WESTERN EDGE

STRUCTURE PLAN

Part Two: Explanatory Report

June 2016

WESTERN EDGE

LANDCORP Cedar Woods

CLE TOWN PLANNING + DESIGN

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WESTERN EDGE STRUCTURE PLAN

PART TWO - EXPLANATORY REPORT

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1.0 PLANNING BACKGROUND

1.1 Introduction and Purpose

This Structure Plan applies to the Western Edge 'Urban Development' zone identified under the Town of Port Hedland's Town Planning Scheme No.5 and is referred to in this report as 'Western Edge'. The Western Edge Structure Plan has been prepared by CLE Town Planning + Design on behalf of Cedar Woods and Landcorp and is lodged pursuant to Clause 5.2.1 and Appendix 10 of Town Planning Scheme No.5 which requires a development plan (structure plan) for Western Edge.

The Structure Plan provides a policy framework to guide future subdivision and development, coordinate the distribution of public open space and establish an appropriate road hierarchy. The Structure Plan recognises the key elements of the *Pilbara's Port City Growth Plan* and the Town of Port Hedland's *Active Open Space Strategy* and comprehensively addresses the environmental, social, economic and infrastructure matters.

The format of the Structure Plan is consistent with the Western Australian Planning Commission's *Structure Plan Frameworks (August 2015)* as well as other recently approved development plans (structure plans) within South Hedland.

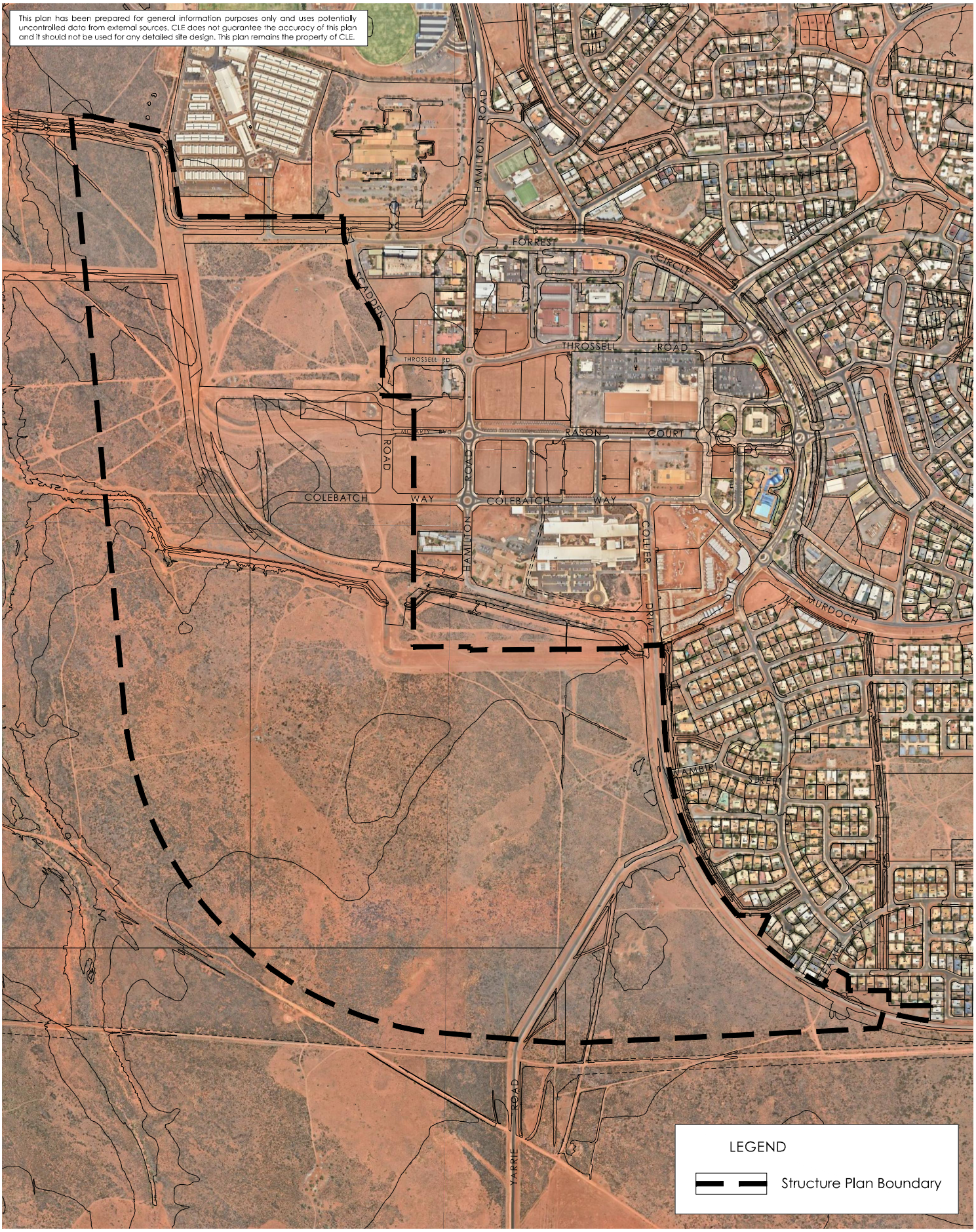
The Structure Plan consists of three parts:

Part 1: Implementation Report - contains the Structure Plan Map and development controls that will facilitate the various initiatives described in the Explanatory Report. These provisions are to be paid 'due regard' by the decision maker when considering any application for development or subdivision pursuant to the *Planning and Development (Local Planning Scheme) Regulations 2015 Schedule 2 – Deemed provisions for local planning schemes*.

Part 2: Explanatory Report - discusses the key outcomes and planning implications of the background and technical reports and describes the broad vision and more detailed planning process which has informed the Structure Plan Map. Part 2 is based on a detailed site specific analysis of the key opportunities constraints, informed by the following technical reports and strategies:

- Environmental Assessment Report;
- Aboriginal Heritage Survey;
- Bushfire Management Plan;
- Transport Assessment;
- Local Water Management Strategy; and
- Servicing and Infrastructure Report.

Part 3: Technical Appendices - includes the technical reports and supporting plans and maps outlined above.



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SITE PLAN AND ORTHOPHOTO

Figure 1

The Structure Plan provides a planning framework for the growth of the emerging South Hedland community, allowing for the delivery of approximately 1,600 – 1,650 dwellings within Western Edge. This will assist in providing a critical population mass to support the growth of the South Hedland Town Centre and allow the South Hedland housing market to respond to future fluctuations in housing demand in the region.

To service this residential growth, the Structure Plan allows for a 3.5ha primary school site consistent with the *Pilbara's Port City Growth Plan*. The primary school is proposed to be collocated with a large area of District Open Space as identified in the Town's *Active Open Space Strategy*.

1.2 Land Description

The Structure Plan area covers lots 500(North), 500(South), 521, 604, 606, 400, 358, 450(North), 450(South), 353, 361, 362, 501, 502, 3259, 3282, 3487, 6102 South Hedland. A site plan and orthophoto of the Structure Plan area and the surrounding land is Figure 1.

The following sections provide a detailed description of the Structure Plan area and surrounds.

Source: Google Maps

2323-79-01 (26.02.2016), NTS

LOCATION PLAN

Figure 2

1.2.1 Location

Western Edge is located within the suburb of South Hedland, approximately 12km south of the Port Hedland City Centre "as the crow flies" (refer Figure 2 – Location Plan).

The Structure Plan is bounded by the South Hedland Town Centre to the east, vacant land to the south and west and Forrest Circle to the north. On the opposite side of Forrest Circle and north of Western Edge is the Gateway Village short-say accommodation facility.

The established residential areas within South Hedland are north-east, east and south-east of the Town Centre. These established areas include local amenities such as POS, shopping facilities, an aquatic centre and the Hedland Health Campus. Western Edge is not considered an extension of the established residential areas rather, is the first stage of residential development south west of the Town Centre.

South Creek is located approximately 250m west of Western Edge and plays a key role in the regional drainage network and has informed the drainage strategy for the Structure Plan.

1.2.2 Area and Land Use

The Structure Plan has a total area of approximately 169 ha comprising of 18 lots ranging in size from 0.3ha to 156.5ha.

Western Edge is devoid of any significant vegetation with only scattered areas of shrubs occurring across the site. The land is unencumbered by existing development and is not used for any formal purposes.

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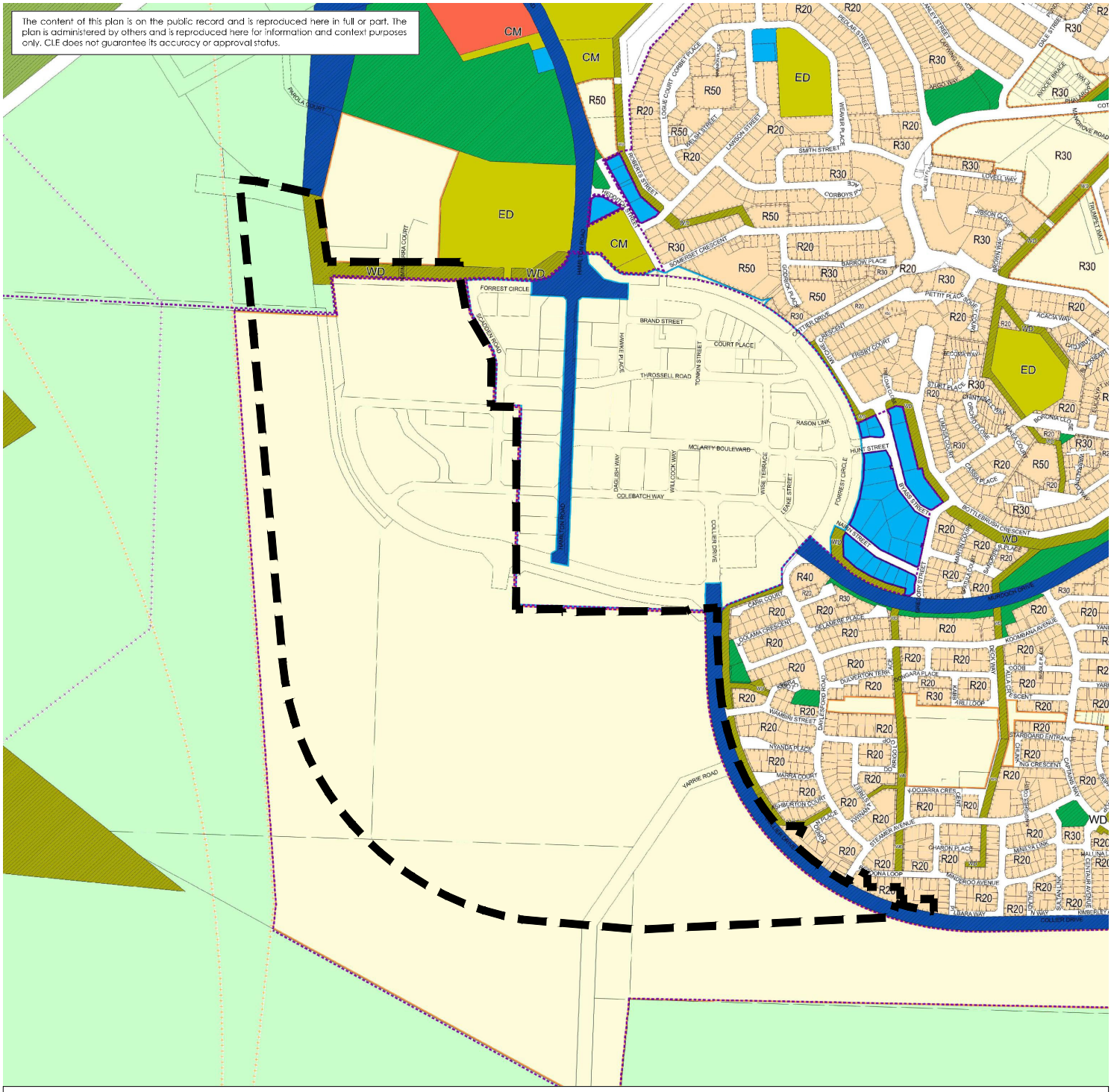
1.2.3 Legal Description and Ownership

All lots with the Structure Plan are owned by the State of Western Australia. Accordingly, the Western Australian Government's land and development agency, Landcorp, is progressing the planning framework over Western Edge with Cedar Woods assisting in a project management role.

