City of Armadale

Subdivision and Development Guidelines

Edition 3 – 2021

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UPDATES

The original City of Armadale Subdivision and Development Guidelines was published in August 2014. The document update history is included in the table below:

Date	Updates	Contents and purpose	Edition No.	Amended Modules
Sep-18	1	Revision of Edition 1	2	All
Mar-18	1	Replacement of text	2	Crossovers
Aug-21	1	Reference to CoA PP 2.4 added	3	Submission Inclusions

Each update will be listed above with the Guidelines, as amended.

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INTRODUCTION

This document is to be interpreted as the minimum standard for subdivisional development and is to be read in conjunction with the City of Armadale *Subdivisional Design and Construction Policy* and the *AUS-SPEC Specifications* adopted by the City of Armadale.

This document has been compiled to assist all parties involved in the subdivision process to meet the City of Armadale requirements in the developing of residential and industrial subdivisions within the City.

The City of Armadale is the authority responsible for the future care, control and management of the road and stormwater drainage infrastructure constructed to enable the subdivision of land. The City therefore retains the right to require a subdivision to be constructed to the standards detailed in this document and to its entire satisfaction. All designs submitted for approval will be checked against these guidelines and those found requiring additional information or which do not meet the specified requirements, will be returned for revision.

2. THE CITY OF ARMADALE'S OBJECTIVES

The City of Armadale wishes to ensure all subdivision and development is in accordance with the City's Local Planning Strategies and Objectives.

It is intended that Armadale will be a City where development:

Considers and responds to our unique historical and environmental values;

- Embraces environmentally responsible approaches to energy and water consumption;
- Incorporates healthy lifestyle activities and access to adequate green space; and
- Is complimentary to Armadale's sense of place and occurs within a current or contemporary and effective planning framework.

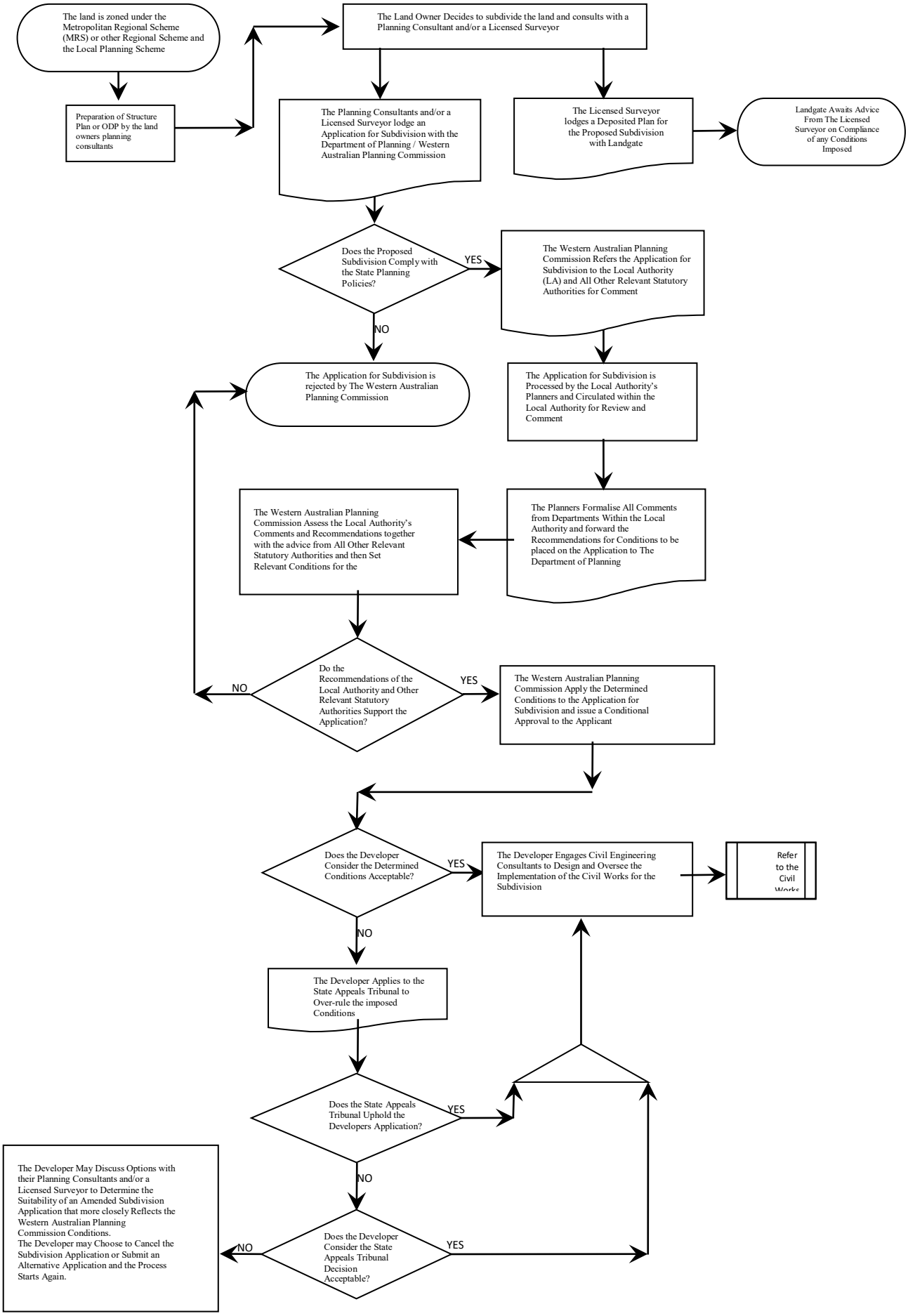
Statutory Environment

The subdivision and development of land in Western Australia is controlled by legislation, which includes:

- Planning and Development Act 2005
- Local Government Act 1995

Where the conditions of subdivision approval require the construction of roads and/or drainage shown on the plan of subdivision then, pursuant to the Planning and Development Act 2005, the City of Armadale requires that the Developer employ a suitably qualified Consulting Engineer to design the civil engineering works and a Superintendent of Works to ensure the intent of the design for the subdivision is met.

Subdivision Process Flow Chart



3. ENGINEERING REQUIREMENTS AT THE PLANNING STAGE

Engineering Assessment Requirements

The City's Subdivision Engineer outlines the proposed conditions and advice notes for a development application received from the Western Australian Planning Commission (WAPC), based on the *WAPC Model Subdivision Schedule – October 2017*, and may relate to, but are not limited to, the following:

- Stormwater management;
- Access/crossover requirements;
- Earthworks;
- Soil conditions;
- Existing vegetation;
- Existing and proposed road network;
- Existing and proposed path network;
- Public Open Space (POS) requirements;
- Infrastructure requirements.

Once the City's Subdivision Engineer has received and collated all Technical Services comments they are provided to the City's Planning Department. The City's Planners provide a response to the West Australian Planning Commission (WAPC) with the recommended conditions for the application.

Contributions and Upgrades to existing City Infrastructure

Upgrading of the City's infrastructure may be required as a result of an application. This could be through either development schemes or from the assessment by the City's Subdivision Engineer. Any upgrading or value of contribution toward such works will be determined by the City.

When identified, the City will request the WAPC to impose a condition on the application for the upgrading of City's infrastructure or a contribution towards upgrading works. The applicant should seek clarification of the condition requirements prior to the expiry of the reconsideration and appeal period. If the applicant is unable to negotiate an outcome between the Developer and the City of Armadale, they have the right to appeal via the WAPC.

4. CITY OF ARMADALE REQUIREMENTS AT THE DESIGN STAGE

City of Armadale Approval

Representatives of the Subdivision Team may visit the subdivision site at any time before or after acceptance of the civil design plans. These visits are not for detailed site investigation and design purposes nor will the City's Subdivision Engineer assess the subdivision in terms of financial viability for the Developer. The City's Subdivision Engineer is reliant upon the accuracy and detail of drawings, specifications and general information submitted by the Consulting Surveyor and the Consulting Engineer in order to assess the proposed works.

Final acceptance by the City of civil design plans is deemed to be given only when the Consulting Engineer receives notification in writing, on a City of Armadale letterhead signed by the City's Manager Subdivisions or their representative, that the plans and specifications are considered acceptable. A set of the civil design plans will also be returned to the Consulting Engineer stamped and signed by the City's Manager Subdivisions as acceptable for construction.

Irrespective of previous acceptance, or the presence of the Contractor on site, the Consulting Engineer is to investigate design defects that have been identified and present a modified design to the City's Subdivision Engineer for acceptance. The City's Subdivision Engineer shall not accept a lowering of subdivision standards to accommodate design defects and the Consulting Engineer shall not rely upon the City's Subdivision Engineer for a solution.

The City of Armadale is under no obligation to accept works which are commenced prematurely and which do not meet standards or requirements. If the Developer commences construction prior to the acceptance of plans by the City's Subdivision Engineer the risk rests solely with the Developer.

Earthworks and Retaining Walls

Consulting Engineers are required to recognise and retain natural features of the site. The earthworks should be kept to a minimum in terms of area and shall comply with the requirements of *AS 3798-2007: Guidelines for Earthworks on Commercial and Residential Developments.*

Earthworks

Subdivisional lots shall be designed in accordance with *AUS-Spec Specification – C014 Earthworks.*

Retaining Walls

Subdivisional retaining walls shall be undertaken in accordance with *AUS-Spec Specification – C040 Retaining Walls*

All retaining wall works within the subdivision require a separate Building License application to be made to the City's Building Services. The application must include plans certified by a structural engineer. **A building licence approval is required prior to the commencement of construction of retaining walls.** Failure to obtain the required approval may result in prosecution under the relevant Act.

5. CITY OF ARMADALE REQUIREMENT FOR STANDARD ENGINEERING DOCUMENTATION

Reports / Information

Most items which will be required in support of the engineering design will be requested as a part of the subdivisional planning process and will be detailed in conditions on any Western Australian Planning Commission (WAPC) approvals. In order to determine the suitability of the engineering design being assessed, the City may require provision of additional supporting documentation which was not identified during the planning process. Typically, developments are required to provide the following investigations / reports in support of the engineering design.

Geotechnical Report

This report must provide sufficient detail about the development area characteristics and soils to define the likely performance of the predevelopment ground from both a drainage and structural perspective. The report must also include recommendations to improve the site characteristics to support future development uses. Geotechnical conditions for development sites within the City can vary considerably. The City requires that the geotechnical report is prepared by an appropriately qualified person. The following information is to be collected, as a minimum:

- Details of the exploration methods used and any relevant standards which were followed for the investigation;
- Date of completing field work and date of completing any laboratory analysis and details of sample storage in the interim period between recovery and analysis;
- Soil profiles to a depth of at least 5m;
- Information on soil moisture content and depth of groundwater at time of investigation, if present;
- Indication of soil strength by layer encountered. Use of Perth Sand Penetrometer Testing is acceptable for sand soils only; measurement of undrained shear strength is expected in fine particle soils by appropriate means;
- Determination of Atterberg limits and particle size distribution is expected;
- To inform drainage design saturated hydraulic conductivity at a range of depths from surface to the groundwater table or 3m below ground level are required;
- Indication of the current site classification In accordance with AS 2870 and likely works to improve the site to an A or S classification;
- Provide advice on the risk and management of Acid Sulphate soils at the site; and
- If in rock areas then bedding plane analysis should be conducted to indicate if failure planes exist which would be detrimental to the proposed land use.

