



Expression of Interest and Tender for the
North Terrace Drainage Design Project

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MARCH 2015

Contact

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Established 2013



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Statement of Declaration

This document is created in response to a call for tender made by your company.

All quoted costs within this document are estimated at this current point in time and are subject to review three months after this document has been issued.

We reserve the right to withdraw our tender submission if no contact has been made to us by your company within four weeks of the issue date.

We at HYDROFUTURE Consulting Pty Ltd declare that the information within this tender document is accurate and correct at this current point in time.

Matt Turner

Company Partner
Project Manager

Christian Somerville

Company Partner
Assistant Project Manager



HYDROFUTURE Consulting
150 Franklin Street
ADELAIDE SA 5000

2 March 2015

Attention: Dr Faisal Ahammed and Ms Kirsty Beecham

RE: North Terrace Drainage Design Tender and Expression of Interest for Feasibility Study

Dear Sir/Madam,

HYDROFUTURE Consulting Pty Ltd is honoured to formally extend our expression of interest in conducting a feasibility study and detailed design for the North Terrace Drainage Design Project presented by Tonkin Consulting. We are pleased to present our Tender submission which entails the costs associated with the feasibility stage.

HYDROFUTURE Consulting Pty Ltd is a Civil Engineering Consultancy established in 2013 and is made up of 28 highly skilled employees with extensive experience and expertise in the following fields:

- Civil Engineering
 - Water Resources Systems and Environmental Management
 - Transport
 - Geotechnical
- Project Management
- Urban Planning

The work ethic at HYDROFUTURE Consulting Pty Ltd is second to none and as a result all previous projects have been completed on time and to the pre-determined budget. Our company will work hard to ensure the feasibility study and detailed design for the project at hand will be completed on time and to budget.

The following tender and expression of interest submission includes an in-depth profile of the company as well as a depiction of the underlying and relative proposed design details for the feasibility study.

HYDROFUTURE Consulting Pty Ltd quotes the feasibility stage of the North Terrace Drainage Design

Project at: **\$286,800.00**

Thank you for the opportunity to quote this tender and for your consideration of this application. Do not hesitate to contact us if any queries or concerns arise. We look forward to your response.

Yours faithfully,

Matt Turner
Project Manager

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1 CAPABILITY STATEMENT

1.1 ABOUT US

HYDROFUTURE Consulting is a civil design and consulting company based in Adelaide with a potential worldwide presence. Our company provides services primarily throughout South Australia employing 28 people with a board range of professional and technical skills along with a wide range of graduate engineers with the promising expectancy for future business growth.

We have additionally provided services outside of Australia for previous private clients with great success showing positive outlook for the company's future.

1.2 HISTORY

Founded in 2013 HYDROFUTURE Consulting has grown from the original seven co-founders till now with 28 employees, quadrupling its staff in less than two years. The original scope involved mainly water systems design, however due to the employee's capabilities and expertise in combination with the current opportunities in the civil engineering sector we have broadened our overall scope. It stands true though this company has a huge focus on water system design for a sustainable future.

Although as a company we may have only a short history it has been vastly successful, with a bright future seemingly ahead. Throughout the two years of operation we have progressed positively through multiple civil design projects for various government, commercial and private clients and aim to continue this for many years to come.

1.3 OUR VISION

At HYDROFUTURE Consulting we see our clients and their desires as individuals just like all our employees, not generic companies and jobs. Each project we undertake is different and requires an individually personalised plan, ensuring every possible aspect is met to meet all our clients' aspirations and hopes. Here at HYDROFUTURE Consulting we see a bright future in which we will be renowned for our excellent personalised services and ability to create liveable, sustainable and most of all individually suitable solutions.

1.4 SERVICES PROVIDED

HYDROFUTURE Consulting offers a broad range of services to cater to the needs of our clients. A number of these services are listed below.

Structural engineering

- Steel & timber design
- Reinforced concrete design
- Finite element modelling design & analysis

Transport engineering

- Road and highway modelling
- Surfacing design & redesign
- Maintenance work design
- Traffic volume & capacity evaluation
- Traffic and roadway systems design

Urban Planning

- Traffic management for construction
- Land & design use in urban environment
- Physical arrangements for conflicted businesses

Environmental engineering

- Environment impact assessment
- Water supply and treatment
- Air pollution management
- Wastewater treatment management
- Solid waste management

Geotechnical engineering

- Soil testing & profiling
- Footing & pavement design
- Slope stability analyses
- Retaining, gravity & cantilever walls

Water engineering

- Design and modelling
- Wastewater treatment
- Wastewater systems
- Sewer Systems
- Water supply systems
- Drainage sys

1.5 COMPLETED PROJECTS

Over the past two years, the management at HYDROFUTURE Consulting have worked around the clock to pursue exciting and innovative projects. A number of these now completed projects are displayed below.

✓ **Waste Water Treatment Plant – Rural Adelaide (2014)**

The biggest project conducted at HYDROFUTURE Consulting was the Wastewater treatment plant located rurally within Adelaide. The client of the project was SA Water who were very pleased with our design. The project in total was budgeted at 85 million dollars and a capacity of processing 150 cubic meters of water a day (150,000,000 liters). This project demonstrates HYDROFUTURE Consulting capacity to deal with large-scale projects with great success.

✓ **Structural Design-Whyalla Regional Cancer Centre Redevelopment (2014)**

HYDROFUTURE Consulting were involved in the redevelopment of the Whyalla Regional Cancer Centre. During this project we produced preliminary designs and drawings on primary steel and reinforced concrete elements within the roofs walls, floors, columns and beams of the centre for our clients. All elements were designed to meet both pre-existing and additional loadings (whether internal, weighted structures or external, wind loads) due to redevelopment. Fire resistance, earthquake resistance, practicality and cost efficiency were other primary criteria met within the design.

✓ **Structural Design-Eco Tourism Resort at Port Resolution on Tanna Island, Vanuatu (2014)**

During this project HYDROFUTURE Consulting were charged with design of structural elements for timber bungalows for low impact tourism accommodation. Demonstrating the companies concern and ability to work within environmental consideration. The projects was a success producing an effective efficient environmentally friendly solution, rather than a typical large scaled commercialised project which would be detrimental to the local environment and remote/relaxing ambiance.

✓ **Water Systems Infrastructure Design- Strathalbyn (2014)**

Within Strathalbyn HYDROFUTURE Consulting carried out preliminary designs for sewer, water supply and stormwater design systems. During these projects we supplied appropriate, sustainable and cost effective practical solutions to our clients. The solutions provided were comprehensive as we pride our self on our water and roads conjunction systems, considering ourselves experts within this field.

✓ **Retaining Wall and Footing Design-Noarlunga Rail Line, Seaford Shopping Complex (2014)**

The footing and retaining wall preliminary design were carried out by HYDROFUTURE Consulting for our clients. We produced an effective solution that was safe and practical while also not to produce conflict with the local railway systems. This allowed the trains to stay of schedule and keep local community members happy.

✓ **Audits of Santos oil and gas assets environmental conformance against Santos Environmental Health and Safety Management Standards (2015)**

A desktop gap analysis was undertaken by HYDROFUTURE Consulting checking the conformance of assets in EABU (Eastern Australia Business Unit) against Santos internal environmental standards. As a result of this gap analysis a list of non-conformances were identified for each of the assets and an action plan developed to address these non-conformances. Opportunities for improvement of the application of the environmental management systems in Santos were also proposed by HYDROFUTURE Consulting.

Also, audits of Santos' Waste Management Plans, Water Resources Management plans, air emissions and energy efficiency took place by HYDROFUTURE Consulting.

✓ **Groundwater sampling procedures for Patricia Baleen Gas Plant (2015)**

HYDROFUTURE Consulting developed detailed groundwater sampling procedures for Santos to be used by people on Patricia Baleen Gas Plant site to monitoring any environmental impacts from activities.

✓ **Engineers Without Borders Project (2012)**

HYDROFUTURE Consulting participated in humanitarian projects in Vietnam. HYDROFUTURE Consulting used waste as new building materials for housing. This resulted in reducing the environmental and housing problem in the project area.

✓ **Adelaide oval car park management (2014)**

HYDROFUTURE Consulting was responsible for managing the all construction phase of a new multistorey car park for the Adelaide Oval. This included managing contractors, material, environmental health and safety issues, etc. HYDROFUTURE Consulting delivered the project on time on budget and to the required quality standards.