The legal description and ownership of the lots within the Structure Plan is demonstrated in Table 1 below.

Table 1 – Land Ownership and Legal Description

Lot Number	Owner	Land Area (ha)	Plan	Volume / Folio
500 (South)	State of WA	4.54	P063966	LR3156-935
521	State of WA	1.08	P071965	LR3162-265
604	State of WA	0.96	P071984	LR3161-584
606	State of WA	12.50	P071984	LR3161-586
400	State of WA	82.80	P072979	LR3162-159
358	State of WA	47.04	P074206	LR3162-725
450 (North)	State of WA	2.64	P074371	LR3162-742
353	State of WA	156.53	P074712	LR3163-704
361	State of WA	64.54	P074712	LR3163-707
362	State of WA	6.20	P074712	LR3163-708
500 (North)	State of WA	0.31	P076077	LR3025-693
501	State of WA	2.54	P076077	LR3025-694
502	State of WA	0.40	P076077	LR3025-695
3259	State of WA	3.30	P213764	LR3012-485
3282	State of WA	0.56	P214020	LR3149-666
3487	State of WA	0.76	P214020	LR3149-671
450 (South)	State of WA	0.67	P218335	LR3022-466
6102	State of WA	1.98	P221110	LR3120-428



LEGEND

LOCAL SCHEME RESERVES

(see scheme text for additional information)

- Conservation recreation and natural landscapes
- District road
- Local road
- C Other public purposes : Cemetery
- E Other public purposes : Energy
- I Other public purposes : Infrastructure
- T Other public purposes : Telecommunications
- WDT Other public purposes : Waste disposal and treatment
- WD Other public purposes : Water and drainage
- EX Other purposes : Explosives safety area
- I Other purposes : Infrastructure
- P Other purposes : Port Facilities
- Parks and recreation
- State and regional road

LOCAL SCHEME ZONES

(see scheme text for additional information)

- Airport
- Commercial
- Community
- CM Community : Community
- ED Community : Education
- H Community : Health
- Industrial development
- Industry
- Light industry
- Mixed business
- Residential
- Rural
- Rural residential
- Strategic industry
- Tourism
- Town centre
- Transport development
- Urban development
- West end residential

OTHER CATEGORIES

(see scheme text for additional information)

- Scheme boundary
- Local Government boundary
- R20 R Codes
- A1 Additional uses
- Development plan areas
- Special control areas
- SCA1 Special control areas
- No zone
- Waterbodies

Structure Plan Boundary

CLE TOWN PLANNING + DESIGN

Source: Department of Planning

2323-80-01 (26.02.2016), NTS

TOWN OF PORT HEDLAND TPS No. 5

Figure 3

1.3 Planning Framework

1.3.1 Zoning and Reservation

Town Planning Scheme No.5

The Structure Plan area is zoned 'Urban Development' under Town Planning Scheme No.5 (TPS5) and is identified as 'Development Plan Area Western Edge' on the Scheme Map (refer Figure 3). Pursuant to Clause 5.2.1 and Appendix 10 of TPS5, a Development Plan (Structure Plan) is required to be prepared over the Western Edge Development Plan Area prior to the Council considering subdivision or development.

The specific precinct objectives for Western Edge are listed under Clause 5.3.8 of TPS5 as follows:

- *Provide for a permanent residential population within the catchment area of the South Hedland town centre;*
- *Provide for diversity in housing choice and 'affordable' housing;*
- *Provide for higher density residential development in closer proximity to the South Hedland town centre, with more traditional home sites towards the west of the precinct;*
- *Provide for Open Space 'green links' to South Creek environs; and*
- *Provide opportunity for Primary School and Tertiary Education Facilities.*

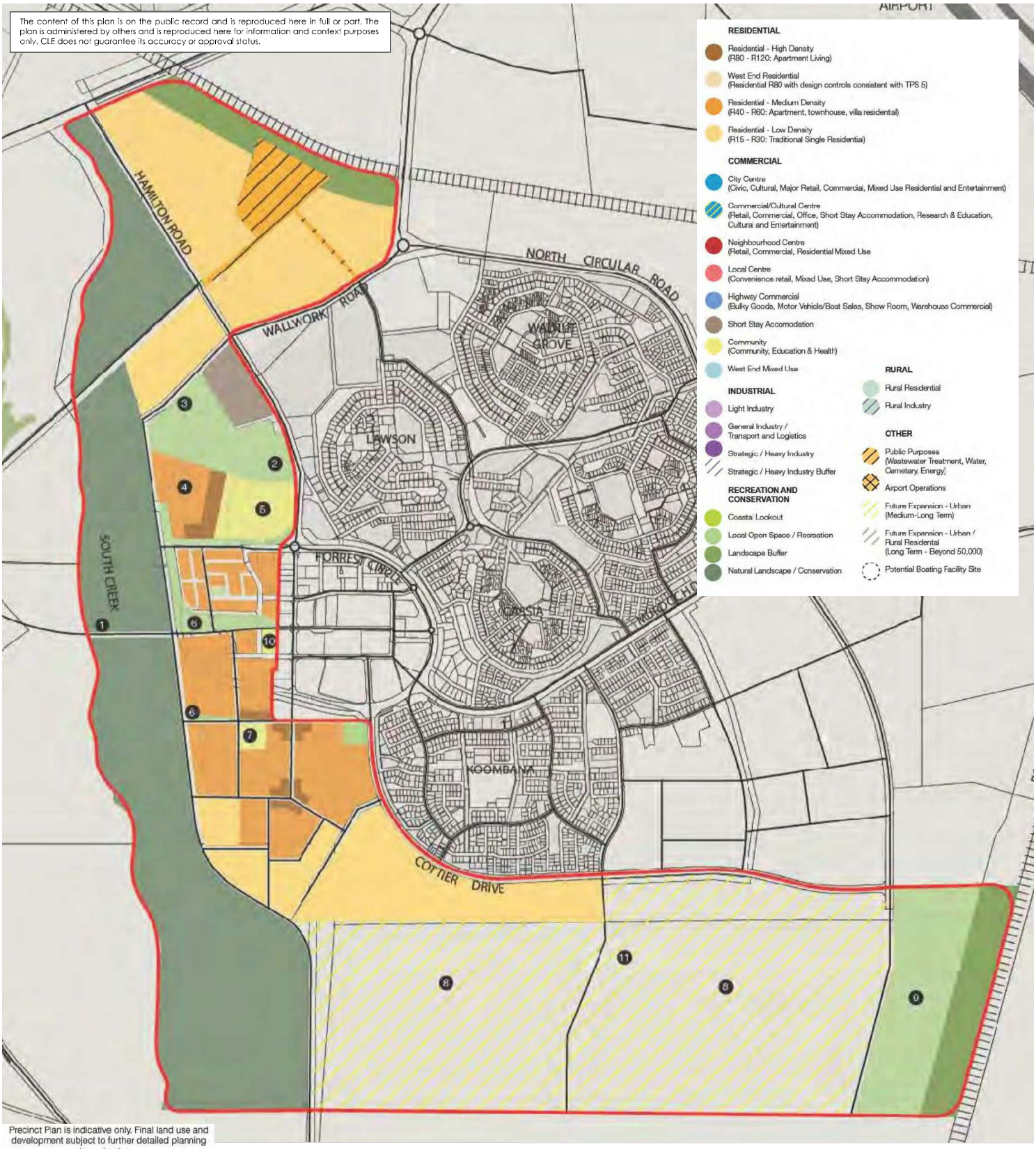
The Western Edge Structure Plan has been prepared in accordance with the above objectives and is capable of facilitating a diverse range of housing types through an appropriate density response based on the sites location immediately adjacent the South Hedland Town Centre. The network of public open space (POS) is evenly distributed throughout the Structure Plan area to maintain 'green links' that also perform an important drainage function. The Structure Plan also provides for a Primary School co-located with District Open Space to cater for future population growth and its recreational needs. The Structure Plan's response to the above objectives is discussed in further detail under section 3 of this report.

Appendix 10 – 'Urban Development Zone Additional Requirements' of TPS5 sets out additional requirements for the Western Edge Development Plan Area as follows:

- *A District Water Management Strategy covering the whole of the Development Plan Area to the satisfaction of the Department of Water; and*
- *A Transport Impact Report covering the whole of the Development Plan Area to the satisfaction of the Western Australian Planning Commission.*

Further to the requirements of Appendix 10 of TPS5, a Local Water Management Strategy has been prepared over the entire Structure Plan Area and is included as Appendix 1. The Structure Plan response and the strategies for managing the surface hydrology characteristics of the site in relation to future development are discussed further under section 3.2 of this report.

Further and pursuant to Appendix 10 of TPS5, a Traffic Assessment has been prepared to accompany the Structure Plan and is included as Appendix 2. The findings of the Transport Assessment and the Structure Plan's relationship to the surrounding road network are discussed in further detail under Section 3.4 of this report.



Source: Town of Port Hedland

2323-83-01 (26.02.2016), NTS

PILBARA'S PORT CITY GROWTH PLAN
- PRECINCT 10 SOUTH HEDLAND WEST

Figure 4

1.3.2 Planning Strategies

Pilbara Planning and Infrastructure Framework

The Pilbara Planning and Infrastructure Framework (PFIF) was published by the Western Australian Planning Commission (WAPC) in February 2012. The PFIF defines strategic direction for the future development of the Pilbara region over the next 25 years. It seeks to ensure that development and change in the Pilbara is achieved in a way that improves people's lives and enhances the character and environment of the region.

The PFIF can be summarised as:

- Addressing the scale and distribution of future population growth and housing development, as well as identifying strategies for economic growth, environmental issues, transport, infrastructure, water resources, tourism and the emerging impacts of climate change.
- Setting out regional planning principles, together with goals, objectives and actions to achieve these. It represents an agreed 'whole of government' position on the broad future planning direction for the Pilbara and will guide the preparation of local planning strategies and local planning schemes.
- Informing government on infrastructure priorities across the Pilbara and giving the private sector more confidence to invest in the region. The infrastructure priorities identified in the PFIF have been determined following extensive liaison with State Government agencies, local government and other key stakeholders.