Stormwater Management Plan

The submitted Urban Water Management Plan (UWMP) or Stormwater Management Plan (SMP) is to comply with the City of Armadale's *Stormwater Management Handbook* and reflect the criteria established in the Local Water Management Strategy (LWMS) for the relevant area.

Foreshore / POS Management Plans

In areas where development borders a natural waterway, a foreshore management plan is required to be prepared for the development. This document is to be developed in consultation with both the City of Armadale's Parks and Environment Departments and to be provided as an approved document informing the Engineering Design.

Erosion and Sediment Control Plan

This plan is particularly important for development within the hills areas. The Erosion and Sediment Control plan needs to demonstrate the following:

- Slope grades on the site;
- Extent of earth disturbing activities;
- Any vulnerable user environments or user groups nearby;
- Measures to prevent mobilisation and discharge of sediments to downstream areas;
- How environmentally sensitive areas are to be protected from transported materials i.e. wetlands, lakes etc.;
- Needs to also include long term measures for prevention of sediment; transportation beyond end of works while the estate is being established and in its early life; and
- Should conform to CoA environmental policy and should be endorsed by environmental team.

Dust Management Plan (DMP)

The Armadale area is impacted by strong seasonal winds and wind borne sediment transportation is a particular concern when undertaking land development works within the City. A DMP must be prepared for any proposed land development works. This DMP:

- Must comply with the City's environmental policy and be endorsed by environmental team.
- Needs to consider construction and build out phase.
- Must have practical measures which do not require input from the City of Armadale.

City of Armadale Inclusions within a Civil Engineering Submission

Drawings shall be submitted to the City in in accordance with the criteria on the City's website www.armadale.wa.gov.au. Submission of documents will be in an electronic format. A covering letter is to be included in the submission which outlines the relevant WAPC conditions that the design drawings satisfy. The Consulting Engineer shall provide written confirmation that the drawings have been prepared in accordance with the Subdivision and Development Guidelines and other relevant standards.

The preparation of the plan and document submission(s) must also consider and address the Local Planning Policy (LPP) PLN 2.4 – Landscape Feature and Tree Preservation. This LPP provides guidance on information that is required at the Civil Design, Earthworks and Practical Completion stage of a project.

Every plan sheet within the submission must conform to the City of Armadale Drawing sheet templates and include the following information:

- Developer name and contact details (minimum postal address and telephone number);
- Consultant engineer name and contact details (minimum postal address and telephone number);
- Development name and stage;
- Title;
- Revision status including date;
- Previous revisions and purpose;
- Drawing size and scale (A1, 1:1,000); and
- Signed and dated, Drawn By, Designed By, Drafting Check and Design Check fields. A plan can be drawn and designed by the same person but must be checked by a second competent individual.

Cover Sheet

Minimum inclusions:

- Name of Project;
- Stage of Project;
- WAPC no. if applicable;
- Date of submission;
- Current submission revision & purpose;
- List of all previous submissions including purpose, revision & date;
- List all plans included in the submission inclusive of drawing number, title and revision; and
- Sign off for the submission by a suitably qualified practicing engineer eligible for registration as a professional engineer with Engineers Australia. A wet ink signature, date and EA registration number is required for the sign off.

Area Plan, Typical Scale 1 : 10,000-20,000

An area scale plan indicating the subject site within the locality, minimum inclusion:

- Prominent features on the landscape i.e. named hills, principle roads nearby, notable buildings, religious & educational establishments, rivers, lakes, wetlands, forest;

- Shows main entries into the completed estate from the existing road network. If the stage is part of multiple works this plan may also show some of the previous and future development staging; and
- Construction Traffic and haulage routes.

Staging Plan

A staging plan is required for all developments which contain more than one stage of works. Minimum inclusions are:

- Location of various stages;
- Sequence of development stages; and
- Access points for each stage.

Pre-Calculation Sheet, Typical Scale 1 : 1,000 – 5,000

Shows the finished estate minimum inclusion is:

- Perimeter length, width and area dimensions for: Roads, footpaths, lots, Public Open Space (POS) Drainage reserve, School sites, Conservation Category Wetlands (CCW), state forest, rivers, lakes, foreshore areas; and
- The category of features listed i.e. footpath - District Use Path, Road – Neighbourhood Connector.

Environmental Plan

This plan needs to identify the key environmental conditions within and near to the development boundary. The plan should show:

- Conservation category & resource enhancement wetlands and their associated development buffers;
- Rare or protected flora and fauna;
- Creeks, rivers and other natural water courses and associated flood fringes; and
- Aboriginal or other state significant heritage sites.

Where relevant, the following information is required in support of the Civil Engineering submission:

Wetland Management Plans

Where the preparation and implementation of a Wetland Management Plan is required as a condition of subdivision, the following minimum content is required:

- Background information including: location, boundary, classification, buffer areas, assigned management category and Unique Identifier Number, future and current land use, proposed land use and adjacent land uses, pre development hydrological flows and anticipated post development flows.
- Mapping of areas of native vegetation within the wetland and the wetland buffer.
- Mapping of areas of non-native vegetation within the wetland and the wetland buffer.
- Vegetation community information and information relating to the occurrence of native fauna shall be included where known.

- Detail of the threats to the wetland including threats such as vegetation trampling, feral animals, weeds, fire, pests and diseases, water levels, and nutrient enrichment.
- Proposed management actions that reduce the potential impacts of threats. Actions should detail approximate costing, implementation timelines, priorities for management and measureable targets."
- All wetlands being retained in Public Open Space are required to be fenced with conservation style fencing or fencing consistent with Australian Standard 4970-2009 "Protection of trees on development sites".

Dieback Management Plans

Where the preparation and implementation of a Dieback Management Plan is required as a condition of subdivision, the following minimum content is required:

- Map showing any areas of native vegetation proposed to be cleared/ retained.
- Map showing adjacent areas of vegetation that could be effected by works on-site.
- Interpretation of the site vegetation by a qualified dieback interpreter and provision of details of the dieback interpreter's qualification.
- Results of interpretation shown on a map as 'dieback infected', 'dieback free' or 'uninterpretable'.
- Assessment of risk including a schedule of any proposed works (including clearing of vegetation, construction of roads/ access ways/ fences/ structures or the installation of drainage etc).
- Construction map illustrating areas that may be required for parking of machinery, stockpiling, storage, or clean down.
- Information relating to how compliance with the plan will be demonstrated.
- Development of strategies to minimise the risk of introducing and/or spreading dieback during the undertaking of each of these proposed activities in 'assessment of risk'.

Watercourse and Wetland Re-vegetation Plans

Where the preparation and implementation of a Watercourse or Wetland Re-vegetation Plan is required as a condition of subdivision, the following minimum content is required:

- Documentation of:
  - existing vegetation including species and condition;
  - wetlands or watercourses that occur on the site;
  - hydrological balance of any watercourses and wetlands;
  - non-native species and proposed methods/ timing control;
  - threats to the wetland/ watercourse and modes of control;
  - proposed areas of revegetation including:
    - sedge planting within an ephemeral water-body and up to 0.5 meters either side of the high water mark,
    - shrub planting 10 meters from the sedge zone and;
    - tree planting a further 5 meters from the shrub zone.
  - names of the locally native species proposed to be planted, method of planting and maintenance schedule.

  - source of plant stock and demonstrated compliance with industry standards for plant disease and hygiene.
- The following minimum specifications apply to the final species density:
  - Trees planted 10 to 20 plants per 100 square meters;
  - Embankment shrubs planted at 150 to 200 shrubs per 100 square meters;
  - Watercourse beds and fringes within 0.5 meters of the high water mark, 400 to 600 rushes/ sedges per 100 square meters.

All watercourses or wetlands being retained in Public Open Space are required to be fenced with conservation style fencing or fencing consistent with Australian Standard 4970-2009 “Protection of trees on development sites”.

Revegetation for Screening/ Landscape Enhancement

Where the preparation and implementation of a revegetation plan is required for screening or landscape enhancement, the following minimal content is required:

- Documentation of the names of the locally native species proposed to be planted, method of planting and maintenance schedule.
- The following minimum specifications apply to the final species density:
  - Rows of trees 5 meters apart with at least 1 tree per 10m.
  - Rows of shrubs 5 meters apart, with at least 1 shrub per 2m.
  - Random planting to achieve the same density is acceptable.

Revegetation for Spray Drift Buffers

Where the preparation and implementation of a revegetation plan is required for spray drift buffer, the following minimal content is required:

- Documentation of the names of the locally native species proposed to be planted, method of planting and maintenance schedule. Species are required to be long lived non-weedy tree and shrub species that will ultimately provide a permanent barrier from the ground up to a height of 1.5 times the spray release height with 50% porosity, favouring species with long, thin and rough foliage.
- Documentation of the source of plant stock and demonstrated compliance with industry standards for plant disease and hygiene.
- The following minimum specifications apply to the final species density:
  - Four rows of trees/ shrubs, with rows 5 metres apart
  - Include a 10 metre firebreak on both sides of the four rows of trees

Geological Plan

Using the data available from the Department of Water "WinBore", Perth geological survey and the site investigation conducted this plan shall show as a minimum:

- The superficial soil profile across the site, typically to a depth of between five and ten meters below predevelopment ground levels or to refusal in hard ground;
- Where the site is known to be within a medium or higher risk area of acid sulphate soils indication of the likelihood for acid sulphate soils across the site;
- A description of the soil layers recorded at the site including infiltration properties of the insitu soil;
- Seasonal maximum groundwater level for the site adjusted for distance from nearest "WinBore"; and
- Levels across the site to Australian Height Datum (AHD). If necessary this plan may be supplemented with cross sections.

Earthworks Plan

The earthworks plan should detail the finished AHD level and contours across the subject area as well as providing details of the necessary works to achieve this final form. The Earthwork Plan shall be in accordance with *AUS-Spec Specification – C014 Earthworks.* The minimum inclusions on the Earthwork plan are:

- Finished surface level and contours of lots, roads, pertinent subsurface layers i.e. clay formation, and POS including retardation basins & permanent lakes;
- Seasonal maximum groundwater level and contours;
- A site survey shall be prepared identifying any vegetation proposed to be removed and approved by the City prior to commencement of earthworks. The plan shall include the species of the vegetation and its size.
- Indicate where cut and/or fill operations are being conducted;
- Batter details between lots and to road reserves both permanent and temporary;
- In notes detail the Optimum Moisture Content (OMC) and Modified Maximum Dry Density (MMDD) for compaction of the soils across the site;
- Details of imported fill material including but not limited to description & bulk density; in the case of granular fill, internal angle of friction and percentage of fine material (passing 0.075mm sieve) should be listed and for clays cohesion (c') and shrink swell index values should be stated;
- Dependent upon the features surrounding the site, e.g. groundwater dependant wetlands, it may be necessary to include information for land at the perimeter of the study area. If necessary this plan may be supplemented with cross sections; and
- If earthworks are required on neighbouring lots, than the owners written consent must be submitted with the civil engineering submission.

