

TENDER SUBMISSION FOR THE NORTH TERRACE DRAINAGE DESIGN



Client: Tonkin Consulting & SA Water

Da Vinci Engineering | March 2015



11th March 2015

Dr F Ahammed & Mrs K Beecham
School of Natural & Build Environments
University of South Australia
Mawson Lakes Blvd
Mawson Lakes SA 5095

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

Dear Dr Faisal Ahammed and Mrs Kristy Beecham,

Da Vinci Engineering (DVE) is pleased to formally register an expression of interest for the Feasibility Study and Concept Design for the North Terrace Drainage Design, offered by Tonkin Consulting.

DVE, established in 2014, is a team of 30 talented, highly motivated, enthusiastic and technically skilled engineers with a wealth of knowledge, specializing in the following disciplines:

- Project Management
- Environmental Engineering
- Transportation Engineering
- Civil and Structural Engineering
- Geotechnical Engineering
- Stormwater & Water Sensitive Urban Design

Da Vinci Engineering use rigorous management strategies to ensure the completion of a comprehensive feasibility study on time and on budget, with a focus on finding innovative solutions.

The following expression of interest outlines the DVE company profile followed by the tender documents for the North Terrace Drainage Design Feasibility Study.

Da Vinci Engineering are pleased to submit a tender price for the **North Terrace Drainage Design** at:

\$267,600 AUD (ex. GST)

Da Vinci Engineering appreciates the opportunity to submit a tender for this project and looks forward to your response.

Regards,

Hugh Burger
DVE General Manager



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1. Company Overview

The name Da Vinci Engineering was chosen to highlight the aspiration of its employees to continually deliver solutions to engineering problems that are innovative and meet client requirements while also delivering on key company parameters including, but not limited to, constructability, safety, asset life, environmental aspects, recreational opportunities, visual acceptance, relative cost as well as community acceptance.

DVE delivers on these through its highly motivated employees and management structure, which ensures all work and concepts are elevated through its management structure for review as they are being developed.

Da Vinci Engineering (DVE) values the paramount importance of client communication in order to precisely deliver on their requirements and expectations.

DVE allocates the role of stakeholder and community consultation to the project manager to ensure these aspects of the project are given the highest priority and delivered to the project team at the highest level.

1.1. Company History

Formed in 2014, DVE has used the diverse experience of its staff to deliver projects of the highest quality. Past projects have shown the innovative structure of DVE as a team of people with different roles and responsibilities rather than a hierarchy of individuals to be the foundation of the company's success.

To compliment this company structure DVE has developed management strategies to be implemented continuously throughout a project to ensure the delivered product is of the highest quality produced by DVE. These strategies are described in Section 8 of this document and include Environmental, Occupational Health, Safety & the Environment, Stakeholder and Quality Assurance.

1.2. Company Objectives

The primary objective of DVE is to produce quality projects while adhering to the company's values, strategies and requirements of the clients for every project. Furthermore DVE follows every project with an intensive review process to ensure any and all new challenges encountered during the project are analyzed for their potential to be incorporated in the company's strategies.

As DVE continues to grow, it aims to use its success to inspire other organizations and engineers to find their own success through their own innovations, by incorporating primarily environmental, safety and stakeholder concerns from the ground up.

1.3. Company Services

DVE has proven capable of solving engineering problems from a variety of disciplines in the past. Though DVE is confident in its ability to address the challenges arising from any project, it does specialize in the following disciplines:

- Project Management



- Environmental Engineering
- Transportation Engineering
- Civil and Structural Engineering
- Geotechnical Engineering
- Stormwater & Water Sensitive Urban Design

1.4. Mission Statement

DVE is focused on delivering projects that are of the highest quality through the evaluation of their strategic plans during the course of a project. DVE wishes to further expand and refine their strategies through their current projects by capitalizing upon opportunities, learning from the constraints and listening to the stakeholders, projects partners and staff.

1.5. Vision Statement

DVE aims to be an industry leader and primary example of innovative-multi disciplinary design solutions within the engineering community in Australia and, eventually, internationally. Having achieved this status DVE can broaden its interests to include consulting on projects and providing guidance on a number of projects simultaneously, bringing innovation and strategic planning to projects all throughout the world.



2. Financial Backing & Insurance

2.1. Financial Backing

A primary strength of DVE is the diversity of project size in terms of feasibility, design and construction projects. Using the same banking institution for all projects, the available financial backing ranges from \$250,000 for feasibility and design projects through to \$25,000,000 for construction projects.

The use of a single, world renowned financial institution for all projects shows the level of confidence the partner shows in DVE's capability to deliver on contracts. Furthermore DVE is proud to state its financial backing has been the same since the inception of the company, this history showing the level of partnership between DVE and its financial backer.

2.2. Retention of Funds

DVE works as both the principle contractor for clients as well as sub-contractor as in the case for the *North Terrace Drainage Design for Tonkin Engineering & SA Water*. As such DVE is aware and happy to comply with the industry standard 5% retention of funds until project completion and handover and is willing to accept a range of payment schedules for preferred clients such as *Tonkin Consulting and SA Water*.