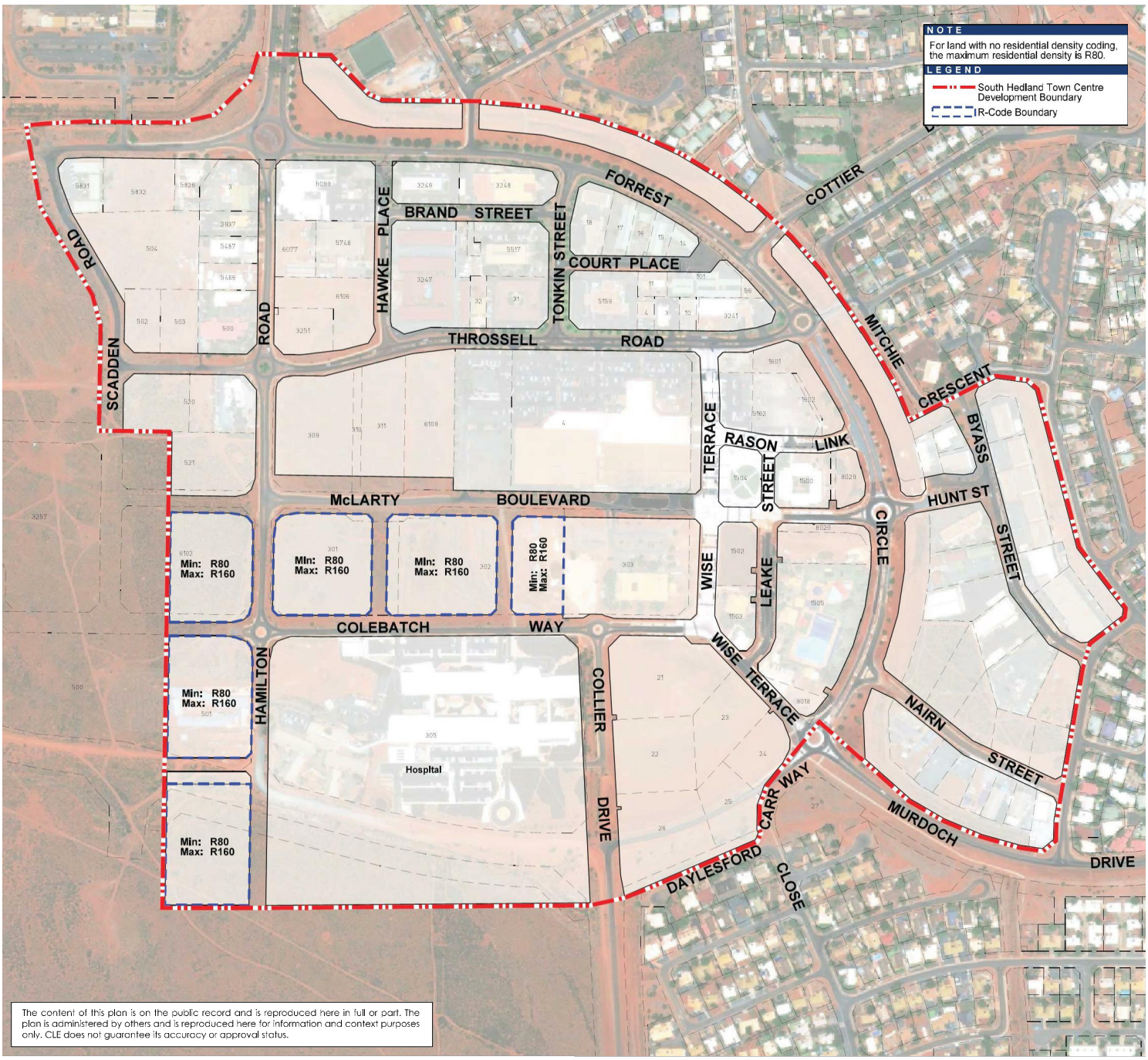
The PFIF envisages Port Hedland/South Hedland as growing into a city with a population of 50,000 people by 2035. It acknowledges that the housing form will change significantly to accommodate this growth with more townhouses and other forms of medium-density living being developed.

The residential density coding ranges proposed by this Structure Plan are consistent with this vision and will assist in accommodating the anticipated population growth whilst offering housing diversity in the region.

Pilbara's Port City Growth Plan

The *Pilbara's Port City Growth Plan* (the Growth Plan) was endorsed by the WAPC on 5 July 2012 and provides a high level strategic blueprint to facilitate the sustained growth of Port Hedland into a Port City with a population of 50,000 people. The Growth Plan identifies a lack of housing as the most critical impediment to economic growth in Port Hedland and seeks to address this issue. The Growth Plan identifies 23,043 new dwellings within Port Hedland with 17,440 of these to be provided in South Hedland.

The Growth Plan identifies 16 Growth Precincts with Western Edge located within 'Precinct 10 – South Hedland West' (refer Figure 4). Western Edge is described as South Hedland's newest land release area, supporting immediate and short-term land supply and bringing a permanent population catchment to the west of the Town Centre. The Growth Plan envisages higher densities in proximity to the Town Centre with more traditional home sites to the south-west and south of the precinct.



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Source: RPS

2323-82-01 (26.02.2016), NTS

SOUTH HEDLAND TOWN CENTRE R-CODE DENSITY MAP

Figure 5

The Structure Plan provides for higher density residential development in proximity to the Town Centre, particularly abutting the R80 – R160 areas within the South Hedland Town Centre Development Plan (refer Figure 5). The Structure Plan also proposes a residential zoning to deliver more traditional home sites on the periphery of Western Edge and abutting the future outer ring road, consistent with the Growth Plan.

The Growth Plan contains 'Implementation Indicators' for Precinct 10 which highlight the need for an immediate land release requirement of 120ha on the western edge. This land release is to be delivered by an 'intervention' approach to bring forward standard agency approval timeframes and facilitate a 0-2 year development and lot release.

The anticipated staging for Western Edge is planned to deliver approximately 400 dwellings in the first stage with the timing for subsequent stages dictated by the market and take-up of Stage 1. Development of the first stage immediately adjacent the Town Centre as proposed by the Structure Plan is consistent with the intent and principles of the Growth Strategy.

Pilbara's Port City Implementation Plan

The *Pilbara's Port City Implementation Plan* (the Implementation Plan) provides a framework for delivering the objectives and findings of the Growth Plan. The Implementation Plan identifies Western Edge as being progressed by Landcorp for the purposes of immediate residential land supply. The key implementation actions identified by the Implementation Plan in the delivery of Western Edge are:

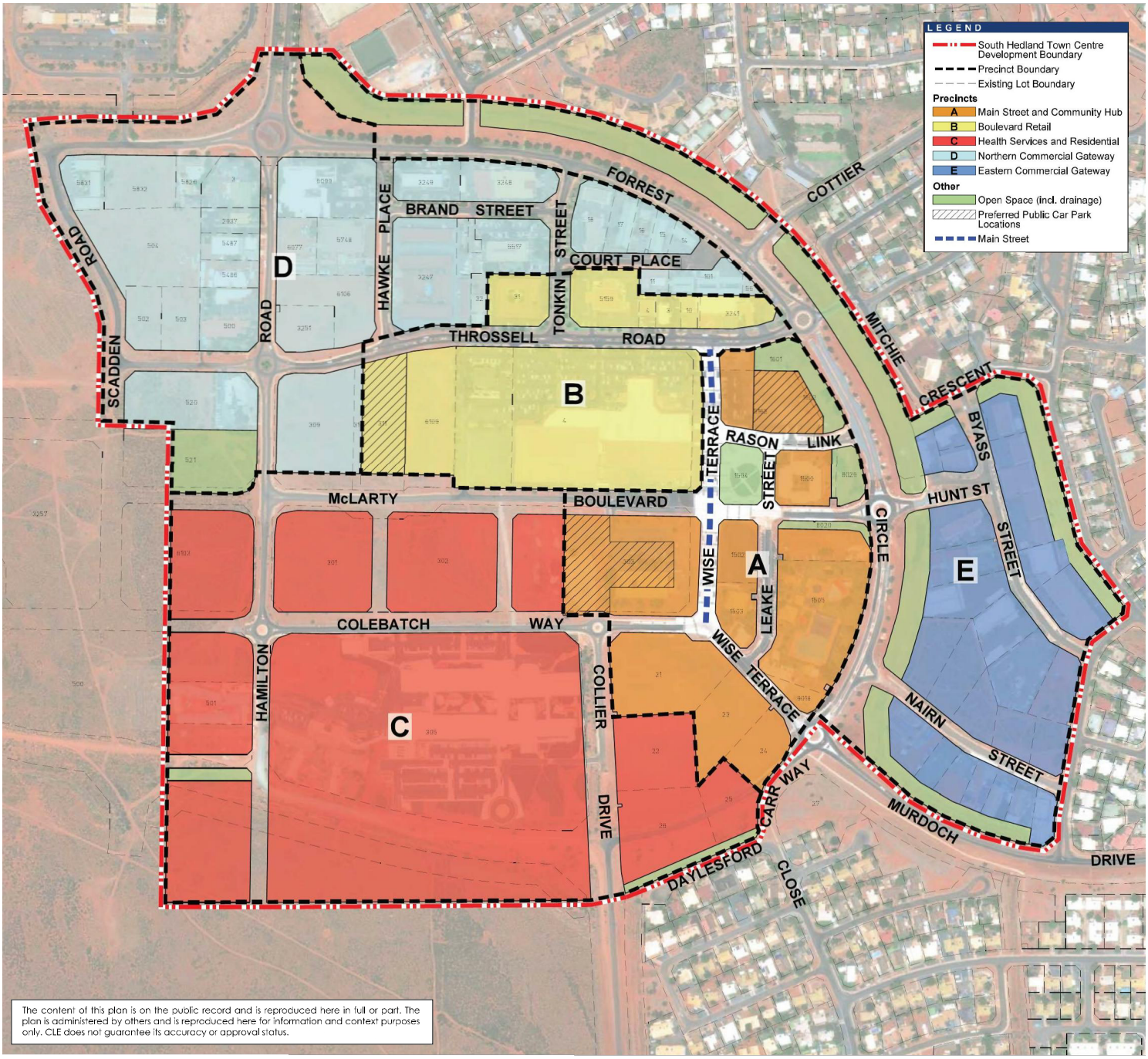
- Landcorp to progress immediate master planning over the land (rezoning & structure plan);
- Town of Port Hedland, Department of Environment and Conservation and Department of Planning to facilitate expedited approvals processes;
- Department of Water to assist in site responsive development outcomes to address fill/flooding challenges; and
- Horizon Power and Water Corporation to address infrastructure capacity requirements to ensure delivery program is achieved.

Preparation and lodgement of this Structure Plan represents a significant and critical step in-line with the Implementation Plan that will facilitate delivery of the first stages of residential development within Western Edge.

Town of Port Hedland Active Open Space Strategy (2011)

The *Active Open Space Strategy* has been prepared by the Town to coordinate the number and location of sporting facilities that were identified as necessary to accommodate an increasing demand for recreational opportunities. An underlying philosophy of the *Active Open Space strategy* was to create fewer, larger public open spaces that combine sporting areas and bushland spaces.

In relation to Western edge, the Strategy identifies district playing fields as being required within the precinct, with the size and location to be determined. Consistent with the Strategy, the Structure Plan provides an 11.8ha area of District Open Space which is discussed in further detail under section 3.3.2 of this report.



Source: RPS

2323-81-01 (26.02.2016), NTS

SOUTH HEDLAND TOWN CENTRE DEVELOPMENT PLAN

Figure 6

1.3.3 Policies

Draft South Hedland Town Centre Development Plan

The South Hedland Town Centre Development Plan abuts the eastern boundary of Western Edge and is subject to the preparation of a separate Development Plan (refer Figure 6). The South Hedland Town Centre Development Plan (SHTCDP) was adopted by the Town on 23 October 2013 and is awaiting the final endorsement of the WAPC. The SHTCDP is considered a seriously entertained document and accordingly, has been paid due regard in the preparation of this Structure Plan. The draft SHTCDP will coordinate the future development of the South Hedland Centre and designates land use precincts, residential densities and street block road layouts.

The area of the SHTCDP that abuts the south-east boundary of Western Edge is designated as 'Health Services and Residential' with a density of coding of R80 – R160. The area abutting the north-east boundary of Western Edge is identified as 'Northern Commercial Gateway' with a density coding of R80. The 'Health Services and Residential' area of the SHTCDP includes the existing hospital site and is planned to accommodate mixed use developments that include ground floor commercial uses with higher density residential above.

The 'Northern Commercial Gateway' precinct is located at the northern entry of the Town Centre and is planned to accommodate office and commercial uses with a focus on business investment, whilst encouraging mixed use residential. Preparation of this Structure Plan has considered and responds to the adjoining SHTCDP land use precincts by providing appropriate densities in proximity to future planned commercial uses. The Structure Plan response and relationship to the SHTCDP is discussed in further detail at section 3 of this report.

State Planning Policy 3.7 – Planning in Bushfire Prone Areas

State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP 3.7) seeks to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. SPP 3.7 and the accompanying *Guidelines for Planning in Bushfire Prone Areas, December 2015* ('the Guidelines') set out the information requirements at each stage of the development process for planning in bushfire prone areas.

At the structure planning stage, the Guidelines require sufficient information to be submitted which demonstrates a "*strategic ability with localised scope to address bushfire risk*" through the preparation of a Bushfire Management Plan. In accordance with SPP 3.7, a Bushfire Management Plan has been prepared by RUIC Fire (refer Appendix 4) in support of this Structure Plan, demonstrating that bushfire is not a constraint to the future development of Western Edge.

Liveable Neighbourhoods

Liveable Neighbourhoods is the WAPC's 'operational policy' for greenfields development in Western Australia. *Liveable Neighbourhoods* sets out the key considerations for master planning new communities including subdivision layout and movement networks, as well as the location of open space, community facilities, schools and activity centres.

