



Lecture
Notes

EGB123 Notes

Jaden Ussher

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Chapter 1

Week 1

1.1 Unit Introduction

1.1.1 Unit Motivation

*Engineers have the task of creating, maintaining and extending the physical infrastructure that allows society to function. This infrastructure has developed over many generations, in response to the needs and demands of society, and has become more complex over time. **Planning** and **design** are the key activities that are used, together with management, to bring projects through to successful completion.*

Definition 1.1.1: Unit Overview

This unit introduces the knowledge and skills used to undertake site investigations and project assessments as part of infrastructure planning and management activities to meet stakeholders' needs.

1.1.2 Assessment Overview

The units assessments will consist of the following:

- Assessment 1: **Study Area Investigation** - You will work in a group of four:
 - to investigate functions of a real world engineering system at an urban study area.
 - with co/leadership of sub tasks pre-assigned to specific members with contribution by all other members.
 - 15% individual across two sub tasks, 15% group (30% total)
 - **Submission:** Group submits, each individual submits a text response on own contribution (Same Due Date).
- Assessment 2: **Major Project Assessment** - Work in a group of four:
 - Prepare a major project assessment that reviews and analyses prescribed technical aspects of two real world major civil engineering projects.
 - 20% individual across two sub tasks, 15% group (35% total)
 - **Submission:** Group submits, each individual submits a text response on own contribution (Same Due Date).
- Assessment 3: **Final Exam** - Individual (35%).

1.2 Urban Study Area Investigation

You will be provided a study area investigation brief that contains backgrounds as well as directions on how to conduct investigation. Will work in a group of 4 to complete:

- 4 items in Sub Task A (Each led by one group member)
- 2 items in Sub Task B (Co led by two group members)
- 1 Technical report in Sub Task C (All group members contribute).

1.2.1 Investigation

The project will involve three sub tasks:

1. Topography and Water Utilities

- Topography
- Stormwater
- Sewer
- Water Reticulation

2. Bridge Approaches and Bridge Structure

- Bridge Approaches and Abutments
- Bridge Structure

3. Engineering Technical Report

For each item in sub task A, the item will ask you to

- explain the typology of the system with definitions and roles of components.
- Locate certain features on spatial layer documents.
- Annotate responses to queries on spatial layer documents.
- Interpret the system under investigation and discuss how that system relates to street layout, build form, ease of movement.

For sub task B, you will be asked to:

- **B1** Consider bridge approaches and abutments, and how they relate to the street layout and build form. This will be done using six tables, each containing a series of stated forms or stated considerations about bridge approaches and abutments.
- **B2** Consider the bridge structure for a real bridge in the study area.

1.2.2 Information Sources

Throughout the unit, the following sources of information will be used:

- Spatial information on Community maps, nearmap, google street view.
- Government and agency documentation from Austroads.

Chapter 2

Week 2

2.1 Public Utilities

- Public utilities is where most urban civil engineering activities are focused.
- Civil engineers have a **duty of care** to ensure that their activities do not harm public utilities and do not allow public utilities to pose health, environment and safety risks to the public.

We need to know where public utilities are located so that we:

- Can engineer in a way that does not damage them.
- Can accommodate any necessary changes
- don't damage them during construction.
- can coordinate with PU system owners and operators.

2.1.1 What are Public Utilities in the Urban Context?

Systems of infrastructure that:

- Convey something (e.g. water reticulation) and/or
- Change state of something (e.g. voltage transformer)

For community benefit. Most often, public utilities need to be located in or near public spaces:

- For ease of access for maintenance, operations etc.
- To avoid interference with private land uses

2.1.2 Where are Conveyance Public Utilities Located in the Urban Context?

Where possible, within a strip of public land such as a:

- Casement (road land) OR
- Easement (special purpose land)

Benefits of locating within public land:

- Makes access easier
- Longitudinal configuration of the land often suits conveyance

But technical aspects sometimes require their installation through private land allotments:

- e.g. some stormwater, sewer due to grade alignment requirements for hydraulics (fluid flow) using gravity

2.1.3 Where are Change of State Public Utilities Located in the Urban Context?

May be located within:

- Road casement or an easement
- Public land (e.g. park)
- Private land allotments

Sometimes may need to be installed within a structure/building.

2.1.4 Public Utilities with Individual Property Connections

Electricity connections:

- Here are 230V twisted-pair wires for individual house connections

Not every property has a connection to every PU system, e.g.