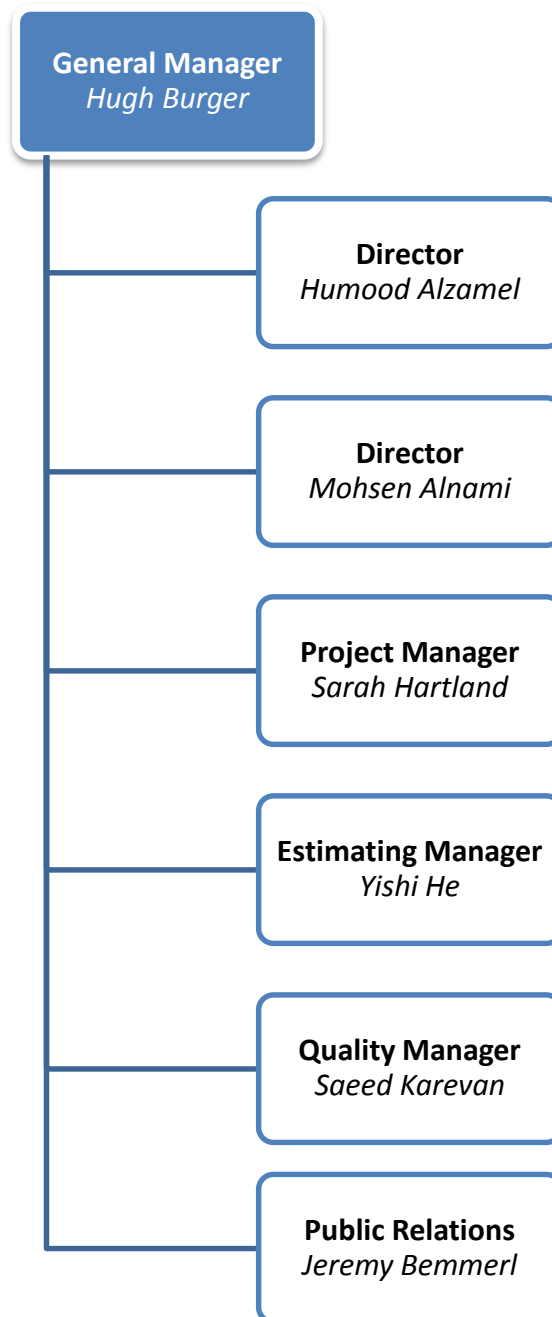
2.3. Insurance

As a feasibility, design, project management & construction company DVE maintains insurance for all of its projects, with a maximum indemnity insurance guaranteed up to \$100,000,000 for construction contracts, as well as the option to reduce the level of cover to an appropriate level for each contract.

For the *North Terrace Drainage Design* feasibility project DVE is providing insurance of \$500,000 to protect against potential required changes to the feasibility project, additional staff or resources required to complete the project and the potential change in the financial market affecting the timeline or existence of the project.

3. Management Structure

3.1. Company Hierarchy





3.2. Key Employees

3.2.1. General Manager

The General Manager is responsible for the organization of roles within the company, as well as the selection of new engineers to join the team at DVE. The General Manager is also responsible for finding new tenders for the company as well as establishing and maintaining relationships with industry partners.

The General Manager is also responsible for liaising with DVE's financial and legal partners.

3.2.2. Directors

DVE Directors are directly responsible for the delivery of project tenders and act as a knowledge and experience resource for the rest of the management team.

3.2.3. Project Manager

The Project Manager is responsible for looking after existing projects, acting as a resource for the project teams. Project Stakeholder Management and Public Consultation are the responsibility of the Project Manager, with the assistance of the General Manager.

3.2.4. Estimating Manager

The Estimating Manager is obligated to manage the financial and planning aspects of tender submissions through extensive engineering experience and a drive to keep up to date with industry practices.

3.2.5. Quality Manager

The Quality Manager is responsible for the continual development of the strategic documents that ensure DVE projects are of the highest quality. The Quality manager also provides a resource for the project team where new problems or opportunities are not sufficiently covered by the existing strategic documents, with support of the entire management team.

3.2.6. Public Relations Manager

The Public Relations Manager is responsible for the management of DVE staff, as well as the recruitment of new engineers to join the team. The Public Relations Manager is also responsible for all company logos, graphic designs as well as marketing and public image requirements.

3.3. Company CV's

The following pages contain DVE's management team CV's.



Hugh Burger

Role: General Manager

Email: burhy004@mymail.unisa.edu.au



Education

Bachelor of Civil Engineering

Employment Experience

Dec 2014 – Feb 2015

BluBuilt Constructions

Undergraduate Construction Engineer
Undergraduate Estimating Engineer

Jan 2015

PT Design

Undergraduate Structural Engineer

Project Experience

- Cleland Wildlife Park Upgrade
- Residential footings, wall framing, bracing, external decking & internal flooring.
- Commercial footings & roof framing
- Industrial construction including quality & safety
- Tendering of small projects including bridges & dam extensions.
- Experience using EstimatorVJ, Microstran, DesignIT

University Experience

- Whyalla Hospital Construction
- Seaford railway extension
- Strathalbyn sub-development (drainage)
- Experience using CORD, SpaceGASS, MATLab, DRAINS, WaterGEMS, MicroStation, 12d



Humood Alzamel

Role: Director

Email: alzhy001@mymail.unisa.edu.au



Education

Certificate IV Foundation (SAIBT)

Bachelor of Civil Engineering

Employment Experience

Jan 2015 – Feb 2015

Tawbad General trading and Contracting company

Undergraduate Civil Engineer

Jan 2014- March 2014

Tawbad General trading and contracting company

Undergraduate Civil Engineer

Project Experience

- Kuwait Municipal council Headquarter & Multistorey car park project.