The Structure Plan has been prepared in accordance with the principles and specific objectives of *Liveable Neighbourhoods*.

Table 2 – Agency Consultation

Agency	Date	Method	Agreed Outcomes
Department of Water (DoW)	1 June 2010	Project hydrologists JDA meeting with DoW and subsequent emails.	• Towns in the Pilbara have been developed using open drains rather than piped drainage and this is appropriate due to the high rainfall intensities and runoff rates compared with the South West of WA. • Need to ensure that existing creeks and drains are retained as far as possible - working with the existing drainage system, rather than against it. • Flood risk is the main issue from surface water, however groundwater levels also need to be checked. • Management of erosion and sedimentation is important. • Other water quality issues such as nutrient concentrations are of lower priority in the Pilbara. • DoW accepts there will not be 2 years of pre development groundwater monitoring data. DoW will expect some monitoring bores to be installed to show the elevation of the water table relative to ground level to indicate whether imported fill will be required. • DoW may require ongoing post development surface water and groundwater quantity and quality monitoring to protect and/or improve ecosystem health. • The LWMS checklist contained in BUWM (WAPC, 2008b) should be used.

Town of Port Hedland	September – November 2015	Email advice based on preliminary review of Structure Plan.	LWMS
			• Provide cross sections for Multiple Use Corridors and POS;
			• Expand the LWMS boundary to include additional areas;
			• Clarify the relationship between the Western Edge LWMS and the LWMS prepared for the Town Centre.
			Traffic
			• The Town supports the Outer Ring Road (ORR) being omitted from the LSP in principle, subject to:
			  ○ Demonstrating that Western Edge can function adequately without the ORR:
			  ○ The addition of internal road connections to compensate for the omission of the ORR;
			  ○ Preparation of a full Transport Assessment that models the full extent of the LSP area; and
			  ○ Updating the traffic modelling based on the maximum potential yields that can be achieved under the split coding and locational criteria.
			POS
			• Consolidate the central linear POS into one larger POS area; and
			• Remove the oval from within the school site as depicted on the Concept Plan.

1.3.4 Pre lodgement Consultation

The preparation of the Structure Plan has included consultation and liaison with key stakeholders and agencies, with feedback being incorporated into the design and technical analysis of the Structure Plan. With particular reference to the agreed outcomes with the Town of Port Hedland, all necessary modifications to the Structure Plan Map and technical appendices have made in response to the Town's comments.

Table 2 outlines the agency consultation undertaken in the preparation of the Structure Plan.

2.0 SITE CONDITIONS AND CONSTRAINTS

The following sections outline the site conditions and constraints for Western Edge and are informed by various technical reports prepared in support of the Structure Plan. As demonstrated in further detail below, the Structure Plan area is suitable for urban development and all environmental matters such as groundwater, drainage and bushfire can be appropriately managed through standard practices.

It should be noted that as part of Amendment No. 53 to TPS5 which zoned the land 'Urban Development', an Environmental Assessment Report (EAR) was prepared to identify any potential environmental features within Western Edge. The Environmental Protection Authority (EPA) considered Amendment No. 53 prior to it being advertised and determined that the amendment was not to be formally assessed, noting that the site is degraded and consisting of the same vegetation and habitat as is abundant in the surrounding areas. The EPA notice detailing their advice was issued on 4 June 2012, reference identification A491717.

2.1 Biodiversity and Natural Assets

An Environmental Assessment Report (EAR) has been prepared by RPS in support of the development of Western Edge and is included in full as Appendix 3. The EAR demonstrates that no environmental conservation issues exist with regards to the land and that development in accordance with the proposed Structure Plan will not impact on any significant species of flora or fauna.

2.1.1 Flora and Vegetation

The Structure Plan area does not contain any Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) and is well suited to urban development. This was confirmed by a Level 1 Flora and Vegetation Survey which comprised of two field surveys and a desktop assessment.

Field survey results confirmed no occurrences of Threatened Rare Flora species as listed by the Department of Environment and Conservation (DEC) or species of national conservation significance listed under the *Environmental Protection and Biodiversity Conservation Act 1999*. The majority of vegetation on the subject land is considered to be in 'Excellent' to 'Very good' condition, with some isolated areas being 'Degraded' to 'Completely Degraded'.

One priority species (Heliotropium muticum) was recorded during the 2012 field survey however, habitat for this species is not considered to be limited to the subject land and is common in the Port Hedland hinterlands. It is therefore unlikely that the Structure Plan area would constitute significant habitat upon which Heliotropium muticum is dependant upon for survival. This was acknowledged in the EPAs determination of Amendment No. 53, which noted "*the same vegetation and habitat is abundant in the surrounding areas*".

2.1.2 Fauna

A Level 1 Fauna Survey comprising a desktop review and field survey were undertaken for the Western Edge in February 2012. The Fauna Survey found:

- No recorded occurrences of threatened species;
- Two migratory bird species protected under the EPBC Act and two Priority 4 bird species under the Wildlife Conservation Act 1950 were recorded during the field survery however, given the proximity of Western Edge to the existing South Hedland Town Centre, it is likely that the fauna of conservation significance may avoid the area;
- Although the subject land may potentially contain habitat which could potentially be utilised by the identified species of conservation significant fauna, it is unlikely to be considered significant habitat upon which any of these species are dependant upon for survival; and
- That referral to the Department of the Environment (DoE) under the EPBC Act will not be required for the project.

2.2 Landform and Soils

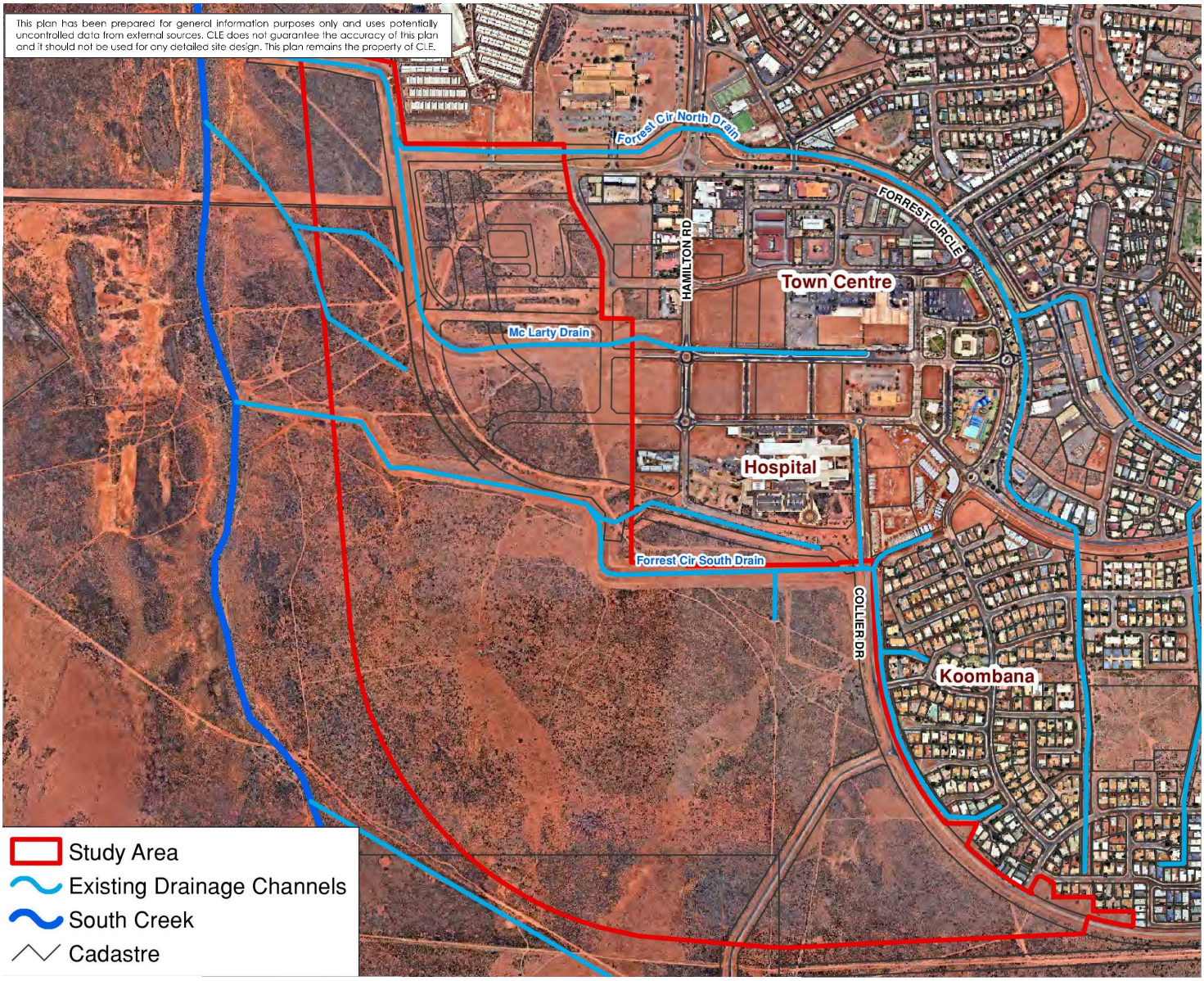
2.2.1 Landform and Topography

The natural topography of Western Edge exhibits little variation in relief, sloping from approximately 14m Australian Height Datum (AHD) in the south east down to approximately 10m AHD in the north west. The ultimate earthworks design will respect the natural landform and seek to minimise the fill necessary to facilitate development. This also allows for the land to be drained and serviced without the need for substantial earthworks and retaining. Maintaining the natural drainage characteristics of the land is a pivotal component of the Structure Plan which has informed the overall design of the POS and street networks.

2.2.2 Soil Types

Soil types within Western Edge are suited to urban development. The land is situated within the De Grey Roebourne Lowlands Zone, the natural geology of which can be described as consisting of alluvial plains and sand plains (and some flood plains and stony plains) on alluvial and marine deposits over rocks of the northern Pilbara Craton.

The Structure Plan area is mapped by the DEC as being of no known risk of encountering Acid Sulphate Soils (ASS) within 3m of the soil's natural surface. An ASS Management Plan may be required to be prepared in accordance with standard practice prior to any excavation or dewatering occurring as part of the construction process. This will be subject to confirmation of fill levels and the detailed design of service infrastructure.



Source: JDA Consultant Hydrologists

2323-86-01 (22.04.2016), NTS

EXISTING LOCAL SURFACE DRAINAGE INFRASTRUCTURE

Figure 7

2.3 Groundwater and Surface Water

2.3.1 Existing Conditions

Management of the ground and surface water is comprehensively addressed through the Local Water Management Strategy (LWMS) prepared by JDA Consultant Hydrologists (refer Appendix 1). As demonstrated in the LWMS, ground and surface water can be appropriately managed as part of the development process and are not constraints to development.

