabamoopo Hospital for the rendering of tertiary psychiatric services as a part of the academic complex.

This portion of the budget should be ringfenced out of the hospital budget and managed by the Limpopo Academic Hospital.

Table 36: Recurrent cost of tertiary services to be provided at the Thabamoopo Hospital

Scenario 1
THABAMOOPO HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	4 014 632
GOODS & SERVICES	17,9	1 000 862
MEDICAL LAB NHLS	4	223 656
OTHER	0,1	5 591
MEDICINE	4	223 656
MAINTENANCE	0,5	27 957
CAPITAL EQUIPMENT	1,5	83 871
HOUSEHOLDS	0,2	11 183
GRAND TOTAL		**5 591 410**

Scenario 2

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	68,5	4 014 632
GOODS & SERVICES	20,5	1 201 459
MEDICAL LAB NHLS	4,2	246 153
OTHER	0,1	5 861
MEDICINE	4,5	263 735
MAINTENANCE	0,7	41 025
CAPITAL EQUIPMENT	1,3	76 190
HOUSEHOLDS	0,2	11 722
GRAND TOTAL		**5 860 777**

7.3.5 Tertiary services cost of whole Limpopo Academic Hospital Complex

The costs shown in the following tables are those costs that will be incurred at the four hospitals that function as part of the tertiary (and academic) complex in Limpopo. This includes the academic divisions and Departments for the University of Limpopo.

This budget should be managed by the Limpopo Central Hospital.

Table 37: Recurrent cost of services to be provided at the four hospitals in the Limpopo Academic 'Complex'

Scenario 1
LIMPOPO ACADEMIC COMPLEX

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	987 844 477
GOODS & SERVICES	17,9	246 273 205
MEDICAL LAB NHLS	4	55 033 119
OTHER	0,1	1 375 828
MEDICINE	4	55 033 119
MAINTENANCE	0,5	6 879 140
CAPITAL EQUIPMENT	1,5	20 637 419
HOUSEHOLDS	0,2	2 751 656
GRAND TOTAL		**1 375 827 963**

Scenario 2
LIMPOPO ACADEMIC COMPLEX

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	68,5	987 844 477
GOODS & SERVICES	20,5	295 632 289
MEDICAL LAB NHLS	4,2	60 568 566
OTHER	0,1	1 442 109
MEDICINE	4,5	64 894 893
MAINTENANCE	0,7	10 094 761
CAPITAL EQUIPMENT	1,3	18 747 413
HOUSEHOLDS	0,2	2 884 217
GRAND TOTAL		**1 442 108 726**

Scenario 1 has been adopted going forward:

Table 38: Recurrent cost estimate of services to be provided at the new Limpopo Central Hospital

LIMPOPO CENTRAL HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	841 680 576
GOODS & SERVICES	17,9	209 834 016
MEDICAL LAB NHLS	4	46 890 283
OTHER	0,1	1 172 257
MEDICINE	4	46 890 283
MAINTENANCE	0,5	5 861 285
CAPITAL EQUIPMENT	1,5	17 583 856
HOUSEHOLDS	0,2	2 344 514
GRAND TOTAL		**1 172 257 070**

Table 39: Recurrent cost estimate of services to be provided at the Pietersburg Hospital

PIETERSBURG HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	109 585 671
GOODS & SERVICES	17,9	27 320 105
MEDICAL LAB NHLS	4	6 105 051
OTHER	0,1	152 626
MEDICINE	4	6 105 051
MAINTENANCE	0,5	763 131
CAPITAL EQUIPMENT	1,5	2 289 394
HOUSEHOLDS	0,2	305 253
GRAND TOTAL		**152 626 283**

Table 40: Recurrent cost estimate of services to be provided at the Mankweng Hospital

MANGKWENG HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	32 563 598
GOODS & SERVICES	17,9	8 118 223
MEDICAL LAB NHLS	4	1 814 128
OTHER	0,1	45 353
MEDICINE	4	1 814 128
MAINTENANCE	0,5	226 766
CAPITAL EQUIPMENT	1,5	680 298
HOUSEHOLDS	0,2	90 706
GRAND TOTAL		**45 353 200**

Table 41: Recurrent cost estimate of services to be provided at the Thabamoopo Hospital

THABAMOOPO HOSPITAL

EXPENDITURE ITEM	%	Rand
COMPENSAT OF EMPLOYEES	71,8	4 014 632
GOODS & SERVICES	17,9	1 000 862
MEDICAL LAB NHLS	4	223 656
OTHER	0,1	5 591
MEDICINE	4	223 656
MAINTENANCE	0,5	27 957
CAPITAL EQUIPMENT	1,5	83 871
HOUSEHOLDS	0,2	11 183
GRAND TOTAL		**5 591 410**

Table 42: Recurrent cost of services to be provided at the four hospitals in the Limpopo Academic 'Complex'

LIMPOPO ACADEMIC COMPLEX		
EXPENDITURE ITEM	**%**	**Rand**
COMPENSAT OF EMPLOYEES	71,8	987 844 477
GOODS & SERVICES	17,9	246 273 205
MEDICAL LAB NHLS	4	55 033 119
OTHER	0,1	1 375 828
MEDICINE	4	55 033 119
MAINTENANCE	0,5	6 879 140
CAPITAL EQUIPMENT	1,5	20 637 419
HOUSEHOLDS	0,2	2 751 656
GRAND TOTAL		**1 375 827 963**

The total operational cost for the Limpopo Academic Hospital Complex is **R1 375 827 963** not including the life cycle costs.

7.4 Possible 'savings' through transfer of functions from existing Hospitals[26]

7.4.1 Current Pietersburg Hospital posts status

The posts status of the Pietersburg Hospital staff establishment as at 01 May 2018 was as illustrated in Table 43.

Table 43: Posts status of the Pietersburg Hospital staff establishment as at 01 May 2018

DIVISIONS	Approved	Filled	Vacant	%Filled	%Vacant
Allied Health Care Services	229	95	134	41,5%	58,5%
Clinical Care Service	2	1	1	50,0%	50,0%
Clinical Psychology	17	15	2	88,2%	11,8%
Corporate Services	337	177	160	52,5%	47,5%
Financial Management Service	204	123	81	60,3%	39,7%
Medical Service	670	226	444	33,7%	66,3%
Nursing Services	1407	821	586	58,4%	41,6%
Office of the CEO	49	10	39	20,4%	79,6%
Oral Health Services	160	42	118	26,3%	73,8%
Pharmaceutical Services	93	49	44	52,7%	47,3%
Grand Total	**3168**	**1559**	**1609**	**49,2%**	**50,8%**

There are over 1500 staff currently employed and a remaining 1609 vacant posts. This is a huge establishment for a 504-bed hospital. Detailed examination of the posts shows:

- many sections created with no filled posts
- several sections created from the Medical School with no contribution to the hospital itself
- Fixed ratio of beds per professional nursing post of 1,8 for both general and specialist nurses (combined
- 95 (41,5%) of 229 'Allied professions' posts on the establishment filled
- 226 (33,7%) of 670 Medical posts on the establishment filled
- 42 (26,3%) of 160 Oral Health posts on the establishment filled
- 821 (58,4%) of 1407 Nursing posts on the establishment (includes nursing admin posts) filled
  - Professional Nurse: Speciality Nursing - 39,6% filled
  - Professional Nurse: General Nursing - 66,4% filled

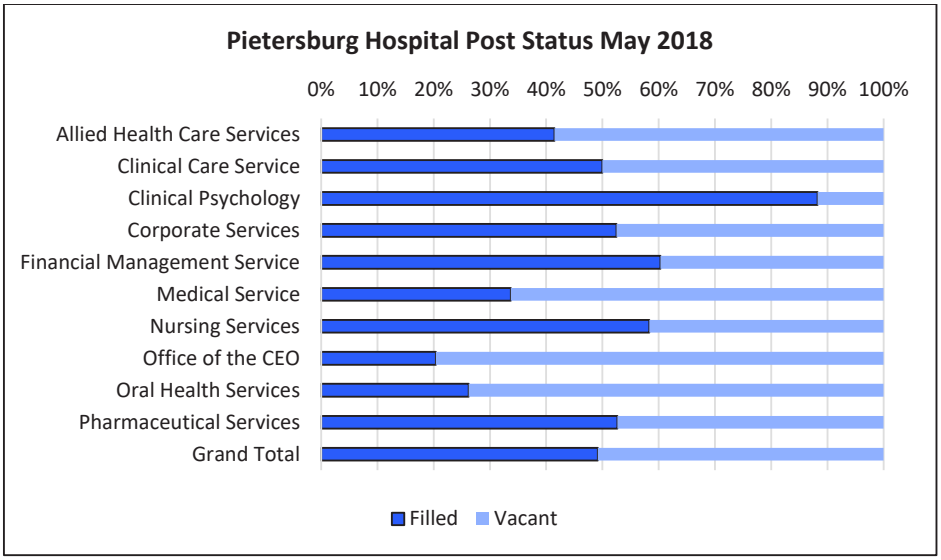
[26] *Annex Persal extracts and graphs (for all tables in this section)*

  - Staff Nurse - 64,6% filled
  - Nursing Assistant - 71,2% filled
  - Nursing Managers - 40,4% filled

- Ratio Beds/Filled nursing post:
  - 1,59 beds/Professional Nurse
  - 2,78 beds/Staff Nurse
  - 2,61 beds/Nursing Assistant
- Ratio Beds/Approved nursing post:
  - 0,87 beds/Professional Nurse
  - 1,80 beds/Staff Nurse
  - 1,80 beds/Nursing Assistant

Distributions of the vacancies shown in Tables and Figures of Annexure 7: Pietersburg Hospital Post status as at May 2018 – LCH

Figure 11: Posts status of the Pietersburg Hospital staff establishment as at 01 May 2018



This establishment needs to be completely reviewed and posts structure reconsidered

7.4.2 Personnel transfer

For the purposes of seeking 'savings' only FILLED posts were considered.

From the original document provided by Pietersburg Hospital management, at a meeting on 24th May 2018 four lists of filled posts were extracted:

List1	Conversion of the document that was provided to a list of posts per Division, Subdivision, Section, and Subsection (approximating the proposed future organogram)
List2	Extract from List 1 are posts that are de facto LAH posts
List3	Extract from List 1 are posts that are de facto Head Office posts (Forensic Pathology, Public Health, Community Dentistry)
List4	Extract from List 1 are posts that are de facto Pietersburg (Capricorn Regional) Hospital posts

As far as was possible, the posts in these lists were costed using average Persal Salary scales (Sept 2017) and added Costs to Employer (CTE).

Since some of the functions of the Limpopo Academic Hospital Complex are already provided in the Pietersburg Hospital (albeit at a modest level), most of the personnel involved in delivering those services will move to the new hospital. Others will stay at the existing hospitals but work as a part of the Limpopo Academic Hospital Complex (e.g. Oncology at Pietersburg Hospital).

The numbers keep changing as staff move, but about:

- 457 posts (29% of the current filled complement)
- with a value of around R268m per annum (75,4% of the present compensation budget)

will no longer be required to render the District/Regional Hospital services in Pietersburg Hospital since they provide tertiary services. (Table 19)

This includes support staff posts to the extent that they are a part of the clinical services. Both hospitals will need support functions and many posts will be duplicated at the new facility.

Table 44: Posts identified on May 2018 Pietersburg/Polokwane Hospital payroll that could be abolished and reallocated across Limpopo Academic Hospital (and Complex)

PORTIONS OF THE PIETERSBURG ESTABLISHMENT (MAY 2018)	Approv	Filled	Vacant	%Filled	%Vacant	Estimated CTE	
POSTS STATUS AS AT 01 MAY 2018	**3168**	**1559**	**1609**	**49,2%**	**50,8%**	**355 617 164**	
POSTS FOR TERTIARY (LAH) ESTABLISHMENT	1127	457	670	40,6%	59,4%	268 000 905	75,4%
POSTS IN ACADEMIC ESTABLISHMENT (but on HO, not LAH)	58	17	41	29,3%	70,7%	7 234 280	2,0%
POSTS TO REMAIN ON PBH (Capricorn Regional) ESTABLISHMENT	1983	1085	898	54,7%	45,3%	80 381 979	22,6%

Figure 12: Posts identified on May 2018 Pietersburg/Polokwane Hospital payroll that could be abolished and reallocated across Limpopo Academic Hospital (and Complex)

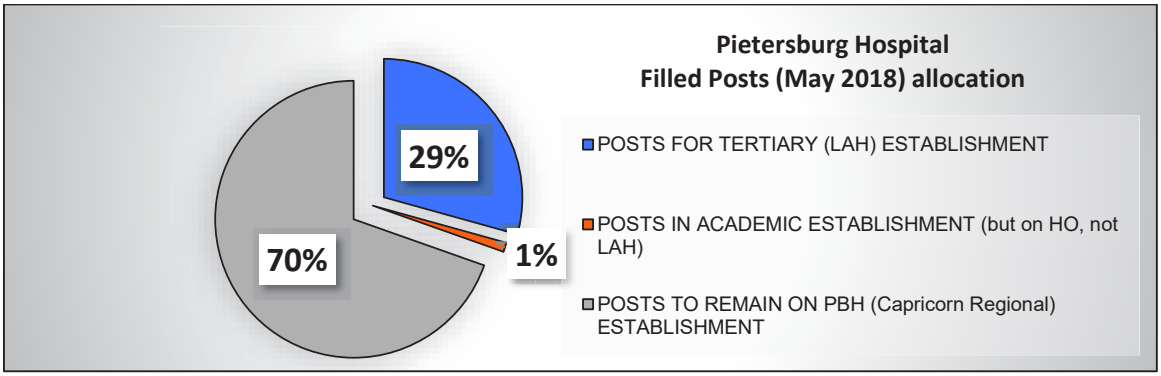


Table 45: Medical posts identified on May 2018 Pietersburg/Polokwane Hospital payroll that could be abolished and reallocated across Limpopo Academic Hospital (and Complex)

MEDICAL SERVICE	Approv	Filled	Vacant	%Filled	%Vacant	Estimated CTE	
POSTS STATUS AS AT 01 MAY 2018	**670**	**226**	**444**	**33,7%**	**66,3%**	**155 172 491**	
POSTS FOR TERTIARY (LAH) ESTABLISHMENT	516	168	348	32,6%	67,4%	143 517 616	92,5%
POSTS IN ACADEMIC ESTABLISHMENT (but on HO, not LAH)	44	17	27	38,6%	61,4%	7 234 280	4,7%
POSTS TO REMAIN ON PBH (Capricorn Regional) ESTABLISHMENT	110	41	69	37,3%	62,7%	4 420 595	2,8%

Table 44 shows that the bulk (92,5%) of the medical posts (doctors) in question (168 of 226 identified posts) provide services that will physically move off the Pietersburg Hospital campus.

The potential 'savings' to the budget estimated for compensation of employees for the new Limpopo Central Hospital is therefore for the 457 posts with an estimated cost of R 268m per annum.

A word of caution: there may still be a need for 'different' posts at the District/Regional Hospital that are currently not provided or are unoccupied.

7.4.3 Medicines

The medicines currently dispensed at Pietersburg Hospital pharmacies include several very expensive tertiary service items. Some of these items are used for the services rendered by the 224 professionals which services will no longer be rendered at this facility. It is extremely difficult to estimate the value to attach to these medicines and consumables.

The costs associated with Oncology (including Clinical Haematology – haemophilia – that is not oncology) will not be a savings as this service will continue (and increase) in future.

The 'savings' could be around 80% of the current pharmacy expenditure of close to R50m pa; so R40m.

7.4.4 Laboratory tests

Likewise, the laboratory tests currently requested at Pietersburg Hospital from the NHLS laboratories include several very expensive tertiary service items. Some of these items are used for the services rendered by the 224 professionals which services will no longer be rendered at this facility. It is extremely difficult to estimate the value to attach to these investigations.

The costs associated with Oncology (including Clinical Haematology – haemophilia – that is not oncology) will not be a savings as this service will continue (and increase) in future.

The savings could be around 80% of the current laboratory expenditure of close to R50m pa; so R40m.

7.4.5 Goods and services

The use of goods and services at Pietersburg Hospital includes several very expensive tertiary service items. Some of these items are used for the services rendered by the 224 professionals which services will no longer be rendered at this facility. It is extremely difficult to estimate the value to attach to these goods and services.

The 'savings' could be around 80% of the current goods and services expenditure of close to R250m pa; so R200m. The major expensive products involved in these services include:

- Nutrition
- Blood-product & plasma
- Renal dialysis
- Surgical implants & prostheses
- Surgical supplies

7.5 Summary of potential savings

The possible reduction in the estimated new hospital complex budget can be summarised as follows:

• Limpopo Academic Complex estimated budget	R1,3bn
• estimated existing cost of compensation	-R268m
• 80% pharmacy expenditure (R50m)	-R40m
• 80% laboratory expenditure (R50m)	-R40m
• 80% goods and services expenditure (R250m)	-R200m
TOTAL	R548m

The proportion of the estimated operating budget for the new hospital, for costs that are already incurred, is **in the order of R548m, which is around 40% of the estimated budget**.

An additional R750m per annum recurrent budget will be needed to operationalise the full central service (2018 costs and prices). If only 70% of the proposed posts are filled this amount will be in the order of R412m per annum (R960m – R548m).

7.6 Cost of building Capricorn Regional Hospital capacity

However, after demolition of parts of the Pietersburg Hospital infrastructure, the remaining infrastructure available for realignment as the Capricorn Regional Hospital will be about a 350-bed capacity (depending on the configuration of services). This is not to say that the 350-bed capacity is the optimum size for Capricorn district. It must be remembered that there will be infrastructure for at least 90 bed capacity at Pietersburg on loan to the new academic (Central) hospital. If, and when, that capacity can be constructed at the new campus, then the Capricorn Regional Hospital will be around 440 beds.
There is significant work to be done to plan the existing and new hospital (services and infrastructure) capacity for Capricorn district and for the province as a whole. In the first instance the 350-bed regional service capacity needs to be provided with appropriate resources to fulfil its role.

The recurrent costs of a 350-bed regional (mixed L1 and L2 service) hospital are likely to be in the order of magnitude of similar services. Two hospitals that may serve as examples for operating expenditure estimate purposes are Worcester Hospital and Paarl Hospital in the Western Cape.

Table 46: Regional Hospitals of similar size to Capricorn

Regional Hospitals	Province	Gazette beds	NDOH beds	TOTAL beds	L1 bed Total	L2 bed Total	L3 bed Total
Lower Umfolozi War Memorial Hospital	KwaZulu Natal	283	270	268	160	108	0
Worcester Hospital	Western Cape	322	269	269	134	135	0
Mofumahadi Manapo Mopeli Hospital	Free State	300	270	270	217	53	0
Mamelodi Hospital	Gauteng	400	281	282	179	103	0
Mapulaneng Hospital	Mpumalanga	252	282	282	232	50	0
Paarl Hospital	Western Cape	369	285	301	168	133	0

Table 47: Example similar Regional Hospital recurrent expenditure

Expenditure	PAARL	WORCESTER
CTE	R 250,8m	R 237,1
Other	R 107,5m	R 101,6
Total	**R 358,3m**	**R 338,7**

As can been seen in Table 47 (calculations in Annex: 'Pietersburg Hospital Post status as at May 2018 – LCH') the portion of the current CTE expenditure that will not need to transfer to the new hospital, and which remains available for the re-categorised Capricorn Regional Hospital is only R80,4m, plus about R34,5m for the remaining recurrent expenses, totalling R114,9m.

Capricorn Regional Hospital	
Remaining budget after tertiary 'savings' transferred to LCH	
Total Cost of Employment (TCE)	R 80,4m
Other recurrent expenses	R 34,5m
Budget required for 350 bed L2 hospital	-R 400,0m
Shortfall	-R 285,1m

If a budget of about R400m will be required for the Capricorn Regional Hospital (350 beds of existing Pietersburg Hospital) then the short-fall will be in the order of R285m.

7.7 Summary of additional funding required for the new services

While there are potential 'savings' from transfer of existing resources with the clinical functions, the services will be substantially more and more complex. In summary the additional funds required to operationalise these additional services will be in the order of: (2018 prices and Rand value)

- New funds for Limpopo Central Hospital R565m (R420m to R750m)
- Capricorn regional hospital additional requirement R285m
- **Total additional funding to the Limpopo budget** **R840m per annum**

7.8 Systematic build-up of services 2019 to 2024

The building and commissioning of the new Limpopo Central Hospital infrastructure will not be complete for about five years, or more. In the meanwhile, the demand on services is increasing and the existing staff, infrastructure and technology are less able to cope.

The capacity needs to be steadily ramped up, beginning with the 2018/19 Adjustment Appropriation, so that the department keeps pace with service demand and is ready for operationalising the new facility when the time comes. Much can (and must) change in the interregnum.

7.8.1 Critical personnel

Limpopo DOH has made several motivations for the filling of critical vacant posts. A recent exercise was conducted to begin a process of identifying the posts that are essential to improving clinical capacity.

Over the next three years the entire organisational plan for the central hospital and all regional hospitals needs to be reviewed and amended. In the meanwhile, there are some critical bottlenecks to developing appropriate clinical capacity in the province. For example:

- The need for clinical governance to be driven from the centre (because there is so little decentralised capacity in this very rural province) means that the more senior posts need to be filled first
- Registrar posts and other training posts (interns, etc) require dual approval (from the LDOH and from HPCSA) and the professional council must satisfy itself that the capacity exists to train appropriately
- Unless the clinical capacity of the regional hospitals (and district) is deliberately strengthened the central hospital will be flooded with referrals owing to failed interventions when the patients present for care

The posts that have been identified as being most critical and essential to stabilising services immediately are listed in the tables. The summary is a need to fill:

- 102 posts: Pietersburg (85) and Mankweng (17) at a CTE of R 88,3m pa
- 54 new posts in the five Regional Hospitals in 2018/19, at a CTE of R48,3m pa
    - Tshilidzini 18/19 20
    - Letaba 18/19 8
    - St Ritas 18/19 4
    - Mokopane 18/19 14
    - Philadelphia 18/19 8

If these posts can be filled from 01 January 2019 then the immediate increased funding in the **2018/19 Adjustment Appropriation** needs to be R22m for TCE and R12m other costs (around **R34m**).

The **additional staffing will cost totals of R136,6m per annum** (2018 prices and value).[27] The operating expenses that will be associated with this additional staff will be in the order of **R43 68m**. (Goods and services, medicines, laboratory tests, etc.) These costs will need to be carried through the full period until the new hospital is commissioned, plus annual COLA and inflation of non-personnel costs.

[27] *Details are in the Annexure: 'Staffing plan LCH & RegHosps May 2018_1'.*

Further posts will need to be filled in 2019/20 and subsequent years, both in the Academic Complex hospitals and the Regional Hospitals. The LDOH has a detailed plan to roll out these additional posts but the development of service infrastructure and technology, and the availability of the scarce resources will dictate the viability of the plan.