Sewer Reticulation

Sewer plans submitted shall be approved by the Water Corporation. Beyond the requirements of the Water Corporation, the City of Armadale uses the Sewer Reticulation plan in conjunction with the roads and drainage plans to ensure that infrastructure is located advantageously for maintenance of council assets. The City requests the number of service crossings are minimised and does not permit services of any type under road pavement where a viable alternative alignment exists. If easements are required, then these shall be clearly indicated on the plans.

Water Reticulation

Water Reticulation plans submitted shall be approved by the Water Corporation. Beyond the requirements of the Water Corporation, the City of Armadale uses the Water Reticulation plan in conjunction with the roads and drainage plans to ensure that infrastructure is located advantageously for maintenance of council assets. The City requests the number of service crossings are minimised and does not permit services of any type under road pavement where a viable alternative alignment exists. If easements are required, then these shall be clearly indicated on the plans.

Power and Lighting Plan

Shows the layout of the electrical installation across the development minimum inclusions are:

- Location of all power infrastructure in public land and easement (including street light poles, power poles, control cabinets, transformers, etc);
- Locations of power cable road crossings;
- Illumination levels across the finished development area;
- The designers Western Power accreditation including registration number; and
- Western Power catalogue numbers for items presented.

Master Services Plan

Master services plans shall, as a minimum, show the following:

- All services including existing shall be represented on these plans, including as a minimum drainage, treated/potable water, raw water, sewer, Telstra, National Broadband Network, gas, electrical, private works;
- Trench alignments of all services within the limit of works (single line representation for shared trench);
- All service pits to scale and street lighting to be shown;
- Tree planting centre lines in correlation with the landscape plan;
- Any structural or mechanical protection if applicable; and
- Clear indication of incidents where minimum vertical or horizontal clearances are not achieved and detail of actual clearance.

Road Layout Plan

The Road Layout Plan shall be in accordance with *AUS-Spec Specification – D006 Geometric Road Layout* and the Approved Structure Plan. The Plan shows the layout and configuration of the roads & footpaths through the development, as a minimum the plan will indicate:

- Limit of works to be constructed including ALL connections to existing work;
- All proposed allotments and reserves within the development;
- All easements and land acquisitions;
- All streets to be constructed, including proposed street names;
- Chainages on traverse lines at all tangent points and cross-sections (at intervals of not more than 20 metres, along the centre line of the road);
- Kerb radii (to face of kerb) and kerb type including offsets;
- Footpaths, bicycle paths, and/or shared paths, and all pedestrian kerb crossings to concord with the Disability Discrimination Act. Levels shall be sufficiently documented to demonstrate compliance with requirements of Australian Standard AS1428 'Design for Access and Mobility';
- Locations of all existing & proposed driveways, drains, pits, and poles;
- Street name signs at all intersections;
- All existing and proposed fill areas and depths of fill;
- All probable or known slip areas and unstable area;
- Set out details for all horizontal curves;
- Locations and description of roadside furniture; and
- Locations of culvert crossings and hard-standing areas for vehicle access into allotments.
- Demonstration of effort to protect trees with in road median islands.

Road Longitudinal Section Plan

Road Longitudinal section plans, as a minimum, shall show the following:

- Centreline chainage;
- Street name;
- Centreline and top of kerb levels required at least every 20 metres on straight grades and a maximum distance of 10 metres on vertical curves, at all tangent points, changes of grade, low points and at each end of vertical curves;
- Plot of each proposed top of kerb, back of path and existing surface level on title boundaries;
- Length of vertical curves and intersection points;
- Kerb and centreline grades;
- Grading on rural roads to include a grading of table drains on the same section;
- Location of intersecting streets and Cul-de-Sac, including temporary Cul-de-Sac for streets that are constructed in stages;
- Road grading a minimum distance of 100 metres beyond the end of works;
- Kerb levels shown on returns at quarter points in addition to tangent points. This may be tabulated as an alternative;
- Kerb returns grading showing the grading into the adjoining street. Note this is not required if detailed contours are provided;
- In Cul-de-Sacs, grading of the kerb around the turning head;
- Level and location of all existing services to be in conflict with proposed works;

- Datum RL;
- Drainage long section;
- Services crossing; and
- Low points indicated.

Road Cross Sections

Cross section shall be drawn for chainages at 20 metres on straight grades and a maximum of 10 metres on vertical curves Cross-sections shall also be shown at all tangent points and at extreme changes in existing surface conditions. Road cross-section plans, as a minimum, shall show the following:

- Street name;
- Road chainage of cross section;
- Levels of existing surface for the full width of the road reserve;
- Design levels for kerb, footpaths and road pavement for civil works;
- Indicate pavement crossfall (%) if different from typical road crossfall as shown on the typical road cross section;
- Position and level of crown of road;
- Extent and slopes (%) of batters and open drains if different from typical road crossfall as shown on the typical road cross section;
- Existing buildings on adjacent allotments abutting streets including floor levels;
- Location and level of existing services (level where there is to be a conflict with proposed works);
- Datum RL;
- Pavement boxing profile indicated;
- Drainage levels;
- Other services; and
- Road reserve boundary and details at title boundaries.

Typical cross-sections should be included in documentation where applicable and shall show the nature and location of the following:

- Profile and geometry of finished surface;
- Location of subsoil drainage and conduits for services;
- Details of footpath and road pavement profile;
- Cut/fill batter slopes;
- Kerb type;
- Kerb offsets from title boundaries;
- Drainage infrastructure location;
- Services infrastructure location and typical details;
- Pavement materials, compaction requirements and nominated seal;
- Road reserve width; and
- Road carriageway width (between kerb inverts).

Signage and Line Marking Plan

A signage and line marking plan is to be included in the submission. The plan is to be in accordance with current Main Roads Western Australia standards detailing the following as a minimum:

- All street signage including regulatory warning and guide signs where required;
- Sign positions;
- Line marking.

Intersection and Cul-de-Sac Details

Details shall include:

- All kerb types, driveways crossings, footpaths and kerb crossings;
- Street Names;
- Grades and vertical curves;
- Contours on all finished road pavements indicating surface drainage flow;
- Road chainages;
- Proposed top of kerb and footpath levels;
- Location of low points;
- Levels at all tangent points, along crown of road and crown/high point in Cul-de-Sac;
- Radii sizes and tangents points;
- Set out details for all horizontal curves;
- A minimum of four kerb levels around kerb returns;
- Location of all stormwater pipes and pits;
- Sight lines; and
- Round-a-bout vehicle movement paths.

Drainage Layout Plans

The drainage layout plans are to include details of all drainage infrastructure to be constructed, including groundwater controls, storm water treatment structures and outfall drains. Drainage layout plans, as a minimum, shall include the following:

- Limit of Works to be constructed including all connections to existing work;
- All drainage easements within the development;
- All streets to be constructed, including proposed street names;
- Existing surface levels at the corners of all allotments and all significant changes of grade within the allotment, or alternatively contour information of sufficient detail to show same;
- Flood levels shall be shown where applicable;
  - Drainage Pipe data including the following:
  - Pipe Name / ID & type (Storm water / subsoil);
  - Chainages on traverse lines at all tangent points and cross-sections at intervals of not more than 20 metres, along the centre line of the pipe;
  - Pipe material, class, diameter, length & slope, Upstream & Downstream Invert levels.
- Drainage pit data including the following;
  - Pit ID & type;
  - Pit Invert level.
- All existing fences buildings, trees, etc on the street alignment or land through which drains or flow paths shall pass;
- Existing or proposed open earth drains, dams, watercourses, bore holes, wells and springs within the area.

Drainage Longitudinal Sections

A drainage longitudinal section is required for each leg of drainage, inclusive of subsoil. Drainage longitudinal sections, as a minimum, shall show the following:

- Centreline chainage;
- Existing and finished surface levels at 20m spacing maximum and at all grade changes;
- Invert level of pipe at the inlet and outlet to pits;
- Datum level;
- Pit description;
- Depth to invert of pits from finished surface;
- Pipe material ,class, diameter, length & slope;
- Actual velocities, discharge and pipe capacity;
- Plot of design pipe;
- Plot of hydraulic grade lines and levels;
- Pit numbers / ID;
- All existing services shall be shown on the section where the designed pipe crosses;
- A pit schedule detailing:
  - Pit number;
  - Pit type;
  - Internal dimension of pits;
  - Inlet and outlet levels;
  - Pipe sizes;
  - Finished top of pit level;
  - Depth of pit;
  - Pit lid details;
  - Comments specific to pit.
- The location of the pipe (i.e. Street name, reserve, lot number) on the longitudinal section;
- The location and type of special backfill in trenches; and
- Street names relevant to road crossings.

Drainage Retardation & Treatment Drawings

On-site detention and drainage retardation drawings, as a minimum, shall show the following:

- Limit of Works to be constructed including all connections to existing and proposed work;
- Property boundaries and easements within the limit of works;
- Areas of fill greater than 300mm depth;
- Flood levels shall be shown where applicable;
- Drainage Pipe diameters and grades;
- Drainage Pit numbers / ID;
- All existing or proposed fences, buildings, trees, public open spaces features in the vicinity of the works;
- Invert levels of all inlet and outfall structures including pipes and open drains;
- Surface levels and freeboard;
- Batter slopes and grades of basin floor;
- Outlet control details or similar for on-site detention systems;
- Top Water Levels during both the minor storm event and 100 ARl storm event;
- The hydraulic grade line in the inlet pipe/drain for both the minor storm event and 100 ARl storm event;
- Invert levels and cover levels of associated pits and Gross pollutant traps;
- Design catchment and storage volume requirements shall be stated on the plans; and
- Planting schedules for wetlands including quantity and species of all plantings.

Drainage Catchment Plan

Details the surface flow movements and drainage system capture arrangements across the development. As a minimum, the following is required for critical storm events from the one to hundred year Average Reoccurrence Interval (ARI) storm events:

- Sub-catchment plan;
- Major and minor flow path direction;
- Volumetric discharge rate (m^3/s) at all locations of discharge into receiving waters, or detention / treatment structures;
- Velocity (m/s), depth of flow (mm) & velocity depth product;
- Maximum flooded area for all areas of sags; and
- Gutter flow width, in the case of sag pits flooded width and overflow paths will also be necessary.

Drainage Calculations

This can be presented graphically or in a tabular form and should detail the calculation method and parameters selected for stormwater and subsoil drainage. Justification for parameter selection should also be provided.

Standard Drainage Details

Detail drawings, as a minimum, shall show the following:

- All pits, pipes and special drainage structures;
- Method of downstream erosion control at outfalls;
- Method of erosion control for batters in areas susceptible to erosion;

Retaining Wall Layout Plan

Shows the locations and layout of retaining walls throughout the development, minimum inclusions are:

- Location of retaining walls throughout the development including those at boundary areas;
- Finished ground levels each side of proposed retaining walls;
- Finished surface contours;
- Extent of footings for retaining walls; and
- Sign off of the retaining walls layout proposed by a practicing Structural Engineer registered with Engineers Australia. Sign off to comprise Wet ink signature and Engineer's Australia registration number.