University Experience

- Whyalla Hospital Construction
- Seaford railway extension
- Strathalbyn sub-development (drainage)
- Experience using **CORD, SpaceGASS, MATLab, DRAINS, WaterGEMS, MicroStation, 12d, Minitab, Microsoft visual & Solidworks**



Mohsen Alnami

Role: Director

Email: alnmy003@mymail.unisa.edu.au



Education

Bachelor of Civil Engineering

Employment Experience

Sep 2013 - Dec 2013

Ministry of Municipal and Rural affairs.

Project Experience

- Familiarity with certain projects such as asphaltting, construction and improvement of city entrance.
- Technical follow up for projects.

University Experience

- Whyalla Hospital Construction.
- Strathalbyn sub-development (drainage).
- Experience using, SpaceGASS, MATLab, DRAINS, WaterGEMS, MicroStation, 12d.



Sarah Hartland

Role: Project Manager

Email: harsk005@mymail.unisa.edu.au



Education

Bachelor of Civil Engineering

Employment Experience

Dec 2014 – Feb 2015

Department of Planning Transport and Infrastructure

Undergraduate Traffic Engineer

Project Experience

- Cleland Wildlife Park Upgrade
- Ministerial investigations
- Crash analysis
- Pedestrian studies
- Blackwood Draft RMP Edition 2 Update

University Experience

- Whyalla Hospital Construction
- Seaford railway extension
- Strathalbyn sub-development (drainage)
- Experience using CORD, SpaceGASS, MATLab, DRAINS, WaterGEMS, MicroStation, 12d



Yishi He

Role: Estimating Manager

Email: heyys001@mymail.unisa.edu.au



Education

Bachelor of Civil Engineering

Employment Experience

Dec 2014 – Feb 2015 **University of South Australia**
Undergraduate Water Engineer

Project Experience

- South Australia rainfall data analysis
- House structural design
- Experience using Trend

University Experience

- Whyalla Hospital Construction
- Seaford railway extension
- Strathalbyn sub-development (drainage)
- Road and pavement design
- Flood and risk management
- Catchment modelling of Mt Pleasant
- Flood analysis study
- Experience using CORD, SpaceGASS, MATLab, DRAINS, WaterGEMS, MicroStation, 12D, RORB



Saeed Karevan

Role: Quality Manager

Email: karsy019@mymail.unisa.edu.au



Education

Bachelor of Medical Science Radiation
Bachelor of Civil Engineering (Structural)

Employment Experience

2011 – 2012 **Canberra hospital, ACT Health, Australia**
Radiation Therapist, Professional Development Year Position

2003 **Pars Jonaubi and France Total**
Earthwork and Road construction Project

2002 **Nimrokh Company**
Hydro Fuel Plan & Tunnel Project

1997 **AmirKabir Subway, Keyson Company**

1995 **Spandan Company**
Fars Multi-Fuel Power Plan Project

Project Experience

- Site technician and engineers and technologist assistant in project
- Oversee construction of road
- Supervision of earth works
- Management of construction staff
- Liaison between consultant and site administration
- Organize and control the building operations
- Supervision of workers and rosters
- Liaison between project managers and skilled workers
- Supervising the safety of the site
- Material control and checking specifications
- Survey assistant and project technician
- Read and interpret construction drawings and control operations
- Surveyor assistant including use of Theodolite and Auto-Level

University Experience

- Whyalla Hospital Construction
- Seaford railway extension
- Strathalbyn sub-development (drainage)
- Experience using **CARD, SpaceGASS, DRAINS, WaterGEMS, 12d**



Jeremy Bemmerl

Role: Public Relations Officer

Email: bemjd001@mymail.unisa.edu.au



Education

Bachelor of Civil Engineering

Project Experience

- Engineers Without Borders (EWB) – Sustainable Vietnam Project
- Structural Analysis – UniSA Mawson Lakes MM Building Boardwalk
- Whyalla Hospital Structural Design
- Seaford Railway Extension
- Strathalbyn Sub-development Drainage Design

University Experience

- Experience using CORD, SpaceGASS, AutoCAD, MicroStation and Strand7
- Proficient communicational and interpersonal group work skills.



4. Past Projects & Experience

4.1. Previous Experience

DVE comprises of experienced engineers who have practiced multi-disciplinary engineering across a wide variety of projects, the list below describes the previous experience of the DVE staff:

- Structural Analysis of UniSA Mawson Lakes M² Building Boardwalk
- Kuwait Municipal Council Headquarter and Multistorey Car Park
- South Australia Rainfall Data Analysis
- Residential Structural Design
- Cleland Wildlife Park Upgrade Project
- Pedestrian Safety Concept Planning Study
- Design & Construct Tendering of Pedestrian Bridges and Dam Extensions
- Commercial Footing and Roof Framing Design
- Multi-fuel Power Plant Project
- Hydro Fuel Plan and Detouring Tunnel Project

4.2. DVE Projects

The list below contains the project in which DVE has been involved.