✓ **Britannia Roundabout Re-Development (2013)**

The previous Britannia Roundabout was notorious to Adelaide road users due to the high vehicle impact statistics including a devastating 48 casualties as a result of accidents between 2008 and 2012. Our vision at HYDROFUTURE Consulting was to increase driver and pedestrian safety by reducing the number of accidents as well as the severity of any accidents, all whilst increasing efficiency and traffic flow. The end result yielded a 30% drop in crash rate at the point in time of collecting statistics and a massive 40 second reduction in traffic efficiency in afternoon peak periods.

✓ **Surface Water Seepage and Table Water Analysis:**

At current rehabilitation centres there is still a need to analyse the water run-off that occurs from older, acidic mines such as Brukunga Mines, south-east of Adelaide. In this analysis, the acidic levels of water run-off were seeping into the underground water table and then connecting with the existing gully stream. As farmers were using this water for irrigation and live-stock this acidic water is not desirable. An analysis was created and graphically represented with possible solutions for the client. The client selected one of the options offered and the work was carried out accordingly to the design plans and to the Australian Standards efficiently.

✓ **22 Mega-Litre Stormwater Dam Design and Construction:**

Currently Kadina, Yorke Peninsula, South Australia, only has one stormwater dam which carries the townships entire stormwater supply. This dam has a total capacity of 13 Mega-litres (ML). This resulted in problems due to the underlying fact that the capacity of this dam was insufficient for a town which has quite a large spread of land. A second elevated-wall dam was designed to handle the overflow of the existing dam and to provide extra irrigation to a local resident. The final design was created to act like a balance tank and increased the townships stormwater supply to over 30ML.

✓ **Moonta Community RV Dumping Point:**

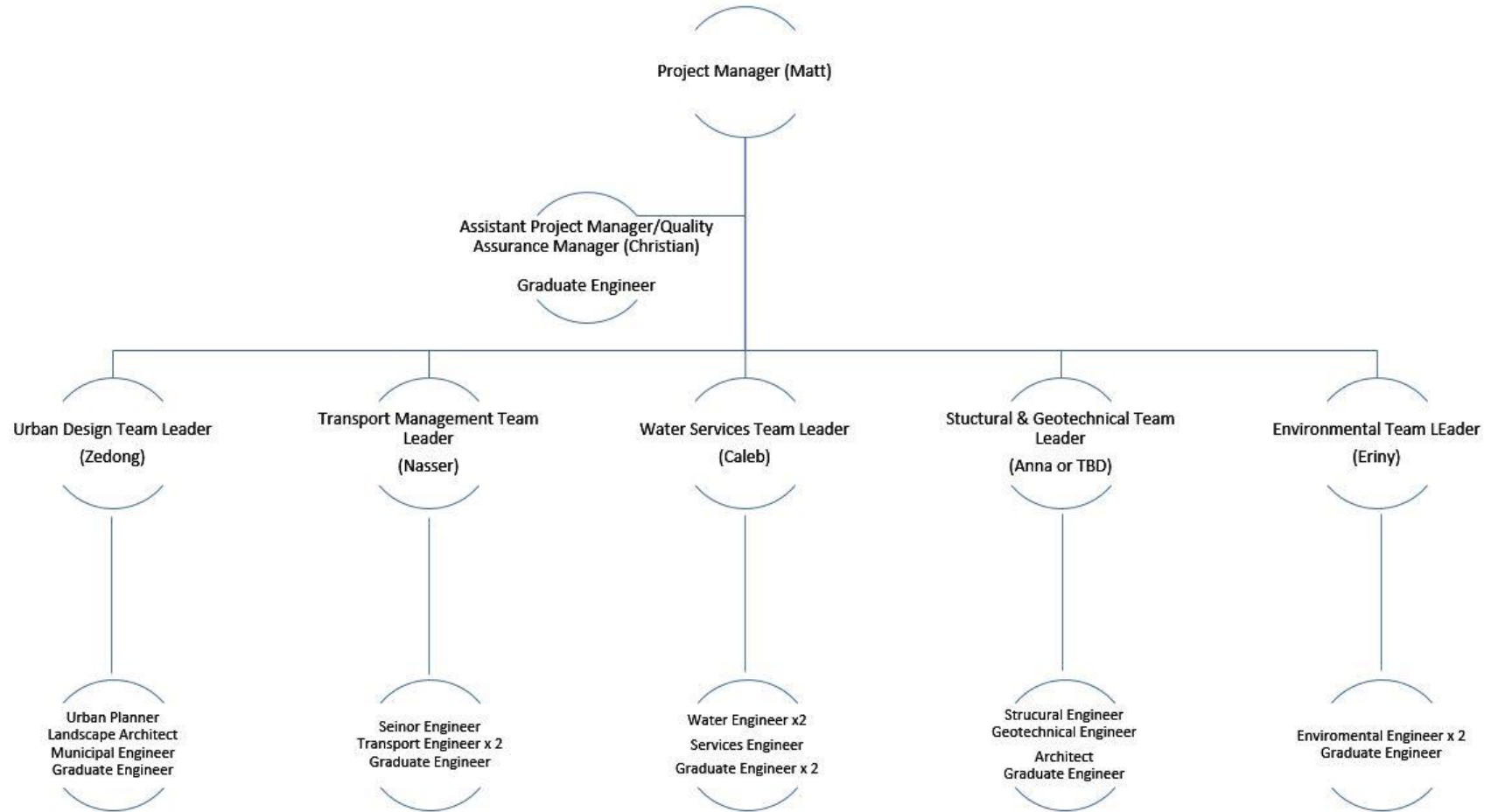
Currently there is no existing dumping point for RV's or the like to dispose of their grey and black water waste in the township of Moonta, the closest being 15km way. A site was set up, and then the appropriate plumbing and irrigations were set into place. Finally the section off the side of the road was profiled and rubble placed on top to provide a safe driving experience for the vehicles. This comes at no cost to the users and provides a safe dumping point for tourists.

1.6 FINANCIAL STATUS

HYDROFUTURE Consulting maybe a relatively newly established company, but our growth over the last two years stands out above the rest and indeed raises the bar for a new company with no prior goodwill or history.

Our previously completed projects have earned us a great deal of goodwill and assisted to create strong relationships with not only our clients, but also a number of financial institutions. All of these financial institutions have continued to work with us on new and existing projects.

1.7 COMPANY STRUCTURE



1.8 MANAGEMENT PROFILES

1.8.1 Project Manager

MATT TURNER

Curriculum Vitae

| | |
|--------------|--|
| Roles | Project Manager Civil Engineer |
| Email | turmh003@mymail.unisa.edu.au |
| Office Phone | 8272 1235 |



EDUCATION

| | |
|----------------|---|
| 2011 – Present | University of South Australia Bachelor of Engineering (Civil & Structural) |
| 2010 | Naracoorte High School SACE |

NOTEABLE EXPERIENCE

- Project Manager Waste Water Treatment Plant – Rural Adelaide
- Engineers Without Borders Humanity Project – Water Quality Resources

FORMER PROJECTS

- Water Resources System Design for Strathalbyn, South Australia (2014)
- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)
- Noarlunga Rail Line No. 59 Extension (2014)
- Tanna Island, Vanuatu single storey timber framed bungalow design (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel Design) (2014)

COMPUTER SKILLS

- SolidWorks, Microsoft Office, DRAINS, HEC-RAS, CIRCLY, GALENA, Matlab, STRAND7

PROFESSIONAL QUALITIES

- Excellent leadership capabilities and team skills
- Punctual and reliable
- Extremely adaptable with excellent problem solving skills
- Self-motivated, driven and enthusiastic
- Ability to work to and meet deadlines
- Ability to work under pressure

1.8.2 Assistant Project Manager/Quality Assurance Manager

CHRISTIAN SOMERVILLE**Curriculum Vitae**

| | |
|--------------|--|
| Roles | Assistant Project Manager Quality Assurance Manager Civil Engineer |
| Email | SOMCJ001@mymail.unisa.edu.au |
| Office Phone | 8272 1236 |

**EDUCATION**

| | |
|----------------|--|
| 2011 – Present | University of South Australia Bachelor of Engineering (Civil) |
| 2009-2010 | TAFE SA Diploma of Engineering Drafting |

NOTEABLE EXPERIENCE

- Civil Engineering work experience at the City of Campbelltown (2014-2015)
- Engineering analysis of property development applications for the City of Campbelltown including stormwater drainage design determination
- Road Surveying for stormwater runoff data
- Design and drafting of traffic calming measures for medium to high volume sub-arterial roads
- Project Manager for the Adelaide Britannia Roundabout re-development (2013)