Retaining Wall Longitudinal Sections

Where the length of an individual retaining wall exceeds 40m or contains changes in direction or retained height varies by more than 50% across the length of the wall or the wall is located adjacent a road intersection then a longitudinal section of the wall is required to detail at no more than 10 metre chainages:

- Levels for top of wall (TOW) and bottom of wall (BOW);
- Finished surface levels for retained ground and low side of the wall;
- Where a wall is located within or adjacent to a road reserve level information should be provided for the finished verge and road surface;
- Gradient of the finished land on both side of the retaining wall;
- Top level of any parapet or railings located on top of the wall;
- Location of any stepped or ramped access integrated into the retaining wall; and
- Sign off of the proposed retaining wall longitudinal sections by a practicing Structural Engineer registered with Engineers Australia. Sign off to comprise Wet ink signature and Engineer's Australia registration number.

Retaining Wall Details

Details pages are required to support the layout plan showing all types of retaining structure proposed. Minimum inclusions are:

- Detail full width and depth of retaining wall construction;
- Provide details on retaining wall type & construction material i.e. cantilever steel pile or mass gravity reconstituted limestone;
- Detail any drainage incorporated as a part of the retaining wall;
- Detail any bridging required where retaining walls interact with other infrastructure i.e. drainage, power cables etc;
- Detail any steps or ramp construction included in the retaining wall;
- Parapet or fence construction details;

- Provide information on parameters selected in retaining wall calculation, notably: soil bulk density, soil internal angle of friction & apparent cohesion, surcharge load – live & dead, design life;
- Retaining wall calculation method i.e. Rankine, Coulomb; and
- Serviceability limit states i.e. max applied load, min. ground surface on front face, offsets to live and dead surcharge loads.

Entry Statement and Other Specialist Detail Drawings

Submissions for entry statements and other specialist detail drawings, as a minimum, shall include:

- Details of any specialist items proposed i.e. unique street furniture; lake pumps etc.;
- Detail all street furniture; and
- Structural details of estate entry statements.

Landscape Drawings

Landscape plans submitted in support of the civil design, as a minimum, shall show the following:

- Planting schedules and any specific planting requirements such as size of hole, root barriers, fertilisers etc.;
- Location and spacing of all trees, shrubs and plants etc.;
- Location and details of any trees or vegetation to be removed;
- Irrigation details including metering, backflow prevention devices, pipe diameter and materials, valve details;
- Path, bollard and fencing construction details;
- Lighting details;
- Supply and installation details of playground equipment;
- Open water bodies to cross reference to other retardation basin or drainage plans; and
- Details of services within landscaped areas.

Where clearing is required as part of subdivisional development, the following is must be provided prior to earthworks/earthworks approval/commencement of works:

- A site survey plan should be prepared by the subdivider that identifies any vegetation proposed to be removed and approved by the City prior to commencement of Earthworks/Subdivisional work. This plan should include the species of the vegetation and its size.
- The fencing of POS areas prior to construction activities, consistent with *Australian Standard 4970-2009 "Protection of trees on development sites"*

Asset Register

An Asset register detailing life cycle aspects of the proposed civil works is required to show as a minimum the following:

- Unit measurements of components proposed i.e. length of pipe network, area of Public Open Space (POS);
- Material & class of proposed items i.e. class 2 concrete pipe;
- Life expectancy of proposed infrastructure items in a suitable unit of measurement i.e. years for road surfaces, operating hours for pumps;
- Recommended maintenance operations including frequency; and
- Material supplier contact details.

Plan Signing

All engineering plans to be signed by a chartered / registered / professional engineer, with a "wet ink" signature.

6. CITY OF ARMADALE REQUIREMENTS PRIOR TO COMMENCEMENT OF CIVIL WORKS

Pre-Start Up

The Consulting Engineer shall complete the tasks as identified in the pre start-up checklist prior to commencement of civil works. The City's Subdivision Engineer will confirm these requirements are met at the start- up meeting.

Neighbourhood Consultation

Residents likely to be directly affected by the proposed subdivision shall be notified of the proposed works by a letter drop at least 14 days prior to the works commencing on site.

This notice shall include the following information:

- The names of the Developer, Consulting Engineer and Contractor;
- Date of commencement of the works and expected completion date
- Hours of operation; and
- Contact details for the Contractor's representative to whom complaints can be directed.

A sign shall be erected at the entry to the subdivision displaying all of the above information. The City's Subdivision Engineer must receive a plan identifying all lots affected by the proposed subdivisional works and a copy of the letter to be provided to the residents.

Where work on an existing road is required as part of a subdivision, and the work involves fixing or altering the level or alignment of the existing road, the Developer shall conduct the notification and consultation process with the owners of the affected land as detailed in Section 3.51 of the Local Government Act 1995.

Traffic Management

Traffic shall be managed in accordance with *Main Roads WA Traffic Management for Road Works Code of Practice* and *AS1742.3 Manual of Uniform Traffic Control Devices: Part 3 Traffic Control Devices for Works on Roads.*

Where an approved subdivisional development impacts on existing roads, a Traffic Management Plan that has been prepared and signed by an accredited traffic management professional must be submitted to the City of Armadale for consideration and approval. Traffic Management Plan submission requirements are detailed on the City's website www.armadale.wa.gov.au

The Traffic Management Plan shall be developed to minimise the impact of the work on traffic flows, pedestrians, cyclists and emergency vehicles, while ensuring the safety of employees and the public.

Road Closures

Full road closures are to be avoided by the use partial road closures, stop/go controls and contra flow treatments. Where a road must be temporarily closed the road closure process should be in accordance with the *Local Government Act Sections 3.50, 3.50A, 3.51 and 3.52.*

Where it becomes necessary to temporarily close an existing road to traffic in order to carry out approved construction works, the Developer shall apply to the City of Armadale for approval to temporarily close the road at least 21 days before the closure is required.

The application for a temporarily road closure shall include the following details:

- Location of closure
- Reason for closure
- Period of closure
- Route proposed for traffic detour (if any)
- Significant facilities affected by the closure (i.e. schools/hospitals)
- Method(s) of advertising the closure; and
- Traffic Management Plan.

The Developer shall advise all emergency services and the owner(s) or occupier(s) of affected properties and significant facilities of the proposed closure once City of Armadale approval has been obtained. The Developer shall comply with any conditions placed on the temporarily road closure approval. Any approved temporarily road closures must be advertised in the public notices section of the local papers and the West Australian at least 14 days prior to initiating the closure.

Air Quality Associated with the Development Works

To prevent dust nuisance to adjacent properties the City's Subdivision Engineer may direct that no earthworks be carried out when wind, soil and climate conditions are likely to cause dust or sand drift to affect those properties.

The following requirements apply to the management of air quality associated with the development works:

- All disturbed ground shall be treated so as to prevent the generation of dust or other wind-borne material;
- Burning of felled timber, scrub, other vegetation or other combustible material is not permitted;
- Development work shall be undertaken in stages such that a minimum area of ground is disturbed at any one time;
- The Developer shall comply with any specific orders regarding dust nuisance that may be imposed;
- If any dust or wind-borne material nuisance arises, the Developer shall immediately stabilise the affected area(s); and
- The Developer shall be liable for any damage, removal of sand and cleaning caused by dust or wind-borne materials affecting adjacent properties.

Failure to comply with the above may result in abatement and infringement notices under City of Armadale's Prevention and Abatement of Sand Drift local laws.

All sites shall be assessed for the potential of erosion from stormwater runoff prior to commencement of site works. Where risk is identified a management plan must be prepared.

Noise Management Plan

The Noise Management Plan shall include the following:

- A diagram and description of the site and proposed works;
- An assessment of the potential extent of noise emissions likely to be generated during the construction works and the potential impact on adjoining properties;
- Details of methods and procedures for managing noise from construction equipment, and how this shall be monitored;
- A procedure for dealing with complaints about excessive noise. The procedure shall include details of how the Contractor shall handle complaints, including the keeping of a complaints register, showing details of the complaint and the agreed action(s) to be undertaken and a record of advice provided to the complainant by the Contractor and project superintendent within 24 hours of receipt of complaint;
- A disputes procedure for addressing excessive noise.

Prescribed standards for noise emissions are set down in the Environmental Protection (Noise) Regulations 1997, specifically regulation 7, which limits the level of noise and noise characteristics (tonality, modulation or impulsiveness) emitted from any premises to any other premises.

Regulation 8 sets out the assigned levels relevant to types of locations and the time of the day. The levels specified in Regulation 8 are conditional upon no annoying characteristics existing in the noise of concern, such as tonality, modulation or impulsiveness. If such characteristics exist then any measured level is adjusted according to Table 2 of Regulation 8.

For the purpose of these Guidelines, the LA10 values are deemed most relevant. Complaints are likely if noise levels approach 60dB(A) at the nearest noise sensitive premises.

In order for Regulation 7 not to be applied to noise emitted from a construction site as a result of construction work carried out during the specified hours of work, the Developer shall demonstrate that:

- Construction work is carried out in accordance with Section 6 of AS 2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- Plant and equipment used are the quietest reasonably available;
- The work is being undertaken in accordance with an approved Noise Management Plan;
- Written notice has been given to the occupiers of all noise sensitive premises where noise levels are likely to exceed the assigned levels of Table 1;
- The levels set down in Table 1 of Regulation 8 should be achieved wherever practicable; and
- It is reasonably necessary for the work to be carried out outside normal working

hours.

- In relation specifically to dewatering pumps, if the pump can be engineered to comply with a level of 35dB(A) and be non-tonal, then the above conditions need not be invoked. In any event, Pump noise levels should not exceed 45dB(A) at any noise sensitive premises.

Vibration Management Plan

The Developer shall carry out an assessment of the risk of vibration emanating from the site and its impact on adjoining residents and buildings. The vibration assessment shall take account of the following two types of vibration:

- Vibration that may or may not be felt by adjoining residents but is not likely to cause structural or superficial damage to buildings or property; and
- Vibration that has the potential to cause structural or superficial damage.

Where identified as required in the geotechnical report or the risk assessment a Vibration Management Plan shall be prepared for the development works and forwarded to the City's Subdivision Engineer for approval prior to work commencing.

The Developer shall ensure the contractors full compliance with the approved Vibration Management Plan.

The Developer shall limit ground vibrations in adjoining buildings and properties by ensuring that ground particle velocities arising from the operation of vibratory or percussion equipment do not exceed any such limit that would result in nuisance or damage to buildings or property.