Groundwater

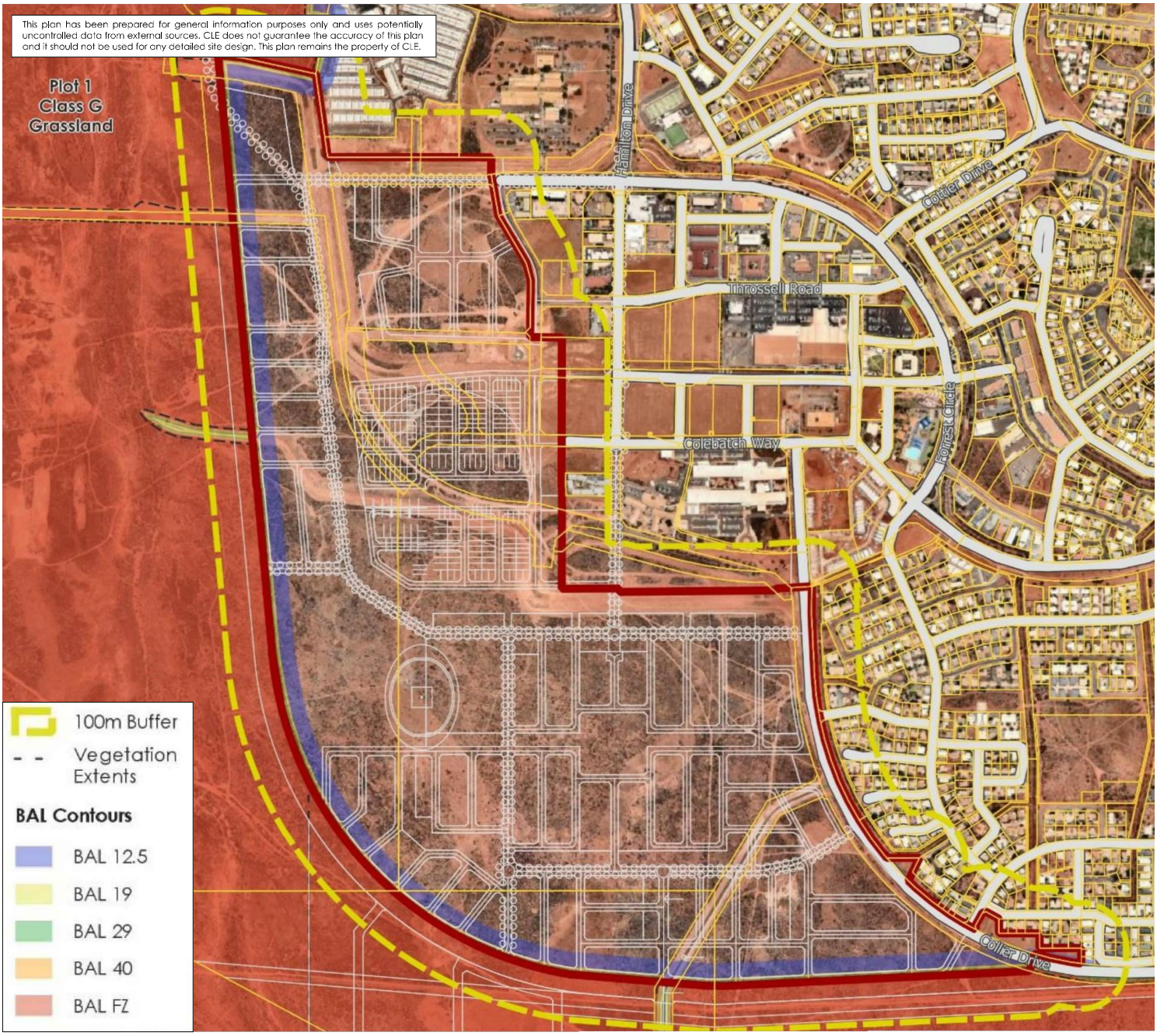
A geotechnical investigation was undertaken for Western Edge by Coffey (2011) at the end of the dry season. The geotechnical investigation utilised a total of 48 test pits at depths of between 1.1m and 3.5m (80% completed to at least 3m). Groundwater was not encountered in any of the test pits although groundwater levels were expected to be higher during the wet season. On the basis of the geotechnical investigation, Coffey concluded that soakwells would not be effective for disposing of stormwater due to the high percentage of fines in the sand and the high rainfall intensities during the wet season.

Five groundwater monitoring bores were installed by JDA at depths varying between 1.7m and 3.4m at the end of 2012 wet season when the highest seasonal groundwater levels would be expected. The bores were installed and monitored in March 2012 and no groundwater was encountered. The bores were fitted with data loggers for approximately 6 weeks to monitor if groundwater levels rose and showed no water in any of the bores between late March and early May 2012, indicating that groundwater is at least 2.4m to 3.4m below the surface. Subsequent monitoring by JDA in March 2013, August 2014 and May 2015 found that the bores were dry on each occasion, consistent with the Coffey geotechnical investigation referenced above.

Surface Water

Existing surface water runoff flows in a north to north-west direction across Western Edge towards South Creek. South Creek runs on a north-south alignment approximately 250m west of the Structure Plan. Existing drains are located within the northern half of the Structure Plan which convey stormwater into South Creek (refer Figure 7). The northern-most drain depicted as 'Forrest Circle North Drain' is retained on its existing alignment whilst the 'McLarty Drain' and 'Forrest Circle South Drain' will be diverted to no longer connect directly with South Creek on their east-west alignment. They will connect with a linear north-south multiple use corridor where they will join the 'Forrest Circle North Drain'. Importantly, peak flow rates do not need to be detained to pre development peak flow, provided there is no impact on surrounding properties and the velocity of the post development flow is minimised to prevent erosion.

The region is subject to infrequent rainfall events that can produce large volumes of water in short periods of time. This can result in seasonal flooding which has formed an important consideration in the preparation of the Structure Plan, with particular regards to the earthworks design and stormwater management strategies. Stormwater management strategies are discussed in further detail under section 3.2 of this report.



Source: *RUIC FIRE*

2323-87-01 (22.04.2016), NTS

BUSHFIRE ATTACK LEVEL CONTOUR MAP

Figure 8

2.3.2 Wetlands and Waterways

Western Edge is unconstrained with regards to natural wetlands and waterways. There are no Environmental Protection Policy or Conservation Category Wetlands located within or in proximity to the Structure Plan area and there are no sensitive receiving environments downstream.

2.4 Bushfire Hazard

A Bushfire Management Plan (BMP) has been prepared by RUIC Fire in accordance with State Planning Policy 3.7 – Planning in Bushfire Prone Areas and is included in full as Appendix 4. The BMP demonstrates that any potential bushfire threats in proximity to the Structure Plan area can be appropriately managed as part of the development process and are not a constraint to development.

The Bushfire Attack Level (BAL) Contour Map prepared as part of the BMP (refer Figure 8) confirms that post-development BAL ratings within the Structure Plan area are within acceptable levels to accommodate residential development. Bushfire mitigation in accordance with the BMP is discussed in further detail under section 3.8 of this report.

2.5 Heritage

2.5.1 Aboriginal Heritage

A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Enquiry System has revealed no recorded Aboriginal heritage sites within the Structure Plan area. Furthermore, an Aboriginal Heritage Survey undertaken by Anthropos Australia Pty Ltd (refer Appendix 5) found that there are no Aboriginal archaeological or ethnographic sites located within the survey area.

2.5.2 European Heritage

There are no recorded places of European Heritage significance within the Structure Plan area.

2.6 Other Considerations

2.6.1 South Hedland Town Centre

The South Hedland Town Centre, located immediately east of Western Edge provides an excellent opportunity for residential development in close proximity to essential services and employment generating land uses. The Structure Plan area is ideally located to deliver a mix of housing types and densities and assist to provide the South Hedland Town Centre with a critical population mass that will assist to drive and sustain commercial development.

2.6.2 Availability of Service Infrastructure

Consulting engineers Cossill & Webley have been engaged to undertake a preliminary review of infrastructure requirements, including staging and funding. Cosill & Webley have advised that the land is capable of being provided with essential services in a timely manner. A detailed Servicing and Infrastructure Report prepared by Cossill & Webley is appended in full at Appendix 6. Servicing and infrastructure are discussed in further detail under section 3.9 of this report.

2323-88-01 (22.04.2016), NTS

RESERVE CLOSURE

Figure 9

2.6.3 Primary School

The Structure Plan includes a 3.5ha Primary School site collocated with District Open Space. This presents an opportunity for the Structure Plan to designate residential densities in close proximity to the school site that maximise the walkable catchment of the school. The Primary School and its relationship to the Structure Plan are discussed in further detail under section 3.6.1 of this report.

2.6.4 South Creek Environs

The Structure Plan is located approximately 250m to the east of South Creek which is a significant watercourse in the region and subject to seasonal flooding. Site levels and earthworks are required to respond to this environmental feature and are detailed further under section 3.9.1 of this report.

2.6.5 Existing Road and Drainage Reserves

Road and drainage reserves currently exist within the Structure Plan area and are in the process of being closed by the Department of Lands (refer Figure 9). A formal request was made to the Town of Port Hedland in July 2014 to close the following reserves in association with development of Western Edge:

- Portion of Forrest Circle / Colebatch Way (road reserve);
- Portion of Scadden Road (road reserve); and
- Portion R35654 (drainage reserve).

On 28 October 2014 the Town formally requested that the Department of Lands close the two portions of road reserve referenced above. With regards to the drainage reserve, Council resolved to support the revocation of the management order at its meeting of 22 October 2014, with the Town formally requesting its cancellation on 20 April 2015 with the Department of Lands.

Closure of the infrastructure reserves is therefore expected to coincide with the lodgement and approval of this Structure Plan and will not be a constraint to the first stages of development.

CLE TOWN PLANNING + DESIGN

Source: nearmap.com 20.11.2014

2323-89A-01 (03.06.2016), NTS

DEVELOPMENT CONCEPT PLAN

Figure 10

3.0 LAND USE AND SUBDIVISION REQUIREMENTS

3.1 Plan Overview and Land Use

The Structure Plan delivers a robust planning framework that responds to the key environmental and land use considerations outlined in Section 2 of this report. The Structure Plan recognises the broader context of South Hedland and provides residential densities which acknowledge the proximity to the South Hedland Town Centre.

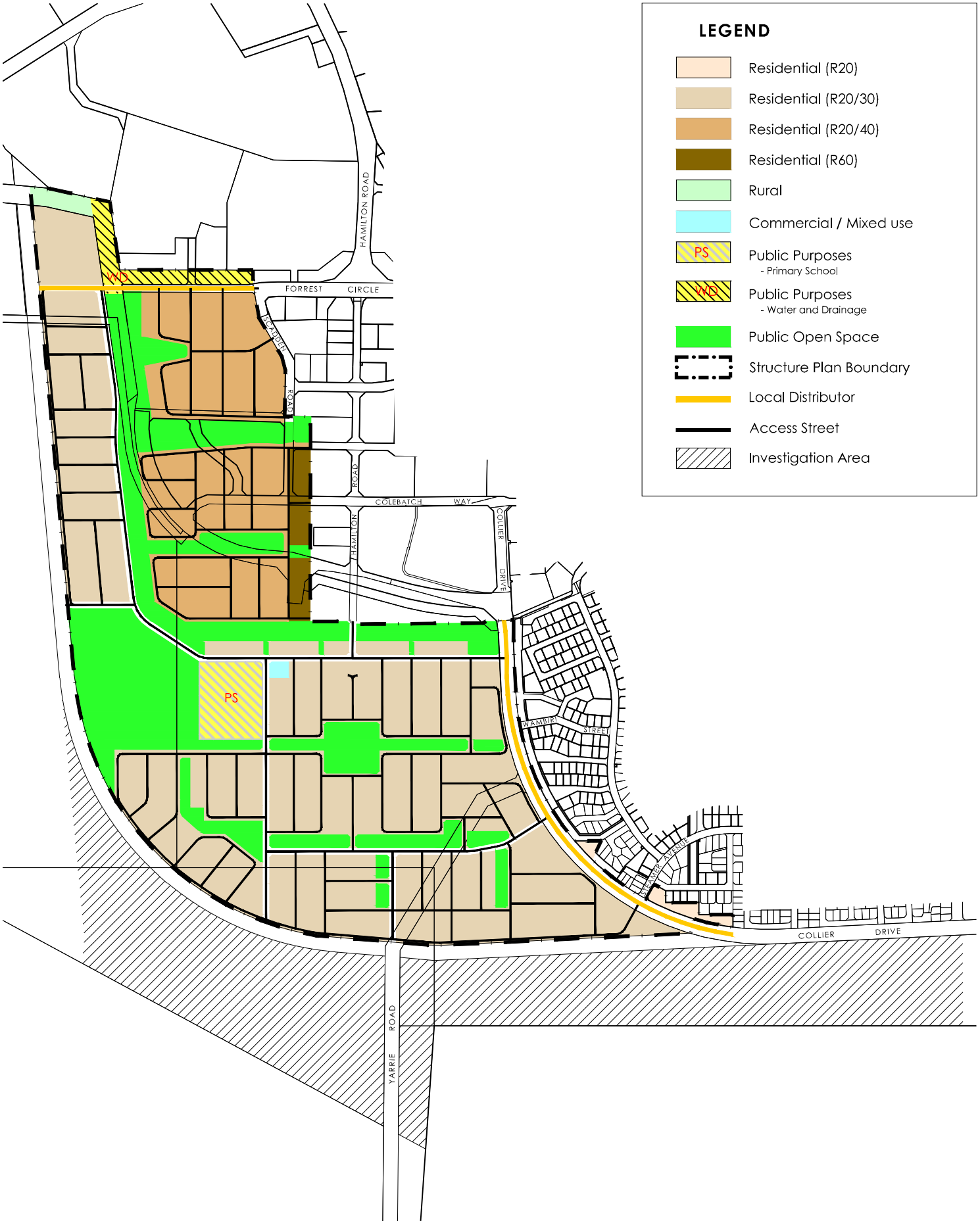
The Development Concept Plan (refer Figure 10) demonstrates one option for development based on the Structure Plan framework. The Structure Plan Map (refer Figure 11) when approved by the WAPC will form the basis for the preparation and assessment of all future subdivision and development applications.