- Reticulated gas
- Hybrid fibre coaxial (HFC) broadband

2.1.5 Public Utilities and Large Land Uses

Large land uses such as hospitals, shopping centres, institutional and highrise apartments:

- May have significant numbers of on-site PU systems
- And associated on-site management systems

2.1.6 Who owns Public Utilities Located within an Urban Context?

Government agencies	Statutory authorities and GOCs	Private agencies
Local government e.g. Brisbane City Council - stormwater...	Urban Utilities • sewer, water reticulation, gas	TPG • optic fibre
State government e.g. Transport and Main Roads - some road PU	Energex • electricity reticulation	Transurban • PU on their toll-roads

2.1.7 Examples of Public Utilities in the Urban Context

Table 2.1: Public Utilities Examples - Conveyance and Change of State

Type	Example Components	Ownership	Location	Position	
CONVEYANCE PUBLIC UTILITIES					
Conveyance	Sewer	Pipe Connector, Maintenance Shaft	Urban Utilities	Within road casements and/or easements and/or private properties	Underground
	Stormwater	Kerb and channel, Pipe	Brisbane City Council	Within road casements and/or public land and/or private properties	At-grade and underground
	Electricity	Ducted cable, Overhead wires on poles	Energex	Within road casements and/or easements and/or public land	Underground or overhead
	Telecoms (copper)	Ducted cable, Pit	Telstra	Within road casements and/or easements	Underground
	Telecoms (fibre)	Ducted cable, Pit	Optus	Within road casements and/or easements	Underground
CHANGE OF STATE PUBLIC UTILITIES					
Change	Sewer	Sewage pump station	Urban Utilities	Within public land (park at catchment low point)	Generally at-grade
	Stormwater	Stormwater Quality Improvement Device (SQID)	Brisbane City Council	Within watercourse boundary (state public land)	At-grade
	Electricity	Substation	Energex	Within a land allotment	At-grade
	Telecoms	Exchange	Telstra	Within land allotment	At-grade

2.1.8 How do we know where Public Utilities are located?

- **Community Maps** - Brisbane City Council provides a community maps service that allows you to view the location of public utilities in Brisbane.
- **Nearmap** - An aerial imagery service that provides high-resolution images of urban areas, which can be used to identify public utilities.
- **Google Street View** - A service that allows you to view street-level imagery, which can help in identifying the location of public utilities.

2.2 Geospatial Mapping

Definition 2.2.1: What is Geospatial Mapping?

A spatial visualisation method that enables the creation of customised maps to address specific requirements. Its primary aim is to show items with geographic coordinates in a geographical framework, providing a representation of the physical world on a map. Various approaches, solutions, and Geographic Information Systems (GIS) software can be employed to analyze existing geospatial data and geographical and terrestrial databases.

2.2.1 Community Maps

Community maps are a geospatial mapping service provided by the Brisbane City Council that provides

Chapter 3

Week 3

3.1 Geospatial Mapping - Stormwater

dendritic storm water system

to find size and material of the item (stormwater drain, manhole etc), go to community maps, select stormwater from the layers and click on the item. This will bring up a pop up with information about the item, including size and material.

Click on drains at different stages to get the diameter and observe how these change as the system goes from upstream to downstream. As well as at different elevations to prevent flooding at different stages in the study area. Note why and where this is done, why would you not want to flood in a certain area? How does it relate to the street layout and build form?

The stormwater at kg study area is let out at the surface near victoria park, where it eventually makes its way out to breakfast creek.

- Will need to use stormwater later
- Will need to refer back to the topography analysis to assist with some aspects of the stormwater analysis.
- May find the aerial photography layer
- Gravity system

Theorem 3.1.1 Tips for Completing Stormwater Definitions

You must provide definitions, roles, images and sources for the information that you gather (The brisbane city council has LOCAL QLD definitions for all the stormwater elements). You can use copilot to assist with this, however you must ensure that you are correctly referencing the information that you gather.

As part of the stormwater analysis, you will need to annotate the PDF documents with arrows to illustrate the direction of stormwater flow through all components of the stormwater system across the study area.

- along the street kerb and channelling and into gully pits
- along surface drains and into gulley pits
- across public open space and into gully pits
- through gully connects to manholes
- foul water/roof water flow through pipes to manholes
- Through the manholes, junctions, drainpipe systems
- From the manholes, junctions, drainpipes system to the culverts, surface drains system and
- from the manholes, junctions, drain pipes system to pipe end outlets and surface drain systems

3.2 Geospacial Mapping - Sewer and Water Reticulation

Chapter 4

Week 6

4.1 Urban Engineering Governance

Governance is the action or manner of governing a state, organisation etc. It encompasses the system by which an organisation is controlled and operates, and the mechanisms by which it and its people are held to account. Ethics, risk management, and administration are all elements of governance.