Table 48: Critical Posts in Pietersburg and Mankweng Hospitals (2018/19)

Posts	PBH18/19	MH 18/19	18/19 COMBINED PBH &MH	CTE 18/19 COMBINED PBH &MH
Assistant Director: Radiographer	1	0	1	169 959
Assistant Manager: Medical Physicist	1	0	1	828 474
Clinical Technologist	1	0	1	602 803
Dental Specialist	1	0	1	991 857
Deputy Director: Radiography	1	0	1	736 425
Head: Clinical Department (Medical)	3	0	3	5 993 240
Head: Clinical Unit (Medical)	7	-4	3	4 793 693
Medical Officer	6	6	12	9 178 596
Medical Physicist	1	0	1	620 553
Medical Specialist	12	7	19	19 423 406
Medical Specialist (Sub Specialist)	3	1	4	4 745 622
Professional Nurse: General Nursing	1	0	1	532 468
Professional Nurse: Speciality Nursing	32	7	39	28 720 575
Radiographer	1	0	1	321 462
Registrar (Medical)	13	0	13	9 573 525
Senior Registrar (Medical)	1	0	1	991 857
Grand Total	**85**	**17**	**102**	**88 224 513**

Table 49: Location of critical Posts in Pietersburg and Mankweng Hospitals (2018/19)

Posts per Clinical Department	PBH18/19	MH 18/19	18/19 COMBINED PBH &MH	CTE 18/19 COMBINED PBH &MH
Anaesthetics & Critical Care	16	6	22	19 295 555
Head: Clinical Department (Medical)	1	0	1	1 997 747
Head: Clinical Unit (Medical)	2	-1	1	1 597 898
Medical Officer	1	3	4	3 059 532
Medical Specialist	1	2	3	3 066 854
Professional Nurse: Speciality Nursing	9	2	11	8 100 675
Registrar (Medical)	2	0	2	1 472 850
Medicine	4	1	5	4 366 245
Clinical Technologist	1	0	1	602 803
Medical Specialist	1	1	2	2 044 569
Medical Specialist (Sub Specialist)	1	0	1	1 186 406
Professional Nurse: General Nursing	1	0	1	532 468
Obstetrics and Gynaecology	9	2	11	8 700 852
Head: Clinical Unit (Medical)	1	-1	0	-
Medical Officer	0	1	1	764 883
Medical Specialist	2	0	2	2 044 569
Professional Nurse: Speciality Nursing	5	2	7	5 154 975
Registrar (Medical)	1	0	1	736 425
Paediatrics	19	5	24	20 098 664
Head: Clinical Unit (Medical)	1	0	1	1 597 898
Medical Officer	-1	1	0	-
Medical Specialist	2	1	3	3 066 854
Medical Specialist (Sub Specialist)	1	0	1	1 186 406
Professional Nurse: Speciality Nursing	13	3	16	11 782 800
Registrar (Medical)	2	0	2	1 472 850
Senior Registrar (Medical)	1	0	1	991 857
Radiological Sciences	12	2	14	11 616 177
Assistant Director: Radiographer	1	0	1	169 959
Assistant Manager: Medical Physicist	1	0	1	828 474
Deputy Director: Radiography	1	0	1	736 425
Head: Clinical Department (Medical)	1	0	1	1 997 747
Head: Clinical Unit (Medical)	1	-1	0	-
Medical Officer	-1	2	1	764 883
Medical Physicist	1	0	1	620 553
Medical Specialist	1	1	2	2 044 569
Medical Specialist (Sub Specialist)	1	0	1	1 186 406
Radiographer	1	0	1	321 462
Registrar (Medical)	4	0	4	2 945 700
Surgery	25	1	26	24 147 021
Dental Specialist	1	0	1	991 857
Head: Clinical Department (Medical)	1	0	1	1 997 747
Head: Clinical Unit (Medical)	2	-1	1	1 597 898
Medical Officer	7	-1	6	4 589 298
Medical Specialist	5	2	7	7 155 992
Medical Specialist (Sub Specialist)	0	1	1	1 186 406
Professional Nurse: Speciality Nursing	5	0	5	3 682 125
Registrar (Medical)	4	0	4	2 945 700
Grand Total	**85**	**17**	**102**	**88 224 513**

Table 50: Critical Posts in Regional Hospitals (2018/19)

POST	New Tshilidzini 18/19	New Letaba 18/19	New St Ritas 18/19	New Mokopane 18/19	New Philadelphia 18/19	Total New Reg in 2018/19	Cost New Reg in 2018/20
Head: Clinical Unit (Medical): Anaesthesiology	1	0	0	0	0	1	1 597 898
Head: Clinical Unit (Medical): Internal Medicine	0	0	1	1	0	2	3 195 795
Head: Clinical Unit (Medical): Obs & Gynae	1	0	0	0	0	1	1 597 898
Head: Clinical Unit (Medical): Paediatrics	1	0	1	0	0	2	3 195 795
Medical Specialist: Anaesthesiology	0	1	0	1	0	2	2 044 569
Medical Specialist: Forensic Medicine	0	0	0	1	0	1	1 022 285
Medical Specialist: General Surgery	1	0	0	0	0	1	1 022 285
Medical Specialist: Internal Medicine	0	0	0	1	0	1	1 022 285
Medical Specialist: Obs & Gynae	0	1	0	0	0	1	1 022 285
Medical Specialist: Paediatrics	1	0	0	0	1	2	2 044 569
Medical Specialist: Psychiatry	0	0	0	0	1	1	1 022 285
Registrar (Medical): Paediatrics	2	0	0	0	0	2	1 472 850
Medical Officer: Anaesthesiology	2	1	0	0	2	5	3 824 415
Medical Officer: Emergency	2	0	0	2	1	5	3 824 415
Medical Officer: General Surgery	0	0	0	1	0	1	764 883
Medical Officer: Internal Medicine	1	1	0	0	2	4	3 059 532
Medical Officer: Obs & Gynae	2	2	1	0	0	5	3 824 415
Medical Officer: Paediatrics	3	2	1	0	0	6	4 589 298
Medical Officer: Psychiatry	0	0	0	0	1	1	764 883
Professional Nurse: Speciality Nursing (Intensive Care)	0	0	0	2	0	2	1 472 850
Professional Nurse: Speciality Nursing (Neonatal Intensive Care)	0	0	0	1	0	1	736 425
Professional Nurse: Speciality Nursing (Orthopaedics)	3	0	0	1	0	4	2 945 700
Professional Nurse: Speciality Nursing (Paediatrics)	0	0	0	1	0	1	736 425
Professional Nurse: Speciality Nursing (Theatre)	0	0	0	2	0	2	1 472 850
Grand Total	**20**	**8**	**4**	**14**	**8**	**54**	**48 276 887**

7.8.2 Clinical capacity (teaching)

Some of posts will enable the LDOH to send staff to Gauteng (or other provinces) to be trained and to return as specialists. Where figures are reflected as negative it is where a post is no longer required because a trainee has returned to fill a different post. This mostly applies to Medical Officers and Specialists.

There are many posts on the current Pietersburg establishment that are not clinical posts of relevance to the clinical care in the hospital. These posts must either be relocated or abolished:

- Forensic Pathology must go to the Forensic Pathology Service and be funded there
- Public Health Medicine must go to Head Office and the staff be tasked to support the Province with technical health service development work
- There are many 'Medical Secretary' posts which are mostly for the support to the academic functions. The funding of these posts should be shared by the university

7.8.3 Critical equipment

There are several major items of equipment (health technology) that are either beyond their useful date and either not functioning or battling to provide service. There are others that will radically improve service delivery if they are procured soon. These include new Linacs, MRI machines, PACS and C-ARM X-Ray machines for the radiology departments.

Table 51: Urgent equipment (HT) 2018/19 (Source Pietersburg Hospital)

2018/19 to 2022/23 LIMPOPO PROVINCE

HOSPITAL	CAPITAL EQUIPMENT				
	2018/19	**2019/20**	**2020/21**	**2021/22**	**2022/23**
PIETERSBURG HOSPITAL	80 000 000	45 000 000	-	-	-
MANKWENG HOSPITAL	-	15 000 000	-	-	-
TSHILIDZINI REGIONAL HOSPITAL	2 400 000	-	-	-	-
LETABA REGIONAL HOSPITAL	2 400 000	-	-	-	-
ST RITAS REGIONAL HOSPITAL	2 400 000	-	-	-	-
MOKOPANE REGIONAL HOSPITAL	2 400 000	-	-	-	-
PHILADELPHIA REGIONAL HOSPITAL	-	2 400 000	-	-	-
LEBOWAKGOMO DISTRICT HOSPITAL	-	2 400 000	-	-	-
TOTAL	89 600 000	64 800 000	-	-	-

There is a massive backlog of health technology amounting to at least **R154,4m** for major items.

7.9 Resourcing strategy

7.9.1 Human resources

Ensuring sufficient, qualified and competent clinical staff is a major challenge. The public sector human resource management processes are controlled by broad public sector mechanisms and many are not sympathetic to the particular issues that clinicians experience.

Be that as it may, there are five strategies to consider:

1. **Stewardship of human resources for health (HRH)**
   - Senior management of public sector must take the human resource issues seriously and do everything in their power to recruit and retain critical staff
   - There are many specialists in the private sector and many of them left the public service. Every effort must be made to get the specialist clinicians to work (even part-time) in the LCH.

2. **Public sector context**
   - The provincial Department of Health must decentralise as much as is possible the management of all HR functions to the hospital management.
   - With the partnership with the University evolving a specific initiative should be undertaken to encourage staff to upgrade their skills by registering for further training and skills qualifications.

3. **Core administration of human resources management**
   There must be a concerted effort to improve management of people. It has already been proposed that HR management be decentralised. Immediate attention must be paid to all HRM functions such as:

- Ensuring that every employee has a job description and that performance reviews are undertaken by the clinical heads
- Employees must be assisted with career path development in the province
- HRH deployment matters must be taken seriously and attended to diligently: recruitment, transfer, discipline, grievances, termination
- Personnel records (Persal) must be improved

4. **Institutional environment**
   - Health professionals regard 'working conditions' as being adequate supplies, appropriate equipment and clean, services wards for their patients. Attention must be paid to keeping the facility 'new'
   - Managers must ensure clear and consistent, regular communication with personnel

5. **Facility organisational practices**
   - Clinical managers must focus on teamwork and make work interesting for the professionals
   - Clinical heads must ensure high clinical standards, and make sure that expectations of their clinical staff are clear

The opportunities that the partnership with UL offer should be an attraction to clinical staff interested in furthering their qualifications and careers. It is therefore important that the hospital management and the University faculty (esp School of Medicine) establish very clear mechanisms for cooperation (already outlined).

7.9.2 Health Technology

The WHO defines a health technology as "the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives."[28] This is very broad and applies to virtually everything that happens in a hospital.

Everything that happens in clinical care from prevention to diagnosis and through treatment to palliation requires health technology. Matters to pay attention to for a successful tertiary service at the new LCH are:

- **Essential medicines**
  The hospital essential medicines list (EML) will need to be adapted to include medicines that are expensive and more comprehensive than the current EML

- **Diagnostic apparatus**
  There are many diagnostic modalities from laboratory tests to radiological imaging and various invasive procedures such as endoscopic examinations. The equipment required for a range of tertiary care (T1; T2 and T3) are listed in the definitions document attached to the National Tertiary Health Services Plan.

- **Medical devices**[29]
  'Medical device' means any instrument, apparatus, implement, machine, appliance, implant, reagent for in vitro use, software, material or other similar or related article, intended by the manufacturer to be used, alone or in combination, for human beings, for one or more of the specific medical purpose(s) of:
  - *diagnosis, prevention, monitoring, treatment or alleviation of disease,*
  - *diagnosis, monitoring, treatment, alleviation of or compensation for an injury,*

[28] www.who.int/health-technology-assessment/about/healthtechnology/en/
[29] http://www.who.int/medical_devices/full_deffinition/en/

- *investigation, replacement, modification, or support of the anatomy or of a physiological process,*
- *supporting or sustaining life,*
- *control of conception,*
- *disinfection of medical devices*
- *providing information by means of in vitro examination of specimens derived from the human body;*

and does not achieve its primary intended action by pharmacological, immunological or metabolic means, in or on the human body, but which may be assisted in its intended function by such means.

Clearly the LCH will need a wide range of medical devices to deliver the full range of tertiary care (T1 and T2).

- **Telemedicine**
  One potential approach to reducing the cost of technology (and improving patient care through clinical collaboration), is through the use of telemedicine; the remote diagnosis and treatment of patients by means of telecommunications technology.

  Telemedicine can be classified into three main categories: remote patient monitoring, store-and-forward and interactive telemedicine.

  - **Remote patient monitoring:** Also known as telemonitoring, remote patient monitoring allows patients with chronic diseases to be monitored in their homes through the use of mobile medical devices that collect data about blood sugar levels, blood pressure or other vital signs. Remote caregivers can review the data instantly.

  - **Store-and-forward:** Also known as asynchronous telemedicine, store-and-forward telemedicine allows providers to share patient information, such as lab results, with a physician at another location.

  - **Interactive telemedicine:** Interactive telemedicine allows physicians and patients to communicate in real time. Such sessions can be conducted in the patient's home or in a nearby medical facility and include telephone conversations or the use of video conferencing software that complies with Health Insurance Portability and Accounting Act regulations.

Failure to budget for and equip the LCH adequately will reduce the value of the infrastructure investment.

8 MAINTENANCE COSTS OVER THE LIFECYCLE OF THE BUILDING

The lifecycle and maintenance costs are based on the general building maintenance of the building fabric and installations, per option, and is costed separately as the operational costs only allow for small items maintenance and replacement. The tables are attached under **Annexure 2**.

Table 52: Elements considered in the maintenance cost estimate over 20 years

Description
NEW BUILDINGS
Structure and building area
Building finishes
Plumbing
EXISTING BUILDINGS
Structure and building area
Building finishes
Plumbing
Enabling & Decanting
EXTERNAL WORKS
External Works
Landscaping
Demolitions
Civil Contractor Preliminary Costs (Sub Contractor)
MECHANICAL INSTALLATION INCLUDING PROFIT AND ATTENDANCE
Mechanical Installation
Fire Installation
Security Installation
ICT Installation, BMS
Main Contractor's Profit and Attendance on Mechanical Installation
Electrical Installation Including Profit and Attendance
Electrical Installation
Main Contractor's Profit and Attendance on Electrical Installation

Table 53: Maintenance cost over 20-year lifecycle

OPTION 1																				
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	TOTAL
54,131,714	57,379,617	60,822,394	64,471,737	68,340,041	72,440,444	76,786,871	81,394,083	86,277,728	91,454,391	96,941,655	102,758,154	108,923,643	115,459,062	122,386,606	129,729,802	137,513,590	145,764,406	154,510,270	163,780,886	**1,713,310,926**
OPTION 2																				
44,120,076	46,767,281	49,573,317	52,547,716	55,700,579	59,042,614	62,585,171	66,340,281	70,320,698	74,539,940	79,012,336	83,753,077	88,778,261	94,104,957	99,751,254	105,736,330	112,080,509	118,805,340	125,933,660	133,489,680	**1,589,356,929**
OPTION 3																				
50,216,385	53,229,368	56,423,130	59,808,518	63,397,029	67,200,851	71,232,902	75,506,876	80,037,289	84,839,526	89,929,897	95,325,691	101,045,233	107,107,947	113,534,424	120,346,489	127,567,278	135,221,315	143,334,594	151,934,669	**1,847,239,411**

9 FUNDING SOURCE

9.1 Current tertiary (L3) bed funding

According to the 2015/16 APP of Limpopo DOH the current L3 beds are funded as follows:

National Tertiary Services Grant (NTSG)	330 462 000	51%
Contribution of Limpopo DOH	311 741 000	49%
Total expenditure: current L3 beds	***642 203 000***	

Affordability and unfunded budget

A funding level of 51% for tertiary services by the NTSG was retained in the proposed 2025 operational expenditure.

With reference to Table above:

The current operational cost of the existing L3 beds is	R 642 203 000 pa
The total operational cost of the Limpopo Academic Complex L3 beds is	R 1 375 827 963 pa
The variance between the two shows an operational cost deficit of	R 733 624 963 pa

This figure correlates with the estimates of a R750m shortfall on the tertiary funding that has already been described. A portion of this estimated deficit consists of the costs incurred by Gauteng province for patients that are currently attended to at tertiary facilities in Gauteng (the current amount is extremely difficult to quantify).

It has been assumed that the project will be delivered through a special purpose vehicle whose only activity will relate to the provision of the project deliverables (project asset and services). The funding structure is discussed under the procurement option.

Planning for the unfunded budget needs to begin now. It is recommended that the NT commence increasing the tertiary budget to Limpopo gradually over the next 5 years so that, once commission is in place, the funding will be in place. This will also allow the province to engage much needed skills ahead of the commencement of operations in the new hospital.

A committee to deal with this matter, consisting of NT, LT, NDOH and LDOH will be set up and a process of meetings will occur to address this issue.

Currently, Limpopo is underfunded in comparison to other provinces. This inequity needs to be balanced which, in doing so, should address the unfunded budget in this case.

10 ECONOMIC AND SOCIAL-ECONOMIC EVALUATION OF THE PROJECT

10.1 Overview[30]

There is no doubt that there exists a strong and vital relationship between health and the economy. *There's a well-understood correlation that as the economy of a country improves, so the health of its citizens improves. What may be less obvious is that the opposite is also true – improving the health of a nation's citizens can directly result in economic growth, because there will be more people able to conduct effective activities in the workforce.*[31]

Investment in health is an essential priority for society. It is a basic truth that poverty, mainly through infant malnourishment and mortality, adversely affects life expectancy which in turn, effects economic growth. Countries with weak health and education conditions find it harder to achieve sustained growth. Economic evidence confirms that a 10% improvement in life expectancy at birth is associated with a rise in economic growth of some 0.3-0.4 percentage points a year *(Bloom,Canning and Sevilla- Harvard University).* The World Bank reports that 50% of the economic growth differentials between developing and developed nations are attributed to poor health and low life expectancy. The healthier the citizens of a country, the more effective the workforce; the better the health of their children, the fewer births, and hence the fewer dependents. This is significant in South Africa where each mother is entitled to receive a grant for every one of her children. Too many children add a significant cost burden to the state in the form of both social grants and healthcare provision.

Disease hinders institutional performance too. Lower life expectancy discourages adult training and damages productivity. Similarly, the emergence of deadly communicable diseases has become an obstacle for the development of sectors like the tourism industry, on which so many countries rely, including South Africa where HIV/AIDS, tuberculosis, and malaria take a huge toll, both in loss of life and reducing the workforce. The growing increase in non-communicable diseases in South Africa, typically associated with wealthier countries – cancer, hypertension, diabetes and heart disease, adds to this burden.

Already, in spite of HIV/AIDS in South Africa, the life expectancy has begun to rise again. This is attributable to, in part, the roll out of ARV's and concerted efforts to reduce infant malnourishment and mortality. However, the roll out of ARV' has added to the disease burden in that, though people are living longer, many on ARV treatment experience renal failure resulting in the need for renal dialysis to sustain life. The provision of renal dialysis is a tertiary service which will be provided in the planned Limpopo Academic Complex hospitals.

With regards to addressing non-communicable diseases, better health service provision will lead to earlier diagnosis in areas such as oncology and cardiology which in turn reduces the cost of patient treatment (for example, late detection of cervical cancer requires a more aggressive, extended treatment) and reduced complications. The initial increased investment in health will ultimately lead to less expenditure required for health in the future as it is far less costly to prevent disease than it is to treat those that are already sick. This has an alternative benefit in that the money planned for healthcare can be reduced in the future as the nation's health improves and can be channelled elsewhere such as to education?

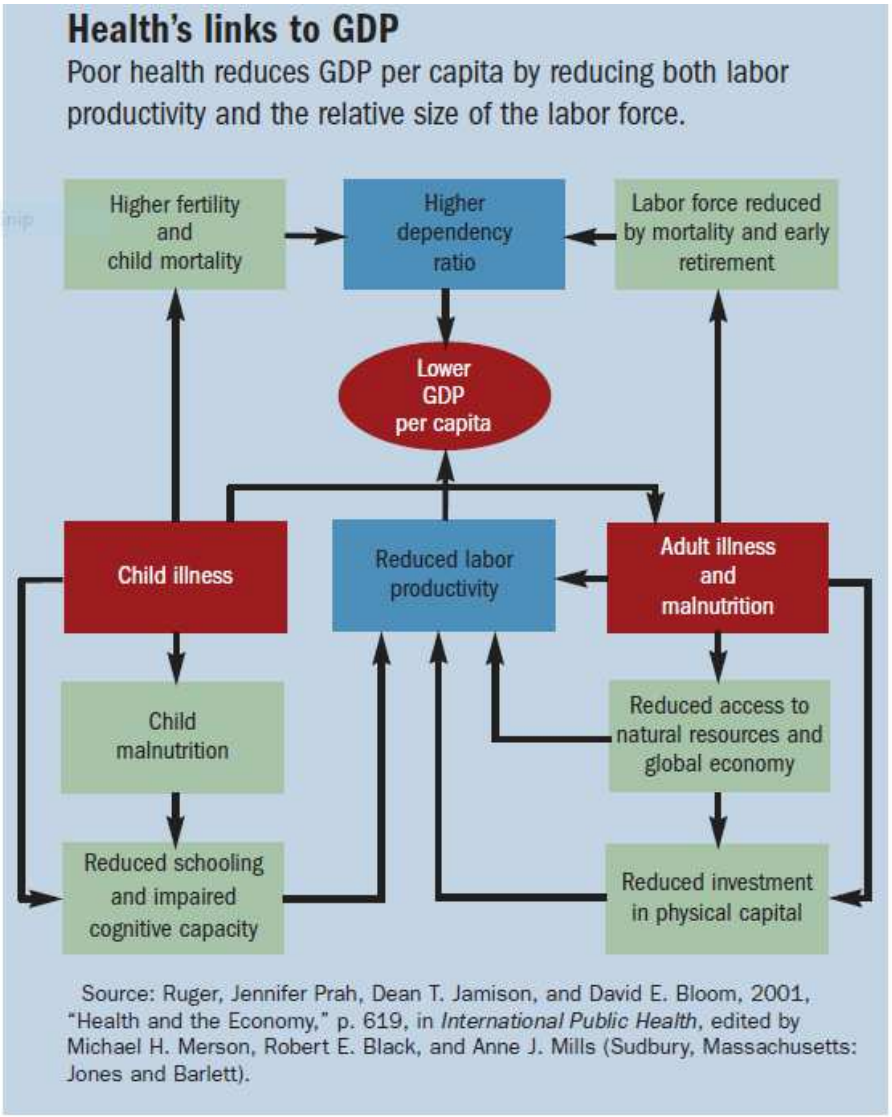
How health affects GDP per capita

Healthy workers are more productive than workers who are otherwise comparable but for their health. Better health raises per capita income through a number of channels:

[30] *Extract from: "Health and Development" ,International Monetary Fund, Washington, DC. December 2004*
[31] *F.S.Collins;World Economic Forum: Growing importance of health in the economy*

- By altering decisions about expenditures and savings over the lifecycle. The idea of planning for retirement occurs only when mortality rates become low enough for retirement to be a realistic prospect. Rising longevity in developing countries has opened a new incentive for the current generation to save—an incentive that can have dramatic effects on national saving rates. While this saving boom lasts for only one generation and is offset by the needs of the elderly once population aging occurs, it can substantially boost investment and economic growth rates while it lasts.
- By encouraging foreign direct investment: investors shun environments where the labour force suffers a heavy disease burden.
- Through boosting education. Healthier children have higher rates of school attendance and improved cognitive development, and a longer life span can make investment in education more attractive. The initial beneficiaries of health improvements are often the most vulnerable group: children.

Figure 13: Health links to GDP



As policymakers with public responsibilities, it must never be overlooked that decisions taken in one sphere affect conditions, stakeholders and policies in another. While the country may want better health systems, the impact of health on the economy should not be underestimated.

10.2 Revenue and profitability

10.2.1 Concept of profitability in public health

Profitability in its usual meaning is not relevant in considering the LCH. The concept's irrelevance does not relate simply to the fact that it will be situated in the public (i.e. non-profit) sector rather than the private for-profit sector.

Thus, National Treasury's Capital Planning Guidelines recognises that different criteria need to be considered when considering projects that address a "defined social requirement"[32], such as those addressing social, health or human rights. The LCH is clearly one such project. The Guidelines recognise that assigning a monetary value to the benefits of such a project is not appropriate, but instead the concern is to find the most efficient way of delivering the desired outputs.

Profitability may be relevant if it is interpreted more loosely as referring to contribution to public well-being. Galea, Dean at Boston University School of Public Health, argues that public health services – which would include the LCH – are a public good.[33] He notes that public goods were initially conceived as goods or services which any person could consume as much of as they wanted without reducing availability for others i.e. the good or service was non-excludable and non-rivalrous. Tertiary hospital services do not meet these criteria as access is restricted by the number of beds and other resources available and, in the private sector, large numbers may be excluded on account of the cost.

However, Galbraith refined the definition of public goods to refer to "things [that] do not lend themselves to [market] production, purchase, and sale. They must be provided for everyone if they are to be provided for anyone, and they must be paid for collectively or they cannot be had at all." Further elaboration saw public goods as having three key characteristics, namely (a) that they are provided through non-market, public production; (b) that they are paid for collectively; and (c) that they are provided at no cost, or reduced cost, to the user. The idea of "public need" thus replaced the earlier requirements that a public good is one from which people cannot be excluded and that are non-rivalrous.

Galea goes on to argue that using this definition, public health services are a classic public good. Of particular relevance to the LCH, he emphasises the contribution of public health to equity in that the availability of public health services reduces the influence of the circumstances of an individual (or a community grouping) on their ability to access health services.

10.2.2 Revenue

Potential revenue generation activities and opportunities will be limited. Over 95% of the Limpopo population is unable to pay for hospital care. Public hospitals may see, admit and treat private, paying patients but they may not retain any revenue so the incentive to diligently collect their dues is impaired.

The current fee levying system is a fee-for-service system. It is planned that the NHI will remove this system and replace it with a Diagnostic Related Group (DRG) payment system. In this way if the public

[32] *National Treasury. 2017. Capital Planning Guidelines. Pretoria: 11.*
[33] *Galea S. 2016. Public Health as a Public Good, accessed at https://www.bu.edu/sph/2016/01/10/public-health-as-a-public-good/*

service LCH does procure equipment that may be used by private sector it will be difficult to charge for the outsourcing of the service.

10.3 Economic growth

The multiplier indicates how much the economy, as measured by GDP, can be expected to grow for every addition rand "injected" by government. The amount injected itself becomes part of GDP and thus increases growth. The multiplier estimates growth in addition to the original injection. The additional growth occurs because the money injected is subsequently spent by those who receive it, and thus generates further production of the goods and services on which they spend.