2014 Whyalla Hospital Construction

- Reinforced Concrete Design for Beam, Columns and Slabs
- Steel Design of Beams, Columns, and Structural Roofing

2014 Seaford Railway Station Extension Project

- Retaining Wall Design
- Slope Stability Design for the Earth Dam

2014 Strathalbyn Sub-Development Project

- Stormwater Design from collection points to the detention basin
- Sewer Design from house to pump station
- Potable Water Supply Distribution Network Design

2014 Noarlunga Rail Line NO.59 Design Project

- Footing Design for a small rail station
- Retaining Wall Design for a cut for rail track that support the footing of the rail station
- Stable Slope Design of the cut on the opposite side of rail station



5. Company Policies

5.1. Environmental Policy

DVE, in managing their activities have a responsibility to employees and the general public. DVE are committed to providing a quality service that ensures an environmentally safe, healthy workplace for all employees, and minimizes the potential impact on the environment. As such, DVE have adopted an environmental policy stance which incorporates the principles of sustainable construction. This policy dictates the management of the environmental aspects of the company and relates to how all constructions will be continually managed and reviewed.

The environmental Policy includes, but is not limited to the point shown below.

- Educate, train and inform our staff about environmental issues that may affect their work.
- Integrate environmental concerns which impact our decision making and activities.
- Adopt the highest environmental standards in all areas of operation, meeting and exceeding all relevant legislative requirements in all projects.
- Minimise waste through reusing and recycling.
- Minimise energy and water consumption within our constructions and project developments in order to reduce the use of natural resources.
- Promote environmental awareness among our employees and encourage them to work in an environmentally responsible manner.
- Reduce risks from environmental, health and safety hazards for employees as well as anyone in the area of our operations.
- Adopt an environmentally sound transport strategy.
- Communicate with the local community and public to convey concern for and assure minimal disruption to the local environment.
- Keep project sites clean and tidy to minimise disruption to our projects, clients, local residents and public.
- Continually assess the environmental impact of our projects, constructions and operations.

The policy is made available to all employees in addition to appropriate training in regards to environmental issues. DVE reviews this policy regularly with respect to legislative changes as well as issues arising from projects.



5.2. OHS&E Policy

DVE is committed to providing a high level of safety for all employees, suppliers, contractors, subcontractors or others who may work or visit work sites. In order to meet all OHS&E requirements, DVE has an integrated management system that incorporates all OHS&E criteria required by legislation as well as DVE's own policies. These are primarily communicated through Safe Work Instructions (SWI's), Job Safety & Environmental Analyses (JSEA's) & Standard Operation Procedures (SOP's)

A review process is set in place to ensure all OHS&E documentation is reviewed at regular time intervals, as well as at the request of any member of the company or operational partners.

DVE aims to minimize the risk of workplace injury and illness of the staff and other people (contractors, subcontractors, labour hire, visitors and community) by adopting a planned approach to the management of OHS&E, including the provision of resources to support its implementation.

The OHS&E Policy includes, but is not limited to the points shown below.

- A proactive approach ensuring all risks and hazards to health and safety are identified, assessed and effectively controlled
- A commitment to OHS&E, effective rehabilitation and claims management.
- All employees are informed about OHS&E issues and are given regular feedback on progress with health and safety matters.
- Ensuring identified targets for The DVE Company's OHS&E are established and monitored, enabling the company personnel to govern and improve their level of performance in this area.
- The policy and procedures guide managers, supervisors and staff in carrying out their responsibilities.
- All employees have the opportunity to participate in the development and review all of the company's policies and procedures through regular review meetings.
- Safety practices and procedures are enforced with statutory requirements whereby all personnel are provided with a safe working environment.
- All employees are provided with appropriate training to identify, assess and monitor risks and hazards in the workplace.
- All personnel are aware of the process on how to report hazards, incidents and injuries.
- Legislative compliance by the continual review of all policies and procedures against the requirements of the OHS&W Act 1986, OHS&W Regulations 2010 and any other applicable Standards and Codes of Practice to guarantee continuous improvement with our OHS&W management system.



DVE is strongly committed to the pursuit of high standards of health, safety and wellbeing for their employees and others within the constructions and operational processes of the company. This policy relates to all employees of the organization as it recognizes that the health, safety and wellbeing of staff are integral to the continued success of DVE.

5.3. Stakeholder Policy

DVE believes its success comes from our passion in creating a valuable relationship with our clients, employees, suppliers, council, government and other stakeholders whenever and wherever we do business. We have confidence in that effective stakeholder engagement relies on a commitment to engage and communicate openly and honestly.

DVE is committed to excellence in service for its stakeholders. We are dedicated to addressing the concerns and interests of all stakeholders to improve the quality of decision making. We acknowledge the best way to do that is to gain input from those affected and involved in our projects.

DVE values stakeholders and uses their input to improve company policy and project outcomes. DVE aims to actively listen to and understand stakeholder needs, seeking to understand how they want to be engaged, based on their particular circumstances. This policy applies to all facets of DVE activities whether they are externally or internally focused.

The Stakeholder Policy includes, but is not limited to the points shown below.

- To identify and communicate with all stakeholders involved or affected by a DVE project.
- To communicate and reduce the negative impact or disruption a project may have on the stakeholders.
- To establish appropriate communication channels to share important information about this project to the respective stakeholders i.e. websites, signs, letterbox drops, meetings, information sessions, emails and hotlines.
- To ensure that any queries or concerns raised by any of the stakeholders are reviewed and handled appropriately and professionally.