FORMER PROJECTS

- Water Resources System Design for Strathalbyn, South Australia (2014)
- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)
- Noarlunga Rail Line No. 59 Extension (2014)
- Tanna Island, Vanuatu single storey timber framed bungalow design (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel Design) (2014)

COMPUTER SKILLS

- AutoCAD, Autodesk Inventor, SolidWorks, Microsoft Office, DRAINS, HEC-RAS, CIRCLY, GALENA, SLOG, SPACE GASS, Matlab, STRAND7

PROFESSIONAL QUALITIES

- Hard working and determined
- Punctual and reliable
- Great team leading skills
- Self-motivated and enthusiastic
- Ability to work to and meet deadlines
- Outstanding interpersonal skills

1.8.3 Water and Services Manager

CALEB SNODGRASS

Curriculum Vitae

Roles Water and Services Manager
Civil Engineer

Email SNOCJ002@mymail.unisa.edu.au

Office Phone 8272 1237



EDUCATION

2010 – Present University of South Australia
Bachelor of Engineering (Civil)

NOTEABLE EXPERIENCE

- Civil Engineering work experience at the District Council of the Copper Coast (2014-2015)
- Waste Water Treatment Plant maintenance and commissioning
- Surveying of roads for life expectancy and future pavement failure
- Project Manager for the Moonta Community RV Dumping Point (2015)

FORMER PROJECTS

- Surface Water Seepage and table water analysis, South Australia (2012)
- Wallaroo Waste Water Treatment Plant Maintenance and commissioning (2014)
- Project Manager for a 22 Mega-Litre Stormwater Dam Design and Construction (2014)
- Moonta Community RV Dumping Point (2015)
- Full Sewer System data analysis, Moonta and Port Hughes, South Australia (2015)

COMPUTER SKILLS

- AutoCAD, Autodesk Inventor, SolidWorks, Microsoft Office, ArcGIS, CIRCLY, Matlab, STRAND7, Synergy

PROFESSIONAL QUALITIES

- Committed and Responsible
- Punctual and reliable
- Team leader and Student
- Highly Motivated and passionate
- Ability to work independently and collaboratively
- Excellent communication skills

1.8.4 Urban Planning Manager

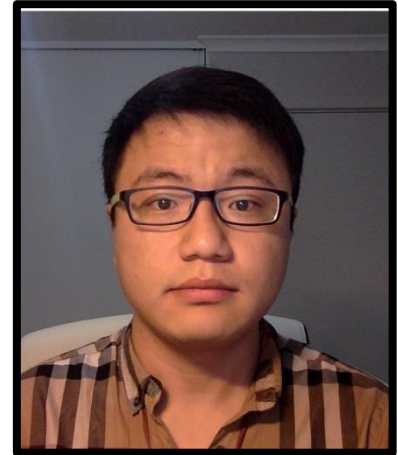
ZEDONG ZHANG

Curriculum Vitae

Roles Urban Planning Manager
Civil Engineer

Email ZHAZY047@mymail.unisa.edu.au

Office Phone 8272 1238

**EDUCATION**

2012 – Present University of South Australia
Bachelor of Engineering (Civil)

2009-2011 Banksia Park International High School
The University of Adelaide (Architecture)

NOTEABLE EXPERIENCE

- Architecture work experience at the City of China (Hetian) (2012-2013)
- Civil engineering work experience at the City of China (Hetian) (2013-2015)
- Engineering cartography assistance for an architectural design company
- Laboratory assistant in the laboratory for a Concrete Mixing plant
- Engineering assistant for coal - fired power station

FORMER PROJECTS

- Design of a suitable deep foundation for the proposed bridge of the Seaford Rail Extension (2013)
- Car park construction management for Adelaide Oval (2014)
- Water Resources System Design for Strathalbyn, South Australia (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel Design) (2014)
- Eco-tourism resort on Tanna Island, Vanuatu single storey timber framed bungalow design (2014)
- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)

PROFESSIONAL SKILLS

- AutoCAD, SolidWorks, Microsoft Office, DRAINS, HEC-RAS, CIRCLY, GALENA, SLOG, Matlab, STRAND7, Chinese, English, Japanese, Office manager assistant

PROFESSIONAL QUALITIES

- Able to communicate with different levels
- Good knowledge in PC operations
- Proficiency in written and spoken English/Mandarin Self-motivated and enthusiastic
- The enthusiasm and enterprising
- The industrious and pragmatic
- Have the courage to challenge and exploration

1.8.5 Structural Engineering Manager

YI ZHANG

Curriculum Vitae

Roles Structural Engineering Manager
 Civil Engineer

Email zhavy158@mymail.unisa.edu.au

Office Phone 8272 1239

**EDUCATION**

- South Australian Institute of Business and Technology (at University of South Australia)
- Diploma of Technology (Engineering and the Environment)
- October 2011-current

- Holmesglen Institute of TAFE
- Certificate I in Construction
- Certificate III in Bricklaying/Block laying
- August 2010-August 2011

NOTEABLE EXPERIENCE

- Building work experience at the City of Camberwell in Melbourne (2014-2015)
- Civil Engineering work experience at the City of Harbin (2014)

FORMER PROJECTS

- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel And Timber Design) (2014)
- Water Resources System Design for Strathalbyn, South Australia (2014)
- Noarlunga Rail Line No. 59 Extension (2013)

COMPUTER SKILLS

- Microsoft Excel, Microsoft Office, SolidWorks, STRAND7, DRAINS, HEC-RAS, CIRCLY, GALENA, SLOG, Matlab

PROFESSIONAL QUALITIES

- hardworking and dedicated
- Very good interpersonal skills
- Experienced in working in a team
- Punctual and reliable
- Self-motivated and enthusiastic

1.8.6 Transport Services Manager

NASSER ALMAIBAD

Curriculum Vitae

Roles Transport Services Manager
 Civil Engineer

Email Almny002@mymail.unisa.edu.au

Office Phone 8272 1240

**EDUCATION**

2011 – Present University of South Australia
 Bachelor of Engineering (Civil)

2009 - 2010 SAIBT
 Diploma of Engineering Environmental
 technology

NOTEABLE EXPERIENCE

- Civil Engineering work experience at the City of Campbelltown (2013-2014)
- Engineering analysis of property development applications for the City of Campbelltown including stormwater drainage design determination
- field data collections, data analysis, and simple modelling procedures in traffic management
- Examined and investigated of traffic management study case and identifying potential problems (2012)
- Project manager assistant for constructing hospital (2013)
- Trained for using tools in construction field and build pods as a project.

FORMER PROJECTS

- Water Resources System Design for Strathalbyn, South Australia (2014)
- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)
- Noarlunga Rail Line No. 59 Extension (2014)
- Tanna Island, Vanuatu single storey timber framed bungalow design (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel Design) (2014)

COMPUTER SKILLS

- AutoCAD, SolidWorks, Microsoft Office, DRAINS, Matlab, STRAND7, SPACE GASS, GALENA

PROFESSIONAL QUALITIES

- Hard working and determined
- Punctual and reliable
- Excellent customer service
- Self-motivated and enthusiastic
- Ability to work to and meet deadlines

1.8.7 Environmental Services Manager

ERINY ABDELRAOUF

Curriculum Vitae

Roles Environmental Services Manager
Civil Engineer

Email abdey007@mymail.unisa.edu.au

Office Phone 8272 1241

**EDUCATION**

2014 – Present University of South Australia
Bachelor of Engineering (Civil)

2010-2012 Flinders University
Bachelor of Engineering (Civil)

NOTEABLE EXPERIENCE

- Civil Engineering work experience at Santos Ltd. (2014-2015)
- Audits of Santos oil and gas assets environmental conformance against Santos Environmental Health and Safety Management Standards.
- Development of action plans for each of the assets in Eastern Australian Business Unit to reach the required level of environmental compliance.
- Proposing opportunities for improvement for application the environmental management systems in Santos
- Groundwater sampling procedures for Patricia Baleen Gas Plant for monitoring environmental impacts from activities
- Trained to undertaking initial contaminated site assessments by LBW environmental projects
- Project manager for the Adelaide Oval multistorey car park (2014)

FORMER PROJECTS

- Water Resources System Design for Strathalbyn, South Australia (2014)
- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)
- Noarlunga Rail Line No. 59 Extension (2014)
- Tanna Island, Vanuatu single storey timber framed bungalow design (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel Design) (2014)