The basic formula for calculating the multiplier is:

$$multiplier = 1/(s+t+m)$$

where s is the marginal propensity to save, t the tax rate, and m the marginal propensity to import.

The investment case for community health workers[34] used a value of 0.1 for *s;* 0.265 for *t* and 0.3 for *m*. Inserting these values into the formula gives a multiplier of 1.5. The same study explored an alternative approach based on an International Monetary Fund paper, which also produced an estimate of 1.5. This is the same value as National Treasury's for the multiplier for community, social and person services in terms of domestic output.[35] A recent, as yet unpublished, study for UN Women in New York[36] assumed values of 0.2 for *s*, 0.27 for *t,* and 0.3 for *m*, giving a somewhat higher multiplier of 1.764.

If we apply the more conservative multiplier of 1.5 to the R1.7 billion estimated as the construction cost, we arrive at an additional R2.5 billion added to GDP. This addition will fall away over time because it is not a repeated injection, but the impact will not dissipate immediately. [37]

If we apply the multiplier to the R756 million annual operating expenditure of the LCH, an additional R1,134 billion is generated. The bulk of this amount should be generated in Limpopo. The most recent estimate of South Africa's GDP puts the value at R4.345.808 billion.[38] If we assume that Limpopo accounts for about 7% of the total, then Limpopo's gross geographic product is approximately R304.207 billion. The injection itself together with the multiplier effect then amount to about 0.6% of Limpopo's gross geographic product if the full benefit goes to Limpopo.

A previous study of the economic multipliers attached to construction of a zinc refinery and phosphoric acid plant in the Eastern Cape shows that only a proportion of the multiplier takes effect in the local or regional economy, with the remainder impacting the national economy. The difference between the regional and national multipliers reflects "leakages" due to inputs being sourced (and thus expenditure incurred) outside the region. In addition, the Eastern Cape study assumed "considerable" leakage in the first rounds of the multiplier process for both construction and production because of the need to import capital goods. The need for imports is likely to be important for the LCH if a substantial proportion of the health technology costs during construction represent imported goods. This factor is likely to be less important during the operational stage.

In the Eastern Cape study, the fact that a large proportion of the expenditure went on inputs rather than wages also reduced the impact on the regional economy. This is also likely to be less of an issue with the LCH given the labour intensity of health services. Finally, the Eastern Cape study also estimated the value of further permanent increases in income (economic growth) resulting from induced

[34] *Daviaud E, Besada D, Budlender D, Kerber K & Sanders D. 2017. Saving lives, saving costs: Investment Case for Community Health Workers in South Africa: What costs and what benefits for the health sector, for the economy and for society. Medical Research Council: Cape Town.*
[35] *National Treasury. 2017. Budget Review 2017. Pretoria.*
[36] *De Henau J. Costing universal childcare and short-term employment and fiscal effects in the economy.*
[37] *Saxby G. 1997. Differential Economic Multipliers: an Extension of Weiss and Gooding and an Application to the Eastern Cape Province. Master of Business Science (Economics), University of Cape Town.*
[38] *Statistics South Africa. 2017. P0441 - Gross Domestic Product (GDP), 3rd Quarter 2017. Pretoria.*

investment occurring in response to operations of the refinery and phosphoric acid plant. Here the impacts might well be less for the LCH as both the Eastern Cape projects directly related to production inputs.

10.4 Employment

Employment increases are generated in three ways. Firstly, there are the direct jobs created by the intervention (the construction and then the delivery of health services). Secondly, there are the indirect jobs created in industries supplying the construction process and subsequently supplying the delivery of health services. Thirdly, there is induced job creation generated by the production of the additional goods and services bought with the earnings of the additional employed people. The first two ways are together referred to as Type I effects. The induced jobs are referred to as Type II effects.

The UN Women study referred to above calculated a Type I employment effect for community and personal services of 5.4 jobs for every million Rand spent in community and personal services. This estimate was derived using the 2014 input-output tables and employment estimates from the Labour Market Dynamics Survey data of 2015 as basis. In contrast, the 2017 Budget Review gives employment effects of 4.1 jobs for community and personal services based on the 2012 social accounting matrix.[39] Of the 4.1 jobs, 2.3 go to people with secondary schooling or less, and 1.8 to people with post-school qualifications.

If we use the conservative Budget Review multiplier, an additional 1,734 jobs for people with grade 12 or lower would be generated, and an additional 1,357 jobs for people with post-school qualifications, giving a total of 3,091 jobs rather than only the 2,214 direct jobs created by the LCH. This excludes Type II employment effects but is already equivalent to nearly 1% of the number of unemployed people in Limpopo. If we use the more optimistic UN Women multiplier, an additional 4,071 jobs are created through the Type I effect.

The UN Women exercise foresaw a further 1.6 jobs created through Type II effects from every additional million rand spent on community and personal services. This implies creation of a further 1,402 jobs by the LCH.

10.5 Well-being

Creating additional jobs has benefits not only because of the growth it can stimulate in the economy through the multiplier, but also because of the personal benefits it brings to the job-holders, their families and communities.

Overall, health employment is dominated by women. Thus, in the third quarter of 2017 the Quarterly Labour Force Survey had an estimated 71% of jobs in the human health sector being held by women. A large proportion of the jobs created through the multiplier effect are also likely to be in female-dominated service areas. There are several reasons why creating jobs for women is especially beneficial.

As noted above, the unemployment rate is higher for women than for men in Limpopo, and only just over half of all those employed in the province are in the formal non-agricultural sector. The expanded unemployment rate, which takes into account those who have given up looking for work although they would like to work, is even higher, at 30.6% for men and 41.2% for women.[40]

[39] *National Treasury. 2017. Budget Review 2017. Pretoria.*
[40] *Calculated from Quarterly Labour Force Survey data, 2017 third quarter.*

The investment case for community health workers cites a range of studies[41] that highlight the benefits that result when women gain employment and/or receive income. These include "significant" macroeconomic gains, greater poverty reduction than all or most other interventions, greater benefit for children and other household members than money income going to men, and increased expenditure on children's education.

South Africa has an unusually large proportion of women who alone bear responsibility for providing for the financial and other needs of their children. In 2016, 73% of Limpopo children under 18 years lived with their biological mother (whether with or without the father), compared to only 29% who lived with their biological father (with or without the mother). Only 27% lived with both parents.[42] With fewer than 10% of fathers deceased, this leaves the majority of fathers who have not passed away living apart from their children. Even where men live with children, they may not contribute to the children's care. Thus, in Statistics South Africa's 2010 national time use survey, more than 80% of men living with children under seven years of age did not spend any time on child care in the previous day.[43] In this situation, money earned by women is far more likely than money earned by men to benefit children and the next generation.

10.6 **Productivity**

The investment case for community health workers provides arguments as to why viewing the health sector as "unproductive" is incorrect. It points to the positive externality created through improvement of the quality and quantity of labour, and thus GDP. It also cites empirical research by the World Bank that shows countries with more developed health systems as having higher productivity in manufacturing.

The investment case for community health workers used a methodology utilised by the World Health Organisation to calculate the additional productivity of a healthier population. It assumed that for each death avoided, a value equivalent to GDP per capita (R7,824 for 2017) for each year lived between 18 to 60 years would be added to GDP. Real GDP was assumed to grow at 1.5% per year, and a discount rate of 3% per year was applied.

Unfortunately, such calculations are not possible for the LCH given the large number of diverse illnesses and conditions which will be treated, and the differences in prognosis and age of patients. However, the example given below in respect of congenital heart defects gives some sense of the contribution to productivity that the LCH might make even through one small aspect of its operations.

10.7 **Fiscal effects**

Fiscal (budgetary) effects can be expected in the form of increased personal income tax from the new jobs, and indirect tax revenue (value added tax, in particular) from increased consumption. These benefits accrue at the national level as taxation is a national competence. There will also be small revenue gains for the province to the extent that patients do not fall under the threshold for payment of user fees.

---

[41] Katrin Elborgh-Woytek, Monique Newiak, Kalpana Kochhar, Stefania Fabrizio, Kangni Kpodar, Philippe Wingender, Benedict Clements, and Gerd Schwartz. September 2013. Women, Work, and the Economy: Macroeconomic Gains from Gender Equity. IMF Discussion Note.; Heintz, J., 2006, "Globalization, Economic Policy and Employment: Poverty and Gender Implications," International Labour Organization, Geneva.; Yoong J, Rabinovich L & Diepeveen S. 2012. The impact of economic resource transfers to women versus men: a systematic review. Technical report. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London; Grinspun Alejandro. 2016. "No small change: The multiple impacts of the Child Support Grant on child and adolescent well-being" in Delany A, Jehoma S & Lake L (eds). 2016. South African Child Gauge 2016. Cape Town: Children's Institute, University of Cape Town: 44-5.

[42] Calculated using General Household Survey 2016 data.

[43] Hall K & Budlender D. 2016. "Children's contexts: Household living arrangements, poverty and care" in Delany A, Jehoma S & Lake L (eds). South African Child Gauge 2016. Cape Town: Children's Institute, University of Cape Town: 33-38.

The total cost of employment for the 2,047 jobs in the LCH is estimated at R841.68 million per year on the 2017 salary scales. If we assume that benefits, overtime and other add-ons add 38% to the gross salary, then total taxable income is around R609.91 million. If we apply the 2017/18 tax schedule to the salaries and deduct the primary rebate for each worker, we get a total of R109.135 million in personal income tax per year.

In addition to these directly created jobs, there are the new Type I jobs created through the multiplier. Above we estimate that there would be 1,357 such jobs. Unfortunately, we do not have the salary bill for these jobs. We therefore use information from the Quarterly Employment Survey[44] on the reasoning that government will only contract with formal sector enterprises. This reports a mean salary of R19,608 per month for August 2017, or R235,296 per year. This results in tax of R32,351 per worker, or R43.90 million for all these additional workers combined.

The LCH's annual expenditure on goods and services (i.e. excluding compensation of employees) will also generate VAT. At an estimated expenditure of R450 million on goods and services, an amount of R55.27 million VAT will be generated.

10.8 Economic analysis

National Treasury's Capital Planning Guidelines[45] describe three different ways in which the economic benefits of planned capital investment can be explored. All of these approaches look beyond the "financial bankability" aspects to describe and, if possible, measure the improvements in economic and social welfare likely to arise from the investment.

The three approaches are:

- Cost-benefit analysis;
- Cost effectiveness analysis; and
- Economic impact assessment.

This document explores all three approaches, although to varying degrees.

10.8.1 Cost benefit analysis

Cost-benefit analysis (CBA) attempts to monetise and then compare the costs and benefits of the investment. The costing does not necessarily rely only on market (financial) prices, but instead makes adjustments for various distortions in the market to arrive at the "economic" value. If costs are less than benefits, then the project is deemed a good use of resources. The net benefit (benefits minus costs) is adjusted so as to reflect net present value in recognition of the fact that benefits in the future are worth less than immediate benefits. Essentially CBA measures efficiency i.e. how well inputs are converted into outputs.

The Treasury guidelines suggest that cost-benefit analysis is better suited for economic infrastructure projects while cost-effectiveness analysis is generally better for social infrastructure projects. This suggests that cost-effectiveness analysis should be the focus for the LCH. Nevertheless, we include a short discussion on the extent to which the CBA approach might be relevant for a project such as the LCH.

Already in the 1960s, if not before, provision of health services was recognised as a form of investment (rather than only consumption).[46] In particular, by improving human capital, health services are likely to result in increased productivity in the workplace. This can, at least theoretically, be measured by

[44] *Statistics South Africa. 2017. Quarterly employment statistics (QES) September 2017. Report P0277. Pretoria.*
[45] *National Treasury. 2017. Capital Planning Guidelines 2017 MTEF. Pretoria.*
[46] *Marshall AW. 1965. Cost/Benefit Analysis in Health. The Rand Corporation: Santa Monica.*

capitalising the value of future production of the person if their life is saved, or the increase in their production if their health and ability is improved. In practice, these calculations are complicated for a venture such as the LCH because of the large range of different services that will be offered, the large number of conditions to be treated, the differing ages (and thus years left in which to contribute economically), and differing prognoses. The fact that only a proportion of the adult population is employed adds a further complication.

One therefore does not attempt to estimate the productivity contribution of the health services. However, it is noted that there would be increased production not only in respect of the patient, but also in respect of family members who will not need to provide the same care for them as if they remained ill, and/or will not need to take the same time off work to accompany them to Gauteng or elsewhere for treatment. Given the focus on children, such accompaniment would often be a necessity rather than a nice-to-have.

Marshall (1965) argues that the fact that people will pay for health services even when this will not increase their economic productivity suggests that the value derived from capitalising their future production results in "serious under-valuation" of the value of the health services. A further problem with the human capital approach is that it assumes that a person's value can be measured by what they are paid, as a person's earnings are generally taken as the measure of productivity.[47] This is a problem to the extent that it disregards discrimination in the market (and so, for example, tends to undervalue women's productivity). It also ignores the contribution of unpaid care work to the economy and society. Calculations based on time use data from South Africa suggest that if time spent on unpaid care work (such as housework, child care and the like) were valued at the median wage in the economy, this would add 30% to gross domestic product (GDP).[48] If work is measured in time, the relative value of unpaid care work is even greater.

An alternative approach to valuing health care is to base the value on what people pay or are prepared to pay for it. The first challenge with this approach is that very few people pay a market rate for hospital services, confounding estimates based on observed behaviour. A second challenge is that the hypothetical "willingness to pay" is heavily influenced by income. This is particularly problematic in the South African situation given the extremely skewed income distribution.

After considering this alternative, Robinson (1993) concludes: "Devising ways in which complex outcomes of health care can be reduced to a single monetary measure is not easy and is the main reason why cost-effectiveness and cost-utility analysis have been relied on more often in the health care sector." He notes further that there could be ethical objections to assigning monetary value to human life. We do not explore willingness to pay.

10.8.2 Cost effectiveness analysis

This approach is used where it is difficult or impossible to attach a monetary value to the benefit, as is often the case where (some of) the benefits are social rather than economic. The approach is appropriate in cases, such as this one, where the Constitution and health policy indicate that government has an obligation or mandate to provide a service, and the question revolves around the best way to provide the service rather than whether the service should be provided. This approach therefore seems appropriate for a project that "is not aimed to be an economic money spinner, rather it is about life saving and improving the health of the nation as well as satisfying the national health insurance initiative."[49]

Despite the name, the cost effectiveness approach again (like CBA) measures efficiency (conversion of inputs into outputs) rather than effectiveness (conversion of outputs into outcomes). However, it compares volume or size of output of different investments rather than comparing costs with outputs.

[47] *Robinson R. 1993. "Cost-Benefit Analysis" in British Medical Journal, 307(6909): 924-926.*
[48] *Budlender D. 2010. "South Africa: When Marriage and the Nuclear Family are Not the Norm" in Budlender D (ed). Time Use Studies and Unpaid Care Work. Routledge: New York: 89.*
[49] *October 2017. Project findings and recommendations report: Limpopo Academic Hospital.*

In simple terms, the investment with the lowest cost per output is the preferred one. In reality, the analysis is more complicated as there are usually multiple outputs.

As noted above, the Treasury guidelines suggest that cost-benefit analysis is better suited for economic infrastructure projects while cost-effectiveness analysis is generally better for social infrastructure projects. This suggests that cost-effectiveness analysis should be the focus for the Limpopo Academic Hospital (LCH). There are, however, several complications.

The first complication is that the preferred option – a 488-bed hospital – has already been identified. It is therefore not useful to compare the three options considered in the investment case.

The second complication relates to the subsequent operations in that some of the services that will be delivered are already being delivered, whether through secondary hospitals in Limpopo or tertiary hospitals in Gauteng. A similar position holds in respect of the LCH serving as a training platform for health personnel. We address these two complications by focusing on changes in services that will occur when the LCH is in place. Expressed differently, we do not include the benefits of services that will continue to be delivered in a very similar way. Instead, we focus on additional services (for example, those created by the additional beds and staff), as well as on services delivered differently (for example, in a Limpopo tertiary hospital rather than a secondary hospital or tertiary hospital based in Gauteng) and differences in the training environment for health personnel.

An earlier document observed that comparison with this "counterfactual" would require consideration of the dis-benefits of continuing with a "compromised clinical training platform", the costs and other disadvantages associated with continuing to send students to be trained outside the country, and the inconvenience (and cost) imposed on patients (and their caregivers) when they were forced to find treatment outside the province.[50]

A third complication is that the investment can be conceived of at least two distinct elements. Firstly, there is construction of the hospital and the benefits that might arise from the construction activity. Secondly, there are the benefits that arise from subsequent operation of the hospital.

To address this complication, we consider the benefits from both construction and subsequent service delivery. In addressing the latter, we recognise that benefits must be discounted because services will be delivered at the new hospital only about five years after the project is approved.

A case study of a new service

The bed allocations foreseen for the LCH were based on the demographic profile of Limpopo and the expected burden of disease. It is difficult, if not impossible, to estimate the benefits of all the different treatments. Instead, we offer a case study to illustrate the approach and the kind of numbers it produces.

One of the key areas of focus in the LCH will be mother and child health. This focus is motivated, among others, by the high infant mortality rate in the province which suggests the need to improve access to tertiary neonatal care so as to allow regional and district maternal and infant services to improve access to services. Within the area of mother and child health, the LCH will provide for treatment of congenital health defects. Such treatment is not currently available in the public health sector in Limpopo.

A recent study[51] in Pietersburg hospital confirms the need for improved services in this area. The study, based on examination of records for the period 2011 to 2015, found an (institutional) maternal mortality rate of 1,579 per 100,000 live births, noticeably higher than the 105 per 100,000 live births recorded in

[50] *October 2017. Project findings and recommendations report: Limpopo Academic Hospital.*
[51] *Ntuli ST, Mogale M, Hyera FLM & Naidoo S. 2017. "An investigation of maternal mortality at a tertiary hospital of the Limpopo province of South Africa" in Southern African Journal of Infectious Diseases, 32(2): 73-76, DOI: 10.1080/23120053.2017.1293902,*

a Gauteng urban hospital.[52] The study notes further that Limpopo is the only province in the country that has not recorded a decline in maternal mortality. The high mortality rate is acknowledged to result from multiple causes. However, the authors note that inadequate resources in terms of personnel, equipment and other requirements are among these causes as is the lack of a dedicated intensive care unit (ICU) for maternity cases.

There is also a high rate of paediatric morbidity in the province. Among neonates, the main causes are preterm births, low-birth-weight babies, sepsis, congenital malformations and oxygen deprivation. Approximately 20 deaths occur in secondary hospitals, with far more occurring at home or in district hospitals. Currently, there are 32 paediatric hospital beds available, but the need is estimated at 60-120 beds. Further, all heart surgery and all renal replacement cases have to be referred elsewhere (in particular Gauteng) because Limpopo hospitals cannot provide these procedures. Limpopo's provincial Department of Health currently incurs the costs associated with these referrals. The province has the capacity to train 10-12 specialists per year and hopes to train its first paediatric cardiologist over the period 2018-2020.

Congenital heart disease is the most common congenital abnormality. A recent MMed study[53], which reviewed echocardiography records for 2010-2014, found 80 children with atrioventricular septal defects (AVSDs). This is only a fraction of the 700 that one would expect to have critical congenital heart disease, suggesting that a large number are identified and untreated and will therefore die early. Of those identified as having AVSD, only 50% were assessed at the Steve Biko Academic Hospital to which they were referred, and only 20% had surgery. The study concluded that only about one in 20 of children needing surgery receive it.

Hoosen et al[54] (2010) cite Medical Research Council statistics which suggest that cardiac abnormalities account for 1.2% of under-5 mortality and are the eighth most important cause of childhood mortality in South Africa. This estimate ignores the large number of deaths where cardiac abnormalities are the root cause of death but, because undiagnosed, another condition is recorded as the cause. Yet Hoosen et al's audit of public sector facilities found that they were generally unable to cater for the needs even of those who were diagnosed.

The audit[55] found that only 800 of the 1,370 operations performed over a 12-month period were done in the public sector. From this they estimated that only 26% of the babies and young children that need simple transposition of great arteries had this operation. If this and similar operations are performed, 85% of children born with congenital heart disease will not die before adulthood.

Daviaud et al[56] estimate the number of disability life years (DALYs) that might be averted (or avoided) by reducing infant deaths through rollout of community health workers. Assuming life expectancy of 64 years and a discount rate of 3%, they calculated that each averted death is equivalent to 28.6 DALYs.

The estimates provided above suggest that currently only 32 of the estimated 700 children with AVSDs were operated on. This leaves 668 children who did not have operations, of whom 85% would die if they did not reach adulthood. Multiplying by 28.6, we arrive at a crude total estimate of 16,239 DALYs if all these children could be operated on at LCH. This is an over-estimate as some of the deaths will occur in later childhood. However, it is an under-estimate on the financial side in not taking account of costs saved by being able to operate locally rather than sending children to Gauteng.

---

[52] One expects the institutional rate to be higher than the general population rate as it is generally the sickest babies who are referred to a secondary hospital.
[53] Shivambu
[54] Hoosen EGM, Cilliers AM, Hugo-Hamman CT, Brown SC, J.R. Harrisberg JR & Takawira FF, Govendrageloo K, Lawrenson J & Hewitson J. 2010. "Optimal paediatric cardiac services in South Africa – what do we need?: Statement of the Paediatric Cardiac Society of South Africa" in SA Heart 7:10-16.
[55] Hoosen EGM, Cilliers AM, Hugo-Hamman CT, Brown SC, J.R. Harrisberg JR & Takawira FF, Govendrageloo K, Lawrenson J & Hewitson J. 2010. "Audit of paediatric cardiac services in South Africa" in SA Heart 7: 4-9.
[56] Daviaud E, Besada D, Budlender D, Kerber K & Sanders D. 2017. Saving lives, saving costs: Investment Case for Community Health Workers in South Africa: What costs and what benefits for the health sector, for the economy and for society? Medical Research Council: Cape Town.

These calculations focus only on children with congenital birth defects. They do not include infants that die from other causes. They also do not include maternal mortality which, as seen above, is one of the indicators being targeted by the province.

Analysis of data from the GHS of 2016 show a mean age of 27 years and a median age of 25 for Limpopo women reported to have been pregnant in the last year. Preventing the death of women in childbirth is thus likely to result in more than 35 additional life years (or even longer, given that women tend to live longer than men). To the extent that birth among younger women is more dangerous, the mean age for those dying in childbirth could be even lower than 25.

The Cuban Doctor Programme

One of the ways in which the South African government has attempted to address the shortage of health personnel and, in particular, the shortage of personnel willing to work in rural areas such as large parts of Limpopo, is by paying for medical students to receive most of their training in Cuba. As noted above, an earlier document suggested that the costs and other dis-benefits associated with this programme was an aspect of the "counterfactual" to the LCH that needed investigation.

In 2015, the Democratic Alliance estimated that the Gauteng government was spending more than R5 million over six years on each student sent to study medicine in Cuba[57], based on the R70.5 million spent that year on 80 students. The party compared the R1.3 million estimate of the cost of training a South African doctor at the University of Cape Town in 2012 with the R1.6 million estimate of the training in Cuba. This excludes the costs of the further two years that they must complete at a local medical university after returning from Cuba so as to be reintegrated.

A more recent estimate is that Cuba is charging provincial Departments of Health between R400,000 and R500,000 per student per year for each of the approximately 2,700 currently studying in Cuba.[58] This can be compared with the approximate cost of R230,000 per year per student at local universities if fees (R60-70,000), government subsidy, living expenses and direct costs of the universities are included. Adding to the cost of training in Cuba is the extra year of study that students spend learning Spanish. Once returned, the provinces must pay 18 months to two years of local full costs for each student.

Limpopo's Department of Health budget vote for 2017[59] has several references to the cost of the Cuban Doctor Programme. It notes that 365 prospective doctors were on this programme in 2017, although the exact rand amounts allocated to support them are not specified or shown.

The costs fall under budget programme 6: Health Sciences and Training. In 2017/18, R660.48 million (R423.32 million in 2013/14) was allocated for programme 6, of which R406.91 million (R222.09 million) went on compensation for employees, R46.12 (R46.89 million) on goods and services, and R200.53 million (R157.03 million) on transfers and subsidies

The steeply increasing trend over the period 2013/14 to 2017/18 is attributed primarily to compensation of employees and the Cuban Doctor programme. Compensation of employees includes the costs of specialists and registrars funded from the Health Professional Training and Development conditional grant[60], stipends paid to student nurses and students on the Cuban Doctor Programme, and salaries of lecturers at training colleges. The programme also includes the costs of bursaries for students at Limpopo Medical School, which were allocated for the first time in 2016/17. Travel costs associated with the Cuban Doctor's programme are included under goods and services. This line item increases 19.7% over the seven-year period. Further costs of the Cuban Doctor's Programme are included under

[57] *Cuban medical training way more costly than local option. BY RDM NEWS WIRE - 22 July 2015 - 11:22, accessed 17 December 2017. https://www.sowetanlive.co.za/news/2015-07-22-cuban-medical-training-way-more-costly-than-local-option/.*
[58] *Information provided by Prof Martin Veller (Dean Wits), 19 December 2017.*
[59] *Department of Health Limpopo. 2017. Vote 7. Provincial estimates of Revenue and Expenditure.*
[60] *Limpopo's allocation from this grant is R131,7 million in 2017/18.*

transfers and subsidies. Both travel costs and the transfers and subsidies were negatively affected by the worsening rand exchange rates which increased the costs despite a halt in recruitment.