Where a Vibration Management Plan is required it shall include:

- A diagram and description of the site and proposed works;
- A dilapidation report of all adjacent infrastructure;
- An assessment of the potential extent of vibrations likely to be generated during the construction works and the potential impact on adjoining properties;
- Details of methods and procedures to manage the generation of vibrations, how this shall be monitored and a disputes procedure for addressing excessive vibration; and
- A procedure for dealing with complaints about excessive vibration. The procedure shall include details of how the Contractor shall handle complaints, including the keeping of a complaints register, showing details of the complaint and the agreed action(s) to be undertaken and a record of advice provided to the complainant by the Contractor and project superintendent within 24 hours of receipt of complaint;

7. CITY OF ARMADALE REQUIREMENTS DURING CONSTRUCTION WORKS

Commencement of Works

No site works shall commence until:

- Design plans and specifications are formally acknowledged as compliant by the City of Armadale;
- The pre-construction requirements have been met;
- A start up meeting has been held; and
- Written authorisation to commence works has been issued by the City's Subdivision Engineer.

Meetings

Regular site meetings are to be held at fortnightly intervals. The City's Subdivision Engineer shall be given no less than forty-eight (48) hours' notice of site meetings and shall be issued with a copy of the minutes (taken by the Superintendent).

Inspection and Testing

Test results are required to ensure that the material supplied and the work carried out conforms to the approved specifications.

Combined Inspections are required to be carried out by the Project Superintendent and the Local Authority representative at the following stage:

- Site clearing and preliminary earthworks;
- Installation of erosion control measures;
- Preservation measures installed for trees, vegetation or heritage sites as determined;
- Completion of path sub-grade; and
- Landscaping and irrigation work.

The Contractor shall allow site access for City of Armadale Officers or their representatives at all times.

Water Source

Water required for construction requirements and dust management must not be sourced from scheme supply. Arrangements can be made to source construction water from the City of Armadale depot.

Road Sweeping

The Developer is required to ensure all affected roads and drainage lines are kept clear of silt and pollutants.

Traffic Management

Traffic management as per the plans prepared is to be in place for the duration of works until practical completion is granted.

Workplace Safety

All work shall be carried out with due regard for the safety of motorists, employees and the general public in full compliance with the Occupational Safety and Health Act 1984 and Regulations 1996.

8. CITY OF ARMADALE REQUIREMENTS FOR AS-CONSTRUCTED DRAWINGS

Prior to the issue of a Clearance for the subdivision, the following "as constructed" drawings and information is required to be submitted to Council by the Developer/Consultant:

- Copies of all engineering drawings/data in electronic format as AutoCAD DWG files.
- "As Constructed Information" of the stormwater drainage component of the subdivision as well as information of all Council assets within the road reserve and public open space, in accordance with current versions of D,R and O Spec in a Map Info (TAB file format). Please refer to the D-SPEC website for further information www.dspec.com.au.
- Public Open Space data must also be in accordance with the current version of O Spec, and the City's Landscape Guidelines for New Residential Developments.
- A PDF of the original Surveyor's as-constructed survey is to be submitted.

9. CITY OF ARMADALE REQUIREMENTS FOR PRACTICAL COMPLETION

Completion of Works

Practical Completion shall be awarded at the completion of all works including the construction of bonded items. Please note, bonded items are works bonded to facilitate early clearance. The defects liability period shall commence once practical completion has been awarded by the City of Armadale.

Achieving Practical Completion

Prior to practical completion being awarded, the Superintendent shall confirm with the City's Subdivision Engineer any items not completed according to the approved plans. The items shall be divided into:

- Those requiring completion, repair or alteration before clearances shall be issued; and
- Minor items requiring repair or alteration by a date specified by the City of Armadale. Practical completion will not be granted until the following is completed:
  - The Consulting Geotechnical Engineer shall certify that the earthworks have addressed the recommendations as identified in the geotechnical report;
  - All regulatory signage and line marking is inspected and approved by Main Roads WA;
  - As-constructed information is to be submitted as per section 7 (POS as-con exempt);
  - All lots are to be classified in accordance with AS2870-1996; and

- Signed copy of the Certificate of Compliance

All regulatory signage and line marking is to be approved by Main Roads WA. Temporary signage and line marking is to be installed **by the developer prior to Practical Completion and maintenance, and is to remain in place** until such time as the Main Roads WA contractor has installed the permanent signage and line marking.

10. CITY OF ARMADALE REQUIREMENTS FOR CLEARANCE

Clearance of Subdivision Conditions

The Subdivision Clearance Request form and the Subdivision Clearance Checklist are in appendix A of the document.

The Developer must meet the following requirements prior to clearance of the relevant conditions of each stage:

- Notices are placed on the individual titles of sites classified below S Class;
- Achieved practical completion;
- Submission of certificates for all test results as defined in specifications;
- Payment of clearance fees;
- Payment of the soil stabilisation bond if applicable;
- Payment of the landscape maintenance bond if applicable;
- Completion of all City of Armadale conditions of WAPC approval supported by written evidence of how each condition has been satisfied.

When making any of the above payments the Developer shall complete the Subdivision Payment Application form in appendix A of the document. An electronic version of the form is available upon request.

Payments

The following payments are required (where applicable) prior to clearance being issued.

Clearance Fee

A clearance fee, in compliance with the City's Planning Department Cost Schedule.

Early Clearance

Neither the City of Armadale nor the Developer is obligated to enter into a bonding arrangement for incomplete works. The acceptance of bonds **may be agreed** as a concession to the Developer by the City of Armadale to facilitate the release of titles.

The City of Armadale will not bond works on land which remains private property after the creation of titles.

Bonding shall only be considered when:

- The land will be under the control of the City after creation of titles;
- All earthworks are completed;
- Roads are constructed to primer seal level;

- Drainage systems are demonstrated as functioning;
- Environmental Management Practices are in place; and
- All relevant fees and contributions are paid.

Applying to Lodge a Bond

The Developer may make application to the City of Armadale to lodge a bond in lieu of completion of some areas of subdivisional works. If the City agrees to this request, bonds must be in the form of cash, bank cheque or an unconditional bank guarantee from an acceptable financial institution.

To apply, the Developer shall complete the "Incomplete Works Bond" Application form in appendix A of the document.

Requests to bond incomplete work shall include:

- Reasons for requesting the bonding of the incomplete works;
- A concise reference to the extent, nature and location of the work to be bonded;
- A timetable for completion of the bonded work;
- An itemised estimate of the costs for the bonded work certified by the Consulting Engineer;
- Lodgement of an amount 50% greater than the itemised estimate of the bonded works certified by the Consulting Engineer;
- The contact details of the Contractor responsible for completing the bonded works;
- Any other information that shall assist the assessment of the application; and
- Agreement to pay a non-refundable fee of 2% of the determined bond amount (including GST). A minimum amount of $1,320.00 (including GST) is currently applicable to this service. This minimum may increase annually as part of the annual review process. The fee is to compensate the City of Armadale for the additional inspection and administration costs incurred by the acceptance of each incomplete works bond.

The City of Armadale will not release portions of bonds until items to the value of 60% of the total bond amount have been completed. Portioned release of bond amounts will only be considered for bonds greater than $20,000.

The City of Armadale reserves the right to draw on the bond to effect completion of the outstanding works at any time. Practical completion will not be awarded until all bonded items are completed to the City of Armadale's satisfaction.

11. CITY OF ARMADALE REQUIREMENTS FOR THE DEFECTS LIABILITY PERIOD

Final Inspection

At the expiry of the defects liability period the Consulting Engineer shall:

- Arrange for a joint inspection of the subdivision;
- Advise the City's Subdivision Engineer in writing, of all identified defects in workmanship or materials, for the City of Armadale confirmation;
- Advise when all defects have been addressed and arrange for a second joint

inspection; and
- Request the return of the defects liability bond and if applicable the soil stabilisation bond.

Regardless of the time elapsed since practical completion, the defects liability period is not considered over until all of the above is addressed and the bond monies have been returned.

12. ROAD DESIGN

City of Armadale Requirements

Intersections must be designed to accommodate the maximum expected traffic volumes during the life of the roads.

Traffic control devices shall be installed where required to properly regulate traffic flows or where traffic problems are anticipated to occur in the future. Traffic control devices shall comply with appropriate Austroads standards and other relevant industry standards and guidelines.

Pedestrian facilities shall be installed where required. The pavement design life shall be 25 years.

Part Lengths of Road

Where a road is not constructed for its full length, a temporary turning circle with an 8m inner radius shall be constructed at the termination point. This temporary cul de sac shall be constructed and kerbed to an asphalt road finish with appropriate drainage treatment. A lesser sealed treatment may be agreed where continuation of the road works are considered imminent. A "No Through Road" sign shall be installed at the intersection where traffic is likely to enter the road and a chevron sign indicating the termination of the road.

Temporary turning circles are to be located wholly within the road reserve or balance lot created as part of the subdivision. An easement in gross is to be provided where the turnaround is constructed on a balance lot.

Where a road is required to extend into an adjoining property to allow for future road construction, the road shall be fully constructed to the property boundary and the temporary turning circle shall be located in the adjoining lot. The following is required:

- A written agreement between the land owner and the City of Armadale that allows turning movements within the private land; or
- A formal easement in gross is to be implemented.

Roads are to be fully constructed for the frontage of each lot to be released. Roads less than 20m in length do not generally require temporary turning circles.

Street Nameplates

Street nameplates shall comply with the standard detail drawing in appendix B of the document.

Construction

Construction practices and techniques are to conform to industry best practice as set out in the relevant Austroads guides and the IPWEA Guidelines.

Surface Course

Except where brick or block-paved surface courses are approved, all urban roads shall be surfaced using bituminous concrete with a minimum compacted thickness of 30mm.

Bituminous concrete laid at roundabouts shall be 40mm thick, 14mm Intersection mix.

10mm nominal bituminous concrete mix is preferred for residential street pavements. 14mm nominal mix is preferred for corrector course/thicklift applications.

Brick or Block Pavements

Brick paving will only be approved by the City of Armadale where deemed appropriate. Coloured or surface treated asphalt is preferred where a contrasting trafficable surface treatment is desired.

Island Treatments

The finished infill treatment for traffic islands shall be trafficable brick paving, or in-situ concrete with surface colouring/patterning to suit the theme for the area.

Traffic Signs and Line marking

Where traffic signs and/or road line marking are required and Main Roads WA has approved the design plan, the Consulting Engineer shall arrange for the signs and line marking to be installed. All posts are to be of frangible material. Temporary traffic signs and/or road line marking is to be installed by the developer prior to PC and remain until MRWA can install the permanent traffic signs and/or road line marking.

Urban/Residential Roads

Roads adjoining residential and special residential lots less than 3,000m^2 are to be built to an urban/residential road standard.

Liveable Neighbourhoods (WAPC & DPI)

Liveable Neighbourhoods, Element 2 – Movement network, shall be used as a guide only when designing urban/residential roads. The following quotes from Liveable Neighbourhoods are to be recognised.

"The introduction of section 169 of the Planning and Development Act 2005 provides that the WAPC may fix the minimum standards of road construction. The road standards set out in this policy are intended as a guide until such a time as any WAPC minimum road standard requirements may be gazetted.