COMPUTER SKILLS

- AutoCAD, Autodesk Inventor, Microsoft Office, DRAINS, HEC-RAS, CIRCLY, GALENA, SLOG, STRAND7

PROFESSIONAL QUALITIES

- Attention to detail
- leadership skills
- Excellent customer service
- Motivated by challenges
- Ability to work to and meet deadlines

1.8.8 Geotechnical Services Manager

ANNA DAI

Curriculum Vitae

Roles Geotechnical Services Manager
Civil Engineer

Email daiay001@mymail.unisa.edu.au

Office Phone 8272 1242

**EDUCATION**

2012 – Present University of South Australia
Bachelor of Engineering (Civil)

2011-2012 TAFE SA
Diploma of Technology (Engineering and
the Environment)

NOTEABLE EXPERIENCE

- City reconstruction planning for Pengzhou City, China (2013-2014)
- Investigation of Shanghai public transport flow in China (2014)

FORMER PROJECTS

- Whyalla Regional Cancer Centre Re-Development (Reinforced Concrete Design) (2014)
- Whyalla Regional Cancer Centre Re-Development (Steel And Timber Design) (2014)
- Water Resources System Design for Strathalbyn, South Australia (2014)
- Noarlunga Rail Line No. 59 Extension (2013)

COMPUTER SKILLS

- AutoCAD, Microsoft Excel, Microsoft Office, SolidWorks, STRAND7, DRAINS, HEC-RAS, CIRCLY, GALENA, SLOG, Matlab

PROFESSIONAL QUALITIES

- High sense of responsibility
- Cooperative with team
- Good interpersonal skills
- Analytical with problems
- Strong determination to succeed

2 POLICIES AND PLANS

2.1 QUALITY ASSURANCE PLAN

At HYDROFUTURE Consulting, quality of work is taken very seriously and is guaranteed through our personalised Quality Assurance Plan. This plan promises to deliver the highest level of quality service and client satisfaction whilst completing projects before their deadline and within budget.

The aforementioned Quality Assurance Plan has resulted in HYDROFUTURE Consulting receiving ISO 9001 Quality Management Systems certification.

Each and every employee at HYDROFUTURE Consulting implements our Quality Assurance Plan by completing a designated checklist through each stage of their respective task and a further checklist is completed by the Project Manager and Assistant Project Management to not only ensure our standards are being met, but to also address any potential issues and to ensure all work is to schedule.

All new employees undergo intensive training for our Quality Assurance Plan and Procedure in their probation period to ensure they have the ability to implement the best quality of work possible. All existing employees undergo further training four times a year. This training includes a look at real-life scenarios in current and previous projects.

The Quality Assurance Plan depends on excellent communication not only within the company but also with the client and associated parties. Employees meet weekly to discuss the status of current projects and in turn ensure they are to schedule. The Project Manager or Assistant Project Manager will contact the client in the event of any potential setbacks (ie delayed delivery of materials), but also in the occurrence of the completion of any key events and ultimately when the client has elected to be notified.

Clients are advised to provide feedback about their experience with HYDROFUTURE Consulting as this will be used to further improve and develop our already highly regarded Quality Assurance Plan.

2.2 WORKPLACE HEALTH AND SAFETY POLICY

HYDROFUTURE Consulting takes stride in its implemented Workplace Health and Safety Policy as it is built on the fundamental legislative requirements and proceedings and further advanced with modern day research and technology.

At HYDROFUTURE Consulting, WHS/OH&S is implemented in every stage of its projects, on-site or off-site, client or employee.

The Project Management Team and each Engineering and Urban Planning manager are trained in Occupational Health and Safety as well as First Aid. Reviewed and further training is provided quarterly to ensure employees continue to understand and implement the policy and also to raise any concerns with the company that may require investigation and further action.

Regular audits and inspections are carried out both on-site and off-site to ensure the WHS policy is being correctly followed and implemented.

WHS Policy Key Points:

- All employees are trained in the safe use of materials and chemicals by understanding the Material Safety Data Sheets (MSDS) available to them both on-site and off-site.
- All employees, contractors, clients and associated parties on-site are to wear the required Personal Protective Equipment (PPE) and to follow the implemented WHS rules and guidelines.
- A WHS officer is deployed to the work-site(s) twice a week to ensure all workers are following the WHS policy. Appropriate action is taken against workers who do not comply.
- All work-related incidents, injuries, risks or hazards are dealt with immediately and investigated accordingly to ensure minimisation of future re-occurrence.
- In the event of a work-related injury, a First-Aid trained employee will perform the appropriate measures in line with the WHS act while waiting for the arrival of an ambulance (if applicable).
- All employees who do not comply with the WHS Policy will receive the appropriate disciplinary action from a written warning to instant dismissal (depending on the situation at hand).

2.3 ENVIRONMENTAL POLICY

HYDROFUTURE Consulting's vision is 'reducing our environmental footprint'. All environmental issues and risks are taken seriously to ensure that we preserve the environment we interact with. The company have its own Environmental management systems to ensure that the all environmental matters are managed with zero tolerance to any impacts that can damage the environment. Our Environmental Management systems ensure that the business is compliant with ISO 14000 standards and Environmental Protection Act (EPA)-1993

Environmental Policy Key Points:

- All activities undertaken by HYDROFUTURE Consulting must comply with the relevant environmental legislations and policies.
- Any environmental impacts must be identify, assessed and mitigated in all phases of the projects (initiation, design, management, construction, operation and maintenance)
- HYDROFUTURE Consulting Environmental Advisers are to be consulted regarding all the environmental matters, including any changes to the agreed EMPs.
- All staff is to be inducted to Environmental Management plans, polices and legislations before commencing any work on site.
- Regular auditing by environmental advisers is to be undertaken, to ensure conformance to the agreed EMP (Environmental Management Plan) and to identify any possible risk and manage them as soon as reasonably practicable.
- HYDROFUTURE Consulting Environmental scorecards are to be evaluated annually to asses our environmental footprint and identify all opportunities for improvement.
- Adopt and promote energy and resources efficiency in all activities undertaken.
- All environmental innovative ideas to be encourage though an annual internal Environmental award.

3 PROJECT DETAILS

3.1 PROJECT OUTLINE

The project presented entails the enhancement of the stormwater drainage systems of North Terrace, Kent Town to protect the properties from flooding. A feasibility study is to be compiled in which involves looking at the proposed area of research and investigating various solutions to determine which result is the most feasible. After a feasibility study is complete preliminary designs can be drawn to further investigate the required technologies and cost of the project. The feasibility study will investigate such solutions as drainage systems, increasing the flow carrying capacity of creeks, detention basins, stormwater source control technologies and Water Sensitive Urban Design (WSUD) features. The feasibility study will also include investigation of stormwater quality control. HYDROFUTURE Consulting will provide a feasibility study with the goals and objectives outlined by Tonkin Consulting in the project brief.

Significant problems identified for this section of North Terrace include:

- The council provides services to over 34,000 residents and in recent years has had significant increases in population..
- Cultural and historical richness and highly developed dynamic business centre.
- One sandstone arch culvert, which is over 150 years old with number of sandstones missing.
- High volume of traffic; the road is busy from 5 am until 3 am most days.
- There are a number of utility service lines and pipes under North Terrace.

These significant problems develop the need for these particular stormwater drainage systems. It is vital to investigate a solution to benefit residents and environment.

3.2 PROJECT OBJECTIVES

- Ensure the new stormwater drainage systems will be capable of meeting the standard of 5 years ARI, 20 years ARI and 100 years ARI.
- Ensure cost effective and environment friendly technologies to manage the quality of the stormwater.
- Ensure construction time avoid rush hours and provide all road users (including motorists, public transport, pedestrians and cyclists) with facility.
- Ensure all cultural and historical properties under special protection.
- To ensure other utility services maintain proper functioning, extensive care is required.

4 FEASIBILITY STUDY PROPOSAL

Building on from the project outline, the feasibility study explores the critical and fundamental requirements, limitations and expected outcomes for the project at hand. The key inputs, outputs and important areas of attention for each team making up our company structure is included in this proposal (Sections 4.2 to 4.7) and will be expanded further in the Feasibility Study.