5.4. Public Consultation

DVE has established a public consultation policy in order to better work *with* the public in the development and delivery of our projects. DVE recognizes that the public play an important part in how a project is received after its completion above and beyond the requirements of those directly involved in the project.

DVE allocated its senior management staff to the role of public consultation to ensure the clear communication of the importance of this process as well as to ensure any concerns are introduced to a project at the highest level.

The Public Consultation Policy includes, but is not limited to the point shown below.



- DVE is committed to community engagement through all stages of a project.
- DVE shares appropriate information regarding the project with the public, including working hours, project scope and timeline as well as environmental and logistical plans.
- DVE provides the public with the contact details of the General Manager and Project Manager of each project to ensure they can communicate with the company at their leisure.

5.5. Quality Assurance Policy & Documentation

DVE guarantees a high quality service to clients through a project specific Quality Assurance Document that is developed using the company assurance policy. This policy provides the highest possible quality services to the clients which are integral to the functioning and continued success of DVE. The policy allows a high quality of services to meet and exceed client's requirements.

The Quality Assurance Policy is essential to the company and is used at each level of a project, from management through to graduates. All the employees are aware of the policy and strictly adhere to the policy to ensure the highest quality of work. DVE's Quality Assurance Policy is based on the Australian/New Zealand Guideline AS/NZS 9001, AS/NZS 9002 and AS/NZS 9003.

DVE's Policy Document is customized for each new project, detailing the quality management requirements to be met for the respective project, as individual 'check' points during the development of a project. The quality management personnel work directly with engineering teams to ensure all components of the project adhere to the Quality Document for the project and Quality Policy of DVE. The Quality Document is developed by the Project Manager & Quality Manager and implemented by all project staff to ensure the standards are being met as the project progresses

The Quality Assurance Document is developed through communication within the company and with the clientele. Weekly project meetings are scheduled to ensure the Quality Document is being reviewed, implemented and kept up to date. This document is then provided to clients at handover stage for their own reference.

The Quality Assurance Policy includes, but is not limited to the point shown below.

- The Quality Document will be produced in conjunction with the client before and during the project life cycle.
- The project team will identify check point that require the signatures of both a DVE representative and a representative of the client.
- The Quality Document will include all DVE personnel education, training certificates and licenses as well as those of all third parties involved in projects.
- The Quality Document will include all relevant paperwork from third parties that detail the quality of their work.



- The Quality Document will be developed by DVE to ultimately be provided to the client as a record of the quality production of the project deliverables.



6. Project Specification

6.1. Project Team

Using experience coming from previous projects, DVE has allocated a project team with a defined management structure and disciplinary teams to enable the facets of the project to be completed simultaneously.

The team diagram in Section 6.2 of this document shows a visual representation of the project team proposed by DVE, with a description of the roles below.

6.1.1. Project Manager

The Project Manager is solely responsible for identifying and reviewing background reports, as well as stakeholder and community consultation. The Project Manager will also be involved in weekly meetings to assess the progress with the managers of each team, as well as meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.2. Project Quality/Safety Manager

The Project Quality/Safety Manager is solely responsible for the development of the safety and quality program. The Project Quality/Safety Manager will also be involved in weekly meetings to assess the progress with the managers of each team, as well as meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.3. Transport Manager

The Transport Manager is responsible for the development of the traffic management plan in a supervisory role with the Graduate Transport Engineers. The Project Transport Manager will also be involved in weekly meetings to assess the progress with the Project Manager and Quality/Safety Manager, as well as with the managers of each other team, as well as meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.4. Environmental/Urban Design Manager

The Environmental/Urban Design Manager is responsible for the definition of environmental concerns, as well as the development of Water Sensitive Urban Design Options, in a supervisory role with the Senior Engineers and Graduate Civil Engineers in the Environmental/Urban Design Management team. The Environmental/Urban Design Manager will also be involved in weekly meetings to assess the progress with the Project Manager and Quality/Safety Manager, as well as with the managers of each other team, as well as meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.5. Stormwater/Civil Design Manager

The Stormwater/Civil Design Manager is responsible for the development of Stormwater Design Options, as well as the associated required civil works, in a supervisory role with the Senior Engineers and Graduate Civil Engineers in the Stormwater/Civil Design Management team. The Stormwater/Civil Design Manager will also be involved in weekly meetings to assess the progress with the Project Manager and



Quality/Safety Manager, as well as with the managers of each other team, and attending meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.6. Service/Utility Manager

The Service/Utility Manager is responsible for the identification of Services and Utilities, as well as the development of the conflict management plan for these utilities and services, in a supervisory role with the Graduate Civil Engineers in the Service/Utility Management team. The Service/Utility Manager will also be involved in weekly meetings to assess the progress with the Project Manager and Quality/Safety Manager, as well as with the managers of each other team, and attending meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.7. Structural/Planning/Integration Manager

The Structural/Planning/Integration Manager is responsible for the design of structural components that arise from the other project teams, as well as the design of the planning and integration to existing stormwater services that required structural designs. The manager delivers these designs in a supervisory role with the Graduate Civil Engineers in the Structural/Planning/Integration Management team. The Structural/Planning/Integration Manager will also be involved in weekly meetings to assess the progress with the Project Manager and Quality/Safety Manager, as well as with the managers of each other team, and attending meetings to evaluate the project in respect to a number of factors (shown in the Gantt Chart, Section 9.1).