This element sets out requirements and some design solutions for a standard set of street types, and some examples of traffic management treatments that satisfy the element objectives. Streets are classified as either arterial routes or local streets, with a range of types in each classification. The WAPC will consider variations for specific purpose streets where a case is provided consistent with the element objectives.

Liveable Neighbourhoods is not intended to be a traffic engineering manual. It provides a guide to principles for designing integrated networks and street design and construction."

Verges

Verges shall be stable, free draining and graded to a smooth even surface, and compacted to not less than 92% of the maximum dry density obtained from modified maximum dry density compaction tests conducted in accordance with AS 1289-2003: Methods of Testing Soils for Engineering Purposes (Pt. 5.2.1).

Where verges fall toward property boundaries, appropriate drainage infrastructure may be required to capture and manage stormwater to prevent water from the road reserve entering private property.

Subsoil drains are to be placed on the high sides of the roads on the subdivision slopes where the thickness of sand is less than 1.2m, or the thickness of free draining sand between base course and laterite or clay soil is less than 0.8m.

Verge fill material must be free of debris and weeds. Topsoil must be to a landscaping quality and Quality Assurance (QA) documentation may be requested.

Where the crossfall of the road reserve is such as to render a verge crossfall of 2% impracticable, the verge may be graded at 2% for 3m from the back of kerb, then at a maximum grade of 1 in 6 extending a maximum of 6m into the adjoining lot.

Rural Residential Roads (lot sizes 3,000 - 10,000m²) and Rural Roads (lot sizes greater than 10,000m²)

Road Reserve

The road reserve width is to be a minimum of 20m.

Surface Requirements

- For lot sizes 3000m² - 5000m² the pavement surface shall be 25mm compacted bituminous concrete. Flush kerbing may be used with a 1.2m shoulder and swale drains, or mountable kerbing with appropriate drainage and verge treatment.
- For lot sizes 5000m² - 10,000m² a 2 coat seal can be used.
- Rural roads shall be sealed with a 2-coat seal using hot bitumen prime and seal. Bitumen application rates shall be designed according to the aggregate size, forecast traffic and other design factors. A running surface aggregate size of 10mm is preferred.

Specifications

- The invert of table drains shall be located a minimum of 2.5m from power poles.
- Flexible pavements shall consist of a minimum pavement depth of 250mm when constructed on sandy soil sub-grades.

Industrial Roads

Industrial Roads comprise all roads in areas zoned for Industry, General Industry, Light Industry or equivalent zonings under the appropriate Town Planning Scheme.

Specifications

Industrial roads shall conform to the requirements set out for urban roads, except as detailed in the following table.

	COLLECTOR ROADS	ACCESS ROADS
Surface Width	10.0m min	9.0m min
Verge Width	5.0m min	5.5m min
Seal	40mm bituminous concrete	40mm bituminous concrete

Battleaxe Lot Access Legs

Urban (Green-title and Strata)

The minimum access leg width for a single battleaxe lot shall be 4m with a 3m wide pavement placed centrally in the access leg, unless a lesser width has been approved by the WAPC.

For 2 or more battleaxe lots with a common access, the minimum standard shall be a 3m pavement with passing lanes of 5.5m at intervals of a maximum 15m.

Battleaxe pavements shall be constructed from:

- Coloured concrete
- Block Paving
- Red asphalt

The access leg shall be drained to ensure that no stormwater from the access way flows on to the road fronting the lot, into the lot, or into any abutting lots. Stormwater shall be collected into an approved soakage storage system, located within the access leg, or connected via a silt trap to the street drainage system. A Water Sensitive Urban Design approach is encouraged.
A 2.8m truncation (2m x 2m minimum) is required at both ends of the access leg to improve safety.

Rural Residential (i.e. Special Residential and Special Rural)

The minimum standard for battleaxe pavements in these areas shall be a sprayed seal, with appropriate drainage to battleaxe legs being provided.

- For lots of size 3000m² to 1HA:
  - A 5m-access leg width, containing a 3m wide pavement, with 500mm shoulders, is to be provided where only 1 lot is to be served.
  - A 6m-access leg width, containing a 4m wide pavement, with 500mm shoulders, is to be provided where 2 or more lots are to be served.

- For lots above 1HA, please liaise with the City for requirements.

13. STORMWATER MANAGEMENT

The Stormwater Management requirements and design principles are detailed in *City of Armadale Stormwater Management Handbook*. Please refer to this handbook for further information

14. FOOTPATHS

The City of Armadale requires the provision of a pedestrian or shared footpath on at least one side of every street up to and including a Neighbourhood Connector Classification. At and above the Neighbourhood Connector Classification a pedestrian path is be provided on one side and a shared path on the other side of every street. The alignment of paths within the road reserve shall be based on safety considerations but generally will be adjacent to the property boundary for lower order roads not exceeding 3,000 vehicles per day and where verge widths are less than 5.3m. Variation to this alignment may be considered where the terrain, vegetation, public utility services or other special circumstances warrant.

Footpaths and shared use paths must have a durable, non-skid surface with tactile ground surface indicators at all pedestrian ramp crossings. Any crossing points such as pram ramps and crossovers should be smooth and flush from the path to the road surface to reduce trips and falls by all path users.

Paths may be constructed in concrete or asphalt. Applications for brick or block paving shall be considered only on place making sites.

- Concrete paths shall be a minimum thickness of 100mm with edge thickening of 150mm as per *City of Armadale Standard Footpath Detail*

- Asphalt paths shall have a minimum base course thickness of 150mm with an asphalt thickness of 25mm. Iron oxide and/or gravel mix asphalt is recommended where vision separation is required.

Pedestrian paths shall be a minimum width of 1.5m.

Shared paths (Dual Use Paths) shall be a minimum width of 2.0m but may be required to have a width of 2.5m on roads with a high traffic volume and where else specified.

District Shared paths (District Dual Use Paths) shall be a minimum width of 2.5m and are to be provided within the streets indicated in the City's Structure Plans and/or District Dual Use Path Network plans.

Drainage

Footpaths within the verge are to be constructed with a 2% crossfall towards the road edge. Footpaths and shared paths within POS areas are to be constructed to crossfall toward the centre of the POS or toward the areas designed to receive and treat surface flows. These grading requirements are to prevent ponding of stormwater over path areas so that pedestrian access is maintained in wet conditions. Specific drainage facilities must be installed where runoff is unable to be directed away from path areas resulting in potential ponding over the path.

Materials

Paths shall be constructed of concrete with a minimum compressive strength of 25MPa at 28 days, a slump of 75mm and maximum aggregate size of 14mm.

Other materials may be approved at the discretion of the City and will be considered on individual application.

Construction

Paths shall be constructed of un-reinforced concrete, 100m thick with edge thickening to 150mm over 300mm. The Path will follow the longitudinal grades of the road and verge with a crossfall of 2% towards the kerb or road.

The sub-grade shall be compacted for a depth of 500mm to not less than 95% of the maximum dry density in accordance with *AS 1289-2003: Methods of Testing Soils for Engineering Purposes (Pt. 5.2.1)*. Quality Assurance documentation is to be submitted for both the sub-grade and the concrete.

The surface finish is to be broom finish (2mm), with a 75mm wide trowelled edge.

Transverse contraction/expansion joints shall be provided using full depth "Lockjoint" or similar products set flush to the path surface. Bitumen impregnated Caneite is not to be used. The spacing of the contraction/expansion joints will be in accordance with the Lockjoint" or similar product specifications. Additional joints may be required around service pits located within paths. Joints are to be aligned with the kerb contraction/expansion joints where possible.

All paths are to be designed in accordance with Austroads standards parts 13 and 14.

15. PUBLIC OPEN SPACE (POS)

The planning, design and implementation of Public Open Spaces is to be undertaken in accordance with the City's 'Landscape Design Guide for Public Open Space in New Residential Developments'. This guide outlines POS planning, design and implementation principles and the landscape design application process.

Design Principles

Landscape Design Principles

Refer to the City's 'Landscape Design Guide for Public Open Space in New Residential Developments' and 'Parks Facilities Strategy 2018'. These documents can be requested from the Parks Department.

Irrigation Design Principles

Irrigation systems must comply with:

- The City of Armadale Standard Specification for Irrigation System Design; and
- Installation and Standard Specification for Bores, Pumps, Headworks & Electrical Cabinets.

This document can be requested from the Parks Department.

POS Construction

Construction

No works shall be undertaken until the detailed landscape plans have been approved by the City.

Practical Completion

Developers are to arrange a Practical Completion inspection of landscape installation with the City of Armadale Representatives. Once agreed as practically complete, the agreed maintenance period shall commence. The costs of maintaining the POS through the maintenance period shall be borne by the developer and the POS shall be maintained throughout the period to the satisfaction of the City of Armadale. The POS will have maturity of vegetation, density of healthy plant material and the standard of infrastructure as specified on the Engineering and Landscaping Drawings submitted for acceptance by the City of Armadale. For further detail refer to the City's *'Landscape Design Guide for Public Open Space in New Residential Developments'*

Handover

Three months prior to the end of the maintenance period the developer will arrange and undertake a joint maintenance inspection with the City's representative to identify any defects in the landscaping. Any areas identified as defective are to be rectified within the three months leading up to the end of the maintenance period. The maintenance period may be extended if the City considers that an additional period of maintenance is required. At handover, the City will require a number of items to be undertaken and documentation issued to the City. For further detail refer to the City's 'Landscape Design Guide for Public Open Space in New Residential Developments'

16. STREETSCAPE LANDSCAPING

The planning, design and implementation of Streetscape Landscaping is to be undertaken in accordance with the City's 'Landscape Design Guide for Public Open Space in New Residential Developments'. This guide outlines planning, design and implementation principles and the landscape design application process. Landscaping will be considered to median islands and roundabouts and designs are to be submitted to the City for consideration.

Verge landscaping

Verge landscaping is to be undertaken and maintained by the adjacent landholder. It is recommended verge landscaping and street trees are supplied through the front lot packages. Refer to the City of Armadale's Streetscapes brochure and Fact Sheets on the website http://www.armadale.wa.gov.au/Home/Services_and_Facilities/Roads_and_Streets

Street Trees

Street trees are to be considered in line with the City's 'Urban Forest Strategy'. This document can be requested from the City's Parks Department.

17. ROADWAY AND PUBLIC AREA LIGHTING

The City requires the provision of standard Western Power street lights in new subdivisional areas but may also accept lighting styles / types from the Western Power decorative range.
LED street lighting from Western Power should be investigated and utilised to achieve required illumination levels when available. Modification of standard street lights is not permitted.

Where a proposed subdivisional road extends from an adjoining road the street lights shall be consistent. Street light selection shall consider existing street lights on surrounding roads.

Plans and specifications for roadway and public area lighting shall be submitted to both Western Power and the City of Armadale for consideration and acceptance.

18. PERMITTED STRUCTURES AND ACTIVITIES WITHIN CITY OF ARMADALE DRAINAGE EASEMENTS

These guidelines apply to any proposal to erect, construct or place any building, wall, fence or obstruction within an easement that is the responsibility of the City of Armadale, on private land.

The following structures and activities will be permitted within a drainage easement subject to conditions 1-7 as detailed below.