The Limpopo Medical School should reduce the need for training doctors in Cuban, and the associated expenses. The LCH will contribute by providing alternative training in Limpopo that is of higher quality and provides broader experience than would be the case without the LCH.

10.9 Economic impact assessment

This approach explores the macro-economic, spill-over and distributional impacts of the investment. Analysis can also be done at micro level, to identify who are likely to be "winners" and "losers" from the investment. The distributional question comes in where winners are currently less or more disadvantaged than losers.

Economic impact assessment can be done either before or after the preferred investment option is chosen. The complications highlighted above are less relevant if there is no or limited displacement of employment and economic activity. We can probably safely assume that the introduction of services there is unlikely to result in a noticeably reduction of staff or activity at other hospitals given the current serious under-provision of public health services in both Limpopo and Gauteng.

PSP Icon's feasibility study for the New School of Medicine[61] foresees economic benefits during the construction phase and on completion in the form of:

- "employment opportunities;
- the provision of goods and services;
- improving the skills of the students passing through the School who, by virtue of their increased earning power, improve economic activity;
- improving the number of health professionals in the region thereby improving the health of the people in the region which, in turn, by virtue of its focus on preventive practice, reduces the burden of disease and the associated drain on the fiscus."

Similar benefits will be found for the LCH.

In purely financial terms, an estimated R1.689 billion will be spent in Limpopo during the period 2019 to 2024 to construct the LCH.[62] Of this amount, professional fees will amount to R254 million and R813 million will be spent on health technology. Once the LCH is up and running, R175m will be paid annually by the Department of Health as rent, with a further R756 million spent on operational costs. Part of these expenses will be offset by savings in costs related to referring patients to Gauteng.

The expenditures will both create jobs and result in growth in gross domestic product (GDP) and gross geographic product (i.e. growth of the economy of Limpopo rather than of the country more generally). The multiplier effect in respect of economic growth is explored in the next session.

10.9.1 Jobs

During construction, the project will create direct employment, especially in the construction industry. Many of these jobs can be filled by local people. It will also indirectly contribute to jobs among suppliers of goods and services. Again, many of the jobs created will be local (or at least provincial) if procurement is done locally.

[61] *PSP Icon. 2013. Feasibility Study for the University of Limpopo as requested by the Department of Higher Education and Training to motivate for Extraordinary Funding from the National Treasury for a New School of Medicine at the University of Limpopo.*
[62] *Amounts are given in 2017 Rand*

Once completed, the hospital will provide 2047 employment opportunities at an annual cost of approximately R841 million. The table below shows the likely distribution of the staff across categories.

Table 54: Proposed staffing of Limpopo Central Hospital

Medical doctors	452
Clinical support	178
Nurses	844
Administration & facility management	573
Total	2047

The majority of these jobs are likely to be held by women given the female dominance within the health sector. For example, analysis of the Quarterly Labour Force Survey of the third quarter of 2017 finds 71% of those employed in human health services to be female. In addition, the administrative and cleaning that will account for between 18 and 20% of the permanent jobs created are likely to be dominated by women. The female dominance is especially beneficial in terms of addressing unemployment as the same survey recorded a female unemployment rate of 21.5% in Limpopo as against a male rate of 17.0%. The importance of female unemployment is discussed further below.

10.9.2 **Services**

In terms of services, an additional 446 L3 beds will be available, and an additional 33,645 patients treated each year. This will bring several different benefits:

- A larger number of people will be able to be treated, and/or will receive treatment more speedily than before, and/or will be able to be treated in Limpopo rather than having to go elsewhere.
- The greater extent, greater speed and proximity of treatment should result in decreased morbidity and mortality, increased productivity, and improved quality of life.
- The increase in productivity will result from both reduced morbidity (and thus less time off sick or working at reduced efficiency) and mortality of the patients, and the reduced time that household members will need to spend caring for the patients, visiting them in hospital and (if treated in Gauteng) accompanying them and visiting them there. The household is also likely to have reduced costs as most illnesses result in expenses related to care and comfort.
- The reduced delay in patients receiving care is likely to result in a longer-term reduction in costs as treatment of illness, disease and injury at an early stage is usually cheaper and more effective than treatment at a later stage.
- A reduction in transport costs for the health services and patients associated with the provision of most tertiary services in a local location (and one which has the greatest density of population in the province), minimal need to refer patients to Gauteng, and the well-maintained roads in the area in which the LCH is to be situated.
- Maintenance costs will be lower in the early years of use of the new building.[63]
- The “massive” legal claims against the provincial Department of Health are likely to reduce with improved facilities and services.[64]

The value of the new doctors that will be trained is not taken into account in this discussion as this value derives from the medical school rather than the LCH. The LCH is, however, especially relevant in respect of registrars and specialists as training in the fully-fledged LCH will produce practitioners who have broader and better experience than they would get in the current facilities. This is especially important given the dearth of specialists in Limpopo. Practitioners of all types are also more likely to stay in Limpopo once the academic hospital is in place as it will offer them and their families a more attractive option than the more rural and less developed settings of the secondary hospitals.

In addition to the better environment when compared to the secondary hospitals, there is evidence that health professionals trained in rural areas tend to practice in these areas. One estimate suggests that students who have been exposed to rural health care during their training are between four and seven

[63] *Department of Health. October 2017. Limpopo Academic Hospital: Summary Business Case. Submission to National Treasury for consideration of MINCOMBUD.*
[64] *October 2017. Project findings and recommendations report: Limpopo Academic Hospital.*

times more likely to work in rural areas after they have graduated.[65] An added advantage not mentioned in the literature is that patients will be treated by personnel who are more likely to be able to speak and understand their home language.

10.9.3 Assessment

An independent analysis was carried out by Demacon market analysts to determine the market effects of the building of a new central hospital. To assess the anticipated economic impact that will be generated by the proposed Limpopo Central Hospital of 488 hospital beds the capital investment and operational expenditure that will be associated with the development are used as basis to quantify the potential impact that will result on the local, district and provincial economies.

The impact refers to the ripple effect throughout the economy caused by investment in a specific economic sector. This impact stretches beyond the jobs and income generated by the original project. In order to estimate the total economic impact, the input-output model is employed – Refer to Annexure for an explanation of this model.

Two levels of economic impacts can be distinguished:

- Quantitative financial and economic impacts, and
- Qualitative socio-economic impacts.

10.9.3.1 Quantitative financial and economic Impacts

Capital Investment Requirement and Operational Expenditure

The following table summarises the Capex and Opex figures for the proposed new LCH. These values will present the basis for the quantitative assessment of the construction and operational phases associated with the development of the new facility.

Table 55: New Limpopo Central Hospital – 2018 NPV

Phase	Value
Capex	R3 977 636 307
Opex	R1 375 827 963

The impact is estimated in terms of two project phases – the construction and the operational phases, commencing with the construction phase impacts in the following section

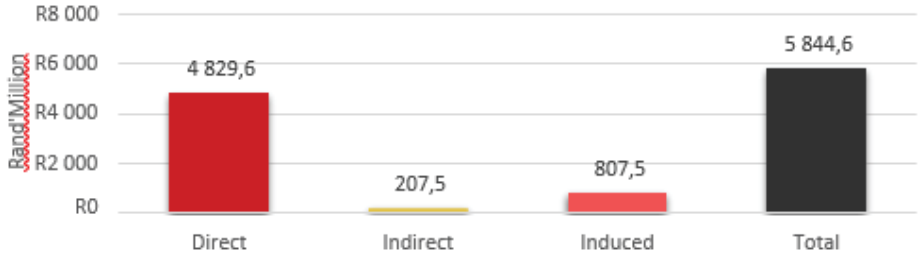
Construction Phase Impacts

This section indicates the anticipated impacts (direct, indirect, and induced) that will result from the construction phase of the proposed new hospital development. It is important to note that these impacts are once off and not sustained annual impacts. The impacts will fade away after the construction of the project.

- Figure 21 illustrates the anticipated additional business sales to be generated by the hospital development during the construction phase.
- Figure 22 provides an illustration of the anticipated additional GGP to be generated by the hospital development during the construction phase.
- Figure 23 provides an illustration of the anticipated additional employment opportunities to be generated by the hospital development during the construction phase.

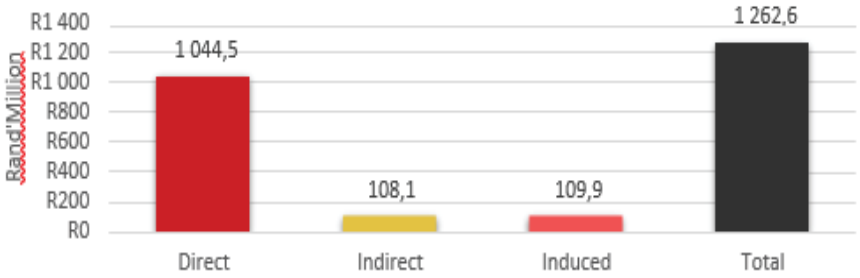
[65] *"Doctor shortage hits rural SA" in City Press, 5 November 2012.* https://www.news24.com/Archives/City-Press/Doctor-shortage-hits-rural-SA-20150429.

Figure 14: Additional Business Sales, Capex Phase, 2018 NPV



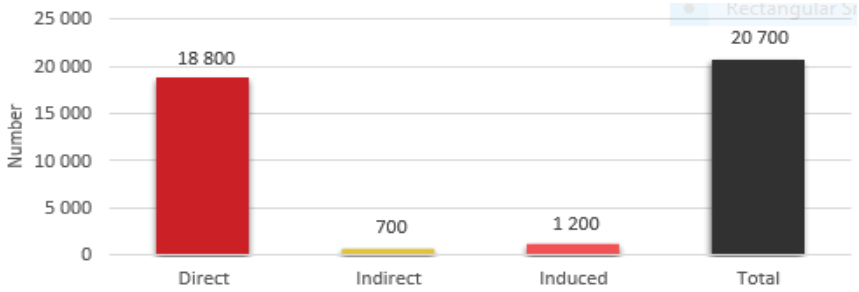
Source: Demacon Estimates, 2018

Figure 15: Additional GGP, Capex Phase, 2018 NPV



Source: Demacon Estimates, 2018

Figure 16: Additional Employment, Capex Phase, 2018 NPV



Source: Demacon Estimates, 2018

The following table provides a synthesis of the abovementioned impacts, in terms of additional business sales, additional GGP as well as additional employment, regarding the proposed new development.

Table 56: Impact of Proposed Development Mix – Construction Phase (2018)

VARIABLE	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
Additional Business Sales (R'million)	4 829,6	207,5	807,5	5 844,6
Additional GGP (R'million)	1 044,5	108,1	109,9	1 262,6
Additional Employment	18 800	700	1 200	20 700

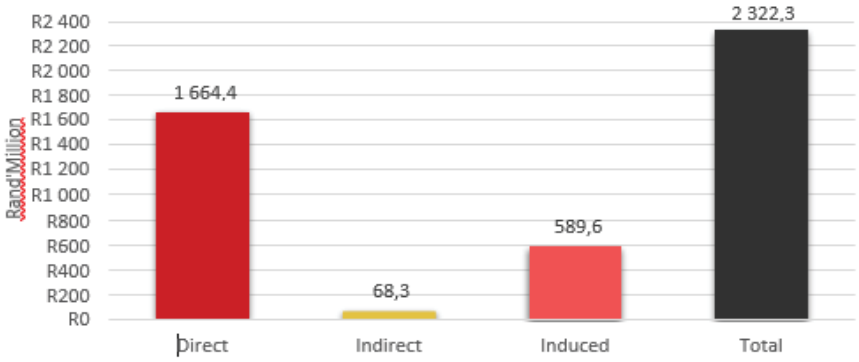
VARIABLE	CAPITAL EXPENDITURE	TOTAL IMPACT
Additional Business Sales		R5.8 billion
Additional GGP	R4.0 billion	R1.3 billion
Additional Employment		20 700 jobs (18 800 direct)

Source: Demacon Estimates,2018

Operational Phase Impacts

The subsequent paragraphs indicate the anticipated sustained impacts (direct, indirect, and induced) that will result during the operational phase of the new hospital development, once the facility is fully operational (i.e. sustained annual impacts).

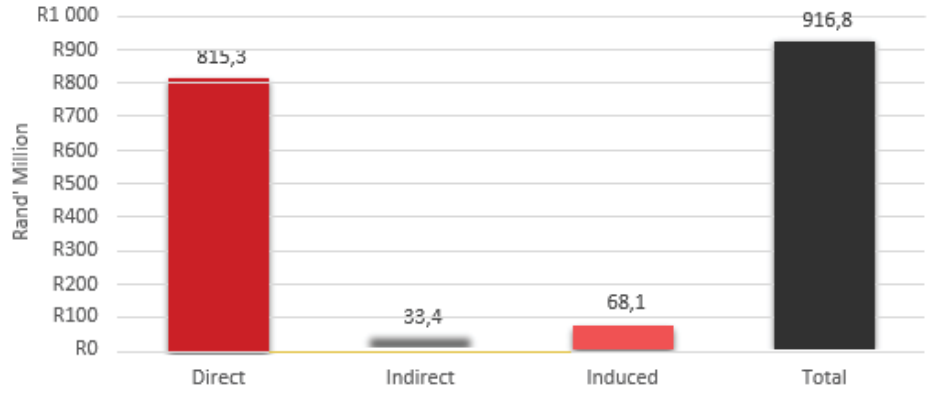
Figure 17: Additional Business Sales, Opex Phase, 2018 NPV



Source: Demacon Estimates, 2018

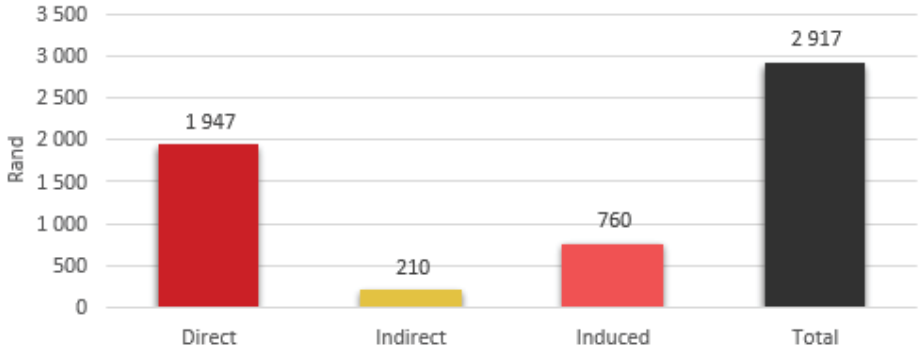
The figures above and below illustrate the anticipated **additional business sales**, **additional GGP, and additional employment opportunities** to be generated by the new hospital during the operational phase.

Figure 18: Additional GGP, Opex Phase, 2018 NPV



Source: Demacon Estimates, 2018

Figure 19: Additional Employment, Opex Phase, 2018 NPV



Source: Demacon Estimates, 2018

The following table provides a synthesis of the abovementioned impacts, in terms of additional business sales, additional GGP as well as additional employment, with regards to the new hospital development during its operational phase.

Table 57: Impact of Proposed Development Mix - Construction Phase (2018 NPV)

VARIABLE	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
Additional Business Sales (R'million)	1 664,4	68,3	589,6	2 322,3
Additional GGP (R'million)	815,3	33,4	68,1	916,8
Additional Employment	1 947	210	760	2 917

VARIABLE	CAPITAL EXPENDITURE	TOTAL IMPACT
Additional Business Sales		R2.3 billion
Additional GGP	R1.4 billion	R0.9 billion
Additional Employment		2 917 jobs (1 947 direct)

Source: Demacon Estimates, 2018

The previous table illustrates that the estimated total annual operational expenditure of approximately R1.4 billion, could create an additional R2.3 billion in new business sales, R0.9 billion in additional GGP, as well as 2 917 sustained employment opportunities. Total impact includes direct, indirect as well as induced effects.

10.9.3.2 Qualitative socio-economic impacts

Two levels of socio-economic impacts can be distinguished namely quantitative and qualitative impacts. The following outlines qualitative socio-economic impacts:

- Improved access to healthcare services,
- Increased demand for skilled healthcare staff,
- Increased levels of disposable household income,
- Increased demand for quality housing, retail and associated community services,
- Strengthening the role and function of Polokwane as an administrative capital and seat of healthcare services in the province,
- Socio-economic development and upliftment,
- Development of small scale SMME service providers, and
- Potential future clustering of medical and related services.

10.9.3.3 Synthesis

The potential economic impact that the proposed new hospital development could induce on the local, district and provincial economies and communities during both the construction and operational phases are indisputable

Table below summarises the findings of the Economic Impact Assessment as described in preceding sections.

Table 58: Synthesis of Impact Modelling Results – 2018 NPV

VARIABLE	INPUT VALUE	TOTAL IMPACT
Construction Phase (Once-off)		
Additional Business Sales		R5.8 billion
Additional GGP	R4.0 billion	R1.3 billion
Additional Employment		20 700 jobs (18 800 direct)
Operational Phase (Sustained Annually)		
Additional Business Sales		R2.3 billion
Additional GGP	R1.4 billion	R0.9 billion
Additional Employment		2 917 jobs (1 947 direct)

Source: Demacon Estimates, 2018

It should be noted that if the development is registered as a PBO (Public Benefit Organisation) it can apply for the exemption of property rates and taxes at the municipal entity, as specified within the institutions tariff policy. If the proposed development were not to occur, the economic benefits in terms of additional business sales, GGP, and employment, would be lost to the local, district and provincial economies.

Qualitative socio-economic impacts include:

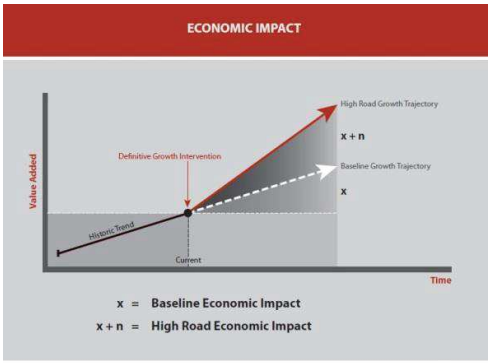
- Improved access to healthcare services,
- Increased demand for skilled healthcare staff,
- Increased levels of disposable household income,
- Increased demand for quality housing, retail and associated community services,

- Strengthening the role and function of Polokwane as an administrative capital and seat of healthcare services in the province,
- Socio-economic development and upliftment,
- Development of small scale SMME service providers, and
- Potential future clustering of medical and related services.

It can therefore be concluded that the development should have a multitude of beneficial economic, social and related impacts – locally and regionally.

10.9.3.4 Input-Output Model

Figure 20: Economic impact of the development



The following figure conceptually illustrates the economic impact that the proposed development could have on the local economy in terms of additional GGP.

Before the input-output model is discussed it is necessary to understand the community economic system and underlying interrelationships (Refer to Diagram A.2).

11 PROCUREMENT STRATEGY

The procurement plan is required as part of the feasibility study, in terms of the Treasury Regulation 6 of the PFMA, to provide an early roadmap for the procurement phase of the project. As such, it must:

- Demonstrate the legal competency of the institution to procure the project (capacity);
- Confirm the availability of funds (budget);
- Outline the time frames for the procurement programme; and
- Identify risks and challenges to the procurement process

11.1 Legislative requirements

The procurement of the LCH will be undertaken in accordance with current procurement legislation applicable to the project inclusive of:

- Section 217 of the Constitution of the Republic of South Africa
- The Public Finance Management Act 1 of 1999 (PFMA) as amended;
- Preferential Procurement Policy Framework act, No.5 of 2000 (PPPFA)
- Treasury Regulation 6 issued in terms of section 76(4)(g) of the PFMA;
- Broad Based Black Economic Empowerment Act, 52 of 2003 (BBBEEA);
- Labour Relations Act, no.66 of 1995 (LRA)

Treasury Regulation 16.5 regulates the procurement process and, in terms of Treasury Regulation 16.5.3, states that:

> *"the procurement procedure must be in accordance with a system that is fair, equitable, transparent, competitive and cost effective and must include a preference for the protection or advancement of persons, or categories of persons, disadvantaged by unfair discrimination in compliance with relevant legislation."*

In addition to the requirements of Treasury regulation 16.5.3, the NDOH is required to follow its Supply Chain Management Policy relating to the manner in which a competitive bidding process is conducted.

11.2 Implementing agent and professional service provider

The NDOH is the implementing agent for the development of the new LCH. To date, the agreement between the NDOH and the Limpopo Department of Health (LDOH) is still to be finalised. The NDOH has appointed Sakhiwo as a multi-disciplinary professional service provider for the overall co-ordination of the planning, design, construction and commissioning of the LCH. Due process has been followed in the appointment of Sakhiwo with the co-operation of the Limpopo Department of Health and the Chief Procurement Officer of the National Treasury as part of a settlement, following court cases in respect of the termination for the appointment of Sakhiwo as the Program Management Unit for the LDOH.

In terms of clause 9 and 10 of the Settlement Agreement as sanctioned by the High Court, Sakhiwo is responsible for services in respect of programme management, town planning, health planning, environmental consulting, architectural design, project management, quantity surveying, civil engineering, traffic engineering, structural engineering, mechanical engineering, electrical engineering, electronic engineering (information technology and security), clinical engineering and health technology, sustainable (green) engineering, rational fire design, information communication technology (ICT) and Hospital Information Systems, organisational development, commissioning, resident engineers, clerk of works and occupational health and safety.

Sakhiwo is further responsible for the delivery of the following work stages in respect of the LCH:

Assessment and alignment of the Feasibility Study; development of a clinical brief, technical brief and master plan; health planning and development of room data sheets, a schedule of accommodation and health technology schedule; development of concept designs, concept plans and project implementation plans; development of cost estimates, budgets and bills of quantities; development of detail design, tender documentation and technical evaluation of tenders; site supervision and construction management of the contractor during the construction period; overall co-ordination and project management activities; development of commissioning plans; organisational development and functional narratives; development of health technology and information communication technology specifications, tender documentation and technical evaluation of tenders; financial control, quality control and reporting services; commissioning of the buildings, equipment and health technology and close-out.

In terms of the above, the procurement of a multi-disciplinary professional team that covers all the planning, design, construction supervision and commissioning supervision under one entity is deemed to be an efficient way of achieving this and provides continuity throughout the entire process from inception to commissioning and close-out. This is specifically so that the planning, design and implementation of a hospital of this nature is considered a very complex undertaking. All the responsibility for any professional liability and lack of performance vests in one entity that reduces the risk of blame shifting between professional disciplines which would normally be found where the client (NDOH) would appoint each and every discipline separately. It also hugely reduces the project management task of the NDOH.

The position of the NDOH as the Implementing Agent, LDOH as the user Department and Sakhiwo as the multi-disciplinary Professional Service Provider, is accordingly allocated.
This leaves the procurement for the construction of the buildings with building related mechanical and electrical installations and the procurement of the health technology (furniture, fittings and equipment, both clinical and non-clinical) as the two areas of procurement that need to be considered in terms of alternative models.

It should be borne in mind that the National Treasury has certain centralised tenders/contracts (RT tenders) for the supply of certain categories of health technology. The NDOH will source those categories of health technology via those tenders. This excludes the invitation of new tenders for those categories of health technology.

Another option that can be considered, is to have one single main contractor that will, under one contract, be responsible for both the construction of the buildings with the in-contract mechanical and electrical installations as well as incorporating the acquisition and installation of health technology. The only advantage of this “single source” approach, is the fact that the NDOH will contract with only one contractor. There are however numerous disadvantages, that rather support an option where the procurement for the construction of the buildings and the supply and installation of health technology as separate procurement processes. The main disadvantage is that it reduces competition in the market in respect of the procurement of health technology in sizeable batches which would negatively impact on price. The “single source” approach has never been followed in South Africa for any major hospital. The conventional building contractors do not have the expertise or know-how to be able to competitively participate in a procurement process for the supply and installation of health technology. The other disadvantage is the fact that the procurement of health technology really happens towards the last year of the building contract and prices as well as technology will change over the course of the construction period. It does not make sense to procurement equipment at the same time as the initial procurement of the building contract. Certain packages, such as office furniture, could form part of the main building contract, as built in furniture would in any case be included.

The NDOH as implementing agent, has accordingly selected an approach where the procurement for the construction of the building and “in-contract” installations shall be separate from the procurement of health technology.

It should be noted that in all instances, the NDOH, as the employer, will be the contracting party and will sign the relevant principal building and supply agreements.