6.1.8. Senior Engineers

The Senior Engineers that exist within the management teams act as team leaders for groups with the Graduate Engineers. Senior Engineers will also liaise with the team manager in each division to ensure the outcomes are in line with the concerns of the project management team.

6.1.9. Graduate Transport Engineers

The Graduate Transport Engineers are responsible for the development of the transport management strategy to ensure minimal disruption to traffic and pedestrian logistics during the project life. The Graduate Transport Engineers will be supervised directly by the Transport Manager.

6.1.10. Graduate Civil Engineers

The Graduate Civil Engineers are allocated within the Environmental/Urban Design Team, Stormwater/Civil Design team and the Service Utility team as these are divisions that apply to a Civil Engineering Graduate. These Graduate Engineers are responsible for producing the deliverables within their project teams and work in groups under the supervision of senior engineers, or as a team under the supervision of the Service/Utility Manager in the Service/Utility Project Team.

6.1.11. Graduate Structural Engineers

The Graduate Structural Engineers are responsible for the structural design of components required by the designs of the other project teams. The Structural Engineers are allocated work and supervised by the Structural/Planning/Integration Manager



6.2. Project Team Diagram

6.3. Project Scope of Works

The following sections of the tender contains a list of the project components and the considerations that DVE will undertake during the process of producing a feasibility study for the outlined project.

The project team is conscious of a number of design considerations that need to be investigated to be able to produce a list of viable design options. These design options will be evaluated to determine the optimum scheme in terms of economic, environmental, construction, social and other considerations.

Some possible solutions or design alternatives have been proposed at this early stage which are subject to change depending on site evaluation and the feasibility study, as such the number of staff required in each position within the project team may change and therefore affect the tender price of this document.

6.3.1. Site Evaluation

A site evaluation of the project area will be conducted to determine the location and condition of the existing storm water management systems. This will include, but is not limited to, an inspection of the pits, pipes, channels, culverts, pumps and other associated infrastructure. Particular interest will be taken in the sandstone arch culvert, which extends over First Creek, as it is almost 150 years old and has the potential for the drainage pipe to be connected to the existing infrastructure.

6.3.2. Viable Options

A number of viable options will be identified on award of the tender which could be accommodated for storm water quantity and quality control in the North Terrace Drainage Design. All options that meet the project criteria will be further investigated at a later stage to determine if they are suitable for this location. A small list of preliminary solutions are listed below;

1. Storm water Design System:

Capable of capturing the entire design flow transferring into First Creek and then into the Torrens River.

2. Urban Design Option:

Use a Water Sensitive Urban Design system with limited storm water components to capture and filter design flow before diverting directly into First Creek and then into the River Torrens; use combination of soakaways and a detention basin to increase capacity and deal with overflow, respectively.

3. Part Storm water & Urban Design Option 1:

Use a storm water system to capture design flow and transfer into detention basin to improve water quality as it flows into first creek and then into the River Torrens.

4. Part Storm water & Urban Design Option 2:

Use a combination of storm water and Water Sensitive Urban Design systems to capture water flows and transfer into detention basin to improve water quality as it flows in First Creek and then in to the River Torrens.

These options are subject to change following analysis of the design flows and existing storm water system, as well as the capacity of the creeks to deal with the 1 in 100 year ARI. DVE will use innovative solutions to design a system that requires minimal disruption and modification of the existing natural waterways.

6.3.3. Preliminary Design for Selected Options

A preliminary design for the selected options will be conducted to determine the extent of each design along with the amount of work involved. In order to ensure consistency of the standard of drainage across the city, the following levels of services have been applied:

- Local/ Arterial roadway – 1 in 5 year Average Recurrence Interval Standard,
- Trapped Low point in roadway – 1 in 20 year Average Recurrence Interval Standard,
- Creeks – 1 in 100 year Average Recurrence Interval Standard.

These standard levels of service must be met in the preliminary design for the selected options and maintained to this level throughout the design process.

6.3.4. Utility Services

Upon an evaluation of the project site DVE will accept the responsibility to locate all existing utility services along the full length of the road to determine the extent of services conflicts and to avoid these clashes where possible with respect to the chosen design option.

DVE will consult with the relevant service authorities to ensure that minimum clearances are met, service alterations are feasible, sufficient construction lead times can be achieved and that the requirements of the service authorities are taken into consideration during the design process. If necessary DVE may redirect underground services to ensure existing businesses and residents continue to receive the necessary utilities during construction.

6.3.5. Traffic Management Strategy

This section of North Terrace has a substantially large Annual Average Daily Traffic (AADT) as it is one of Adelaide's main arterial roads. A traffic management strategy for the project site during the construction phase of the proposed options will need to be completed to ensure that commuters experience minimal discomfort during the project.

This process will need to include the surrounding areas of the project site that may generate traffic flow in this area and how it can be diverted with minimal impacts during peak period times. Adequate walkways are currently provided along both sides of the road at this location which should still allow pedestrians access to at least one footpath during the construction phase of the project.

Further investigation will be required to determine the length of time that footpaths may need to be closed and how this will affect pedestrians in the area.