The key principles of the Structure Plan are as follows:

- Enable the creation of a diverse range of land and housing choices that will appeal to a broad market segment;
- Establish a flexible planning framework that is capable of responding to fluctuations in the demand for housing in the Pilbara;
- Provide a robust urban form that responds to it's proximity to the South Hedland Town Centre and will integrate with future development as envisaged in the draft SHTCDP;
- Provide accessible, attractive and multi-functional open space that can accommodate a range of recreational and formal sporting activities;
- Establish an integrated earthwork and water management strategy that reflects the pre-development hydrology of the site and that mitigates against the risks of seasonal flooding;
- Extend the necessary services and infrastructure in a timely and coordinated manner in support of staged development that will occur incrementally to match market demand;
- Ensure an integrated and interconnected road network that facilitates safe and efficient vehicle, cyclist and pedestrian movement throughout the Structure Plan area and onto the external distributor roads; and
- Establish a framework that allows for the delivery of the public primary school when warranted by population demand and in accordance with the Department of Education's forward planning.

Based on these key principles, the Structure Plan provides the framework for:

- Approximately 1,600 – 1,650 dwellings, with residential densities ranging from R20 to R60. Opportunities for higher densities are provided around the Town Centre, areas of high amenity such as POS and closer to the primary school site. More traditional lot sizes are planned to occur throughout the remaining areas of Western Edge with larger lots towards to periphery;
- Higher-density residential development within the walkable catchment of the South Hedland Town Centre to provide a critical population mass to support businesses within the Town Centre and maximise opportunities for residents to walk to work;



2323-90-01 (22.04.2016), NTS

STRUCTURE PLAN MAP

Figure 11

- An evenly distributed network of multiple use corridors, capable of conveying surface water in accordance with the existing hydrological regime in a manner consistent with water management and stormwater conveyance in the Pilbara;
- A 3.5ha primary school site co-located with an 11.8ha area of District Open Space capable of accommodating the educational and active recreational needs of the community;
- The extension of key road linkages from the Town Centre into a permeable network of access roads that integrate with the existing network whilst providing opportunities for future public transport, cyclist and pedestrian infrastructure;
- Residential development precincts that can be developed stage by stage as warranted by market demand, with the initial stages capable of existing autonomously and effectively; and
- A preliminary earthworks strategy that recognises the landform of Western Edge and the need to mitigate against seasonal flooding.

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3.2 Water Management

The Structure Plan provides a comprehensive planning and design response to address all aspects of urban water management. A Local Water Management Strategy (LWMS) has been prepared by JDA Consultant hydrologists (refer Appendix 1) and outlines the water management strategies for Western Edge. The LWMS has been prepared in accordance with the various flood studies prepared in the region including:

- Town Planning Flood Study for South Hedland;
- South Hedland Town Centre Drainage Design;
- South Hedland Flood Study;
- South Hedland Town Centre – East Precinct Local Water Management Strategy; and
- Port Hedland Coastal Vulnerability Study.

The Department of Water (DoW) has not published any guidelines to assist in the preparation of local water management strategies for sites in the Pilbara Region and, whilst the Better Urban Water Management Guidelines provide guidance, they primarily focus on objectives for the Swan Coastal Plain rather than the Pilbara region.

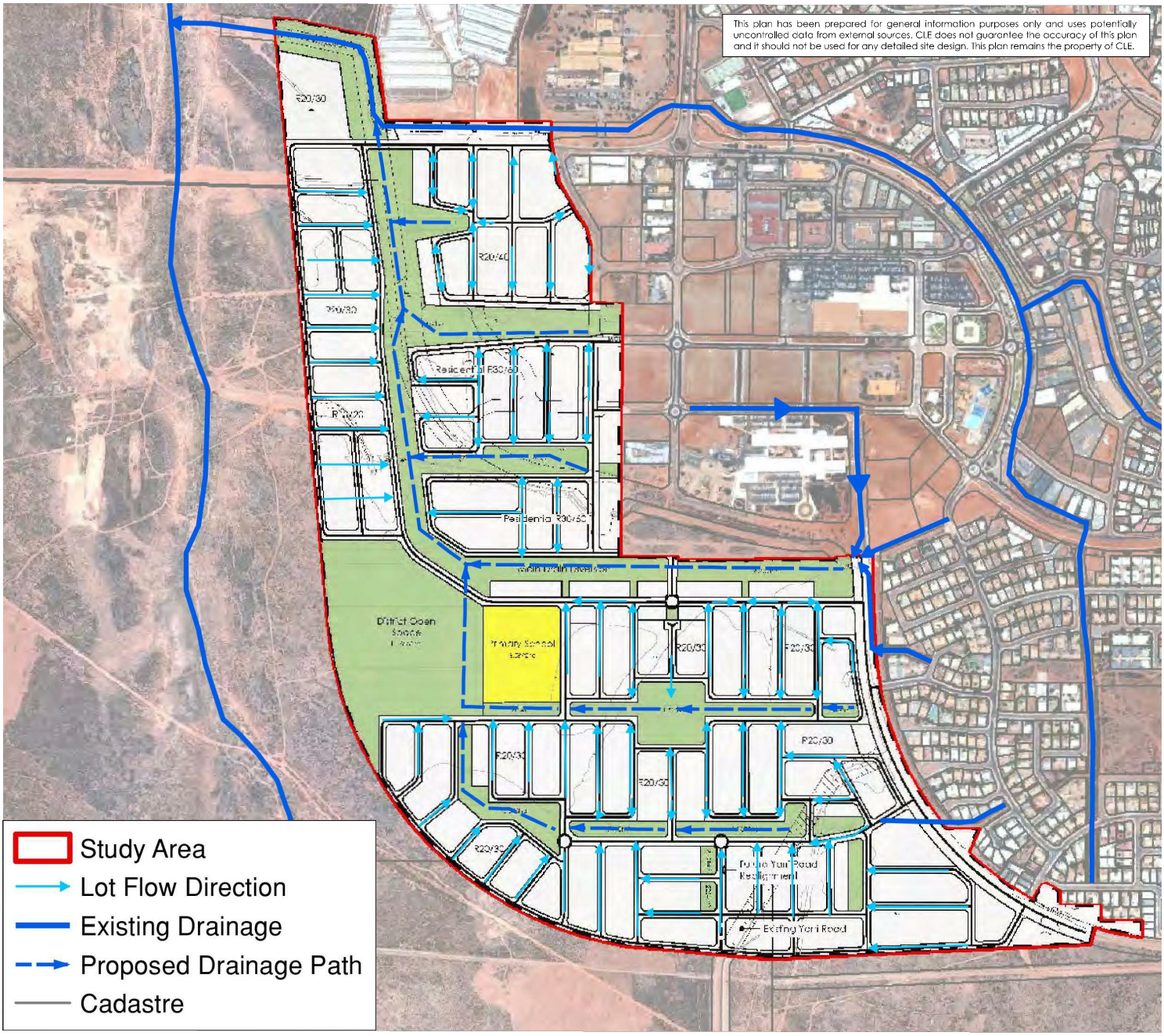
A previous meeting with the DoW regarding a suitable approach to water management for the LWMS has informed its preparation based on the following key principles established at the meeting:

- Towns in the Pilbara are developed using open drains rather than piped drainage which is appropriate due to high rainfall intensities and runoff rates compared to the south-west of Western Australia;
- Existing creeks and drains should be retained where possible in an effort to work with the natural drainage system; and
- Flood risk is an issue with regards to surface water management including the management of erosion and sedimentation.

3.2.1 Surface Water Management

Based on the need to manage infrequent, high volumes of seasonal stormwater, the key principles of the LWMS in relation to surface water management are:

- To prevent the Structure Plan area and the existing development adjoining the Structure Plan from flooding;
- To retain the natural drainage systems and protect/improve the health of the ecosystem by reducing stormwater velocity to prevent the export of sediments; and
- Where there are identified impacts on significant ecosystems, to maintain or restore desirable environmental flows and/or hydrological cycles consistent with the DoWs requirements.



Source: JDA Consultant Hydrologists
2323-91-01 (22.04.2016), NTS

PROPOSED STORMWATER MANAGEMENT SYSTEM

Figure 12

The LWMS employs the following design objectives to achieve the above surface water management principles:

- The use of swales within multiple use corridor's (MUCs) aligned to match existing flow paths where possible. The swales will disperse surface flows throughout the Structure Plan area seeking to minimise flow rates;
- Finished floor levels that are a minimum of 0.5m above the 100 year ARI flood level within a 100m wide corridor adjacent to South Creek in association with regional flood management;
- Finished lot levels with 0.3m freeboard above curb height for the remaining Structure Plan area in association with local flood management.

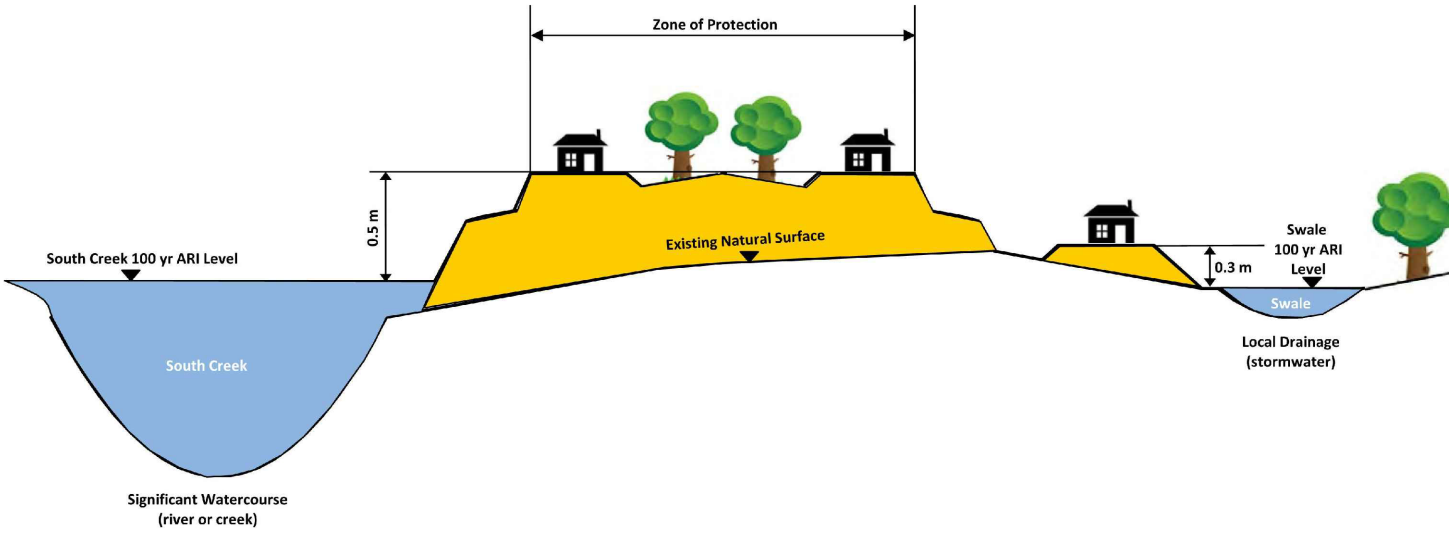
The Structure Plan design and the alignment of drainage swales within MUC's reflects the existing hydrological regime and maintains existing flow paths as closely as possible. The 'developable area' within the Structure Plan has been heavily influenced by the land required to accommodate drainage and manage local flooding. These principles are reflected in the network of drainage swales within MUC's of and the preliminary earthworks strategy. Given the relatively flat topography of Western Edge, the importation of fill has the potential to raise flood levels and impact on adjoining land. The need to mitigate against this scenario is a key consideration in the LWMS which proposes to manage stormwater effectively so that this does not occur.