4.1 STAKEHOLDERS

The stakeholders of any given project can be either those involved and apart of the project or those who may possibly be affected as a result of the project being undertaken and implemented. At HYDROFUTURE Consulting the project management team works hard to ensure the expectations and needs of all its stakeholders are met and managed throughout the duration of the project. A number of the stakeholders relative to this project are listed as follows:

- Sponsor – Tonkin Consulting
- HYDROFUTURE Consulting Project Team and Senior Management
- State Government
- Local Government (The City of Adelaide and The City of Norwood, Payneham and St Peters)
- Department of Planning, Transport and Infrastructure (DPTI)
- SA Water
- SA Power Networks and ETSA
- Businesses (On North Terrace and other roads affected by the works)
- Road Users
- Sub-Contractors (Including Utilities)
- Suppliers and Vendors
- Supporters
- SA Heritage

In order to maintain a happy and professional relationship with our stakeholders, a meeting will be held on a date after acceptance of this tender and suitable with Tonkin Consulting's schedule at The City of Norwood, Payneham and St Peters Council Chambers. All stakeholders will be invited to attend via a letter sent out which will also depict the project scope.

Based on the response from the meeting and letters, the needs of the stakeholders will be prioritised according to their level of importance and all decisions of the project will be made alongside these needs.

4.2 WATER AND SERVICES

Currently the drainage of stormwater on North Terrace, Kent Town is quite insufficient for the flows that it receives. North Terrace is known to be a busy residential and commercial street that has high flows of traffic that leads in and out of the City of Adelaide.

4.2.1 Goals and Objectives

The goal of the Water and Services team is to provide stormwater drainage to minimise flooding on roads and local properties. If a storm water upgrade is to be carried out then the integrity of the other existing services must be upheld and bypassed to keep the upgrade on schedule.

In order to upgrade the existing stormwater infrastructure the water and services team will:

- Collect Monthly Rainfall Data (BOM.gov.au)
- Analyse existing Stormwater, Sewer and other services depths
- Create a new Stormwater Design
- Contact Dial-Before-You-Dig and Local Council for Service depths and telephone/power cables
- Determine potential stormwater solutions

4.2.2 Assumptions

Some assumptions during the project will have to be made in order to complete the study on time and in a professional manner. Some of these assumptions will be:

- Detailed study of existing area stormwater drainage, essentially how the exiting stormwater holds up during a flooding event.
- Detailed information on current traffic patterns, high and low flows
- Current GIS and Dial-Before-You-Dig data is given freely and accurately
- Assume that the existing infrastructure is inadequate.

4.2.3 Considerations and Potential Options

There are three options that the company offers with regards to the drainage solutions.

- *Natural Vegetation Absorption*
- *Increase and improvement on existing infrastructure*
- *Combination of Natural vegetation and improvement of existing infrastructure.*

Natural Vegetation Absorption would consist of slight road adjustments and traffic flow alterations. The natural vegetation that would be used would be Australian Vegetation to ensure local vegetation and diversity. This natural vegetation would be used to slow or stop the high flow of water runoff. In addition, the natural vegetation will absorb some of the water flow before it enters the existing infrastructure.

Improvement of existing infrastructure would involve the addition of Side Entry Pits (SEP's) along the affected road, increase culvert size and perhaps even road profile redesign to ensure the even distribution of water runoff, among other potential drainage solutions. This option will take longer than the natural vegetation solution; however, the results would most likely be better.

The combination of the two would take the longest, in regards to completing the works and the feasibility study, however, this solution would almost minimise or completely negate the water runoff flooding that is occurring today. These are the options that HYDROFUTURE Consulting are offering to minimise the flooding on the North Terrace and surrounding roads.

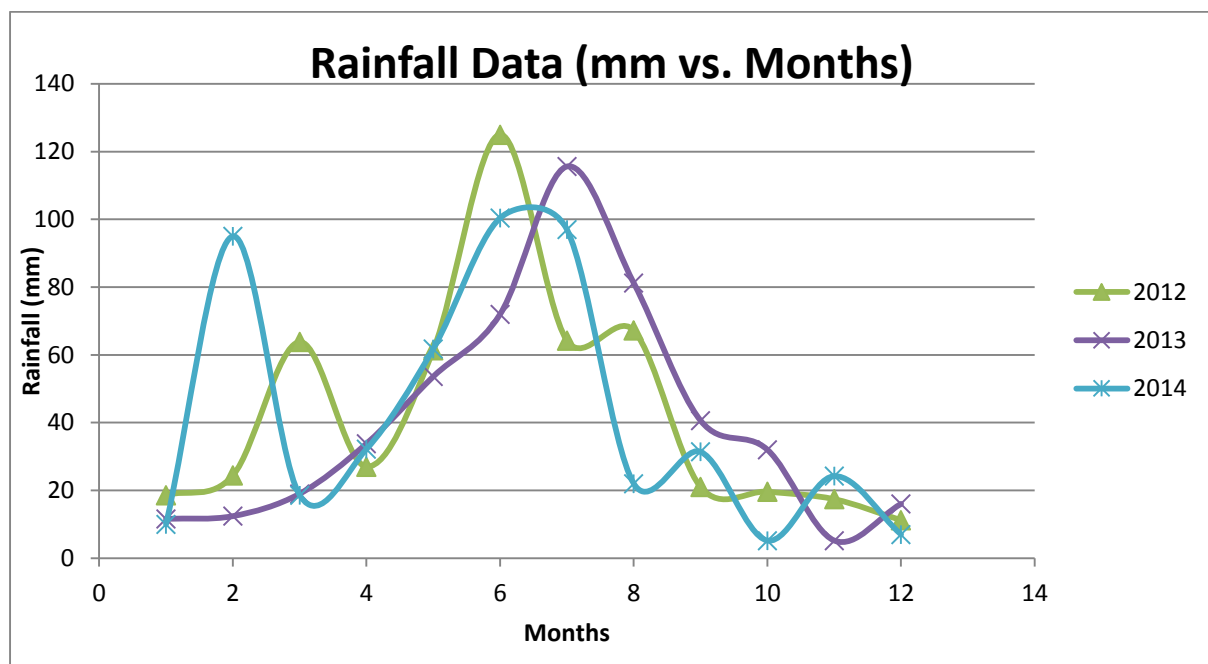


Figure 1 - Current Rainfall for the Kent Town Area (Bureau of Meteorology)

Using the Bureau of Meteorology it can be determined the nominal rainfall times. This information can be used to determine when the Feasibility Study should be carried out and also when the infrastructure improvement works should be carried out after. For example, the Feasibility Study should be held somewhere between May and August as that is where the area of Kent town receives the most rainfall. In doing this, accurate data can be collected to determine why the existing infrastructure is insufficient. On the other hand, it can be seen when the least rainfall is received, between September and December. This is when the infrastructure improvement works or natural vegetation solutions should be carried out. Doing it within these months will not only reduce delays in the project due to weather problems but provide a cost effective work schedule.

4.2.4 Feasibility Study Process

- Review Reports from BOM, local complaints, surveying information
- Examine current stormwater infrastructure
- Gather data from local and State Government's
- Identify Services Location
- Maintain Water Quality as a high priority

4.2.5 Management of Existing Services

The integrity of the existing services has to remain intact in order to reduce delays, reduce risks and hazards to workers and residences. Before any work commences, a Dial-Before-You-Dig form will be completed to ensure the piping and cabling of services such as, SA Power Networks, Telstra, Gas etc. will remain intact throughout the entire project. Reducing the digging and excavation of soils will be ideal and attempted, to reduce costs and to minimise the risk of puncturing a cable or pipeline which will ultimately increase the project's timeline. Working around these services, if possible, will provide a cost and time effective method for completing the project on time.

4.2.6 Water Quality Assurance:

As the stormwater runoff eventually reaches the River Torrens, water quality is of high importance. Compromising the quality of the stormwater that enters the river is not acceptable. HYDROFUTURE Consulting will ensure the utmost importance will be placed on the overall quality of water entering the stormwater systems. This could be through gross pollutant traps, SEP grids and working with local government for street sweeping etc.

Ensuring the quality and integrity of the water entering the stormwater system is important to us and we would like to reflect that with the works undertaken. No shortcuts will be taken to speed up the process of construction that will affect the overall quality of water sources which eventually enter the River Torrens.

4.3 URBAN PLANNING

The scope of works relating to urban planning is to undertake a feasibility study for the stormwater drainage systems of North Terrace that investigates the influence of this construction project to the North Terrace urban area. This ensures the development of the North Terrace is sustainable and environmentally friendly. The urban planning design is not only considered with the present, but more importantly the future influence of the project.

4.3.1 Goals and Objectives

The goals of urban planning are to ensure the influence of this project has minimal negative impact to the surrounding area of North Terrace. Potential negative impacts could include environmental pollution, water pollution, air pollution and the negative impact to the local communities.