11.3 Funding model

The funding model to be applied in respect of the LCH will determine what alternative procurement models may be available to be followed. It has been confirmed that the funding of the capital expenditure for the planning, design, construction, equipping and commissioning of the LCH will be provided by the fiscus in the form of a grant to the NDOH.

This position eliminates procurement models where the long-term funding/financing of the capex for the LCH forms part of the model. The Public Private Partnership (PPP) models as well as the Public Investment Corporation (PIC) models are excluded. Both of these models have been considered and for the sake of completeness are summarised in short at the end of this section.

11.4 Alternative procurement models

This leaves few possible options for procurement of the main building contractor or multiple building contractors and the suppliers of health technology:

1. The Public Sector Comparator (PSC) (Conventional) model;
2. Design and Build (with or without interim finance)
3. Construction Management

For the procurement of health technology, as a separate procurement activity, there are also a few procurement models.

1. Supply and install (Conventional)
2. Supply, install and maintain (with or without funding)

11.4.1 The Public Sector Comparator (PSC) – Conventional Model

The Public Sector Comparator (PSC) model is the procurement option that is traditionally used by the Departments of Public Works and other implementing agents to procure the construction of buildings. The PSC model is normally based on a Design-Bid-Build (DBB) which is widely used by the public sector to procure capital assets. Under the DBB, the Implementing Agent/Department procures a professional team to do the planning, design and prepare the specifications of the new facility. The completed design is tendered through a publicly published Request for Proposal (RFP) or a Notice to Tender inviting construction contractors to bid for the construction of the new facility.
This procurement policy of the NDOH, in this project, will apply and the procedures in terms of the procurement policy will be followed.

The professional team of the Department is responsible for the planning and design of the buildings and the electrical and mechanical installations that are building related, as well as security and ICT network installations, through an interactive process with the Implementing Agent and the User Department.

SMME targets will be set at a percentage to be set by the NDOH, currently in the order of 30% for building contracts.

Once the designs and specification have reached tender stage with the relevant approvals of the NDOH and the SIPDM in place, the tender document will be submitted to the Bid Specification Committee (BSC) of the NDOH for interrogation of the documents and approval for the tender to be published. The tender will then be published in the Government Gazette, on the CIBD platform and in such daily newspapers as the NDOH deems fit.

As a result, competitive bids are provided on the basis of a final (or a very advanced) detailed design. The department, therefore, vis a vis the contractor, retains the risk of any design deficiencies or subsequent changes during the construction period. This risk is however covered by the professional indemnity of the Professional Service Provider, Sakhiwo in this instance.

Once the tender is closed, the Bid Evaluation Committee (BEC) of the NDOH will evaluate the bids. The Professional Service Provider (Sakhiwo) may assist the BEC with the technical evaluation. The PSP will however not have any vote on the BEC.

Once the bids are evaluated by the BEC, the bids are referred to the Bid Adjudication Committee (BAC) for final adjudication and award of the tender to the successful tenderer. The PSP will not have any input into the adjudication process.

The NDOH as employer will enter into a Principal Building Contract with the Contractor. The Contract mainly used as principal building agreement is the JBCC Principal Building Contract (Government Version).

The Professional Service Provider will project manage the construction, do quality, cost and progress monitoring. Monthly progress payment certificates will be issued by the Principal Agent in terms of the JBCC PBA for payment by the NDOH to the Contractor.

Once construction is complete, the department will take possession of the asset and assume long-term responsibility, including the risk associated with the asset.

11.4.2 Design and build (with or without interim financing)

This method can be used where the Building Contractor is required to appoint their own design team. Again, the Procurement Policy of the NDOH would be followed and the same steps in terms of the BSC, BEC and BAC.

A proper user requirement report will need to be developed by the professional team of the Implementing Agent. It is not as if this method can be followed without the need of the Implementing Agent to appoint a professional team. The professional team will develop the clinical brief and technical brief with the user requirements to a certain level and most of the time a conceptual design is done to form the baseline for the Design and Build Contractor to follow. Because there is more risk in this method for the contractor in that there is no detail design and no Bills of Quantities available, the contractor will make allowance in his price to cover these risks.

In order to ensure that the Bidders bid on the same premises in terms of the eventual requirements of the Implementing Agent and the User Department, the design process is taken to a point where a detail design is almost achieved. The less information is available, the more difficult it is for the bidders to price and the more difficult it is for the evaluation and adjudication of the competitive bids.

For office buildings or factories, the design and build option makes sense as the intensity of having to liaise on the design with the client, is less. In the case of hospitals, a thorough interactive process is required during the design stage with the User Department and the Implementing Agent and interaction with the professional team of the NDOH, after the award of the tender.

The idea with design and build is that the tenderers bid a fixed price. However, because of the uncertainties because of the level of information that is available, these uncertainties will be priced in. The professional time that would be required from the professional team of the contractor to achieve the design requirements of the user department and the implementing agent after award, is also uncertain and the Contractor in terms of the fees allowed for his professional team will also be priced to make allowances.

Although it is argued that the risk is devolved onto the contractor, any user requirement that falls outside of the initial user requirements will be priced separately and added to the contract price. The design and build contract leaves the contractor and the Implementing Agent exposed to disputes as to whether a specific item was provided for in the user requirements or not.

Another advantage that is normally attributed to the Design and Build method, is that the Implementing Agent saves time in the procurement process as it does not have to appoint a professional team and only when the designs are done, go to tender for construction. This is only of benefit if the Implementing Agent has an in-house competent team of professionals that can develop the user requirements and comparator. If the Implementing Agent has to appoint a professional team via a procurement process to develop the user requirements and the comparator, this advantage falls away.

In this instance with the LCH, where the professional team has been appointed and designs have been developed to an advance stage, there is no advantage in terms of the time saving element. In fact, it will lead to a duplication of costs if the contractor also has to appoint a professional team. There is also no guarantee that the professional team appointed by the contractor who has the most favourable tender sum, will in fact have the hospital experience and know-how to design an efficient hospital.

In some instances, the Design and Build comes as a Design, Build and Finance option, where the funding can either be long term and or short term during the construction period only. In this case the contractor provides the funding for the construction for the period of the building contract. The Implementing Agent will then pay the contractor either the full contract sum on final completion of the construction or over a period after final completion. This may assist the Implementing Agent with cash flow, but the interim finance costs will be calculated by the contractor and built into the contract price and the contractors cost of finance will in all likelihood be more than that of the State.

The NDOH does not support the Design and Build option as feasible for this project. As stated before, the unique nature of this facility requires that the NDOH and LDOH retain control over the planning, design and execution of the facility. Sakhiwo's existing appointment already caters for all the facets of design and execution and the appointment of a professional team by a Contractor will lead to unnecessary duplication of costs.

11.4.3 Construction management

The next method to be considered is Construction Management. The principles upon which Construction Management work, is where the employer (NDOH) does not appoint a main building contractor that takes care of the entire construction through its own domestic sub-contractors and selected sub-contractors. The employer will break the contract down into works packages and appoint a contractor for each and every work package.

Construction Management is considered to be a cost saving methodology as the main contractor will not be taking a mark-up on the sub-contracts. This will however only be the case if the cost of the employer for managing a range of sub-contractors, is less than the cost of a main contractor controlling the process.

The management challenge for the NDOH will be to properly co-ordinate the various sub-contractors such that the one does not delay the other as delays will lead to extension of time claims from the contractors and can be excessive. When the main contractor appoints the sub-contractors, the main contractor absorbs the risk of any one or more of its sub-contractors being behind schedule and the negative impact on the program of another sub-contractor.

Apart from the management challenge to properly co-ordinate, the model also by definition creates more administration for the employer as the employer now has building contracts with each and every contractor and a progress payment certificate will be issued per month for every contractor.

The risks and management and administrative burden that this method will bring for the NDOH, renders Construction Management a non-feasible option.

11.4.4 Public Private Partnership (PPP)

As indicated above, the LCH was previously registered as a PPP project and a Transactional Advisor was appointed to do a needs analysis study and determine the affordability of using the PPP model for the design, construction, commissioning and equipping of the new LCH. The PPP option was thereafter deemed to be unaffordable and the option discarded.

11.5 Health technology procurement

11.5.1 Supply and install (conventional)

The conventional method of health technology (HT) procurement is where the Implementing Agent appoints a health technology professional to develop a health technology schedule of all the furniture, fittings and equipment (clinical and non-clinical) that are required to commission and operationalise the hospital. The HT Specialist will develop a room by room list of equipment and specifications of the HT required. This process is an interactive process with the clinicians of the hospital.

The HT Specialist will develop a Bills of Quantities, specifications and tender documentation. The Procurement Policy of the implementing Agent(NDOH) will be followed for the procurement of the health technology. The tender document will be submitted to the Bid Specification Committee for approval, prior to the tender being published. The Bid Evaluation Committee and the Bid Adjudication Committee will then evaluate and assess the bids and do the award of the tenders.

The procurement process for the supply and installation of HT will normally commence about a year from the intended date of practical completion of the construction works. The HT Schedule is developed from the planning stage of the project as certain equipment has an impact on the design of the facility in terms of space, weight and connectivity implications.

At the time of commencement of the tender process, whether the HT tender will be an all-inclusive tender where there will be a single supplier of all HT or whether the HT will be divided into batches that will be tendered separately needs to be considered. Firstly, all HT that forms part of the National Treasury centralised tenders (RT Tenders) will be grouped separately as they may be procured by placing orders in terms of the RT tenders, without any further bidding process.

Very few suppliers have the capacity to be able to supply all the HT for a hospital as an all-inclusive tender and taking that course will eliminate numerous suppliers from the tender process. It is therefore advisable to package the HT into batches where similar types of equipment are procured by means of one tender. As such, office furniture can be procured as a batch, imaging equipment can be procured as a batch, theatre equipment can be procured as a batch, etc. This enables suppliers that specialise in specific types of HT to be able to compete on a reasonable basis.

One of the other aspects to be considered is to include in the tender an extended warranty period (3 to 5 years) as an option. The bidders will be responsible for the supply, installation and commissioning of the HT under the supervision of Sakhiwo. Normally there would be a one-year warranty. An extended warranty can be a separate item on the bills to be priced separately.

Training of the hospital staff on the utilisation and operation of the equipment is a normal term of the tender and included in the supply price. So is also the supply of maintenance and operational manuals. The NDOH as the Implementing Agent will be signing the supply agreements following the award of the tenders.

The conventional method is currently the norm in the public sector, although the NDOH is open to consider the supply, install and maintain option, with or without funding, at the time when the procurement process for HT has to commence.

11.5.2 Supply, install and maintain (with or without funding)

The supply, install and maintain option, with or without funding, is a procurement option where the same process is followed as under the conventional method. However, a maintenance period is attached to the tender in this instance. The supplier will have the obligation to maintain the equipment for a period of normally 5 years. The maintenance is priced separately in terms of the Bills in order to allow the Implementing Agent to consider whether the additional cost relating to the maintenance is feasible and affordable. The Implementing Agent awards the tender only in respect of supply, installation and commissioning with the normal warranty period and does not add the maintenance component. The maintenance component will normally be paid on a structured basis over the five-year period, whether it is quarterly or bi-annually or annually.

Options are further available to include in the tender a funding structure for the supply, installation and commissioning (and training) on HT. There are various asset financing models that can be used and the asset financing of equipment is a common approach in the private sector. Apart from the cash flow advantage that it has, it also has the advantage that it keeps the supplier committed to keeping the equipment in a good workable condition for the period of the funding structure, which normally coincides with the maintenance period.

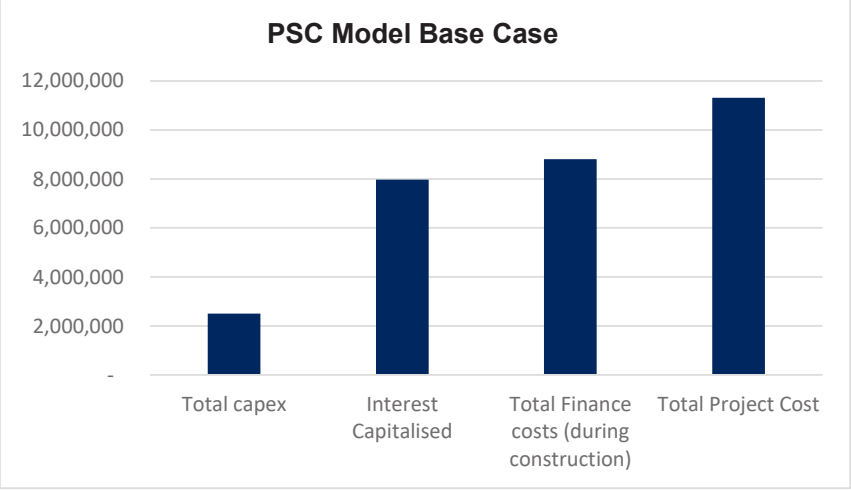
This is an option that should be thoroughly investigated, looking also at the cost of the capital in terms of the asset finance model.

11.6 Proposed project structure and funding sources

In terms of the PSC model, the proposed structure the NDOH assumes full responsibility of the funding via the National Treasury, the assumption the ultimate funding source being through the long-term government Debt capital markets programmes.

11.6.1 Base model analysis – nominal cash flows

Table 59: PSC model



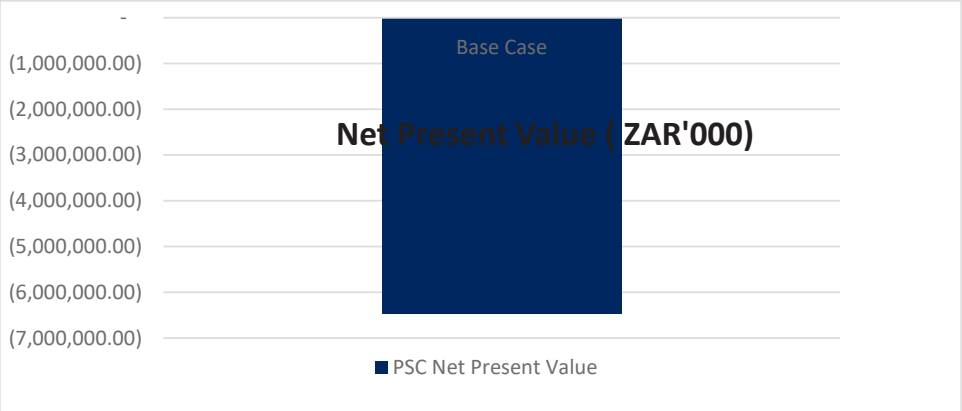
The overall analysis based on the base case shows the following:

- Total Capital Expenditure is subject to possible escalation and cost overruns.
- Total Project Cost which is the total capital expenditure inclusive of total funding costs associated with the project.
- The PSC model includes R11,3 billion of nominal cashflows over the 22 year projection period.

11.6.2 Net Present Value (NPV)

The Net Present Value (NPV) is central to fully understanding the whole life cost of a project as well as a basis for comparing and evaluating projects that have different cash flows.
The NPV assessment below is calculated using a discount rate of (5.7%) to account for the time value of money based on long term projected inflation

Table 60: Net present value



11.7 Funding model assumptions

11.7.1 Key dates

The key base date for the PSC model's base is 30th June 2018. The model assumes that construction commences on 1 January 2020, following on from 9 months design process. The construction period is 60 months (five years), commissioning is 6 months with the commercial operations date at 1 January 2024. The modelling period is monthly during construction and semi-annual during operations.

11.7.2 Inflation and foreign exchange rate

The inflation and foreign exchange rates will have an influence on both the construction and HT equipment costs with HT being the most effected. This is identified as one of the major risks to the cost estimation of this project therefore the option (option 2 in this case) with the shortest time frame is at less risk of inflationary influences.

11.7.3 Capital expenditure

In terms of Capital Expenditure, the PSC capital model budgeted capital expenditure is(construction) R2.6 billion. This is the result of the provision of pre-contract and post contract escalation costs which

amount and professional fees. NDOH is solely liable for any additional cost overruns and escalations of the project based on procurement inefficiencies.

11.7.4 Taxation

In the terms of PSC Model, as a government entity, the NDOH is not liable for any taxes which is a cash flow benefit

11.7.5 Financing

The National Treasury will be funding the hospital through the fiscus
Below are the funding assumptions of the Funding Model

Table 61: Funding model assumptions

Assumption	LCH Project Parameters
Capex & S Curve	2,6 billion (construction)all in end of job cost project
Construction period	60 months construction period
Commissioning period	6 months

The PSC Model Capital Expenditure costs are not fixed and are subject to escalation

11.8 Timelines

The following table indicates the timelines for a project of this size using the IUSS Order of Magnitude Estimator as a benchmark and illustrating the synonymous SIPDM gateways.

Table 62: Critical gateways in the project programme

IUSS Order of Magnitude Estimator			Standard for Infrastructure Procurement and Delivery Management (SIPDM)		
Stage	**Timeline**	**Time (months)**	**SIPDM Gateway**	**Name**	**End of stage deliverable**
1	Project identification and scope of work	0	0	Project initiation	An initiation report which outlines the high-level business case together with the estimated project cost and proposed schedule for a single project or a group of projects having a similar high-level scope
2	Site identification and overall brief	0 Complete	1	Infrastructure planning	An infrastructure plan which identifies and prioritises projects and packages against a forecasted budget over a period of at least five years
3	Principle approval land use/develop detailed brief		2	Strategic resourcing	A delivery and/or procurement strategy which, for a portfolio of projects, identifies the delivery strategy in respect of each project or package and, where needs are met through own procurement system, a procurement strategy
4	Site Development Plan, EIA - approval LA and brief	0 (EIA pending)	3	Prefeasibility	A prefeasibility report which determines whether or not it is worthwhile to proceed to the feasibility stage
5	Approval and clinical design brief	0		Preparation and briefing	A strategic brief which defines project objectives, needs, acceptance criteria and client priorities and aspirations, and which sets out the basis for the development of the concept report for one or more packages
6	Approval of operational cost and HR requirement	1			
7	Request for service(RFS) to Implementing Agent	0 complete			
8	Appointment of Consultants				
9	Confirmation of Brief/Scope				
10	Concept design approval	1	**4**	**Feasibility**	A feasibility report which presents sufficient information to determine whether or not the project should be implemented
				Concept and viability	A concept report which establishes the detailed brief, scope, scale, form and control budget, and sets out the integrated concept forone or more packages
11	Design development with report	8	5		

IUSS Order of Magnitude Estimator			Standard for Infrastructure Procurement and Delivery Management (SIPDM)		
Stage	**Timeline**	**Time (months)**	**SIPDM Gateway**	**Name**	**End of stage deliverable**
12	Project execution plan approved	2		Design development	A design development report which develops in detail the approved concept to finalise the design and definition criteria, sets out the integrated developed design, and contains the cost plan and schedule for one or more packages
13	Tender and technical documentation completed	2	6	Design documentation	Production information which provides the detailing, performance definition, specification, sizing and positioning of all systems and components enabling either construction (where the constructor is able to build directly from the information prepared) or the production of manufacturing and installation information for construction
				6A Production information	
				6B Manufacture, fabrication and construction information	Manufacture, fabrication and construction information produced by or on behalf of the constructor, based on the production information provided for a package which enables manufacture, fabrication or construction to take place
14	Tender advertising	1			
15	Tender closing	2			
16	Tender award	2			
17	Contract start date	1			
18	Site handover/Access date				
19	Planning complete				
20	Construction Completion	60	7	Works	Completed works which are capable of being occupied or used
			8	Handover	Works which have been taken over by the user or owner complete with record information
			9	Package completion	Works with notified defects corrected, final account settled and the close out report issued
21	Commissioning of facility	6			

The LCH project is at Gateway 4, feasibility. The procurement timetable going forward that is appropriate for procurement of the project is indicated in the following table:

Table 63: Project programme timetable

Stage	Timeline LCH Project	Timeline (months) Proposed	SIPDM Gateway	Name		Date
10	Concept design approval	1 8	**4**	**Feasibility approval**	Presentation to Peer Review	30th June 2018
				Concept and viability approval	Presentation of Concept Design to Peer Review	21st August 2018
					Approval Gate 4	14th October 2018
11	Design development with report	2	5	Design development	Presentation to Peer review	30th April 2019
12	Project execution plan approved	2			Approval Gate 5	14th June 2019
13	Tender and technical documentation completed	3 1 2	6	Design documentation	Presentation to Peer Review	1st August 2019
				6A Production information		
				6B Manufacture, fabrication and construction information		
					Approval Gate 6	15th August 2019
14	Tender advertising	2				1st September 2019
15	Tender closing	1				1st November 2019
16	Tender award	2				14th January 2020
17	Contract start date	60				7th February 2020
18	Site handover/Access date					
20	Construction Completion	48 1	7	Works/Construction	Approval Gate 7	
			8	Handover	Approval Gate 8	
			9	Package completion	Approval Gate 9	6th January 2025
21	Commissioning of facility	6		Commissioning		6th July 2025
				Operations commence		7th July 2025

The procurement plan will be closely monitored by the project office of NDOH and regularly updated in accordance with variations or amendments of the process, all of which will be tracked to ensure a record of reasons for both.

Table 64: Estimated Timeline for the Project

ESTIMATED TIME LINE FOR PROJECT		OPTION 2			
		ORIGINAL PROGRAM		REVISED PROGRAM	
Order of Magnitude Estimator - IUSS		NEW	Pietersburg Regional Upgrade	NEW	Pietersburg Regional Upgrade
MILESTONE	**STAGE**				
Approval and clinical design brief	5				
Approval of operational cost and HR requirement	6				
Request for service (RFS) to Implementing Agent	7				
Appointment of Consultants	8				
Confirmation of Brief/Scope	9	Aug-18	Aug-18	Nov-18	Nov-18
Concept design approval (Gateway 4 Feasibility)	10	Oct-18	Oct-18	Jan-19	Jan-19
Design development with report (Gateway 5)	11	Apr-19	Feb-19	Jun-19	Mar-19
Project execution plan approved	12	Jun-19	Mar-19	Jul-19	Apr-19
Tender and technical documentation (Gateway 6)	13	Aug-19	May-19	Oct-19	Jun-19
Tender advertising		Sep-19	Jun-19	Oct-19	Jul-19
Tender closing	14	Nov-19	Aug-19	Nov-19	Aug-19
Tender award		Jan-20	Oct-19	Jan-20	Oct-19
Contract start date		Feb-20	Nov-19	Feb-20	Nov-19
Site handover/Access date		Feb-20	Nov-19	Feb-20	Nov-19
Completion		Jan-25	May-21	Jan-25	May-21
Commissioning of facility		**Jul-25**	**Aug-21**	**Jul-25**	**Aug-21**
Construction period		60 months	18 months	60 months	18 months
Commissioning period		6 months	3 months	6 months	3 months

11.9 Capex budget projections to 2026

Table 65: Option 2: Estimated Cash Flow Projections: all

OPTION 2									
CAPEX	**MTEF**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**	**2024/2025**	**2025/2026**
CAPEX - Limpopo Central Hospital	**Total**								
Professional Fees	R 386,804,237	69,624,763	110,101,284	32,285,598	35,004,386	35,684,082	34,664,537	26,621,458	42,818,128
Construction	R 2,221,231,399	R -	R 74,041,047	R 422,033,966	R 457,573,668	R 466,458,594	R 453,131,205	R 347,992,919	
Equipment & Commissioning	R 921,192,759	R -	R -	R -	R -	R -	R -	R 552,715,655	R 368,477,104
Sub Total	**R 3,529,228,394**	**R 69,624,763**	**R 184,142,331**	**R 454,319,564**	**R 492,578,054**	**R 502,142,676**	**R 487,795,743**	**R 927,330,033**	**R 411,295,232**
CAPEX - Pietersburg Regional Hospital									
Professional Fees	R 29,990,300	R 6,747,817	R 10,055,369	R 7,441,991	R 5,745,122	R -	R -	R -	R -
Construction	R 175,105,682	R -	R 58,368,561	R 116,737,121	R -	R -	R -	R -	R -
Equipment & Commissioning	R 74,703,421	R -	R -	R 74,703,421	R -	R -	R -	R -	R -
Sub Total	**R 279,799,402**	**R 6,747,817**	**R 68,423,930**	**R 198,882,534**	**R 5,745,122**	R -	R -	R -	R -
CAPEX- Immediate equipment									
Equipment & Commissioning	**R 154,400,000**	R 89,600,000	**R 64,800,000**	R -	R -	R -	R -	R -	R -
CAPEX-1,2 & 3									
Professional Fees	R 416,794,536	R 76,372,580	R 120,156,653	R 39,727,590	R 40,749,507	R 35,684,082	R 34,664,537	R 26,621,458	R 42,818,128
Construction	R 2,396,337,081	R -	R 132,409,607	R 538,771,087	R 457,573,668	R 466,458,594	R 453,131,205	R 347,992,919	R -
Equipment & Commissioning	R 1,150,296,180	R 89,600,000	R 64,800,000	R 74,703,421	R -			R 552,715,655	R 368,477,104
TOTAL CAPEX	**R 3,963,427,797**	**R 165,972,580**	**R 317,366,260**	**R 653,202,098**	**R 498,323,175**	**R 502,142,676**	**R 487,795,743**	**R 927,330,033**	**R 411,295,232**

11.10 DORA Allocation for the Limpopo Central Hospital[66]

To date the following MTEF allocation has been made to the Health Infrastructure Grant in respect of the Limpopo Central Hospital (LCH). The funds are ring-fenced for LCH:

2018/19	R166m (R76,4 Prof Fees and R89,6 for HT at Polokwane Hospital)
2019/20	R247m (R70m Less than cashflow to NT – R317m)
2020/21	R653m
2021/22	R498m
TOTAL	R1 564m

R1.4 billion (R247m, R653m and R498m) to fund the planning and construction of the Limpopo Academic Hospital in Polokwane. This funding is added to the Health Facility Revitalisation component of the NHIIG. This allocation is subject to conditions outlined in paragraph 4 and Annexure B

4.1. The allocations for the Limpopo Academic Hospital are subject to the preliminary conditions set out in Annexure B of the letter (Annexure 11 of this document). Allocations will be modified in subsequent budgets as conditions are fulfilled and based on the progress of each stage of the project.