6.3.6. Consultation with existing businesses

A number of local retail/ commercial businesses are located along the subject section of North Terrace which will be impacted during the construction process of the project.

Consultation with the surrounding businesses will need to be conducted to determine the impacts of the project on their businesses, including access to the properties via North Terrace, during construction and post construction phases.

6.3.7. Evaluation of proposed options

Each of the options identified during the feasibility study will be evaluated to determine the most suitable option(s) to be adopted for managing the storm water in North Terrace, with the selected option chosen by the client.

All viable options must consider the following parameters as taken from the specification provided by SA Water and Tonkin Consulting;

- Capability to meet the operational objectives
- Constructability
- Maintenance including asset life
- Environmental enhancement
- Adverse environmental impacts
- Recreational amenity and opportunities
- Visual Impact
- Safety
- Likely community acceptance
- Likely order of cost/ relative costs of options to one another

6.3.8. Environmental and Sustainability Considerations

The environmental concerns arising from this project will largely be defined as the project progresses, as such DVE has allocated a large team to manage both Environmental concerns in conjunction with the Water Sensitive Urban Design of the project; a brief list of expected issues are shown below.

- Air pollution
- Noise pollution
- Water pollution
- Foliage protection



- Waste management
- Sustainable construction materials
- Storm water contamination during construction
- Minimal disruption to traffic flows (causing increased exhaust pollution)

6.3.9. Geotechnical Management

In order to redevelop the storm water system, the pavement surface of the road will be required to be reinstated after the projects works. Though no specific geotechnical team has been allocated, the Stormwater/Civil Design team will liaise with the Department of Planning, Transport & Infrastructure to ensure the pavement design is sufficient to meet the standards required for this busy section of road.

DVE expects DPTI may take the development as an opportunity to resurface the road, though as this will not be confirmed until later in the project, as such geotechnical designs will be developed for road reinstatement by the Stormwater/Civil team, based upon DPTI's requirements.

6.4. Proposed Methodology

The Feasibility study will produce a deliverable that defines the optimum design solution for the North Terrace Drainage Design in terms of Economic, Environmental, Construction, Social and other considerations. In addition to a description of the required design, the feasibility will define the cost of the project in terms of the design and construction stages.

The major components that will be included in the final feasibility report are shown below.

- Transport Management plans for the life of the project.
- A complete Storm water/Water Sensitive Urban Design.
- Integration plan to connect new design with existing services, including arch culvert at First Creek.
- Environmental Plan addressing concerns and recommending mitigation strategies in regards to environmental issues arising from the project.
- Project Quality Document
- Project Safety Document
- Service/Utility Document including required clearances, service locations, service interruption strategy and conflict management strategy
- List of required detailed design documents and drawings

In order to achieve these deliverables, the project team for the Feasibility Study will require information regarding the design flow of the storm water system to be designed, this may require calculation using ARI & IFD with hydrological calculation methods, as well as existing road pavement designs and Annual Average Daily Traffic (AADT), footpath designs, scaled plan views of the development areas, plans of the



existing storm water system in the development area as well as immediate surrounding areas and available specifications of the existing arch culvert at First Creek.

6.5. Strategy Following the Completion of the Feasibility Study

Following the completion of the feasibility study, the detailed design can begin where the designs that have been produced and costed during the feasibility stage can be designed and drafted. This stage will require the re-organization of the project team into teams of appropriate size and abilities to complete each section of the design, followed by the allocation of design works to be completed by each team.

During this stage the project management team will use the plans developed during the feasibility stage, including quality, environmental and service/utility plans to ensure the drawings produced adhere to the quality outlined in the feasibility study.

6.6. Assumptions & Issues Prior to Commencement

It is expected there will be issues that must be addressed prior to the commencement of the feasibility study, many of which may only be resolved by making assumptions until the detailed design or construction phases of the project are in progress. A list of these issues and assumptions are listed below.

- Ensure the project team understands their roles and the roles of other members in the project teams, as well as the management and reporting structure to ensure they are producing work as intended from the start of the project
- It is assumed there will be exclusions that are defined as the project develops that will need to be properly defined, such as quality of stormwater entering the system from adjacent properties.
- Upon the receipt of further information regarding the project there may be a need to reorganize the allocation of graduate engineers within the project teams.

7. Project Constraints, Issues & Constraints

The City of Norwood, Payneham & St Peters is an established metropolitan council east of the Adelaide CBD and is well regarded for its cultural and historical richness and highly developed dynamic business centre.

North Terrace, Kent town has suffered significant flooding from the Royal Hotel to College Road during heavy rainfall events. The city would like to develop a significant storm water solution to resolve this flooding. The new solution will aim to provide cost effective and environmentally friendly technologies to manage storm water quantity and quality in an efficient manner.

As the existing systems in the Norwood & St Peter's council are currently unable to sufficiently contain large rainfall events, DVE has been invited through a feasibility study to update the current storm water infrastructure to be able to meet the capacity required with minimal environmental impact or disruption to the public.

Due to the location of the project site a number of traffic management solutions will need to be considered, as such DVE has a large traffic engineering team that will play a vital role during the design process.

Listed in the following sections are a number of constraints and opportunities that DVE has identified in the proposed project along with the risks involved as well as the approach that DVE will take to ensure the best design is achieved with minimal impact on the environment and adjacent properties.