A number of other important goals are:

- To ensure the carrying capacity of this new stormwater drainage systems can be used for at least next 100 years and can deal with large volume of rainwater of 1 in 20 ARI.
- To ensure that local environment (water, air and ground surface etc.) is complete restorable after the construction
- To protect and provide a quality life to the North Terrace local communities and relevant businesses
- To ensure the local business centres, local communities and relevant authorities approve of the proposed options
- To investigate and determine the possible impacts that the proposed options would have on the local businesses and community during and post construction

4.3.2 Assumptions

During the construction process the local traffic conditions will be significantly affected, to reduce the magnitude of impact, it is assumed any available free land can be used to place construction equipment to reduce the use of road surface. It is assumed this kind of land can be used during the construction under the agreements of landholders such as local council or private landholders.

Urban planning requires a lot of background information about local population, local environment, local business and local traffic condition. It is assumed that the information provided about any existing services is accurate and precise.

4.3.3 Urban Planning Team Focus

The urban planning services required in this project will be led by the team leader Zedong Zhang, who has had plenty of experiences in a construction. The aim of this project is to provide cost effective and environment friendly technologies to manager quality in an efficient way to make the North Terrace area a better place to live. To achieve these wonderful goals, the City would like to develop significant stormwater drainage systems to resolve flooding during heavy rainfall events. Before the project begins, there are a few issues that have to be solved to get to the next stage.

- To provide an exit for local residents, North Terrace has over 34000 residents, keep the local traffic condition unblocked is the prior mission.
- The city of Norwood Payneham & St Peters is well regarded for its cultural and historical richness, retaining a sense of heritage is very important for the local council and Adelaide.
- The city of Norwood Payneham & St Peters is a highly developed dynamic business centre and local business can be significant effect by the contraction, to minimise this influence also a job for urban planning team.

4.3.4 Council Regulations

Ensure all the planning of the stormwater drainage systems project are met and follow council regulation and policy that have been published. Furthermore, the whole project and any construction related to this project has to meet the relevant area of Australian Standard, the following department, policy and standard have to meet:

- SA Water Department
- The City of Adelaide
- The City of Norwood Payneham & St Peters
- Department of Planning, Transport and Infrastructure
- SA Heritage Place

4.3.5 Heritage Issues

In South Australia, there are two main pieces of legislation, the Heritage Act 1993 and the development Act 1993, any properties that need to undergo change that are registered in the Department of Environment and Heritage must get permission from local council and the Heritage Trust of South Australia.

An ancient building is located around the corner of Hackney Road and North Terrace, this building was constructed in 1876/77. The name of this building was 'Romilly House', in 1990, the property

was on the State Heritage Interim Register. Any project plan related to this building has to get permission from the council of Norwood Payneham & St Peters and the Heritage Trust of South Australia.

4.4 STRUCTURAL ENGINEERING

Tonkin Consulting has provided approval for the main drainage pipe to be connected into the 150 year old sandstone arch culvert which passes over First Creek.

Due to its age and the fact that a number of sandstone blocks were found missing during inspection, an assessment is to be undertaken by our qualified structural engineering team to analyse the structural integrity of the culvert and to also implement safety measures to support the culvert and ensure workers can safely work with the existing infrastructure.

4.4.1 Goals and Objectives

The goals of structural engineering team are to provide and design a sustainable, efficient, innovative and durable drainage system structure (road culverts for creek crossings etc.) to meet client's requirements.

- Investigates and analysis the 150 years old sandstone arch culvert that passes over First Creek.
- Developing and producing an innovative management to ensure the construction around and involving the 150 years old infrastructure is safe.
- Investigate and analysis all the existing service structures and other infrastructures with extensive care to make sure the current construction has the minimum influences to the existing structures.
- Ensure all the structures included in the project can support the levels of services that have been applied (1 in 100 year Average Recurrence Interval standard etc.).
- Ensure all the structures that design by the team are met relevant Australian Standards, legislations and policies during the design process.

4.4.2 Assumptions

During the structure design, some of assumptions had been made to produce the final design that will meet the client's requirements.

- All the existing structures are stable to hold all construction activities.
- All the data that relevant to the structures design was correct (supporting soil data etc.)

4.5 TRANSPORT

The project at hand will require a great deal of preparation in regards to managing traffic and transport due to the underlying fact that the project involves works to a major arterial road on the outskirts of the CBD.

A number of important factors relating to transport are to be considered for when the works begin on North Terrace. All of which need to be addressed, in order to meet the needs of our stakeholders while maintaining our quality assurance.

4.5.1 Goals and Objectives

- Accurately estimate traffic volumes for North Terrace and surrounding roads using traffic survey on site and DPTI reports
- Provide a traffic management plan with alternate routes that will cause the least delay for motorist and public transport
- Provide a traffic management plan that is both safe and effective while causing the least amount of discomfort to surrounding community's
- Produce safe cycling and pedestrian paths options that allow easy access to and from the city as well as local businesses.

4.5.2 Assumptions

All previous DPTI traffic volume reports on North Terrace and surrounding road reports will be available at commencement date of feasibility study.

4.5.3 Considerations and Potential Options

The road maintains large volumes of traffic capacity from early morning (5am) until late at night (3am) with both public transport (buses) and personal vehicles making up the flow.

During the morning most of traffic is inflowing into the city and contrastingly later in the afternoon the majority of traffic is flowing out of the city, this will be a key factor in the traffic management strategy that will be implemented by HYDROFUTURE Consulting.

This could allow for possible one-way traffic flows during construction due to closed lanes, which will vary in direction respective to the time of day. During the morning one way traffic can be conducted into the city while mid to late afternoon one way traffic can be allowed out of the city. This would utilise the amount of road available to be used more effectively for the traffic situations, while other routes would also be determined to allow for additional traffic.

Another option, which would be optimal, is utilising the four lanes that North Terrace has with a construction plan that only requires one outer lane to be closed at any given time. This would give the option to have two lanes for one direction and one lane for the other. Although additional routes may also be required this plan allows for a more natural traffic flow settings for motorists.

However at times roads may need to be shut completely which would preferably be done during the lowest traffic volume hours. This will definitely mean traffic management plans with alternative routes will need to be design.

HYDROFUTURE Consulting aims to manage all these arise problems through traffic surveying, which will be completed on site during the feasibility study, with additional traffic reports being used from DTPI. This will be conducted on both North Terrace and major surrounding roads, including Hackney Road, Dequetteville Terrace and Fullarton Road as well as other minor surrounding roads.

This will be used in order to determine traffic volumes as well as traffic capacities for surrounding roads in order to determine plausible alternate routes. This will include both public transport and personal vehicles. Additional surveying will be conducted in order to determine optimal public transport routes.

A pedestrian and cycle plan will also be investigated for design in order to keep the community both safe and on schedule.

4.5.4 Affected Streets by Road Construction and Viable Options:

There are roads which will be mostly effected by the construction site specially with reducing the flow rate of roads which will cause increase the volume of traffic. Some issues might occur but at the same time there are some viable options to reduce the potential delays as much as possible.

The transportation for the east side of Dequetteville Terrace and Princess High Way can go through Rundle Street, Little Rundle Street, King William Street and Little King William to enter or exit the city. Also they can use Baliol Street and Marlborough Street and head through Rugby Street and Wayndra Lane to exit to Hackney Road to go to the north side of the city. Moreover, most of the traffic will appear more in the 3 minor roads except for Little King William Street. However, public transportation will replaced in Little King Street since it is quite a small distance away, also King William Street could be used for the residential cars only which will be helpful to keep the public transportation on time and to reduce the traffic volume of other routes.

Furthermore, safety is an important factor within traffic management and on the work site. For safety reasons speeds can be reduced to minimise the risk of possible accidents that would give poor control of the traffic volume.

There are five steps that would be required to go through while processing the North terrace drainage project, which will be listed below:

- Assess opening risks of road project, which is studying the performance and efficiency of the road, which is consisted of which is studying the performance and efficiency of the road.
- Prepare the opening strategy, which is assessing low, medium and high risk assessment.
- Prepare the opening readiness plan, where required documents be ready and revised for implementation.
- Implement opening readiness plan.
- Evaluate Effectiveness of the opening readiness plan, at this stage it is important for managers and employees to write a report as a guide regards to challenges faced during working in the project.