The proposed stormwater management strategy within the LWMS involves stormwater being conveyed by the road system and discharging into drainage swales. Roads will convey stormwater runoff from both impervious lot areas and the roads themselves, with stormwater contained by the depth of the kerb up to the 1:5 year event. The roads will then discharge into the system of drainage swales with roads directly abutting swales potentially containing a one way cross fall which directs stormwater runoff towards the swales over a flush kerb.

Due to the large rainfall intensity and volumes experienced in the region, conveyance of stormwater will occur via overland paths and open drainage systems (roads and swales) rather than underground pipes. The system of drainage swales have been designed to be MUC's fulfilling both a drainage and public open space function.

Consistent with current flow-paths, surface water will drain in a north-west direction via drainage swales that have been designed to align as closely as possible with the existing drainage paths. The swales will provide some attenuation of peak surface water flows and some water quality treatment measures prior to discharging into South Creek. At the northern extent, the swale system links into the existing Forrest Circle North Drain to the west of the Town Centre, utilising an existing drainage reserve (refer Figure 12). This is proposed to achieve a lower discharge level for the Structure Plan thereby reducing fill requirements. The Forrest Circle North Drain has been increased in size to convey both the existing and proposed catchments.

Post development conditions are expected to be similar to pre development conditions due to the limited infiltration and high runoff rates that currently exist within Western Edge. This will assist to minimise the potential impact of development on the hydrological regime.



Floodplain and stormwater management provide:

- 0.5 m minimum freeboard between the 100 yr ARI flood level in South Creek and minimum buildings floor level;
- Zone of protection for South Creek flood levels, with ground/fill level minimum of 0.5 m above the 100 yr ARI flood level at some point within the zone;
- 0.3 m minimum freeboard between the 100 yr ARI flood level in the local drainage swales and minimum building floor level;

This approach was adopted following discussions with Department of Water Floodplain Management.

Conceptual stormwater modelling was prepared by JDA using hydraulic modelling and is detailed in full in the LWMS (refer Appendix 1). The hydraulic modelling provides an assessment of the drainage swales and road conveyance systems to measure the potential flood impacts on South Creek. The modelling demonstrates that flow is contained within the swale and road systems, with some inundation of POS areas. Lot levels will be required to have a minimum 0.3m freeboard above kerb height to elevate properties above local stormwater levels and protect properties against the potential impacts of local flooding.

3.2.2 Regional Flood Management

The flood modelling as part of the LWMS was used to assess the impact of fill on the flood levels of South Creek. The modelling was based on flow data and levels obtained by Cardno (2011) in their Port Hedland Coastal Vulnerability Study. The detailed modelling revealed that whilst filling of the Structure Plan area did result in a small area with a flood level increase of greater than 150mm, the affected area is located to the south and is not planned for future development in the Growth Plan for South Hedland and so will not impact on any existing or future development.

To mitigate against the impacts of regional flooding, a 100m wide protection zone is proposed immediately adjacent South Creek where minimum floor levels will be 0.5m above the 100 year ARI flood level (refer Figure 13). These flood mitigation measures are consistent with the advice of the Floodplain Management Section of the DoW and will elevate dwellings above the 100 year flood level thereby assisting to protect properties from the impacts flooding.

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3.2.3 Groundwater Management

As discussed earlier under section 2.3.1 of this report, previous monitoring undertaken by JDA indicates that groundwater is at least 2.4m to 3.4m below the surface. Further, the LWMS states that the fill required to provide clearance above flood levels will be the critical factor in determining fill requirements rather than clearance to groundwater. Preliminary earthwork considerations indicate that 0.6m of fill will be required across the Structure Plan area on average however, finished lot levels will be finalised as part of the detailed design at subdivision stage and will form a key consideration in the preparation of the Urban Water Management Plan (UWMP). Preparation of an UWMP at subdivision stage is consistent with the standard development process and will allow the more detailed water management criteria to be established once a subdivision design is confirmed.

3.2.4 Monitoring and Implementation

The stormwater management strategy in the LWMS focuses on implementation of current best management practices without the requirement for a post development monitoring program. The LWMS recommends the installation of water level data loggers in existing groundwater monitoring bores within the Structure Plan area in preparation for the next wet season to assist with the detailed design of finished site levels.

3.2.5 Water Conservation

The supply and sustainable use of water within Western Edge are key components of the LWMS. Potable water is anticipated to be provided via an extension of existing infrastructure within the South Hedland Town Centre. Water conservation measures will be promoted to reduce scheme water use consistent with the Water Corporations "Waterwise" land development criteria including:

- Promotion of waterwise practices including fixtures and fittings;
- Use of native vegetation within drainage swales which require no/less irrigation;
- Rainwater tanks to collect stormwater from roofed areas for possible reuse at a domestic scale;
- Development of dwellings consistent with water efficiency measures of the State Governments 4 Star Plus energy efficiency scheme.

Specific measure to achieve water conservation will be detailed in the Urban Water Management Plan.

POS areas will be landscaped appropriately for climatic conditions and areas requiring irrigation will be minimised. It is proposed that any irrigation required for POS areas will be sourced using treated wastewater from the South Hedland Waste Water Treatment Plant.

Table 3 – Public Open Space Schedule (all areas are in hectares)

Site Area		169.2
Deductions		
Primary School	3.50	
Existing Forrest Circle Drainage Reserve	3.44	
Commercial	0.20	
Restricted Use (above 2%)	0.00	
Total Deductions	7.14	
Net Site Area		162.1
Other Deductions		
1:1 Drainage within POS	5.30	
Gross Subdivisible Area		156.8
POS @ 10%		15.7
Public Open Space Requirement		
May Comprise:		
Min 8% unrestricted POS	12.6	
Max 2% restricted POS	3.1	
TOTAL POS REQUIRED		15.7
Public Open Space Provided	Unrestricted POS Area	Restricted POS Area
A	2.94	0.34
B	2.77	0.13
C	1.83	0.52
D	1.30	0.08
E	3.27	0.37
G	3.09	0.21
H	1.35	0.12
I	1.84	0.14
J	0.96	0.00
TOTAL (ha)	19.35	1.91
Additional Deductions		
Restricted Open Space Surplus		0.0
Public Open Space Contribution		
Min 8% unrestricted POS	19.35	12.3%
Max 2% restricted POS	1.91	1.2%
Total Creditable POS Provided	21.26	13.5%
Public Open Space Contribution (Including District Open Space)		
F (District Open Space)	11.27	0.13
Total Creditable POS Provided	32.66	20.8%

1. *Site Area is the total area of the Structure Plan boundary, including all lots and road reserves within the boundary.*
2. *In accordance with Liveable Neighbourhoods, the area subject to inundation more frequently than a one year average recurrance interval rainfall event is not included as restricted or unrestricted open space and is a deduction from the net site area (LN R33). Areas for the detention of stormwater for a greater than one year average recurrance interval up to the five year recurrance interval is restricted open space up to 20%. Areas for the detention of stormwater for a greater than five year average recurrance interval is within unrestricted open space (LN R25).*
3. *Drainage areas are based on Figure 24 of the LWMS prepared by JDA.*
4. *All POS areas are indicative only and are subject to refinement and detailed design at subdivision stage.*

3.3 Public Open Space

3.3.1 Open Space Provision and Schedule

The areas and distribution of public open space (POS) throughout the Structure Plan is largely dictated by the functional stormwater management requirements, which has necessitated the provision of a series of open drainage swales. The drainage network has been designed to form a series of landscaped corridors which serve a dual function both in terms of stormwater conveyance and passive open space in accordance with the provisions of *Liveable Neighbourhoods*.

These multiple use corridors (MUCs) are a key feature of the Structure Plan, influencing not only the design and provision of POS but the overall layout and function of the Structure Plan as a whole.

Areas of proposed unrestricted and restricted POS are clearly identified within Table 3 'Public Open Space Schedule' above. As demonstrated, the Structure Plan accommodates 21.26ha of POS at 13.5% of the gross subdivisible area. This total area includes a diverse range of POS for passive and informal recreation.

In accordance with *Liveable Neighbourhoods*, areas between the 1:1 year and 1:5 year ARI stormwater levels are eligible for a full credit provided they do not exceed 2% of the 10% minimum POS contribution. As demonstrated by Table 3, these areas do not exceed 2% of the minimum required 10% for Western Edge and therefore receive a full credit. Drainage areas below the 1:1 year ARI level have been deducted from the gross subdivisible area.

3.3.2 District Open Space

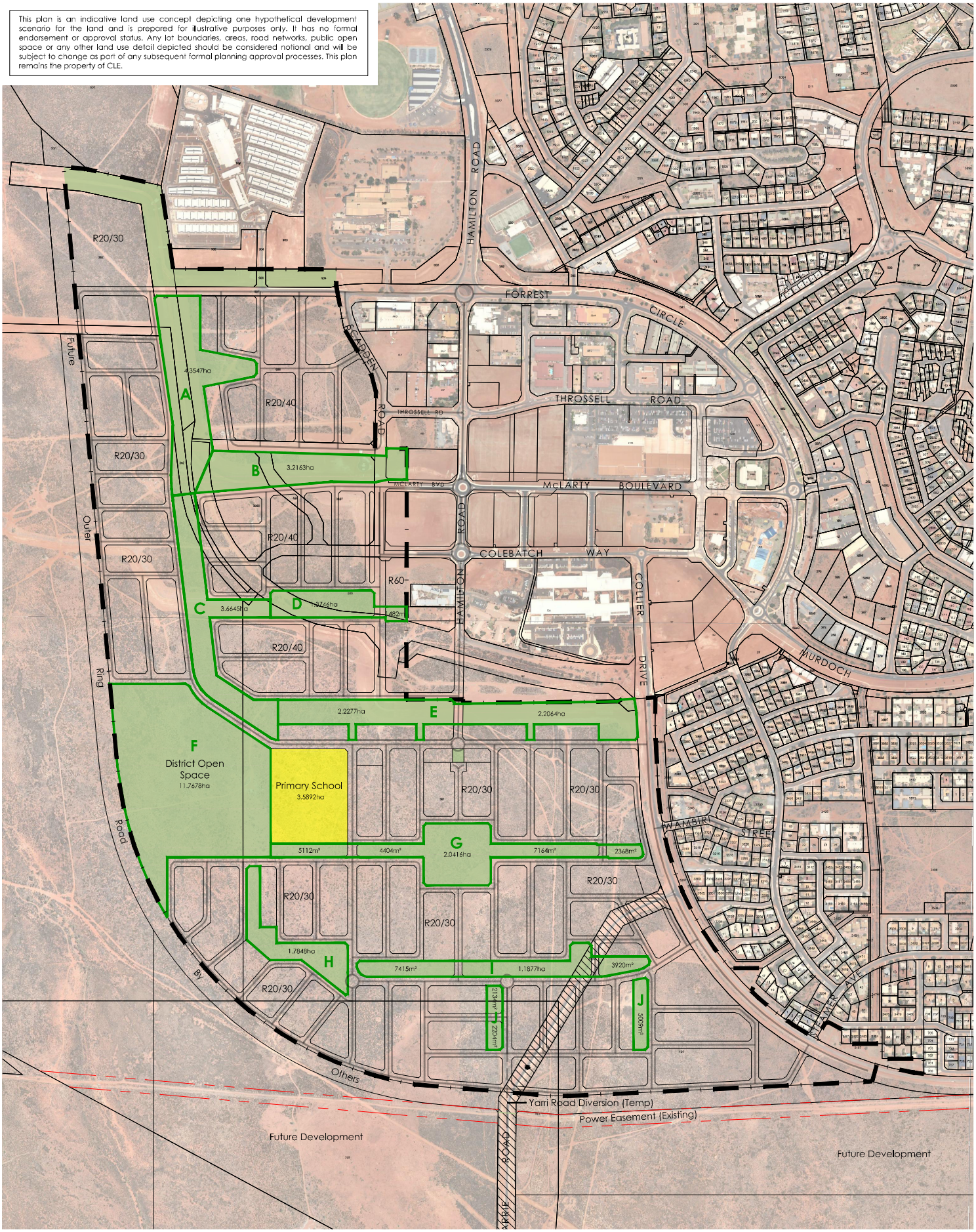
In addition to the MUC's which perform a recreational and landscape amenity role, active open space is accommodated through the provision of an 11.8ha area of District Open Space. The District Open Space is collocated with the Primary School site and is capable of accommodating the active recreational needs of the community and the school. When included in the overall POS calculation, the District Open Space increases the overall POS provision for Western Edge to 20.8% of the gross subdivisible area and well beyond the minimum required 10%.