IMMEDIATE TIMELINE BASED ON SIPDM AND BUDGET FACILITY FOR INFRASTRUCTURE (BFI) REQUIREMENTS

- 6 November 2018 Steering Committee Meeting
- 12 November 2018 Notice to National Treasury and BFI re Gateway 4 Review on 6 December 2018
- 13 December 2018 Gateway 4 Review
- 17 December 2018 Report to BFI: Preliminary Designs with GBA and detailed cost per Department
- 14 January 2019 Gateway 4 Review Report
- 22 January 2019 Steering Committee Meeting for End-of-Stage 4 Deliverable (Feasibility) Acceptance
- 31 January 2019 First Quarterly report to BFI
- 31 January 2019 Confirmation of SIPDM being followed to BFI
- 28 February 2019 Comprehensive Project Plan to BFI
- 28 March 2019 Steering Committee Meeting for End-of-Stage 5 Deliverable (Design Development) Acceptance

[66] ANNEXURE 11: National Treasury letter: Amendment of the Conditions in the National Health Insurance Indirect Grant: Health Facilities Revitalisation Component Grant Framework:
Signed 8/10/2018

11.10.1 MTEF budget projections to 2023

The following table is an estimate of the required budget projected for all the projects under option 2 (Capex) and the expected operational budget additional requirements for tertiary services to year 2022/2023.

Table 66: MTEF provision to 2023

OPTION 2						
CAPEX	**MTEF**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**
CAPEX - Limpopo Central Hospital	**Total**					
Professional Fees	R 386,804,237	69,624,763	110,101,284	32,285,598	35,004,386	35,684,082
Construction	R 2,221,231,399	R -	R 74,041,047	R 422,033,966	R 457,573,668	R 466,458,594
Equipment & Commissioning	R 921,192,759	R -	R -	R -	R -	R -
Sub Total	**R 3,529,228,394**	**R 69,624,763**	**R 184,142,331**	**R 454,319,564**	**R 492,578,054**	**R 502,142,676**
CAPEX - Pietersburg Regional Hospital						
Professional Fees	R 29,990,300	R 6,747,817	R 10,055,369	R 7,441,991	R 5,745,122	R -
Construction	R 175,105,682	R -	R 58,368,561	R 116,737,121	R -	R -
Equipment & Commissioning	R 74,703,421	R -	R -	R 74,703,421	R -	R -
Sub Total	**R 279,799,402**	**R 6,747,817**	**R 68,423,930**	**R 198,882,534**	**R 5,745,122**	R -
CAPEX- Immediate equipment						
Equipment & Commissioning	**R 154,400,000**	R 89,600,000	**R 64,800,000**	R -	R -	R -
CAPEX-1,2 & 3						
Professional Fees	R 416,794,536	R 76,372,580	R 120,156,653	R 39,727,590	R 40,749,507	R 35,684,082
Construction	R 2,396,337,081	R -	R 132,409,607	R 538,771,087	R 457,573,668	R 466,458,594
Equipment & Commissioning	R 1,150,296,180	R 89,600,000	R 64,800,000	R 74,703,421	R -	
TOTAL CAPEX	**R 3,963,427,797**	**R 165,972,580**	**R 317,366,260**	**R 653,202,098**	**R 498,323,175**	**R 502,142,676**
OPEX	**MTEF**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**
Pietersburg hospital		**R 23,145,488**	**R 205,148,562**	**R 310,100,601**	**R 310,100,601**	**R 848,495,253**
Mankweng Hospital		**R 5,968,601**	**R 67,606,981**	**R 83,526,583**	**R 83,526,584**	**R 240,628,749**
TOTAL OPEX		**R 29,114,089**	**R 272,755,543**	**R 393,627,184**	**R 393,627,185**	**R 1,089,124,002**
Total all	**R 3,963,427,797**	**R 195,086,669**	**R 590,121,804**	**R 1,046,829,282**	**R 891,950,361**	**R 1,591,266,678**

2018/19 Approved by NT as per the Cash Flow R166m[67]
2019/20 R247m approved – difference R70m
2020/21 Approved as per cash flow R653m
2021/22 Approved as per cash flow R498

[67] ANNEXURE 11: National Treasury letter: Amendment of the Conditions in the National Health Insurance Indirect Grant: Health Facilities Revitalisation Component Grant Framework:
Signed 8/10/2018

Key Success Factors

The Table below describes some of the major success factors that need to be in place to ensure the effective roll-out of a comprehensive procurement programme of the type required here. The organisations above apply many or all of these basic principles.

Table 67: Success Factors for Effective Programme management

Factor	Comments
Skilled resources	• Access to experienced engineering and project management skills (either in NDOH or from third parties) • Standard governance, oversight and support processes to facilitate project planning and development, execution.
Close interaction with end-users and stakeholders	• Input from end-users is vital to confirming an acceptable design. Managing stakeholders (including the bidders, affected hospitals and State Departments) is key to ensuring that they are committed, appropriately informed and contribute to the success of the programme.
Programme/project scheduling	• Project scheduling is a specialist skill that requires suitable qualified resource; • Good scheduling enables a more dynamic response to project challenges.
Clarity in contract drafting	• Contract provisions should clearly delineate roles and responsibilities for the various parties. • An agreed governance structure should be adopted including governance, oversight and assurance roles which limits scope creep.
Well-defined and controlled scope	• Demand changes and change orders during construction are key drivers of scope creep. • Transparent procedures are required to control on scope changes and ensure parties have a full understanding the impact of change orders before final authorisation is given.
Realism	• The complexity of large-scale projects is often underestimated at the outset of projects resulting in “optimism bias” in costing and other assumptions;
Effective risk allocation	• The correct identification, assignment and monitoring of risks transferred to contractors is key to avoiding risk. • Transferring too much risk to contractors may force contractors to compensate by way of lower quality work, ultimately leading to additional costs. • Managing portfolio risks potentially dilutes the total risk as opposed to only managing project risks.
Timely decision making	• Contractors may forge ahead with inappropriate solutions where timely decisions are not forthcoming; or • Delayed decisions may lead to delays or scope changes, resulting in significant costs and/or claim. • An enabling governance system is necessary for leaders to govern with confidence, making timely decisions using high quality management information.

Strong communications	• Clear communication to decision-makers may be compromised from fear of delivering bad news. This can delay timely decision making (see above).
Active quality management	• An agreed quality plan based on appropriate standards for service delivery supports positive engagement and the achievement of value for the State. • This also supports consistent application of the Government-Wide Immovable Asset Management Policy will be supported. • Life cycle costs for the portfolio can be maximized as opposed to varying life cycle cost reductions for individual hospitals.

12 GOVERNANCE

12.1 Stakeholder engagement

For the purpose of this project, stakeholders have been divided into the categories listed below:

- Statutory stakeholders: those departments which have a direct role in the vetting and approval of the Project and without whose consent the Project may not proceed;
- Project participants: those organisations which have a direct involvement in the new project through the provision of services or utilities;
- Referral hospitals and other primary healthcare units within LCH catchment area;
- Organised labour and unions: those organisations representing staff;
- The public and everyone else not forming part of the above.

Particular NDOH statutory and advisory bodies and stakeholders are identified on the NDOH website and include the following:

- Allied Health Professions Council of South Africa;
- Council for Medical Schemes;
- Health Professions Council of South Africa;
- Medicines Control Council;
- National Health Laboratory Services;
- South African Dental Technicians Council;
- South African Medical Research Council;
- South African Nursing Council and
- South African Pharmacy Council

Project team participants comprise:

- National Department of Health (NDOH);
- Limpopo Department of Health (LDOH);
- National Treasury (NT);
- Limpopo Treasury (LT);
- Department of Higher Education and Training (DHET)
- Consultants

Table 68: List of stakeholders and project participants

	Name	Discipline	Organisation
NATIONAL DEPARTMENT OF HEALTH			
1	Dr M Shaker	National Support	NDOH
2	Christie Engelbrecht	Infrastructure	NDOH
3	Ndina Mphaphuli	Infrastructure	NDOH
LIMPOPO DEPARTMENT OF HEALTH			
1	Dr. N Kgaphole	Head of Department	LDOH
2	Dr. T Mhlongo	DDG Tertiary Services	LDOH
3	Dr. Dombo	DDG PHC	LDOH
4	A Ntsewa	CEO	Mankweng Hospital
5	Dr. A Modiba	CEO	Pietersburg Hospital
6	Prof. AJ Mbokazi	University of Limpopo	
7	Dr. M.J. Mojapelo	Acting Director	LDOH
8	A.N. Ramukumba	CEO	Mankweng Hospital
9	Dr. S. Maweya	C.E.D.	Pietersburg Hospital
10	Dr. M. Ntshengedzeni Muvhango	Clinical Manager	Mankweng Hospital
11	Dr. C T Ntsoane	Deputy Director	Pietersburg Hospital
12	Dr. S. Ramahlima	Deputy Manager	Pietersburg Hospital
13	Dr. SZ Mzezewa	HOJD Plastics	Mankweng Hospital
14	Dr.DS Nesengani	HOJD Obstetrics & Gynaecology	PH & MH
15	Dr.MMZ Bhuiyan	Head of Surgery	PH & MH
16	Dr. P.M. Masegela	Consultant Urology	Pietersburg Hospital
17	Dr. C.J. Landauer	HOCU- Department Cardio-thoracic surgery	Pietersburg Hospital
18	Prof. T. Mariba	Specialist Internal Medicine	Pietersburg Hospital
19	Dr. A.R. Ratsela	HOJD Internal Medicine	Pietersburg Hospital
20	Dr. S.M. Risenga	HOJD	Pietersburg Hospital
21	Dr. S. Omoding	Pietersburg Hospital	Pietersburg Hospital
22	Dr. C.Sutton	HOCU -Paediatrics & Child Health	Pietersburg Hospital
23	Dr. E.K.Motlanthe	Acting Pharmacy Manager	Pietersburg Hospital
24	Dr. S Ntlamele	Medical Physicist	Pietersburg Hospital
25	Dr A Robertson	Head of Paediatrics	LDOH
26	L Roper	Engineer	LDOH- Infrastructure
27	M Morkel	Town Planner	LDOH - Infrastructure
NATIONAL TREASURY			
	B Mashelo	Lead Assessor	NT
	C Steyn	QS	Consultant to NT
	J Daven	NT Health	NT
	R Mokanse	NT: BO	NT
	DR M Blecher	NT: Health	NT
LIMPOPO TREASURY			
DEPARTMENT OF HIGHER EDUCATION			
	Prof. J Nel		Edupark
	H Du Toit		UL
	P Franks		UL

Table 69: Consultant engagement to date

	Name	Discipline	Company
1	Johann Loubser	Legal services	Sakhiwo Health Solutions (Pty)Ltd
2	Edwina Fleming	Health Planner & Architect	
3	Dr. Nicholas Crisp	Public Health Specialist	Private Consultant
4	Robert Futter	Director	Cresco Group
5	Sinesipho Maninjwa	Economist	
6	JP Du Plessis	Market Analyst & GIS Operator	Demacon
7	Deorah Budlender	Social Economist	Private consultant
8	Steve van Jaarsveld	Project Manager	Ntaba Resources & Project Managers
9	Rudolf Roos	Pr.Architect	Hospital Design Group
10	Piet van Heerden	Pr. Architect	
11	Walter Moilwa	Structural Engineer	S & W Consulting Engineers
12	Cobus Maree	Civil Engineer	
13	Shane Wessels	Electrical Engineer	
14	Pienaar Roussouw	Mechanical Engineer	Deltamech (Pty)Ltd
15	Andre Viljoen	Quantity Surveyor	SVP Quantity Surveyors
16	Basie van der Merwe		

NDOH will remain responsible for liaison with its statutory stakeholders and other stakeholders as is necessary.

13 ROLES AND RESPONSIBILITIES

13.1 National Department of Health

Government, through Gazette, places the responsibility for central hospitals with the National Department of Health. Thus, NDOH is primarily accountable for overseeing and ensuring the success of the Central Hospital project. The NDOH is the primary government healthcare sector stakeholder with ultimate authority over the healthcare sector approval and budget provision for the Project.

NDOH shall be responsible for:

- Determining the objectives and key performance indicators which shall consist of time, cost, quality, healthcare and job creation and SME development metrics;
- Determining the scope and the range of procurement and partnering options to be considered;
- Determining the Clinical Brief which is an outline of the user requirements and operational narrative to inform the Professional Team of the design requirements;
- Working with National Treasury to ensure that the requisite funding is secured for the programme from public or private sources;
- Structuring the roll-out of the programme in terms of time-frames and phasing of the project;
- Approval of the programme implementation plans, including key milestones, budgets and cash-flow projections;
- Final approval of the site development plans, final designs, construction drawings and budgets (including detailed bills of quantities) for the project;
- Effective Implementing Agent contract management;
- Establishing a Steering Committee to manage the performance of the project and implementing agent at an operational level.;
- Establishing the requisite internal capacity to effect the roles and responsibilities of NDOH on the project. A project office will be established in the NDOH and supported by three appropriately qualified and skilled built environment professionals and one equally skilled qualified health planner. The office shall be responsible for full project management and administration

13.2 Provincial Departments of Health

LDOH is the local government healthcare sector stakeholder. As part of the Joint Steering Committee, (JSC), all procurement activities and documentation will require their approval before submission to NT. The Central Hospitals will be part of a broader health care network and referral system that is managed by Provincial Departments of Health and these departments remain responsible for overseeing the day-to-day management of these facilities. Thus, these departments are also accountable for the success of the Central Hospital project

13.3 National Treasury

National Treasury in the primary government finance sector authority responsible for compliance with PFMA and Treasury Regulation 16.

The National Treasury is responsible for fiscal allocations across different sectors and spheres as well as determining appropriate funding models for government social and economic infrastructure. The roles and responsibilities of NT shall be as follows:

- Facilitating access to public finance for the Central Hospital and monitoring its effective management.
- Facilitating access to alternative funding sources as may be required, including supporting the development of innovative funding solutions.

13.4 University of Limpopo Faculty of Health Sciences

The University of Limpopo Faculty of Health Sciences will be the medical school occupying the new medical school adjacent to the new LCH and will provide the learning platform at the LCH.

13.5 Governance structure within NDOH

Responsibility for the new central hospital has been transferred to the national department of health which has capacitated a task team “project office” to effectively manage the development of the project

Programme Oversight and Steering Committee (POSC)

The POSC will be established with the purpose of ensuring close collaboration between NDOH as the primary custodian of the project and all its stake holders and partners. The POSC will provide strategic oversight at different levels.
The POSC will be chaired by the relevant DDG of the NDOH

Executive Project Manager (EPM)

The EPM manage the project at executive level providing oversight, guidance and direction to the Project office and its Coordinating Project Manager and will report directly to the department and its POSC.

The EPM shall also be responsible for any liaison between the NDOH and any third party (i.e. National Treasury, PIC or an implementing agent) with regards to the project.

The EPM should have at least 10 years post- graduate experience in the planning of large health infrastructure projects and is registered either as a professional engineer in terms of the Engineering Profession Act, a professional quantity surveyor in terms of the Quantity Surveying Profession Act or a professional architect in terms of the Architectural Profession Act.

Project Office (PO)*

The NDOH with the assistance of DBSA has established a pool of professional individuals for all the required field of expertise for mega projects such as LCH from which individuals and firms can be assigned tasks based on as and when required. The PO services will holistically be provided by the NDOH, augmented by specialist individuals as and when required. The overall intent of the PO is to have consistency in approach throughout all phases of the project. Through the centralization of skills and experience, the PO will support many of the key success factors required in delivering projects with the complexity and sophistication of a major hospital.

The roles and responsibilities of the participants in the Project Office can be summarized as follows;

- Full project management covering all stages of the project from design through to commissioning, close out and post evaluation;
- Full project administration during all stages of the projects as above;
- Full coordination, reporting and risk management responsibilities at portfolio, program and project levels through all stages of the projects;
- Any other responsibilities that may be required for successful completion and utilization of the projects

***Note:**

If financing and Implementation is going to be through the PIC, The linkages and contact, etc. should be through the Project Executive Office or its nominees-The relations and responsibilities would be determined in the agreement with PIC.

The following positions as highlighted from the Governance Structure will be filled through the pool of the Project Office:

- Project Coordinating Manager
- Project Construction Manager
- Project Legal and Contractual Manager
- Project Financial Manager
- Project Health Planning, commissioning and operationalization Manager
- Any other expert/s that may be required on short or long-term bases for successful completion of the project.

These members of the PO are a core group of experienced personnel each skilled in their specific area of expertise.

The following are some macro responsibilities of the above managers and their Coordinating manager:

- Financial: develop and maintain a cost plan and monitor the budget expenditure as well as assist the financial team;
- Contract administration: Administer the contract in accordance with the requirements of the selected contract;
- Construction monitoring: Monitor that design assumptions are valid, the design is being correctly interpreted and the work is being executed in accordance with the designs, appropriate construction techniques and good practice;
- Project management: Manage projects, in accordance with the SIPDM project stages, in a manner that enables the employer to achieve its objectives and in such a manner that:
  - all projects are developed and managed in terms of a common procedural approach and integrated with the employer's administrative processes;
  - the various elements of the project are properly co-ordinated;
  - the timely completion of the project is facilitated;
  - effective use of the people involved with the project is made;
  - The systematic identification, analysis, and response to project risk occurs.
- Occupational health and safety services: Monitor compliance with occupational health and safety requirements, conduct random site audits and issue, where necessary, improvement notifications, contravention notices and prohibition notices
- Management of the project team as illustrated in the figure above:
  - The health facility planner and the task teams associated with that portfolio;
  - The financial manager
  - The legal and contractual manager
  - The lead professional service provider
  - The Construction project manager

Through the ***centralisation of skills and experience***, a Project Office will support many of the key success factors required in delivering projects with the complexity and sophistication of a major hospital.

Additional key success factors supported include:

- Well informed strategic health planning:
- Infrastructure planning and design managed and supported by experienced health planners and consultant teams with a proven record of successful experience in the field of health facility design;

- Well-defined and controlled project scope and brief documentation sufficiently detailed to inform and guide the process from design, through tender, construction, commissioning to final handover and operation;
- Contract clarity and better contract management;
- Realism – better estimation of the complexity of large projects;
- Timely decision making;
- Strong reporting communications delivering more accurate project performance and early warning for project remedial action:
- Active quality management;
- Comprehensive risk management with risk identification and mitigation:

13.6 **Joint Steering Committee (JSC)**

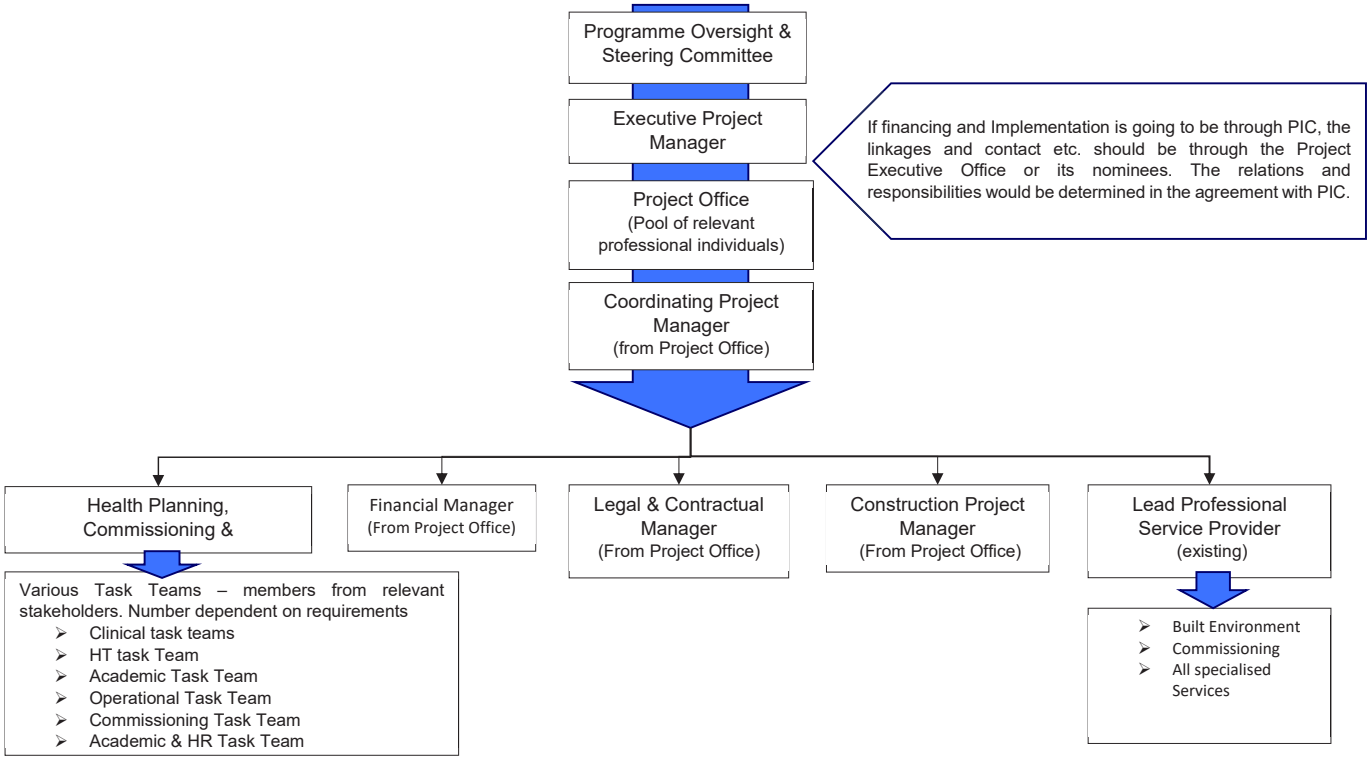
A JIC comprising at least the following role-players is to be established to manage the development of the academic complex (hospitals and faculty):

- National Department of Health (NDOH)
- Limpopo Provincial Department of Health (LPDOH)
- Health Professions Council of South Africa (HPCSA)
- South African Nursing Council (SANC)
- Council on Higher Education (CHE)
- Department of Higher Education (DHET)
- Affected Higher Education Institutions and Nursing Education Institutions (HEIs/NEIs)
- University of Limpopo (UL)

The JIC will provide assistance to the project office to ensure the successful delivery of the Project. For the purposes of governance of the Project, the functions of the JSC are to:

- Facilitate communication between the parties;
- Review the progress on the Implementation of the agreement;
- Manage and resolve potential disputes;
- Monitor and maintain alignment with institutional policy and strategy;
- Achieve agreement objectives within the agreed scope, time, cost and quality;
- Provide advice and written consent on scope variation;
- Facilitate all necessary national treasury approvals;
- Provide feedback to all the relevant stakeholders

NATIONAL DEPARTMENT OF HEALTH - LIMPOPO CENTRAL HOSPITAL
Governance structure during development of the project



14 RISK ANALYSIS

Refer to the Risk Matrix: Annexure 6

The determination of risks inherent in the delivery of large complex public projects and treatment thereof is essential for the procuring institution and is a key aspect of the value assessment termed as "risk analysis" as it is likely that additional costs will be incurred due to certain events (i.e. risks) that will transpire over the life of the project. This could include, design changes or changes to specifications after construction has started or during operations, with the increase in inflation and foreign exchange rates during the life of the project. Already, since the inception of the project, VAT has been increased by 1% to 15%. Traditionally delivered projects have a tendency to run over budget and time when the objective is to achieve strong performance in terms of on-time and on-budget delivery. All these "risks" add real costs to the project over and above the projected base costs and mitigation should be planned for. Therefore, the purpose of the risk analysis is to identify the project risks and resulting additional costs that need to be factored into the estimated costs as part of the value for money (VFM) exercise.