- Pergolas.
- Demountable above ground swimming pools and spas.
- Any framed structure, with or without cast-in-situ concrete floors, that has a total area of 40m^2 or less and is one of the following:
  - An attached or freestanding carport, residential garage or patio addition.
  - An outbuilding (i.e. not attached to the main building)
  - A carport or garage under the main roof that is assessed as not being potentially habitable.

Special purpose buildings that are intended for transformers, tanks, fixed plant and the like, are **not** permitted.

- Garden walls/fences less than 1.8 metres in height. The height is the distance between the finished ground level on the lower side and the top of the wall or fence, not including the height of any supporting retaining wall.
- Garden walls/fences that are designed for dismantling, such as post and rail, sheeting and precast interlocking components, 1.8 metres in height (the wall may, or may not, support an exempted structure). The wall height is the distance between the finished ground level at the base of the wall and the top of the wall.
- Retaining wall of less than 1.2 metre height or, for precast interlocking components, 1.8 meter in height (the wall may or may not, support an exempted structure). The wall height is the distance between the finished ground level at the base of the wall and the top of the wall.
- Surface treatments. These are typically concrete, bitumen, paving, block work or gravel.

- Earthworks and landscaping, barbecues, domestic fishponds and domestic fountains.

- Other utility and private services. Although these are classed as exempt, all efforts should be made to avoid the placement of significant services within the zone of influence. Crossing should be made at right angles to the City of Armadale's asset wherever possible.

However, only where each of the following conditions is met:

- It does not provide structural support to a non-exempt structure.

- Sufficient soil cover (minimum 600mm) is maintained over any City of Armadale infrastructure.

- The performance of the infrastructure is not inhibited.

- A minimum of 2m clearance is maintained from any manhole.

- The manholes are adjusted where necessary due to the changes in ground level.

- Existing City of Armadale infrastructure is to be upgraded where required.

- All building and planning requirements are satisfied. All costs are to be met by the landowner.

19. PROPOSED INFRASTRUCTURE CROSSING EXISTING ROADS

City of Armadale approval is required where infrastructure is proposed to cross a road. All road crossings require a detailed notification to the City of Armadale a minimum of 10 working days prior to works commencing.

An application for infrastructure to cross an existing road must be accompanied by:

- Detailed plans of the intended works certified by a Civil Engineer; and

- A traffic management plan prepared and signed by an accredited professional.

Prior to works commencing all residents that could be affected must be notified at least 3 days before the works.

Boring

The City of Armadale requires all road crossings to be mechanically bored beneath existing roads and the following applies:

- All underground crossings of roads and footpaths should be made at right angles to the road alignment

- All pits excavated for the locating of boring equipment are to be set back a

minimum of 0.5 meters from the back of kerb; and

- All bored crossings are to comply with the Utility Providers Code of Practice, and all verge reinstatements are to comply with IPWEA's "Restoration and Reinstatement Specifications for Local Governments in Western Australia".

Trenching

Open trench installation may be considered where it can be demonstrated that boring is not suitable, subject to prior approval from City of Armadale, the following applies:

- Straight saw cuts are to be made through the full depth of the pavement on all edges of the proposed trench
- Remove any unsuitable backfill material from the site, and dispose of through legal means.
- Before the general backfill of the trench is commenced, the work is to be inspected by a City of Armadale Officer
- Manholes, and spaces around the installed utility, shall be carefully compacted with hand rammers. The minimum depth of initial hand compaction above the crown of the pipe is not to be less than 150mm
- The backfill material is to be stabilized with 1-3% cement content, based on site conditions, to achieve a Maximum Dry Compressive Strength of 1700 kN. Increased cement content may be added at the Superintendents discretion, subject to providing evidence to the City of Armadale supporting the increase
- Compaction of the remaining backfill shall be carried out in layers. Compaction shall be achieved by mechanical means with water to a density of not less than 95% of the modified maximum dry density when tested and the road base placed within the reinstatement is to be compacted to not less than 98% of the modified maximum dry density when tested. All works to be in accordance with AS 1289-2003
- Install surface treatment to the same standard or better than existing
- A bitumen seal is required under all asphalt patches and reinstatements; and
- Ensure final surface is uniform to existing pavement, tolerances +5mm -0mm.

20. CROSSOVERS

Information on Crossovers can be found on the City's website at **https://www.armadale.wa.gov.au/crossovers**

21. GLOSSARY OF TERMS

In these guidelines, the following designated meanings apply:

Western Australian Planning Commission (WAPC)

The agency delegated with powers to approve and impose conditions upon subdivision development within Western Australia, as outlined by the Planning and Development Act 2005.

City of Armadale

The local government representing the interests of the Armadale community, when local government is nominated by the WAPC, to administer and clear certain conditions of subdivision imposed by the WAPC.

Subdivider/Developer

The subdivider/developer is the owner(s) of, or the company nominated to improve, the land proposed for subdivision and development.

The subdivider/developer is responsible for engaging the Consultants and the Contractors that undertake the design and construction of the subdivisional works.

Planning Officer

The Executive Director of Development Services will designate a Planning officer for all planning matters relating to subdivisions within the City. The designated Planning officer is responsible for any non-engineering WAPC subdivision conditions. They will co-ordinate and administer the City's planning requirements for each subdivision approval/clearance.

Subdivision Engineer

The Manager Subdivisions will designate a Subdivision Engineer to be responsible for administering engineering relating subdivision conditions. The City's Subdivision Engineer will inform the City's Planning officer of progress towards the completion of engineering conditions.

Consulting Surveyor

The Consulting Surveyor is a licensed surveyor engaged by the Developer to prepare the deposited plan, for submission when requesting clearance, after all WAPC conditions of subdivision have been satisfied.

Consulting Engineer

The Consulting Engineer is a professional engineer employed by the Developer to meet the civil works requirements of the City of Armadale pursuant to the Planning and Development Act 2005. The Consulting Engineer is to be eligible for corporate membership of the Institution of Engineers Australia or registration in the National Professional Engineers Register and is responsible, to the Developer, for the detailed investigation and design of the civil engineering works to satisfy the relevant WAPC conditions of subdivision to the approval of the City of Armadale.

Project Superintendent

The Project Superintendent is the person employed by the Developer to oversee the progress and standard of construction by the Contractor. The Consulting Engineer frequently undertakes the role of Project Superintendent.

The Project Superintendent is responsible, to the Developer, for ensuring that the Contractor completes the subdivision works to the approved drawings and specifications.

Contractor

The Contractor is the person employed by the Developer to construct the subdivision works in accordance with the approved drawings and specifications.

The Contractor is responsible to the Developer, and carries out the works being overseen by the Superintendent. There is no contractual or supervisory relationship between the Contractor and the City of Armadale.

22. APPENDIX A

SUBDIVISION PAYMENT FORM

Refer to section 9.2 for more information on payments.

Payee Name:	
Payee Address:	
Property Owner Name(s):	
Property Address:	
WAPC Number:	

Provide one cheque for Subdivision Fees/Contributions and one cheque for Bonds.

SUBDIVISION FEES AND CONTRIBUTIONS (Non-refundable)

Type of Fee	*Date*	*Account #*	*Receipt #*	*Amount*
Clearance Fee				
Engineering Supervision Fee				
Bond Fee: Incomplete Works				
Contribution to Works				
Comment:				
			TOTAL:	

BONDS (Refundable)

Type of Fee	*Date*	*Trust*	*Receipt*	*Trust*	*Amount*
Defects Bond					
Soil Stabilisation Bond					
Landscaping Maintenance Bond					
Incomplete Works Bond					
Comment:					
				TOTAL:	

The return of Defects Bonds, Soil Stabilisation Bonds, Landscaping Maintenance Bonds and Incomplete Works Bonds are subject to the works being completed to the satisfaction of the City of Armadale and within an acceptable timeframe.

INCOMPLETE WORKS BOND APPLICATION

Prior to completing this form, please contact the City to establish if your bond request is likely to be acceptable. The City may only consider a bonding arrangement for incomplete works once it has been demonstrated that the request meets the requirements outlined in section 9.3 of the Subdivision and Development Guidelines.

WAPC Number:	
Subdivision name and stage:	
Name and address of person(s) responsible for payment of the bond:	
Subdividers Name / Company:	
Reasons for requesting the bonding of incomplete works:	
Total bond amount proposed:	

Please attach relevant documentation and details of the works for which the bond shall cover. Bonds shall be provided in the form of cash, cheque or unconditional bank guarantee (ensuring that stamp duty has been paid and it does not have an expiry date). The application may be refused on the basis of insufficient information.

The following information must be provided with the application:

- A plan/drawing depicting the location and the area of the specific works to be covered by the bond.
- A schedule of the bond amount referring to all items for which it shall be utilised (inc. GST).
- A copy of the awarded contract schedule of costs shall also be submitted.
- Endorsement of the bond amount by the Consulting Engineer.
- A committed timetable or program for the completion of the outstanding works.
- The incomplete works bond shall include a contingency amount of 30% of the contract value.
- Written confirmation that the Local Government engineering supervision fees, maintenance bonds and any required contributions have been paid.
- Payment of Bond Fee (2% of bond amount, minimum $110.00 fee inc. GST).

Signature of Applicant: _____ **Date:** _____

SUBDIVISION SUBMISSION EXTERNAL CHECKLIST

The Civil Engineering Consultant is to complete this form and include it with the design drawing submission for the subdivision. For more information refer to section 4.2.

WAPC Number:	
Subdivision name and stage:	
Details of the Consulting Engineer and person responsible for the subdivision drawings submission:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

	Transmittal document has listed all the items sent to City of Armadale.
	Two copies of all drawings listed in section 4.2.
	Drawings have been certified by a practicing Civil Engineer.
	The Consulting Engineer has confirmed in writing that the drawings have been prepared in accordance with Subdivision and Development Guidelines and other relevant standards.
	Certification by the designer that each of the relevant conditions has been satisfied.
	Where conditions have not been satisfied, additional documentation is attached explaining the reasons why.
	A staging plan is provided.
	All management plans required by WAPC conditions are submitted.
	Copy of specifications is supplied.
	Traffic impact studies have been attached.
	Drainage calculations are included.
	Dust nuisance/site assessment submitted as per section 5.1.5.
	Road pavement calculations included.
	Street lighting design and certification.
	Structural certification where appropriate.

Signature of Applicant: _____ **Date:** _____

SUBDIVISION SUBMISSION INTERNAL CHECKLIST

The City's Subdivision Engineer is to complete this form as part of the review of the design drawing submission for the subdivision. For more information refer to section 4.2.