4.6 ENVIRONMENTAL CONSIDERATIONS

HYDROFUTURE Consulting prides itself in its reputation as a company that works towards reducing its environmental footprint. We always consider environmental management as one of our highest priorities to manage and consider. Therefore, as part of the feasibility study for the project our team of highly experienced environmental engineers will be developing a unique Environmental Management Plan (EMP) to ensure that all the environmental issues are managed in an appropriate way according to standards. This Environmental Management Plan (EMP) will take into account the results of the Environmental Impact Assessment (EIA) that will be undertaken.

HYDROFUTURE Consulting has the appropriate resources to undertake the Environmental Impact Assessment (EIA). We have a broad range of experience with environmental management issues ranging from reviewing an environmental impact statement for the South Road Super-way to undertaking environmental audits for Santos Management Standards.

With strong communication bases between the experience HYDROFUTURE Consulting Team Managers – civil, transport, water, structural, geotechnical, environmental and quality management - we can ensure that any environmental risk will be easily identified and addressed throughout all stages of the project.

A summary of the process that HYDROFUTURE Consulting will be using to achieve these outputs is outlined in the Environmental Procedure section (Section 4.8.1). Some of the issues that will be considered when developing the EMP and undertaking the EIA are outlined in sections (4.8.2-4.8.6).

4.6.1 Goals and Objects

- Identifying all sensitive receptors that could be impacted by the project through undertaking ecological surveys and reviewing of old reports.
- Undertaking an Environmental Impact Assessment (EIA) to evaluate each of the impacts.
- Developing an Environmental Management Plan (EMP) that will be used during the project design and construction.
- Working with the Water Resources team during the feasibility study to choose an option that has the least reasonable impacts on the environment.

4.6.2 Assumptions

- Ecological survey of the fauna and flora present in the project area will be obtained from local councils and previous ecological studies.

4.6.3 Environmental Procedure

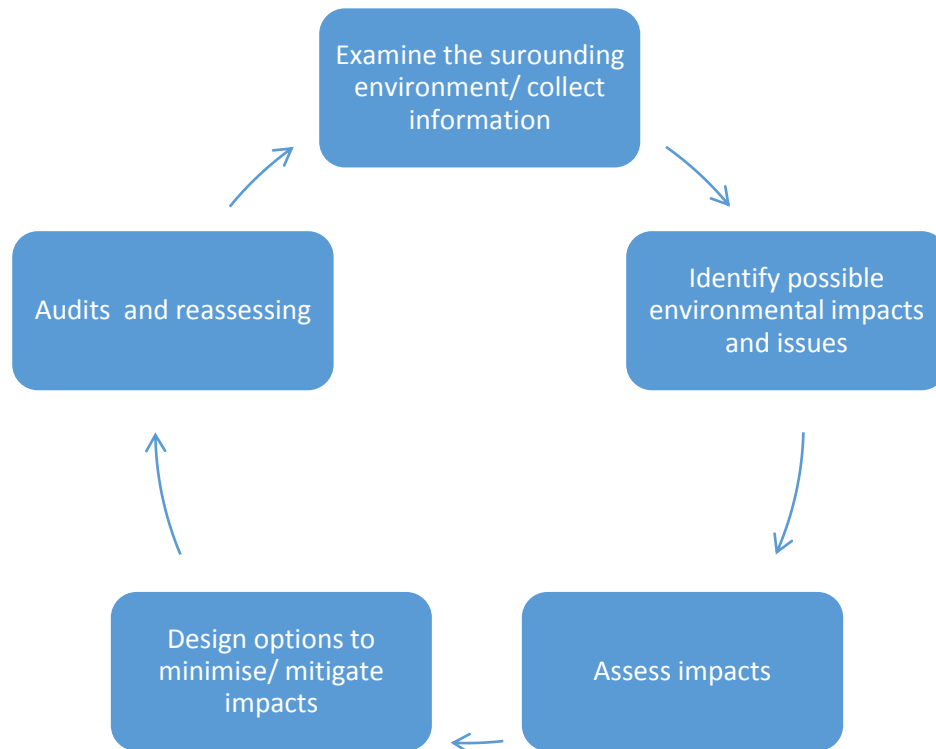


Figure 2: Environmental Management System procedure

As a company that prides itself in its care about the environment, we implement an iterative process when it comes to environmental management (Figure 2). During the feasibility study for the project our highly experienced environmental engineers will be implementing the procedure outline in Figure 2 to make sure that all the environmental issues are managed to the highest standards.

- We will start by examining the surrounding environment of the project area and possible impacted receptors (e.g. River Torrens). This would be achieved by reasonable ecological studies of the area's possibly impacted areas.
- A list of all the impacts and environmental issues will then be identified.
- Each of the impacts will then be further assessed and prioritised according to the degree of the impact.
- All the environmental issues will then be considered when choosing the preferred design option for the project. All the impacts from the project and/or its construction will also be

considered and management actions for mitigating them will be outlined in the project specific EMP.

- The process will be repeated if any more impacts were identified in later stages of the process.

4.6.4 Water Quality

Stormwater quality is important to monitor and control in order to avoid any environmental impacts on water bodies. Storm water is considered as a greywater, which unlike sewage (black water) does not go through a treatment process. Therefore, during the feasibility study, options that can improve quality of the stormwater will be considered. Examples of these options are:

- Gross Pollutants Traps
- Trash Racks
- Bio-filtrations Stormwater Harvesting and Reuse

During the construction process prevention of pollutants from entering the waterways must also be considered and managed to ensure compliance with Stormwater Pollution Prevention - Code of Practice for the Building and Construction Industry – EPA- March 1999.

- Management of pollutants such as tack coat, binder, asphalt, oil spills or other material will be outlined in EMP to stop it entering any water sources.

4.6.5 Air Quality

- During the construction of the project air quality can be affected either by dust from activities like excavation and earth works or air emissions from work vehicle's exhausts.

Management Strategies

- The soil is to be kept damp at all times via spraying with water in a judicious manner.
- Ensure all vehicles meet emission standards to reduce their carbon footprint.

4.6.6 Site Environmental Management

Erosion and Sedimentation Runoff

- As part of the management plan we will develop a Soil Erosion and Drainage Management Plan (SEDMP).
- SEDMP will ensure that we conform to the requirement of the contract to make sure that pollutants such as litter, sediments and wash down water are controlled on site in an appropriate manner during construction.

Excavated Soil

- Disposal of excess excavated material (soil, etc) will also be managed and outlined in the EMP
- Required environmental testing for the surplus excavated material disposal will also be outlined in the EMP
- Since the site is also located near Torrens River, it could be expected that groundwater will be encountered during excavation.
- Dewatering of the groundwater from the excavated material (if required) in a safe and environmentally friendly manner will be outlined in the EMP, ensuring that the groundwater pumped from excavation is disposed of in accordance with EPA (Environmental Protection Authority) requirements.

Waste

- Waste and rubbish will be removed from site and disposed of in accordance with the Environmental Management Plan (EMP).

4.6.7 Noise Emission

- Noise emissions usually accompany the construction phase of any project. Noise can have impacts on the surrounding sensitive receptors including humans and fauna in addition to impacts on everyday activities of local residence and businesses.

Management Strategies

A noise management plan is to be developed as part of the Environmental Impact Statement (EIS) of the project. This noise management plan will consider the following, but not limited to:

- Working hours will be agreed upon with stockholders impacted by noise in conjunction with the Traffic management plan.
- All machineries used are to be serviced to an acceptable level to reduce possible noise emissions.
- Noise is to be monitored at all times to ensure compliance with the legislative requirements and the agreed conditions.

4.6.8 Flora and Fauna

- Ecological survey data for the construction/impacted area will be collected from the City of Norwood, Payneham and St Peters Council.

- Species that are identified as threatened species according to the EPBC Act (Environment Protection and Biodiversity Conservation Act 1999) present in the area should be documented and dealt carefully with if encountered.
- Clearing of vegetation or shrubs will be limited to the very minimum to reduce impacts of the environment.

Management Strategies

- Approximate vegetation clearing will be documented in the EMP during the feasibility study.
- If any trees are required to be removed and relocated, approvals will be obtained during the feasibility study environmental management stage.
- Technical Procedures on how trees should be relocated and removed will also be documented in the EMP.

4.7 GEOTECHNICAL ENGINEERING

The feasibility study will delve into the geotechnical engineering project specifications relating to the project at hand. A number of potential aspects of the project requiring geotechnical engineering services include work to the existing road, verge and surrounding ground, for example, in the case of enhancing the existing infrastructure for drainage, a number of the aforementioned possible solutions from our other engineering teams may require our geotechnical engineers to conduct tests like soil reactivity and soil suction to collect important information.