Table 4.1: Governance vs Management: Key Distinctions

Governance	Management
Strategic focus (directional, big picture)	Operational focus (helping things to work smoothly on a daily basis)
Longer term outlook (e.g. annual, whole of project)	Shorter term outlook (e.g. daily, weekly, stages of a project)
Development of policy and planning	Implementation and application of policy and planning
Provides guidance to enable management	Takes guidance from governance

There are different forms of Public Governance. Some of which include:

- Top down methods primarily involving governments and their bureaucracy
- Networks involving public private partnerships of with collaboration of community organisations (participatory governance)
- Use of market mechanisms where principles of competition serve to allocate resources while under government regulation.

Corporate governance is the set of processes, customs, policies, laws and institutions affecting how people direct, administer or control a corporation. It involves relationships among many stakeholders and corporate goals. **Project Governance** is about the processes needed for a successful project. "An oversight function aligned with the organisation's governance model and encompasses the project cycle".

4.1.1 Governance and the Civil Engineer

What we do as a Professional Engineer must be done in the context of a system of Governance. Acting outside of the system of governance may be counter productive, unethical and/or unlawful.

4.1.2 Australia's Framework of Government

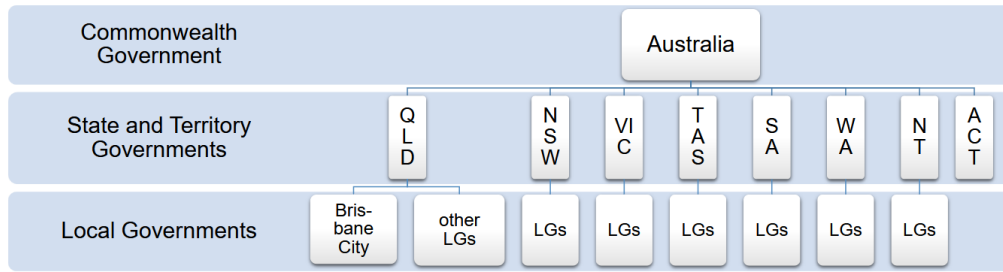


Figure 4.1: Australian Governance Structure

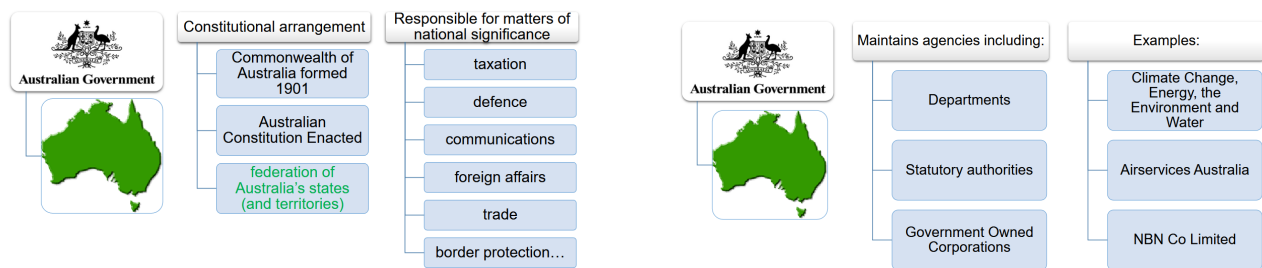


Figure 4.2: Commonwealth Government

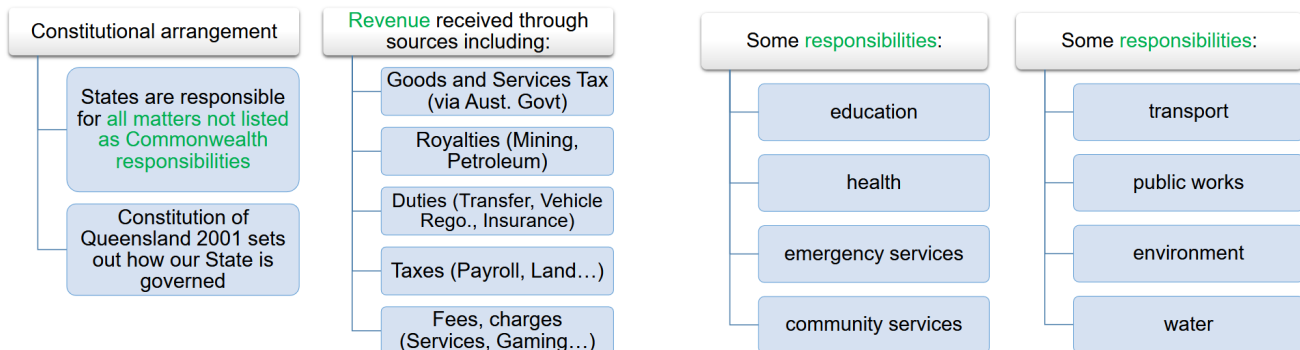


Figure 4.3: State Government

4.1.3 Local Government

- Local Government is the lowest lay of government, but by no means the least important
- Many states maintain small local governments (suburbs etc)
- Queensland maintains larger LGs called city councils or regional councils. Larger LGs tend to be more economical.
- Revenue is recieved through sources including council rates, fees, charges for services (rubbish collects etc) and grants from higher levels of government.
- Some responsibilites include:
 - Preparation and Stewardship of Planning Scheme