Date Reviewed:	
Reviewed By:	
WAPC Number:	
Subdivision name and stage:	
Details of the Consulting Engineer and person responsible for the subdivision drawings submission:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

	General
	Datum, Benchmark
	Street Names
	Lot Numbers
	Lot Dimensions
	North Point
	Existing Contours
	Design Contours
	Groundwater Contours
	Overall Drainage Concept
	Traffic Management Devices
	Drainage calculations are included.
	Plans
	Pavement Widths
	Road Reserve & Verge Widths
	Median Widths
	Centreline Chainages
	Horizontal Curve Data
	Adjacent Lots
	Traffic Management Devices & Emergency Vehicle Access
	Pavement Depths
	Cross falls
	Turning Circle Radii
	Guidepost Schedule
	Road Widening
	Access to Properties
	Existing and Design Service Locations

	Bus Embayment
	Existing & Design Contours
	Tie ins to existing levels (Tapers)
	Existing and Design Street Drainage
	Ground Water Contours
	Superelevation
	Eyebrow Treatment
	Kerb Profiles and Radii
	Cul De Sac Radii and Transitions
	Pedestrian Facilities
	Parking Bay Dimensions
	Future Bus Route
	Design Speed
	Street Lighting Plan
	Non-Motorised Traffic
	Path
	Cycleway or Dual Use Path
	Bus Stop
	Disabled or Pedestrian Ramp
	Barriers, Fencing, Bollards
	Profiles
	Centreline Distances
	SL of Centreline and Property Lines
	Design Levels, Centreline & Channels
	Longitudinal Grades (0.5% - 10%)
	Intersection Points
	Superelevation
	Tangent Points
	Vertical Curve Length
	Transitions
	Finished Surface Levels
	Cross Sections
	Intersections and Roundabouts
	Lot Boundaries
	Transitions & Radii
	Sight Distances
	Existing Levels
	Design Levels
	Public Utilities

	Drainage Plans
	Urban Water Management Plan
	Existing Pipe Sizes, Grades etc
	Existing Manholes
	Existing & Design Services
	Existing Contours & Spot Heights
	Drainage Easements & Widths
	Pipes Obvert to Obvert
	Drainage Alignment
	Water Sensitive Design (Refer Separate Subdivisional Checklist)
	Design Pipe Sizes, Grades etc
	Design Manholes
	Sealed Pipes and Joints Under Road Pavement
	Design Contours and Spot Heights
	Street Names & Lot Numbers
	Open Drainage Structures (Swales & Basins)
	Stormwater Drainage Design Calculations
	Future Development - Impact on Structure Dimension
	Earthworks & Filling
	Geotechnical Report
	Existing Contours & Spot Heights
	Cross Sections
	Retaining Walls
	Design Contours & Spot Heights
	Overspill - Caveat
	Road Shoulder & Verge Treatment
	Approvals/Permits (If Required)
	Main Roads Western Australia
	Water Corporation
	Department of Water
	Department of Environment
	Department of Conservation
	Swan River Trust
	Public Utility Providers
	Traffic Management Plan
	Works in Street Permit
	Works in Street Bond
	Site Stabilisation Bond
	Civil Works Acceptance from the City
	Additional Comments

STORMWATER FOR INFILL DEVELOPMENT
ATTENUATION DESIGN REQUIREMENT CHECKLIST

This form is to be completed and submitted with the subdivision design drawings. For more information refer to section 12.

WAPC Number:	
Subdivision name and stage:	
Details of the person responsible for the subdivision drawings submission:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

☐ Discharge to the City's system is via a silt trap located within the property.

☐ Connection to the City's system is to be via a 90mm Stormwater Grade PVC pipe to a manhole located in the verge fronting the lot.

☐ Minimum cover for any pipes installed in the verge is 400mm or greater where recommended by the manufactures specifications.

☐ Any pipes installed in the verge have been inspected prior to backfill by a City of Armadale Officer.

☐ Trenches are backfilled and compacted in no more than 300mm layers to at least 95% MDD or to match the adjacent in situ material. Quality assurance documentation has been submitted.

Signature of Applicant: _____ **Date:** _____

STORMWATER FOR INFILL DEVELOPMENT
INFILTRATION DESIGN REQUIREMENT CHECKLIST

This form is to be completed and submitted with the subdivision design drawings. For more information refer to section 12.

WAPC Number:	
Subdivision name and stage:	
Details of the person responsible for the subdivision drawings submission:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

☐ Demonstrate the site is located within the area shaded in drawing 08079/1-3.

☐ Demonstrate course free draining sand is to a depth of 1.5m.

☐ Confirm that the area is not susceptible to high ground water or high winter groundwater levels.

☐ The proposed system is sized to detain and infiltrate a 1 year ARI event.

☐ Statement of Undertaking is completed and a copy of the advice to purchasers is submitted.

Signature of Applicant: _____ **Date:** _____

SUBDIVISION PRE-START UP CHECKLIST

WAPC Number:	
Subdivision name and stage:	
Details of the Superintendent for the works:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

Disruption to local neighbourhoods caused by work activities associated with the subdivision shall be minimised. Written authorisation to commence works by a City's Subdivision Engineer will be given once the following pre-requisites are satisfied.

	Current WAPC approval and City of Armadale approved construction drawings (Copies of approved plans and documentation has been issued to Civil Consultant).
	Site assessment completed and appropriate dust and sand drift management plans are in place in accordance with DEP's Dust Control Guidelines, refer to section 5.1.5.
	Noise and vibration management plans completed and approved by the City.
	Traffic management plan prepared and approved by the City.
	Haul route plan identifying fill material source has been prepared and approved by the City.
	Environmental management plan is supplied and approved by the City.
	Complaints register and complaints procedure in place.
	Neighbourhood consultation completed in accordance with section 5.1.1.
	All equipment required for implementation of Management Plans is on site. Dewatering areas specified with Department of Water approval.
	Building Licence approval obtained for retaining walls (required prior to construction of walls).
	Demolition licence for any existing structures approved by the City.
	Hours of operation (Mon-Fri: 0700-1700 & Sat: 0830 – 1300). No work is permitted outside these hours without prior approval from the City. No works to be undertaken on public holidays.
	Appropriate method of disposal of cleared vegetation has been agreed. Either removal or mulching and reuse on site. (Burning of cleared vegetation is no longer permitted. Transportation to another site must be approved by the City and/or CALM due to dieback concerns).
	Destination of spoil, source of fill and road pavement material.
	Sign(s) erected at the entry to the subdivision displaying information as per section 5.1.1.
	Source of construction water is identified.
	Areas or features identified as not to be disturbed are confirmed and barricading/signage inspected.
	Site access details have been discussed and agreed by the Local Authority.

The above items have been duly completed and works authorised to commence (City of Armadale use).

Name: _____ Signed: _____

Position: _____ Date: _____

SUBDIVISION PRACTICAL COMPLETION CHECKLIST

WAPC Number:	
Subdivision name and stage:	
Details of the Superintendent for the works:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

	All construction works are complete, in accordance with the approved plans, or bonds are in place.
	Site finish is acceptable (i.e. generally tidy, no rubbish, graded surface with no wheel ruts etc)
	Road pavement, kerb and paths are satisfactory? (No poor surface finishes, cracking etc)
	Stormwater pit collars (frames) are located centrally over the chamber?
	Stormwater manhole lids (inserts) are off and pits are clean? (Free of rubble and sand etc)
	Stormwater chamber side walls are vertical?
	Stormwater pit collars are supported equally on all sides?
	All lot connections and property silt traps are installed and fitted with a spigot connection.
	Stormwater chamber access through pit opening acceptable?
	Line marking, signs and street name plates are in place?
	Street light poles and street sign poles are vertical?
	Temporary turn-around (Cul de sac) has been constructed in accordance with the approved plans?
	Are appropriate chevron signs and bollards installed at the temporary turn-around?
	Is an easement required for the temporary turn-around and has one been provided?
	Stormwater pit lid levels are flush with finished surface level (FSL)?
	Stormwater pit lid levels and FSL provide detention as specified in bioretention areas
	Number of plants as specified in bioretention areas
	Finished Lot levels and surface grading is satisfactory?
	Top soil has been placed and respread to acceptable tolerances?
	Verges free of debris and grading is satisfactory?
	No subsidence has been identified within the stage of works?
	Fire hydrants are in place and marked with RRPM/post and are set at the correct FSL?
	Service Authority assets are at the correct level?
	Outfalls fitted with grates to prevent entry and are fitted with stainless steel security locking bolts?
	Are EMP provisions in position?
	Pump station is OK and operational manuals have been handed over
	Defects list has been agreed to?
	Asset statement and as constructed plans have been provided?
	Certificate of Practical Completion has been signed and provided to the City?
	Were maintenance staff at the meeting or is a separate handover meeting required?
	The above items have been duly completed and PC authorised to commence (City of Armadale use).

SUBDIVISION CLEARANCE REQUEST

WAPC Number:	
Subdivision name and stage:	
Details of the Superintendent for the works:	Name: _____ Company: _____ Contact Number: _____
Subdividers Name / Company:	

	Paid	Amount	Date	Receipt No.	Trust
Supervision Fee		$			
Defects Bond		$			
Soil Stabilisation Bond		$			
Landscape Maintenance Bond		$			
Clearance Fee		$			
Incomplete Works Bond		$			
Incomplete Works Bond Fee		$			
Contribution		$			

As constructed information has been submitted (Y / N)_____ Date: ____/____/____

Date of Practical Completion: ____/____/____

Developer Endorsement:

On behalf of _____, I _____

of _____, certify that the requirements for all the conditions on the subdivision acceptance have been completed and that the attached Subdivision Clearance Checklist is correct.

Developers Representative: _____ Date: _____

Refer to appendix A of the document for Subdivision Clearance Checklist

City of Armadale Office Use Only					
Clearance approval recommended:					
Officer:		Date:		Manager:	
As-con record number:					
PC approval record number:					

SUBDIVISION CLEARANCE CHECKLIST

Condition No.	Description	Demonstrate how the condition was fulfilled	City of Armadale Comment	Signed & dated by City Officer

AS-CONSTRUCTED INFORMATION SUBMISSION CHECKLIST

WAPC Number:	
Name and stage:	
Property address:	
Surveyor:	
Contractor:	
Consulting Engineer:	

Documentation Required

	The Contractors marked up set of construction drawings (signed by the Contractor and endorsed by the Consulting Engineer/Superintendent)
	The Surveyors as-constructed drawing (signed by the Surveyor and endorsed by the Consulting Engineer/Superintendent)
	The Surveyors as-constructed survey in electronic format (dwg or dxf, GDA 94 MGA Zone 50) A pdf of the original Surveyors as-constructed survey

Information provided on as-constructed drawings

	Pit type, size and location relevant to GDA 94 MGA Zone 50
	Pipe invert levels and pit surface levels (top of lid and bottom of pit) referenced in AHD Pipe length, diameter, type and class
	Sub soil drainage, HCP's, spigots and basins
	Surrounding cadastre, including lot numbers
	Road centreline and kerb alignment plan referenced to GDA 94 MGA Zone 50
	Road centreline and gutter lines levels (referenced to AHD, shown at 20m intervals along the centreline) Footpath locations, width and surface type
	BBQ's, gazebos, seats, tables, taps, fountains and play equipment Reticulation (sprinkler heads, reticulation pipes and solenoids) Garden edging and lawn area

All as-constructed drawings submitted to the City of Armadale must contain an endorsement confirming that the works are compliant with the design plans and requirements of the City.

23. APPENDIX B

Street Name Plate