The Public Sector Risk Management Framework was developed by National Treasury in response to the requirements of the Public Finance Management Act and Municipal Finance Management Act for Institutions to implement and maintain effective, efficient and transparent systems of risk management and control.[68] The Risk assessment is a systematic process to quantify or qualify the level of risk associated with a specific threat or event, to enrich the risk intelligence available to the Institution.
The main purpose of risk assessment is to help the Institution to prioritise the most important risks as the Institution is not expected to have the capacity to deal with all risks in an equal manner

This Risk assessment involves the following key steps:

- Identifying project risks: The objective of risk identification is to understand what is at risk within the context of the Institution's explicit and implicit objectives and to generate a comprehensive inventory of risks based on the threats and events that might prevent, degrade, delay or enhance the achievement of the objectives.
- Estimation of the risk likelihood (probability or frequency of risk occurrence);
- Determination of the risk consequence (outcome or impact of an event);
- Determination of the overall risk rating level; and
- Documentation of the risk assessment process - calculating the value of each risk.

These are tabled in a "Risk Matrix" that includes:

- Risk description -an occurrence or a particular set of circumstances;
- Risk category;
- Causes - how and why the risk can happen (i.e. causes and consequences);
- Likelihood of a risk occurring;
- Consequences - the outcome(s) or impact(s) of an event on the institution;
- Qualitative cost should the risk materialize;
- Risk level rating based on pre-established criteria;
- Prioritisation of the risks
- Accountability for risk treatment;
- Mitigation - the existing internal controls that may reduce the likelihood or consequences of the risks.

The National Treasury Risk Framework lists the following categories of risks:

1. Market risk
2. Design risk

[68] *https://oag.treasury.gov.za/RMF/Pages/s101ExecutiveSummary.aspx*

3. Construction risk
4. Operating risk
5. Political risk
6. Environmental risk
7. Inflation risk
8. Interest rate risk
9. Exchange rate risk
10. Regulatory risk

The risk analysis methodology requires that a project specific risk workshop be conducted with key stakeholders to review and assess the specific attributes of the project that would warrant additions to the standardized risk matrix (National Treasury). This approach ensures that the project specific risks are carefully considered and reflected in the estimation of risk. Below are estimated risks compiled through research of comparative projects of similar size and nature.

The risks are identified in the table below, separated into:

- Departmental risks
- Planning risks
- Design risks
- Construction risks
- Operational risks
- Technology risks
- Financial
- Legal
- Political risks
- Potential changes of life affecting the project

Key Risks include:

- Design risk;
- Completion risk:
- Opex risk: Operational efficiency
- Financial risk;
- Maintenance risk;
- Market risk (Off-take): Ministry of Health budget allocation
- Funding Risk:
    - Long term finance/match currency funding/ lower rates
    - Tranche funding

The following 23 cost variables were identified:

- Risks anticipated during design and construction
    - Design cost;
    - Construction start delay;
    - Construction prime cost;
    - Construction duration delay;
    - Professional fees;
    - Demolition cost;
    - Commissioning start delay;
    - Commissioning cost;
    - Commissioning delay;
    - Preliminary and general;
    - HT equipment costs;
    - FM equipment cost;
    - Decanting cost;
- Risks anticipated during operations
    - Hard FM cost

- HT equipment lifecycle costs;
- FM equipment lifecycle costs;
- HT equipment maintenance costs;
- Facility management staff costs;
- Facility management goods and services;
- Utilities;

- Financial risks
  - Consumer price inflation;
  - Labour inflation top-up; and
  - US inflation.

The following list compiles the major risk categories:

Table 70: Risk Categories

Risk categories	Consequences
Design risk	Cost of modification, redesign costs
Construction risk	Additional raw materials and labour costs, cost of maintaining existing infrastructure or providing a temporary alternative solution where this leads to a delay in the provision of the service
Commissioning risk	additional ramp-up costs, cost of maintaining existing infrastructure or providing a temporary alternative solution where this leads to a delay in the provision of the service
Environmental risk	Additional costs incurred to rectify an adverse environmental impact on the project, incurred from the construction or operation of the project or pre-existing environmental contamination
Financial risk	Additional funding costs for increased margins or unexpected refinancing costs. Cost increases resulting from inflation and foreign exchange changes
Force majeure risk	Additional costs to rectify
Industrial relations risk	Increased employee costs, lost revenue or additional expenditure during delay in construction or service provision post-construction
Latent defect risk	Cost of new equipment or modification to existing infrastructure
Operating risk	Increased operating costs or reduced revenue over the project term
Performance risk	Cost of failing to comply with performance standards
Change in law risk	Cost of complying with new regulations
Technology obsolescence risk	Cost of replacement technology
Maintenance risk	Increased cost of repair above the level included in the raw PSC cost. Additional capital costs required to maintain specified service above the level included in the raw PSC

14.1 Risk comparison

Financial Risks Quantified

Based on the Risk identification, the impact of the high risks namely cost overruns is detailed below:

- Time delay
- Exchange rate USD / ZAR deterioration
- Escalation increases above initial base estimates

The following risks have been calculated per calendar day (excluding VAT) per option:

Table 71: Risk calculations pre and post contract with preliminary costs per option

RISKS:			COSTS PER CALENDAR DAY - EXCL VAT 15%
1. PRE-CONTRACT ESCALATION			
	Amount	**Calendar days**	**Cost per Day (10 months x 30 days = 300 days)**
OPTION 1	165,987,773	300	553,292.58
OPTION 2	140,574,123	300	468,580.41
OPTION 3	151,397,733	300	504,659.11
2. RISKS - CONSTRUCTION: CONTRACT ESCALATION (EXTENSION IN CONTRACT PERIOD)			
OPTION 1	634,596,894	2,160	293,794.86
OPTION 2	368,769,293	1,440	256,089.79
OPTION 3	533,733,784	1,800	296,518.77
3. RISKS - CONSTRUCTION: TIME BASED PRELIMINARY COSTS			
OPTION 1	205,036,000	2,160	85,432
OPTION 2	258,050,000	1,440	161,281
OPTION 3	253,184,000	1,800	126,592

[SVP QS]

Exchange Rate

Set out below is a scenario table which details the possible cost overrun impact for differences in the USD / ZAR exchange rate during construction. This was based on assumption that 10% of Building Capex being denominated in USD, and the balance in ZAR. Please note that ongoing maintenance figures

Table 72: Risk calculations for USD / ZAR deterioration.

Option 1

Exchange Rate	Capex US -ZAR	ZAR	Total	Cost Over Run Impact
13	495 541 111	4 699 180 100	5 194 721 211	1 267 084 905
15	571 778 205	4 699 180 100	5 270 958 305	1 343 321 999
17	648 015 299	4 699 180 100	5 347 195 399	1 419 559 093
19	724 252 394	4 699 180 100	5 423 432 494	1 495 796 187
21	800 489 488	4 699 180 100	5 499 669 588	1 572 033 281

- A worsening in the exchange rate from 13 to 15ZAR / USD will increase the capex by R [1 343 321 99]

Option 2

Exchange Rate	Capex US -ZAR	ZAR	Total	Cost Over-Run Impact
13	3 623 244 496	3 817 662 490	7 440 906 986	3 513 270 679
15	4 180 666 726	3 817 662 490	7 998 329 216	4 070 692 910
17	4 738 088 956	3 817 662 490	8 555 751 447	4 628 115 140
19	5 295 511 186	3 817 662 490	9 113 173 677	5 185 537 370
21	5 852 933 417	3 817 662 490	9 670 595 907	5 742 959 600

- A worsening in the exchange rate from 13 to 15ZAR / USD will increase the capex by R [4 070 692 910]

Option 3

Exchange Rate	Capex US -ZAR	ZAR	Total	Cost Over-Run Impact
13	573 804 284	5 441 344 036	6 015 148 320	2 087 512 013
15	662 081 866	5 441 344 036	6 103 425 902	2 175 789 595
17	750 359 448	5 441 344 036	6 191 703 484	2 264 067 177
19	838 637 030	5 441 344 036	6 279 981 066	2 352 344 759
21	926 914 612	5 441 344 036	6 368 258 648	2 440 622 341

- A worsening in the exchange rate from 13 to 15ZAR / USD will increase the capex by R [2 175 789 595]

15 UNIVERSITY OF LIMPOPO MEDICAL SCHOOL

15.1 Medical School

The University of Limpopo opened the ninth medical school in the country in January 2016, with the first intake of 60 students at Turfloop campus.

The Medical School is one of the two schools in the Faculty of Health Sciences.

The Medical School was accredited by the Council on Higher Education (CHE) and Health Professions Council of South Africa (HPCSA) in 2014 to offer Bachelor of Medicine and Bachelor of Surgery (MBChB) undergraduate degree as a six-year programme. This school also offers accredited postgraduate studies, leading to specialisation in various clinical disciplines, such as Anaesthesiology, Dermatology, Forensic Pathology, Family Medicine, Internal Medicine, General Surgery, Plastic Surgery, Paediatrics and Child Health, Paediatric Pulmonology, and Public Health Medicine to mention a few. The medical school is now (2018) offering MBChB I, II and III. 40 South African students, who started training in Cuba under the Nelson Mandela-Fidel Castro (NMFC) programme into the fifth year of study, with effect from July 2018 are returning to train at the university. The school and the Limpopo department of health are in the process of recruitment of more specialists especially in the department with a shortage such as the pathologies (fortunately there are now have 2 microbiologists, 1 virologist, a haematologist and a part-time histopathologist), general surgery, orthopaedics and ophthalmology. We presently have 180 students registered with us and this number will increase by 40 in July when the NMFC students return.

The school is also training registrars in a number of departments, and fellows in paediatric pulmonology. Some departments like paediatrics and child health, paediatric pulmonology, psychiatry, diagnostic radiology, forensic medicine have had good success in the Colleges of Medicine of South Africa, resulting in an increase in medical specialists trained at this university and the hospitals.

The second School in the Faculty is the School of Health Care Sciences which comprises seven departments: Human Nutrition and Dietetics; Nursing Science; Optometry; Pathology and Medical Sciences; Pharmacy; Public Health; and Pre-Clinical Sciences. The of health sciences is also producing a good number of professionals annually. All the above factors should be taken into consideration on the building of a central hospital for the Limpopo Province.

The central hospital is very much needed in the province and by the university for teaching purposes. It will assist with the recruitment of specialists and sub-specialist to this rural province. This is because it is easier to recruit health professionals to a well-constructed modern hospital than to what presently exists. The university is planning to increase enrolment into the MBChB programme. The school normally has 2000-3000 applicants who qualify for admission but can presently only accept 60 students into the first year. The spinoffs from the central hospital will include decreasing the number of patients transferred to Gauteng and increasing the training platform to the level of some of the sister medical schools.

The feasibility for the new Medical School on the site adjacent to the new site for the Limpopo Central Hospital, is currently being updated for submission to National Treasury approval.

15.2 National and provincial processes

It is important is that a routine, institutionalised and integrated planning process should be established for teaching and training of health science students. This process must incorporate the changing service

demands, changes in regulation of professional practice, challenges of teaching and training in the workplace, technology developments, and a host of other shifting environmental factors. While the Minister of Health is the Minister responsible for ensuring that adequate resources are available for the education and training of health care personnel, the Minister of Higher Education is responsible for the machinery to deliver this education and training.

There are well over 100 health professions registerable with the three main health councils (HPCSA, SANC and SAPC). All of these professionals have to be trained. Educating trainees through to the production of competent professional graduates, and then developing them as professionals, is critical to the sustainability of the health system. Training is complex and for all professions involves a degree of experiential learning on the "service platform".

Provincial health departments play a significant role in the clinical training of health sciences students and accommodate students on the health service platform. Universities must ensure that graduates test compliant with the requirements and standards set for the health, education and science systems.

The concept of an 'academic health complex', which is attractive to HEIs for facilitating their role in health science student education, the role of central hospitals and their governance structures and the plethora of funding sources (NTSG, HPTDG, CG, infrastructural grants etc) create difficulties for planning and delivering health science student training. A common vision must be derived from the need to serve the public in the country, to respond to the health service need and requirements related to burden of disease, the move to universal health coverage as well as quality assurance and at the same time to address the education needs and the role of research in generating knowledge for policy and practice. Practitioners, health educators and health scientists/researchers are all human resources for health and these stakeholders must be incorporated in the vision.

The National Plan for Teaching and Training Health Science Students[69] sets the scene for the establishment of the faculty together with the hospital. The document deals with a wide range of critical issues including:

- Principles regarding roles with respect to health science students on the service platform
- Definitions (including):
  - Breadth of clinical education and training
  - Breadth of service platform for education and training
  - Breadth of teaching (platform) for education and training
  - Academic Health Complex
- Governance of health science student training, including agreements between the parties
- Monitoring tools and processes, such as:
  - Monitoring and evaluation of clinical training
  - Tracking and analysing funding and financing of clinical training
- Training quality, specifically:
  - Fit for purpose training environment
  - Clinical competencies of graduates
- Minimum norms and standards, including accreditation and compliance
- Funding

A major consideration is the agreement between the LDOH and the Limpopo University in relation to the Medical School with respect to:

- Dual appointment of staff;
- Organisational structure and management roles of academic staff;
- Integration of the academic platform into the LCH operational platform;
- Provision of academic spaces and additional space requirements within the LCH;

[69] *PART 3 HSST vFinal (2013)*

- Servicing and maintenance of the above-mentioned spaces;
- The possibility of shared accommodation services related to students and hospital staff.

15.3 Governance of relationships

Guidelines to facilitate governance of critical matters related to tertiary health service delivery and training of the professional human resources required to deliver these services[70] are also available.

Three major issues are discussed:

1. General principles and terminology of "governance' in the context of tertiary services and health science student training
2. National Governance of Tertiary Health Services
3. National Governance of Training and Development for Health Science Students

In Limpopo there is a need to formalise a sound mechanism for the provincial Department of Health, NHLS, and Higher Education Institutions (University of Limpopo and any others) to work together. Three are proposed in the guidelines:

1. Joint Agreement Governance Council (JAGC) for governing and regulating the relationship and interactions between the parties at a policy level (MEC and VC)
2. Health Platform Committee (HPC), a multilateral structure comprising the provincial health department and all HEIs/NEIs training health science students in the province
3. Joint Standing Advisory Committees (JSACs), for governing and regulating the relationship between the provincial DOH and University of Limpopo bilaterally

[70] *PART 4 Integrated Governance 2013 FINAL (2013)*

16 FINAL RECOMMENDATIONS

The aim of the project is to procure the design, construction, finance, maintenance and facilities management operation of new infrastructure and equipment for additional tertiary services in Limpopo Province. The preferred option two, providing a new 488 bed central hospital on the greenfield site donated by the local authority, will make a significant contribution to improving healthcare provision in Limpopo and the region as well as expanding the pool of well-trained healthcare professionals. Not only will this project provide much needed health care, but the implementation and construction of these projects will have a significant impact and positive benefit on the economy of the region and even the country. Large infrastructure projects of this type and nature positively affect the macro economy and this flows through to the micro economy.

Expectation of the countries citizens have increased with regard to healthcare provision yet inequities remain in access and in healthcare conditions across the different groups within South Africa. The need remains to promote more value for money in the health sector, while ensuring universal access, equity and raising quality of care. Investments in health and the design of health financing policies should be addressed in terms of the interaction between health and the economy. Just as growth, income, investment and employment are a function of the performance and quality of the economic system, its regulatory frameworks, trade policies, social capital and labour markets, etc, so health conditions (mortality, morbidity, disability) depend not just on standards of living, but on the actual performance of health systems themselves.[71]

The funding of R 3,963,427,796 for the preferred Option 2 of this project and the additional R800million operational costs per annum that will be required for the optimum operation of this facility once completed, is proposed for approval.

[71] *International Monetary Fund: Health and Development 2004*

ANNEXURES

List of Annexures

ANNEXURE 1: Geographical Definition of Limpopo Province
ANNEXURE 2: Clinical Services Feasibility Study
ANNEXURE 3: Strategic Analysis: Service Delivery Platform
ANNEXURE 4: Schedule of Accommodation
ANNEXURE 5: Option Advantages and Disadvantages Comparison
ANNEXURE 6: Detail Risk Matrix
ANNEXURE 7: Pietersburg Hospital Post Status as at May 2018 - LCH
ANNEXURE 8: Budget Based Staffing Plan - LCH May 2018
ANNEXURE 9: Survey Drawing
ANNEXURE 10: Approval of AIP
ANNEXURE 11: National Treasury letter: Amendment of the Conditions in the National Health Insurance Indirect Grant:P Health Facilities Revitalisation Component Grant Framework: Signed 8/10/2018

APPENDIX I2

MOTIVATION FOR NO LAYOUT ALTERNATIVES

HOSPITAL DESIGN GROUP

984 Jan Shoba Street
Brooklyn
Pretoria 0181
PO Box 2525
Brooklyn Square 0075

T +27 12 346 0526
F +27 12 346 0527
E info@hdg.co.za
mail@hdg-pretoria.co.za
W www.hdg.co.za

Attention:
Mr S van Jaarsveld, Project Manager
Sakhiwo Health Solutions

Per an email: steve@sakhiwo.com

Sir,

NEW LIMPOPO CENTRAL HOSPITAL: EIA

This is to confirm the following:

1. No Alternative Layout is required as three differing layouts were prepared namely:

    a) **Site layout No.1**, dated 2018.11.02 indicating a facility with a separated Oncology Unit, Trauma Centre approached from the north, open staff parking areas and a separate entrance to the Oncology Unit.

    b) **Site Layout No. 2**, dated 2018.12.07 indicated same as above except the Mother and Child Hospital is placed separately on the northern side of the main buildings. The Trauma Centre was situated between the latter and the main entrance. This layout was accepted by SIPDIM Gate 4 with recommendations.

    c) **Site Layout No. 3**, dated 2019.02.15 incorporates the recommendation of SIPDIM Gate 4. This design is deemed acceptable and is carried forward.

No further alternative is required.

2. **Medical Waste/Incineration**
   It is confirmed that medical waste of all categories will be stored securely on site in dedicated rooms for collection by a third party and removed from site.
   No incineration will be installed.

Yours faithfully.

R Roos (PrArch)
ARCHITECT HOSPITAL DESIGN GROUP

APPENDIX I3

CURRICULA VITAE OF EAPs

Queries: Donavan Henning
☎ +27 11 781 1730
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

1 Personal Particulars

Proposed Position:	Senior Environmental Assessment Scientist
Profession:	Environmental Management
Date of Birth:	06 December 1976
Name of Firm:	Nemai Consulting
Name of Staff:	Donavan Henning
Years of Experience:	17
Nationality:	RSA
Membership of Professional Societies	EAPSA SACNASP Reg no: 400108/17

2 Education

M. Sc. Freshwater Ecology, RAU, 2001

3 Selected Experience

(A) WATER RESOURCE MANAGEMENT

(1) Prepared Applicant Guidelines, Decision-support System and standard Record of Decision for Section 21(c) and (i) water uses (National Water Act), for the then Department of Water Affairs and Forestry (DWAF).
(2) Developed the risk-based approach, reporting mechanism and model for the then DWAF's Sustainable EMS, based on ISO 14001 and international best practices. The study focus on Water Resource Management.
(3) Updating of the then DWAF's Integrated Environmental Management Framework and integration of the Integrated Environmental Management tools, with a focus on Water Resource Management.
(4) Prepared Catchment Management Framework for the Upper Klip River for the City of Johannesburg.
(5) Developed a Rehabilitation Plan for Bruma Lake for the City of Johannesburg.
(6) Assisted in the preparation of an Environmental Management Framework for the Jukskei River, where responsibilities included the analysis of water quality, biomonitoring, development of technical intervention measures and associated implementation plan.

(B) ENVIRONMENTAL IMPACT ASSESSMENT (EIA) & WATER USE LICENCE (WULA)

(1) EIA for the Water Transfer Scheme from Mokolo Dam to Lephalale as part of the Mokolo Crocodile West Water Augmentation Project, for the Department of Water Affairs.
(2) EIA and WULA for the uMkhomazi Water Project Phase 1: Raw Water and Potable Water in KZN, for DWS and Umgeni Water.
(3) EIA for the Ncwabeni Off-Channel Storage Dam in KZN, for DWS.
(4) EIA and WULA for the Lower uMkomazi Bulk Water Supply Scheme, for Umgeni

Queries: Donavan Henning
☎ +27 11 781 1730
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

Water.

(5) EIA and WULA for the Augmentation of the Western Cape Water Supply System (Voëlvlei Dam), for DWS.
(6) EIA, and WULA and borrow pit application for the proposed Foxwood Dam and associated infrastructure in Eastern Cape, for DWS. This dam is to allow for a proposed irrigation scheme downstream on the Koonap River.
(7) EIA for Soshanguve South Ext 11 – 13 Housing Development, Tshwane.
(8) EIA for Esther Park Housing Development, Ekurhuleni.
(9) EIA for Syferfontein Mixed Typology Housing Development, Gauteng.
(10) EIA for the mixed-use development of Portion 5 of Brandkop Farm No. 702, Bloemfontein.
(11) EIA for the Fischer Tropsch Wax Expansion project, for Sasol Technology.
(12) EIA for the de-bottlenecking of the Acrylic Acid and Acrylates (AAA) complex, for Sasol Technology.
(13) EIAs and prepared EMPs for Johannesburg Water sanitation and water supply projects for 2003/2004 and 2004/2005 financial years.
(14) EIA for expansion of sewerage Bushkoppies Waste Water Treatment Plant. Performed biomonitoring on Klip River.
(15) EIA for 80km long pipe from Randfontein to Rustenburg. Responsible for all bio-monitoring surveys of rivers crossed in the project.
(16) EIA for a fish barrier on the Mooi River upstream of Spring Grove Dam.
(17) EIA for the Neptune-Poseidon 400kV Power Line from East London to Cookhouse for Eskom.
(18) EMPs for the Acacia, Koeberg, Rugtevalei, Hydra 01 and Hydra 02 Substations for Eskom.
(19) EIAs for river bank stabilization and flood attenuation features in the Jukskei River.
(20) EIA and EMPR for waste rock dump at Beatrix Gold Mines, with public participation.
(21) EIA for proposed Westlake Township development (economic housing project)
(22) EIA for low-cost housing development in Soshanguve (ext. 11, 12 and 13), Tshwane.
(23) EIA for upgrade of De Deur/Walkerville Waste Disposal Site, for Midvaal Local Municipality.
(24) EIA For Parkhaven Filling Station, Boksburg.
(25) EIA for Zandspruit Pumpstation, Rising Main and Existing Sewer Line for Johannesburg Water.
(26) EIA for the Makalu B Substation and Loop in Lines in Sasolburg, for Eskom.
(27) EIA for the Offshore Sandwinning for Developments within the Port of Durban, for Transnet.
(28) Developed the Environmental and Social Management Plan for Kivu 56 - Extraction of Gas and Electric Power Production Plant in the Rubavu District of the Western Province, Rwanda.
(29) Project managed various EIAs, including the following:
    a) Modderfontein Outfall Sewer;
    b) Olievenhoutbosch Ext 37 low cost housing development;
    c) Aspen eco-estate development;
    d) Fairview estate development;
    e) Edenville Bulk Water Supply;
    f) Braam Pretorius Street Extension;
    g) Rehabilitation of Fairland Spruit;
    h) Kempton Park Outfall Sewer;

Queries: Donavan Henning
☎ +27 11 781 1730
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

i) Garsfontein Pipe Reinforcement;
j) Tembisa Reservoir Pipeline;
k) Zuikerbosch embankment stabilisation;
l) Zuikerbosch Central Sludge Pipeline;
M) Mahube Valley Ext. 15 low cost housing development.

(C) ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF) & STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

(1) EMF for the Frances Baard District Municipality.
(2) EMF for the uMkhanyakude District Municipality.
(3) EMF for the Ugu District Municipality.
(4) EMF for the uThukela District Municipality.
(5) EMF for the uMzinyathi District Municipality.
(6) EMF for the Harry Gwala District Municipality.
(7) SEA for the Port of Durban, for Transnet National Ports Authority.
(8) Integrated Environmental Management Plan for the Sol Plaatje Local Municipality.
(9) Biophysical review and planning for the development of the Namakwa District Municipality Environmental Management Framework.
(10) Biophysical and river health investigation for the EMF and SEMP for the Mthonjaneni Local Municipality.
(11) EMF for the Jukskei River.
(12) EMF for the Great Ellis Park development.
(13) EMF for the Mapungubwe World Heritage Site for DEA.
(14) EMF for the Dr Kenneth Kaunda District Municipality.