 - Provision of ceratin infrastructure and services

- Regulation of certain activities
- Examples of this include land zoning, planning, streets, some roads, waste management, parks, building approvals, food health regulation and parking.

4.1.4 Brisbane City Vision

The vision of Brisbane is the outline of goals and desired outcomes for the development and state of the city in relation to communities view as and long term plans. The Brisbane vision is the long term plans and other strategies put in place to address planning for the future.

Vision and Roles

- Regulates certain activities
- Provides services
- Funds other organisations to deliver services
- Partners and alliances with other parties in community interests
- Facilitates others to be involved in activities by bringing groups and other parties together
- Advocated by promoting community interests to other influencers and decision makers.

4.1.5 Professional Associations

The Australian Competition and Consumer Commission

- help educate members, maintaining high standards and ethical behaviour
- can develop their own codes of conduct or voluntary professional rules
- must comply with the Competition and Consumer Act 2010

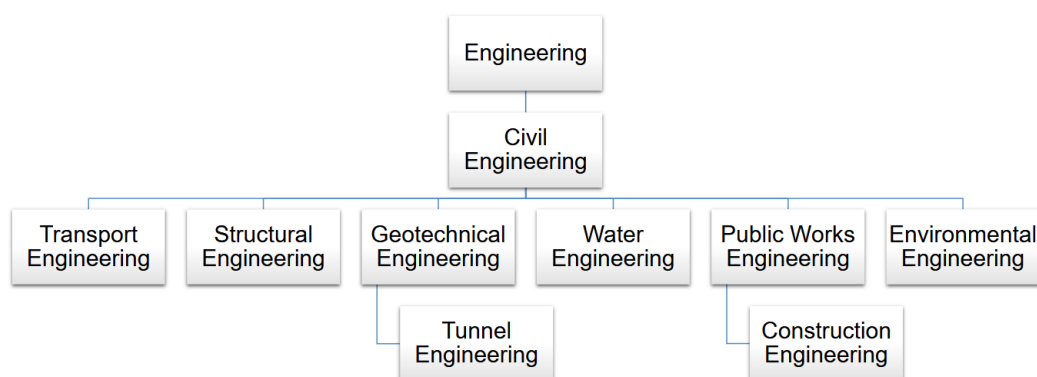


Figure 4.4: Australian Civil Engineering and its Sub-disciplines

Why may civil engineers need professional associations?

- They provide for stable governance to ensure consistently high standards of engineering practice
- They promote the ongoing engagement of each individual engineer with whole Engineering Team
- They provide a well-informed voice on engineering issues important to wellbeing of wider community
- They foster Change when appropriate, and help Engineering Team to manage Change that comes to us

4.1.6 Civil Engineering Sphere of Influence for an Urban Study Area



Figure 4.5: Sphere of Influence

Theorem 4.1.1 Theorem Name

Theorem Statement

Corollary 4.1.2 Corollary Name

Corollary Statement

Lemma 4.1.3 Lemma Name

Lemma Statement

Claim 4.1.1 Claim Name

Claim Statement

Example 4.1.1 (Example Name)

Example explained

Open Question 4.1.1: Open Question Name

Question Statement

Note:-

Special Note

Wrong Concept 4.1: Wrong Concept topic

Explanation

Chapter 5

Second Chapter

5.1 Section 1