4.7.1 Goals and Objectives

- Assess the current soil profile by taking bore log samples in important and relevant areas
- Conduct relevant tests for soil reactivity such as core shrinkage test and shrink-swell test
- Conduct relevant tests for soil suction such as filter paper method test, electrical conductivity method test and Wescor method test

4.7.2 Assumptions

Existing and previous soil profile data will be obtained from the City of Norwood, Payneham and St Peters. The geotechnical team will work alongside the water and services team to determine the need and course of action for the relocation of existing services.

4.7.3 Considerations and Potential Solutions

The existing pavement surface along the roadway of North Terrace has poor drainage and therefore in major storm events a large quantity of surface water collects faster than it can drain and in turn increases the possibility of flooding.

A number of options may facilitate and improve the drainage on North Terrace including a specially designed open-graded asphalt such as an AC10 open surf which will assist in draining surface water through the voids between its porous particles. The asphalt mix will still need to retain its high friction characteristics so the macro texture will need to remain closely bonded to the aggregate particles. This option will also aid in further enhancement to wet weather visibility.

This asphalt-wearing course will be in accordance with Tonkin Consulting's City of Norwood, Payneham and St Peters Stormwater Drainage Contract Documents, which include pavement reinstatement specifications from the Department of Transport, Energy and Infrastructure.

A specially designed subsoil layer could also be implemented to transfer ground water seepage from the overlying subgrade layer. A combination of the two pavement layers could be implemented to further assist in drainage.

Underneath the subsoil layer slotted pipes can be used to collect and transfer the water to the existing stormwater system.

Excess surface water along the road will be collected by the water table and transferred into any of the existing side entry pits along North Terrace.

There are some particular factors that should be considered in order to provide the demanded pavement strength. These factors may include:

- Horizontal shearing stress (for instance, granular pavement with sprayed seal surfacing cannot be used in certain areas; in addition, for granular pavements with thin asphalt surfacing, it will be required to reinforce the asphalt in the locations)
- In-service moisture factors can potentially restrict the application of unbound granular materials
- Heavy loads on vehicles or contact with pavement will result in higher stress
- The transportation cost of the material and the availability of the materials
- Alteration to the intended function of the road and aimed design period
- Alteration to the road network during the design
- Expected changes to vehicle limits (vehicles per day or VPD) during the design period to accommodate future increase in traffic volume
- Complying with sustainability requirement regulations and government ordinance.

Damage to the pavement, resulting from temporary pavement layers beneath the final surface and the transportation of heavy equipment should be taken into consideration to prevent damage to asphalt and avoid the occurrence of premature failures.

4.8 STEPS FOLLOWING COMPLETION

After the feasibility study has been completed and presented to project management team, the team should carefully study and analyse the conclusions and underlying assumptions. Next, the leaders will be faced with deciding which course of action to pursue. Potential courses of action include:

1. Choosing the most viable design scenario or model, developing a design plan and proceeding with creating and operating a design.
2. Identifying additional scenarios for further study.
3. Deciding that a viable design opportunity is not available and moving to end the design investigation process.
4. Following another course of action.

4.9 FEASIBILITY STUDY COSTING QUOTE

The table below displays the project office costs for each employee involved with the project using an estimated time frame of 4 weeks at 15 a week per employee (60 hours each).

Table 1- Project Office Costs

| Division | Position | Employees | Hours | Rate \$/hr | Cost \$ |
|--------------------------------------|----------------------------------|------------|-------------|--------------|------------------|
| Project Management | <i>Project Manager</i> | 1 | 60 | 240 | 14400 |
| | <i>Assistant Project Manager</i> | 1 | 60 | 220 | 13200 |
| | <i>Graduate Engineer</i> | 1 | 60 | 120 | 7200 |
| | Total | 3 | 180 | | 34800 |
| Urban Design | <i>Team Leader</i> | 1 | 60 | 200 | 12000 |
| | <i>Urban Planner</i> | 1 | 60 | 180 | 10800 |
| | <i>Landscape Architect</i> | 1 | 60 | 160 | 9600 |
| | <i>Municipal Engineer</i> | 1 | 60 | 180 | 10800 |
| | <i>Graduate Engineer</i> | 1 | 60 | 120 | 7200 |
| Total | 5 | 300 | | 50400 | |
| Transport Management | <i>Team Leader</i> | 1 | 60 | 200 | 12000 |
| | <i>Senior Engineer</i> | 1 | 60 | 180 | 10800 |
| | <i>Transport Engineer</i> | 2 | 120 | 180 | 21600 |
| | <i>Graduate Engineer</i> | 1 | 60 | 120 | 7200 |
| | Total | 5 | 300 | | 51600 |
| Water & Services | <i>Team Leader</i> | 1 | 60 | 200 | 12000 |
| | <i>Water Engineer</i> | 2 | 120 | 180 | 21600 |
| | <i>Services Engineer</i> | 1 | 60 | 180 | 10800 |
| | <i>Graduate Engineer</i> | 2 | 120 | 120 | 14400 |
| | Total | 6 | 300 | | 58800 |
| Structural & Geotechnical | <i>Team Leader</i> | 1 | 60 | 200 | 12000 |
| | <i>Structural Engineer</i> | 1 | 60 | 180 | 10800 |
| | <i>Geotechnical Engineer</i> | 1 | 60 | 180 | 10800 |
| | <i>Architect</i> | 1 | 60 | 160 | 9600 |
| | <i>Graduate Engineer</i> | 1 | 60 | 120 | 7200 |
| | Total | 5 | 300 | | 50400 |
| Environmental | <i>Team Leader</i> | 1 | 60 | 200 | 12000 |
| | <i>Environmental Engineer</i> | 2 | 120 | 180 | 21600 |
| | <i>Graduate Engineer</i> | 1 | 60 | 120 | 7200 |
| | Total | 4 | 240 | | 40800 |
| Total | | 28 | 1620 | | \$286,800 |

At HYDROFUTURE Consulting we have a wide range of staffed experts, ranging with all different amounts of experience. Within the pricing chart different rates for different employees can be found, ranging from lower priced graduate engineers to high priced project and assistant project

manager roles, with a wide range of different experiences and qualifications in-between (team leaders, engineers, senior engineers, planners and architects). All staffed employees within our company are trained well and have demonstrated extreme capabilities throughout all previous projects. This entire staff list above will no doubt use these previous skills and capabilities to apply to this project in all given opportunities.

4.10 PROJECT SCHEDULE

A Gantt chart has been created to highlight the major tasks, resources and their respective duration and order for the project as seen on page 48. The project milestones and deliverables are displayed below to show the expected due dates and required documentation (plan, statement, data, design, etc), respectively.

4.10.1 Project Milestones

Table 2 - Project Milestones

| Milestone | Due date |
|---|-----------------|
| Stakeholders Meeting | 16/03/2015 |
| Completion of feasibility study | 11/04/2015 |
| Approval for local land use | 26/03/2015 |
| Completion Urban Design Management Plan | 08/04/2015 |
| Completion of Traffic Management Plan | 08/04/2015 |
| Adapt appropriate Structures | 25/03/2015 |
| Completion of EMP | 09/04/2015 |
| Final Drainage Design option | 09/04/2015 |

4.10.2 Main Feasibility Deliverables

- An Urban Design Management Plan to be developed by HYDROFUTURE Consulting Urban Design team
- Stakeholder Analysis showing a table of needs/expectations and priorities
- Traffic Management Plan developed by HYDROFUTURE Consulting Traffic Management team
- Full Environmental Impact Assessment (EIA) undertaken by HYDROFUTURE Consulting Environmental team.
- Environmental Management Plan that will be used during the next stages of the project
- Environmental Impact Statement (EIS) to be submitted to the relevant authorities to ensure compliance with the regulations
- List of all the viable options that can be used to solve the project problem for example WSUD (Water Sensitive Urban Design) options explored by HYDROFUTURE Consulting Water and Services Engineering Team

- An Informed decision on the preferred stormwater drainage method that is proposed to be implemented in the detailed design stage (decided out of the list of viable options previously explored)
- Pavement Design designed by HYDROFUTURE Consulting Geotechnical Engineering Team
- Bore log data for existing soil carried out by HYDROFUTURE Consulting Geotechnical Engineering Team to test current reactivity, suction and other necessary characteristics
- Safety Management Plan for existing structures (stone arch culvert)

Feasibility Study: North Terrace Drainage System