(D) RESOURCE MONITORING

(1) Fieldwork with Department of Environmental Affairs and Tourism, in the Northern Province. In a biomonitoring team, was responsible for performing SASS4, IHAS (Integrated Habitat Assessment System), HQI (Habitat Quality Index), and assisting in performing the FCI (Fish Community Index) and RVI (Riparian Vegetation Index).
(2) Extensive practical fieldwork in biomonitoring of rivers in the Mpumalanga, Gauteng and North West Provinces. Performed SASS4, IHAS, HQI and chemical water sampling and analysis.
(3) Performed biomonitoring of numerous urban rivers (e.g. Jukskei River, Braamfonteinspruit, Sandspuit and Klipspruit) to obtain baseline data to detect disturbance and non-compliance of various construction activities on aquatic ecosystems.
(4) Assisted in the completion of the State of the Rivers Report for the Luvuvhu River.
(5) Experience in Fish Health Assessment Index.
(6) Performed biomonitoring on the Klein-Olifants River and Bosmanspruit in Mpumalanga to obtain baseline data for expansion of mining operations by Ingwe Coal.
(7) Performed biomonitoring (SASS4, IHAS, RVI, habitat integrity index) on the lower Jukskei River to obtain baseline data for a proposed housing development.
(8) Performed the Fish Health Index (FHI) on various fish species in the Vaal Dam.
(9) Performed biomonitoring (SASS5, IHAS) on the Sesmylspruit for the Irene River development

Queries: Donavan Henning
☎ +27 11 781 1730
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

(E) MANAGEMENT

(1) Project managed the preparation of an EMF for the Klipspruit, where responsibilities included the analysis of water quality, biomonitoring, development of technical intervention measures and wetland action plans, and aiding in the set up of the GIS.
(2) Project managed the preparation of the Kliptown Environmental Management Framework, where responsibilities included the (1) establishment of the status quo of the environment, (2) generation of Action Plans to address environmental deficits, (3) preparation of an Environmental Management Plan with area-specific mitigation measures for construction, (4) preparation and management of a Geographical Information System.
(3) Project managed the EIAs for Johannesburg Water's 2004/2005 Capital Projects.
(4) Project managed the EIAs for Johannesburg Water's 2005/2006 Capital Projects.

(F) INSTITUTIONAL AND SOCIAL DEVELOPMENT

(1) Performed environmental training for Rand Water employees.
(2) Held public meetings to garner community views on the Jukskei River during the compilation of the Jukskei River EMF.
(3) Completed a social survey for DWAF, on the impact of defunct mines in the Loskop Dam area on the social environment.
(4) Undertook investigation of social facilitation aspect of four housing developments in Metsweding, namely Ekangala F1, F2 and F3, Rethabiseng Proper, Zithobeni Ext 8 and Onbekend, as well as numerous housing developments in Tshwane.
(5) Performed a needs assessment for the Bekkersdal Township in the West Rand, and prepared Business Plans for combined school sports facilities and a water ring feed.
(6) Undertook water and sanitation needs assessment for seven of the fourteen Southern African Development Community (SADC) member states.

(G) RESEARCH PROJECTS (IN CONJUNCTION WITH VARIOUS INSTITUTIONS)

(1) Undertook study, funded by WRC and CSIR, of the evaluation of the role of a local biomonitoring method in the Ecological Risk Assessment process and in the determination of Resource Directed Measures for the Luvuvhu River
(2) Prepared Guideline to develop a Sustainable Urban River Management Plan, funded by WRC.

(H) COMPILING SPECIFICATION DOCUMENTS

(1) Wrote decommissioning phase of general EMP plan.
(2) Prepared decommissioning strategy for pipe-manufacturing plant.

(I) RISK ASSESSMENTS

(1) Performed Human Health Risk Assessment on contaminated fish from a Zambian copper mine.
(2) Experience in working with human health risk assessment software package Risk*Assistant™.

Queries: Donavan Henning
☎ +27 11 781 1730
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

(J) TECHNICAL PROJECTS

(1) Assisted in the identification of mine holings, sampling of surface and groundwater, and preparation of concomitant GIS.
(2) Prepared Rand Water GIS for a pipeline in the Germiston region. The GIS incorporated significance ratings of environmentally sensitive features to assist in the integration of sensitive issues in future undertakings in the respective area.
(3) Acted as an on-site Environmental Officer during the open-trench crossing and subsequent rehabilitation of a dyke in North Riding.
(4) Prepared GIS for service breakdowns and bylaw contraventions in Greater Ellis Park

(K) ENVIRONMENTAL MONITORING PROJECTS

(1) Olifants River Water Resources Development Project (ORWRDP) Phase 2C: Environmental Monitoring.
(2) Mooi Mgeni Transfer Scheme Phase 2 (MMTS-2) Construction of Spring Grove Dam and associated works for TCTA.
(3) BRT Phase 2, for JDA.
(4) Upgrade of the P1 pipeline in the Magaliesburg Protected Natural Environment, for Rand Water.
(5) Leeukop Relief Outfall Sewer, for Johannesburg Water.
(6) Modderfontein Outfall Sewer, for Johannesburg Water.
(7) Mamelodi Extension 18 low-cost housing development, for the Gauteng Department of Housing.
(8) Environmental compliance monitoring for the Soshanguve Extension 11 low-cost housing development, for the Gauteng Department of Housing.

(L) ENVIRONMENTAL EDUCATION

(1) Developed user-friendly documents of the Resource Directed Management of Water Quality policy, strategy and management instruments for DWAF.
(2) Undertook training of the DWAF Regional Offices of the policy, strategy and management instruments for the Resource Directed Management of Water Quality project.
(3) Developed Basic Environmental Awareness Training Material for the Expanded Public Works Programme, for DEA.

4 Employment Record

2001 – Present Environmental Scientist, Nemai Consulting

Duties:
- Water Resource Management.
- Application, development and implementation of environmental impact and management tools (e.g. EIA, EMP, SEA, EMS, EMF, WULA, environmental monitoring, training).
- Developed Section 21 (c) and (i) WULA guideline.
- Implemented numerous training sessions at all levels of government in the environment sector.

Queries: Donavan Henning
☎ +27 11 781 1730
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

- Developed 8 EMF's.
- Completed over 50 EIAs.

5 Languages

English & Afrikaans - excellent speaking, reading, and writing.

Declaration:

I confirm that the above CV is an accurate description of my experience and qualifications.

Signature of Staff Member

NEMAI CONSULTING

Jacqueline Karen Davis

PERSONAL DATA

Name	Jacqueline Davis
Date of Birth	1984-06-06
Nationality	South African
Qualification	BSc - Environmental Science BSc (Honours) Geography
Years of Experience	6.5
Profession	Environmental Consultant

EDUCATION

- 2003-2005: BSc Environmental Sciences, University of Pretoria.
- 2006-2007: Honours (*cum laude*) Geography, University of Pretoria.

EMPLOYMENT RECORD

1) **March 2006 – May 2011**: University of Pretoria (UP) – Teaching Assistant and Part-time Junior Lecturer; Department of Environmental Affairs and UP – Field-based Researcher (Marion Island and Antarctica).
2) **01 March 2012 – 31 May 2013**: Department of Environmental Affairs; Directorate: Southern Oceans and Antarctic Support (D:SO&AS), SANAP (South African National Antarctic Programme) – Environmental Control Officer (ECO) (14 month contract).
3) **01 November 2013 – 31 December 2013**: KSE Services CC – Professional Assistant, and Public Participation Assistant.
4) **01 January 2014 – 15 January 2016**: uKhozi Environmentalists (Pty) Ltd. – Junior Environmental Assessment Practitioner.
5) **18 January 2016 – 31 May 2017**: Ecoleges Environmental Consultant CC (subcontracted to Basil Read) – Site Environmental Officer (SEO).
6) **03 August 2017 - Current**: Nemai Consulting CC – Environmental Control Officer (ECO).

SUMMARY OF KEY ENVIRONMENTAL EXPERIENCE

1) Prince Edward Islands: first dedicated ECO –
    a. Monitoring all Island activities (construction, logistics, and scientific research) compliance to the Environmental Authorisation, Prince Edward Island Management Plan, and relevant Permits, and associated monthly reporting;
    b. Development and implementation of environmental management procedures, policies, and standard operating procedures (Inspection checklists; Island Biosecurity Plan and Procedure; Disease Outbreak Plan and Emergency Procedure; Hazardous substance spill emergency procedure; etc.);
    c. Mitigation and control of environmental incidences;

   d. Development, Implementation and monitoring of the intensive Alien Eradication and Control Programme (for 7 plant spp., 1 invertebrate, and 1 mammal spp.);
   e. Development of a working Herbarium for Island flora.

2) Site Environmental Officer, Trans-Caledon Tunnel Authority (TCTA) Olifants River Water Resources Development Project (ORWRDP) Phase 2C, Steelpoort area, Limpopo Province:
   a. Implementation of compliance to the Environmental Authorisation (EA) and Environmental Management Plan (EMP) conditions and Specific Project Specifications;
   b. Implementation of pro-active environmental management to achieve best practice;
   c. Facilitation of the remediation of identified non-compliances;
   d. Daily site inspections, compliance monitoring, and both weekly and monthly monitoring reporting;
   e. Monthly interpretation and reporting of water quality results.
3) Environmental Consultant, Goedehoop Colliery Integrated Mining Right, EIA and Water Use License Applications: Public Participation Process and report review.
4) Environmental Consultant, Goedehoop Colliery Socio-Economic Assessment: community and landowner consultation, interviews and formulation of socio economic factors database.
5) Environmental Consultant, Kiepersol Colliery and Railway Siding water quality monitoring: monthly surface and quarterly groundwater sample collection, interpretation of results, and monthly reporting.
6) Environmental Consultant, Kiepersol Colliery EMPr Performance Assessment: performance assessment audit, public participation, and reporting.
7) Environmental Consultant, Welgedacht Coal Railway Siding: Basic Assessment Report, EMPr, and Public Participation Process.
8) Environmental Consultant, Welgekozen Fuel Station: Basic Assessment Report, EMPr, and Public Participation Process.
9) Environmental Consultant, Proxor Water Use License Application: Compilation of IWWMP and Public Participation Process.
10) Environmental Consultant, Proxor Prospecting Right Application (S.16): Public consultation and compilation of consultation report.
11) ECO, Improvement and Upgrade of National Route R23 – Section 1 between Platrand and Standerton and Section 2 between Standerton and Greylingstad, South Africa: monthly ECO monitoring for SANRAL.
12) ECO, Upgrade and Extension of the Klipdrift Water Treatment Works, South Africa: monthly ECO monitoring and reporting for Magalies Water.
13) ECO, De-sludging of Dam 1 at Northern Wastewater Treatment Works, South Africa: monthly ECO monitoring and reporting for Johannesburg Water.
14) ECO, Development of the Sol Plaatjie University Precincts, South Africa: monthly ECO monitoring and reporting for the Department of Higher Education and Training (DHET).
15) ECO, Construction of the new University of Mpumalanga, South Africa: monthly ECO monitoring and reporting for the Department of Higher Education and Training (DHET).

16) ECO, Construction of water pipeline in Ennerdale, South Africa: monthly ECO monitoring and reporting for Johannesburg Water.
17) ECO, Construction of water pipeline from Wallmannsthal Reservoir to Zeekoegat Area, South Africa: monthly ECO monitoring and reporting for Magalies Water.
18) ECO, Renovation and upgrade of the Marotola Primary School, Hammanskraal, South Africa: monthly ECO monitoring and reporting for Gauteng Province Department of Infrastructure Development.
19) ECO, Construction of bulk water supply, Ledig Community, North West, South Africa: ECO monitoring and reporting for Bakubung Minerals.
20) ECO, Upgrade of Emergency Overflow Dam at Driefontein Wastewater Treatment Works, South Africa: monthly ECO monitoring and reporting for Johannesburg Water.
21) ECO, Oxford Parks Development, South Africa: monthly ECO monitoring and reporting for Intraprop Property Development and Investment.
22) ECO, Sharonlea Housing Development, South Africa: monthly ECO monitoring and reporting for VTC Africa.
23) ECO, Olifants River Water Resources Development Project (ORWRDP) Phase 2C, South Africa: weekly ECO inspections and monthly ECO monitoring and reporting including participation in the Environmental Monitoring Committee, for Trans-Caledon Tunnel Authority (TCTA).
24) ECO, Mixed Use Housing Development and Rondebult Road upgrade, Boksburg, South Africa: monthly ECO monitoring and reporting for Leeuwpoort Developments (Pty) Ltd.
25) ECO, Merapi and Everest Substation Upgrade, Free State, South Africa: biweekly ECO site inspections, monthly ECO monitoring, and reporting for Eskom Holdings SOC Ltd.
26) Legal Compliance Auditor, Kusile Power Station Safety Health and Environmental (SHE) Legal Compliance Audit (2018), South Africa: Environmental compliance audit for Eskom Holdings SOC Ltd.
27) Compliance Auditor, Technical and Compliance Assurance Audit on Waste Management Services Provided by EnviroServ Waste Management, South Africa: cradle to grave audit on selected waste streams generated by SASOL and handled by EnviroServ including duty of care compliance audit on EnviroServ systems and operations for SASOL Chemical Industries (Pty) Ltd.

LANGUAGES

English - excellent speaking, reading, and writing

Afrikaans - fair speaking, reading, and writing

1 Personal Particulars

Proposed Position:	Environmental Consultant
Profession:	Environmental Management
Date of Birth:	15 September 1993
Name of Firm:	Nemai Consulting (Pty) Ltd.
Name of Staff:	Christian van der Hoven
Nationality:	South African
Membership of Professional Societies	Candidate Natural Scientist – Environmental Science with the South African Council for Natural Scientific Professions (SACNASP) Registration Number: 118377

2 Education:

B. Sc (Hons) Geographical and Environmental Sciences, University of Pretoria, South Africa, 2016.

B. Sc Environmental Sciences, University of Pretoria, South Africa, 2012-2015

3 Employment Record:

November 2016 – Present: Environmental Consultant, Nemai Consulting (Pty) Ltd.

Compilation of Environmental Screening Reports, Scoping and Environmental Impact Assessments, Basic Assessments, Water Use Licenses and General Authorisations.

4 Selected Consultancies

4.1 Basic Assessments

2016 – Proposed Lerome Bulk Water Supply Scheme, North West, South Africa. Compiling the Draft BAR.

2017 – Proposed Piggery and Abattoir, KZN, South Africa. Compiling the Draft BAR

2017 – Mapleton Pump Station Upgrade, Gauteng, South Africa. Compiling the necessary construction EMPr and Method Statements to be followed during the construction of the upgrade.

2017 – Lanseria Outfall Sewer pipeline, Gauteng, South Africa. Compiling the Draft BAR.

2017 – Proposed Eldorado Park water pipeline upgrade, Gauteng, South Africa. Compiling the Draft BAR.

2017 – Proposed K60 Road, Gauteng, South Africa. Compiling the BAR.

2017 – Proposed Davidsonville Ext. 2 sewer pipeline replacement, Gauteng, South Africa. Compiling the Draft BAR.

2017 – Proposed Stormwater and Sewer Infrastructure for the Umhlanga Ridgeside Development, KZN, South Africa. Compiling the Draft BAR.

2018 – Ivory Park Sewer Pipeline Upgrade, Gauteng, South Africa. Compiling the Draft BAR.

2018 – Blaaupan Sewer Pipeline, Gauteng, South Africa. Compiling the Draft BAR.

2018 – Van Dyk Water Pipeline, Gauteng, South Africa. Compiling the Draft BAR.

2019 – Vaal Gamagara Regional Water Supply Scheme (VGRWSS) Phase 2: Upgrading of the Existing Scheme, Northern Cape, South Africa. Compiling the Draft BAR

4.2 Public Participation Experience

2016 – Pomona Estates Housing EIA, Gauteng, South Africa. Compiling Public Participation documents.

2016 – Prosed Academic Hospital, Limpopo, South Africa. Public Notification: Placement of site notices, newspaper adverts and handing out documents to Interested and Affected Parties.

2016 – Upgrade of Berth 203 & 205, KZN, South Africa. Compiling the EMC Comments and Responses Report (CRR), Dumping at Sea Permit CRR.

2017 – Makalu Substation, Sasolburg, Gauteng, South Africa. I&AP notification.

2017 – ATNS public meeting, Gauteng, South Africa. Assisted with the first and second public meeting

2017 – Proposed Isithombo and Lulisandla Piggeries, KZN, South Africa. Public Notification: Placement of site notices, newspaper adverts and handing out documents to Interested and Affected Parties.

2017 – Proposed Bronberg Reservoir, Gauteng, South Africa. Public Notification: Placement of site notices, newspaper adverts and handing out documents to Interested and Affected Parties.

2017 – Proposed Lanseria Outfall Sewer Pipeline, Gauteng, South Africa. Held a public open day for all registered IAPs and authorities

2017 – Proposed Construction of the Hamarsdale Water Pipeline, KZN, South Africa. Public Notification: Placement of site notices, newspaper adverts and handing out documents to Interested and Affected Parties.

2017 – Proposed Stormwater and Sewer Pipeline for the Umhlanga Ridgeside Development, KZN, South Africa. Public Notification: Placement of site notices, newspaper adverts and handing out documents to Interested and Affected Parties.

2017 – Upgrading the Existing Ship Repair Facility in the Port of Mossel Bay, Western Cape, South Africa. Public Notification: Placement of site notices, newspaper adverts and handing out documents to Interested and Affected Parties.

2017 – MCWAP: Proposed Mokolo and Crocodile River (West) Water Augmentation Project, Phase 2A, Water Transfer Infrastructure, Limpopo, South Africa. Compiling the CRR.

2017 – Proposed Development of the Makalu B (Igesi) Substation and Associated Transmission Loop-in Lines, Sasolburg, Free State Province, South Africa. Draft EIA Public Meeting.

2017 – Proposed Mookodi – Mahikeng 400 kV Line, North West, South Africa. Assisted with Focus Group Meetings and Public Meetings.

2017 – Proposed Steynville Primary School in Hopetown, Northern Cape, South Africa. Social Facilitation. Assisted with second public meeting.

2018 – MCWAP: Proposed Mokolo and Crocodile River (West) Water Augmentation Project, Phase 2A, Borrow Pits, Limpopo, South Africa. Conducting focus group meetings, one-on-one landowner meetings, compiling minutes, conducting public participation for the Scoping and EIA phases.

2018 – Blaaupan Sewer Pipeline, Gauteng, South Africa. Conducting public participation for project announcement phase.

2018 – Van Dyk Water Pipeline, Gauteng, South Africa. Conducting public participation for project announcement phase.

2019 – Proposed Limpopo Central Hospital, Limpopo, South Africa. Conducting the public participation for the review of the Draft Scoping Report, conducting the authorities meeting, compiling minutes.

2019 – Vaal Gamagara Regional Water Supply Scheme (VGRWSS) Phase 2: Upgrading of the Existing Scheme, Northern Cape, South Africa. Conducting public participation for project announcement phase, assisting with public meetings.

4.3 Water Use Licence Applications/General Authorisations

2016 – Proposed Lerome Bulk Water Supply Scheme, North West, South Africa. Compiling the Draft General Authorisation (GA) Application and technical report.

2017 – Proposed Eldorado Park water pipeline upgrade, Gauteng, South Africa. Compiling the draft WULA

2017 – Proposed Lanseria Outfall Sewer, Gauteng, South Africa. Compiling the draft WULA

2017 – Cresta Peri-urban water pipeline replacement, Gauteng, South Africa. Compiling the Draft GA Application and Technical Report.

2018 – Proposed Upgrade of the Raw Water Abstraction at the Maselspoort Water Treatment Works (WTW), Free State, South Africa. Compiling the Draft WULA.

2018 – Ivory Park Sewer Pipeline Upgrade, Gauteng, South Africa. Compiling the Draft WULA Technical Report.

2018 – MCWAP: Proposed Mokolo and Crocodile River (West) Water Augmentation Project, Phase 2A, Water Transfer Infrastructure, Limpopo, South Africa. Compiling the Draft IWULA Technical Report.

2018 – Blaaupan Sewer Pipeline, Gauteng, South Africa. Compiling WULA Technical Report as well as online submission on Electronic Water Use Licence Application and Authorisation System (e-WULAAS).

2018 – Van Dyk Water Pipeline, Gauteng, South Africa. Compiling GA Technical Report as well as online submission on Electronic Water Use Licence Application and Authorisation System (e-WULAAS).

2019 – Vaal Gamagara Regional Water Supply Scheme (VGRWSS) Phase 2: Upgrading of the Existing Scheme, Northern Cape, South Africa. Compiling WULA Technical Report as well as online submission on Electronic Water Use Licence Application and Authorisation System (e-WULAAS).

4.4 Screenings

2017 – Proposed water transfer scheme from Flag Boshielo Dam to Olifantspoort WTW, Limpopo, South Africa. Compiled the screening report.

2017 – JW Corridors of Freedom B, Gauteng, South Africa. Compiling the screening report.

2017 – JW Zamimpilo Informal Settlement, Gauteng, South Africa. Compiling the screening report

2017 – JW Stormhill Ext.2 pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Fleurhof pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Longdale pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Greenside water pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Cottesloe pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Blackheath Ext 1 pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Kaalfontein sewer pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – JW Alan Manor water pipeline replacement, Gauteng, South Africa. Compiled the screening report.

2017 – Lanseria Outfall Sewer, Gauteng, South Africa. Compiled the screening report.

2018 – Tembisa Civic Node, Gauteng, South Africa. Compiled Screening Report.

2018 – Alexandra Fire Station, Gauteng, South Africa. Compiled Screening Report.

2018 – Stellenbosch Fire Station, Western Cape, South Africa. Compiled Screening Report.

2018 – Shoshanguve Roads and Stormwater Infrastructure, Gauteng, South Africa. Compiled Screening Report.

2018 – Rockville Student Centre and Lifestyle Village, Gauteng, South Africa. Compiled Screening Report.

4.5 Scoping and Environmental Impact Assessment (EIA)

2017 – ATNS Isando Property Development, Gauteng, South Africa. Compiling the Draft EIA report.

2017– Proposed Development of the Makalu B (Igesi) Substation and Associated Transmission Loop-in Lines, Sasolburg, Free State, South Africa. Compiling the Draft EIA Report.

2018 – MCWAP: Proposed Mokolo and Crocodile River (West) Water Augmentation Project, Phase 2A, Water Transfer Infrastructure. Assisted with compiling the Draft EIA Report.

2018 – MCWAP: Proposed Mokolo and Crocodile River (West) Water Augmentation Project, Phase 2A, Borrow Pits. Compiling the Draft Scoping and EIA Report.

2019 – Proposed Limpopo Central Hospital, Limpopo, South Africa. Compiling the Scoping Report.

4.6 Section 24G

2017 – Proposed Lerome Bulk Water Supply Scheme, North-West, South Africa. Compiling the Section 24G Report

4.7 Environmental Auditing

2017 – Oxford Parks Development, Gauteng, South Africa. Compiling monthly audit report and attending monthly environmental site audits.

2017 – Steelpoort Water Pipeline, Mpumalanga, South Africa. Assisted environmental site audit.

4.8 Waste Management Plan

2017 – Proposed Waste Management Plan for the University of Mpumalanga, Mpumalanga, South Africa. Compiling the Waste Management Plan.

4.9 Environmental Management Framework

2017 – Proposed Harry Gwala District Municipality EMF, KZN, South Africa. Compiling sections of the status quo of the Draft EMF Report.

4.10 Social Facilitation

2018 – Steynville Primary School in Hopetown, Bloemfontein, South Africa. Conducted monthly Project Steering Committee meetings, facilitated the public participation process and appointment of labour and SMME development.

5 Languages:

English - excellent speaking, reading, and writing

Afrikaans - excellent speaking, reading, and writing

APPENDIX I4

SIP STATUS CONFIRMATION

Christian Van Der Hoven

From: Steve van Jaarsveld <steve@sakhiwo.com>
Sent: 03 September 2019 11:18 AM
To: Christian Van Der Hoven
Subject: FW: Re: RE: LIMPOPO CENTRAL HOSPITAL - SIP

Hello Christian

See correspondence below regarding SIP.

Kind regards
Steve van Jaarsveld
Project Manager
BSc(QS) PrCPM PrQS MRICS PMAQS AAArb

SAKHIWO
HEALTH SOLUTIONS

Cell: +27 72 601 3352 / +27 63 523 3992
Tel: +27 12 346 2745 / +27 12 346 2550
e-mail: steve@sakhiwo.com
website: www.sakhiwo.com

From: Christie Engelbrecht [mailto:Christie.Engelbrecht@health.gov.za]
Sent: 03 September 2019 10:17 AM
To: steve@sakhiwo.com
Cc: Leon Ganswyk
Subject: Fwd: Re: RE: LIMPOPO CENTRAL HOSPITAL - SIP

Hi Steve

See attached correspondence from PICC

Regards

Christie Engelbrecht
Director: Health Infrastructure Delivery Management
Cluster: Health Facilities & Infrastructure Management
National Department of Health
Tel 012 395 8416
Fax 086 632 9486

>>> Tshepo Chuene <TshepoCh@idc.co.za> 9/3/2019 8:11 AM >>>

Dear Christie,

The email serve to confirm that the Limpopo Central Hospital is part of the National Infrastructure Plan under SIP 12 focusing on Revitalisation of public hospitals and other health facilities. The PICC form part of the technical committee and will support the project as part of SIP 12.

Regards,

Tshepo

PICC

SIP Lead

082 523 7597