7.1. Constraints

- The Department of Planning, Transport and Infrastructure (DPTI) are the land owners of this section of road and therefore can influence the final design as it may impact their road and may cause traffic congestion.
- SA Power Networks has requirements when working within a certain distance of their power lines that must be met. These requirements will need to be further investigated depending on the location of the works required.
- To ensure consistency across the city the following design standards must be met:
 - Local/ Arterial roadway – 1 in 5 year Average Recurrence Interval standard
 - Trapped low point in roadway – 1 in 20 year Average Recurrence Interval standard
 - Creeks – 1 in 100 year Average Recurrence Interval standard
- This is an area that includes many heritage buildings and features that will need to be preserved and the appropriate guidelines will need to be considered during the design of the storm water system.



7.2. Issues Involved

- The large traffic volumes along this road will make the construction process more difficult and will restrict the time frame available.
- Intensive safe guards will be required to work around or with the old infrastructure of the sandstone arch culvert.
- There is a large concentration of services in the area that will need to be managed in regards to safety and service interruption throughout the project.

7.3. Opportunities

There is an opportunity to highlight the existing historical features in the area through the design of a modern, culturally and environmentally significant design that will integrate with the existing infrastructure. The City of Norwood, Payneham & St Peters is also enriched with beautiful parklands and gardens and the proposed storm water design has the potential to highlight some of these features in the process.

There is also an opportunity to develop innovative solutions to storm water design in an existing, busy, built up area where there are limited options for development. These constraints can be viewed as an opportunity to develop a new solution to manage the design flows in the area with a focus on water quality, reuse and the environment, while still achieving these goals with a focus on sustainability.

7.4. Approach

DVE plans to review and analyze the existing storm water drainage design, as well as the existing drainage design across the city for consistency; using the provided survey data for North Terrace to be able to obtain a design that will meet all criteria with innovative solutions that are environmentally friendly.

This will ensure that our company provides the best design for all stakeholders that is both economical and environmentally conscious while meeting all design objectives and standard guidelines.

DVE will ensure that all planned construction activities to the site during design and construction phases will not have a lasting detrimental impact on the environment of the study area or the adjacent local businesses and minimise the impact on peak period traffic wherever possible. It is a primary goal of DVE to encourage construction practices that have a lasting *positive* environmental impact on the surrounding community and environment.



8. Project Costing

The Project Team developed by DVE, described in Section 7.2 of this document is used to develop the project cost shown below, the costing is based upon the required 15 hours per weeks for the 4 week feasibility study, with engineering personnel rates charged at competitive standard industry rates.

Item	Quantity	Weeks	Hours/ Week	Total Hours	Cost/ Hour	Total Cost
1. Project Management						
1a. Project Manager	1	4	15	60	\$240	\$14,400
1b. Project Quality/Safety Manager	1	4	15	60	\$220	\$13,200
Sub Total						\$27,600
2. Traffic Management						
2a. Traffic Manager	1	4	15	60	\$200	\$12,000
2b. Graduate Transport Engineer	2	4	15	120	\$120	\$14,400
Sub Total						\$26,400
3. Environmental/Urban Design						
3a. Environmental/Urban Design Manager	1	4	15	60	\$200	\$12,000
3b. Senior Engineers	1	4	15	60	\$180	\$10,800
3c. Senior Engineers	1	4	15	60	\$180	\$10,800
3d. Graduate Civil Engineer	2	4	15	120	\$120	\$14,400
3e. Graduate Civil Engineer	2	4	15	120	\$120	\$14,400
Sub Total						\$62,400
4. Stormwater/Civil Design						
4a. Stormwater/Civil Design Manager	1	4	15	60	\$200	\$12,000
4b. Senior Engineers	1	4	15	60	\$180	\$10,800
4c. Senior Engineers	1	4	15	60	\$180	\$10,800
4d. Graduate Civil Engineer	4	4	15	240	\$120	\$28,800
4e. Graduate Civil Engineer	4	4	15	240	\$120	\$28,800
Sub Total						\$91,200
5. Service/Utility Management						
5a. Service Utility Manager	1	4	15	60	\$200	\$12,000
5b. Graduate Civil Engineer	2	4	15	120	\$120	\$14,400
Sub Total						\$26,400
6. Structural/Planning/Integration Management						
6a. Structural/Planning/Integration Manager	1	4	15	60	\$200	\$12,000
6b. Graduate Structural Engineer	3	4	15	180	\$120	\$21,600
Sub Total						\$33,600
Total						
	30	-	-	1800	-	\$267,600



9. Schedule of Work

The schedule of work to be performed by DVE is detailed on the gantt chart on the following page. This gantt chart includes the expected staff allocations during the feasibility study, as well as the deliverable milestones to be achieved as the project progresses.

The gantt chart also includes the evaluation requirements required by the client, in addition to the review processes required by DVE policy during the progression of any project. These requirements are incorporated into the project continually through the weekly meetings with the management structure, a standing invitation will be provided to the client to encourage their involvement in these meetings.

Though the gantt chart presented is comprehensive, DVE expects the document will be required to change during the development of the project, as such the Project Manager is required to track any deviations from the original gantt chart in this report and liaise with the project management team to ensure the project is on track to deliver all milestones at their allocated time.



9.1. Project Gantt Chart