The District Open Space for Western Edge is identified within the Town of Port Hedland's *Active Open Space Strategy* (2011) ('the Strategy') and is indicatively shown at the corner of Forest Circle / Collier Drive and south of the future hospital site however, the Strategy states that the location is 'yet to be determined'.

The Structure Plan subsequently proposes a more appropriate location for the District Open Space, collocated with the Primary School site and abutting a key access street. This enables the District Open Space to be used in conjunction with the school and enhances its accessibility by allowing direct access from the future inner ring road.

At 11.8ha in area, the District Open Space is capable of accommodating two senior playing fields as well as training and playground facilities in accordance with its intended function outlined in the Strategy. It's central location within the Structure Plan area will serve a wide population catchment and provide efficient road access from the Town Centre.

This plan is an indicative land use concept depicting one hypothetical development scenario for the land and is prepared for illustrative purposes only. It has no formal endorsement or approval status. Any lot boundaries, areas, road networks, public open space or any other land use detail depicted should be considered notional and will be subject to change as part of any subsequent formal planning approval processes. This plan remains the property of CLE.



CLE TOWN PLANNING + DESIGN

2323-96-01 (26.04.2016), NTS

PUBLIC OPEN SPACE PLAN

Figure 14

The Strategy also makes reference to the District Open Space allowing for the development of replacement bowls and tennis facilities so that the existing South Hedland Bowls and Tennis Club on Hedditch Street can be relocated. The Strategy also identifies the order of probable costs for the development of the District Open Space as envisaged by the Strategy, acknowledging that the Town will be responsible for it's development. The District Open Space is of a sufficient size and dimension to accommodate all necessary recreational functions envisaged by the Strategy if and when required.

3.3.3 Description of Open Space Areas

The balance of POS within Western Edge is provided predominantly in the form of MUC's that fulfil a passive open space and landscape amenity role in addition to their drainage function. An area of consolidated POS in addition to the District Open Space is identified in the southern half of Western Edge and will provide opportunities for active as well as passive recreation. The design and treatment of the MUCs will provide a high level of local amenity that maximises the potential to be used for a variety of passive open space functions. Through integration with the road network and the urban environment, the MUCs will achieve high levels of visual surveillance and public accessibility.

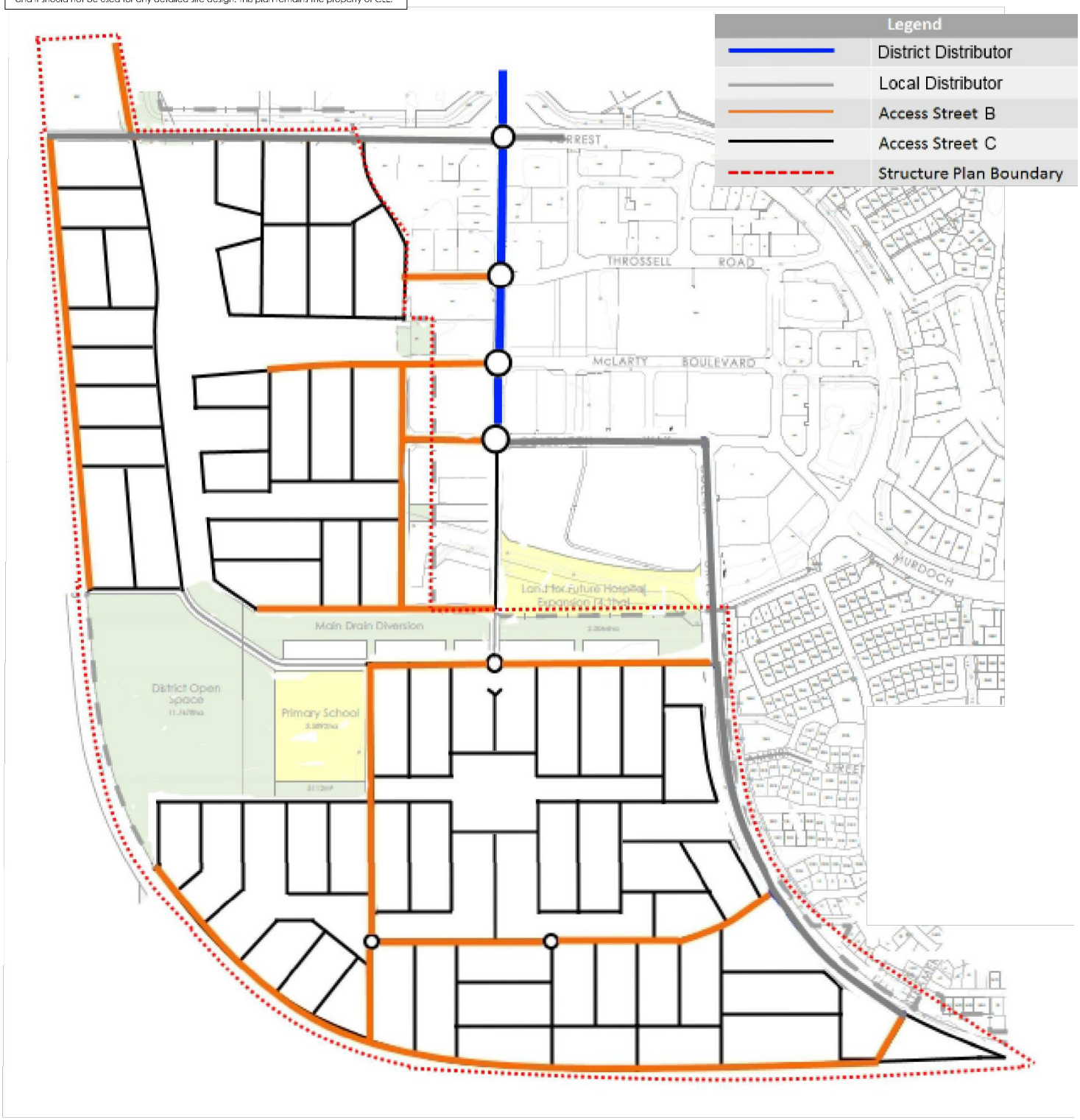
The MUCs will consist of a combination of linear dual-use pedestrian/cycle linkages, extensive bands of amenity providing endemic vegetation and passive/active break-out parklands. It is envisaged that the MUCs will assimilate with the adjacent urban fabric, provide vegetative relief and enhance view corridors. MUCs will have a maximum slope of 1:7 at worst however, most side slopes will be significantly less (refer Appendix E to the LWMS). The MUCs will be vegetated to bind the local Pindan soil thereby minimising erosion and assisting to improve water quality. Spinifex-type grass will be planted at the base of the MUCs where water conveyance is more frequent with slightly graded vegetation being used on the upper slopes including limited planting of trees and shrubs (refer Appendix E to the LWMS).

Importantly, the MUCs will be able to be utilised as POS throughout most of the year given the infrequent, seasonal rainfall that is experience in the Pilbara region.

3.3.4 Streetscapes

All roads within the Structure Plan will be local access streets however, the key 'spine roads' will be higher order access streets and constructed within wider reserves. Higher order access streets will be defined by dense tree canopies formally planted in verges that provide continuity in streetscape language throughout the broader South Hedland context. Lower order access streets will be defined by more compact shade trees better suited to the finer grain of inner residential.

The provision of trees as shade along pedestrian corridors and paths is important in the regional context of Western Edge to provide respite from the heat and create an intimate sense of scale to the otherwise sparsely vegetated landscape.



Source: "Western Edge Transport Assessment"_Cardno 2016

2323-93-01 (22.04.2016), NTS

PROPOSED ROAD HIERARCHY

Figure 15

3.4 Movement Networks

A Transport Assessment has been prepared by traffic consultants Cardno in support of the Structure Plan and appended in full (refer Appendix 2). The Traffic Assessment identifies the road hierarchy, quantifies anticipated traffic volumes and provides an overall assessment of the internal and external road network. The Traffic Assessment builds on and refines the work undertaken as part of the SHTCDP, particularly in relation to intersection capacities and the potential impact of traffic volumes on key distributor roads.

The additional traffic modelling undertaken as part of the Traffic Assessment demonstrates that a significant portion of Western Edge can be developed without any upgrades or modifications to the existing road network and that Western Edge at maximum development potential does not trigger the need to construct the outer ring road (ORR).

3.4.1 Existing Road Network

Access from Western Edge to the wider road network is anticipated to be via three key existing distributor roads described as follows:

- **Hamilton Road -** The portion of Hamilton Road north of Forrest Circle provides a key connection to the western part of South Hedland and Port Hedland further north. Hamilton Road is currently classified as a *Local Distributor* road and constructed as a single lane, median separated road north of Forrest Circle where it carries the highest traffic volumes. South of Forrest Circle, Hamilton Road carries significantly less traffic and is constructed as an undivided single carriageway road within a 20m road reserve. The majority of traffic generated by Western Edge is expected to utilise Hamilton Road;
- **Collier Drive** – Collier Drive is currently classified as a *Local Distributor* road and is constructed as an undivided single carriageway road. The Structure Plan proposes to retain Collier Drive on its existing alignment to service the southern portion of the Structure Plan area for journeys to the South Hedland Town Centre and to access Hamilton Road;
- **Forrest Circle** – The portion of Forrest Circle west of Hamilton Road currently only services local traffic primarily in association with Gateway Village but will provide access to Hamilton Road for the western and northern cells within Western Edge. Forrest Circle is currently constructed as an undivided single lane road.

3.4.2 District and Local Road Network

The Structure Plan proposes a modified grid layout with a high level of permeability and a logical road hierarchy allowing for efficient and safe vehicle movements consistent with the principles of *Liveable Neighbourhoods* (refer Figure 15). The proposed road network will integrate and connect with the existing east-west roads within the Town Centre specifically, Throssell Road, McClarty Boulevard and Colebatch Way.

The alignment of existing road reserves within Western Edge has been utilised for local roads where possible however, there are certain instances where the alignment of some road reserves are not conducive to the design intent for Western Edge. In these instances, an application has been made to the Department of Lands to close the road reserves as outlined above under section 2.6.5 of this report.

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The internal road network is based on the following key principles:

- Efficient and coherent access to Hamilton Road and Collier Drive as the key connections from Western Edge to the wider road network for journeys to Port Hedland and the areas north of South Hedland;
- Higher order local access streets within Western Edge functioning as 'spine roads', providing numerous connection points to the existing external distributor roads; and
- Lower order access streets as the most prevalent road typology within the Western Edge, servicing local traffic only.

The system of higher order access streets will ensure that traffic volumes are dispersed evenly and that the road network does not rely on one or two intersections with distributor roads. These roads rationalise the movement network by providing a clear road hierarchy, allowing traffic to move efficiently and safely from the residential streets onto the distributor roads.

Higher order access streets will be constructed within 17m road reserves as undivided, single carriageway roads with provision for embayed parking if necessary. Single sided roads abutting POS and on the periphery of the structure plan area will have reduced road reserve widths based on reduced verges, consistent with *Liveable Neighbourhoods*.

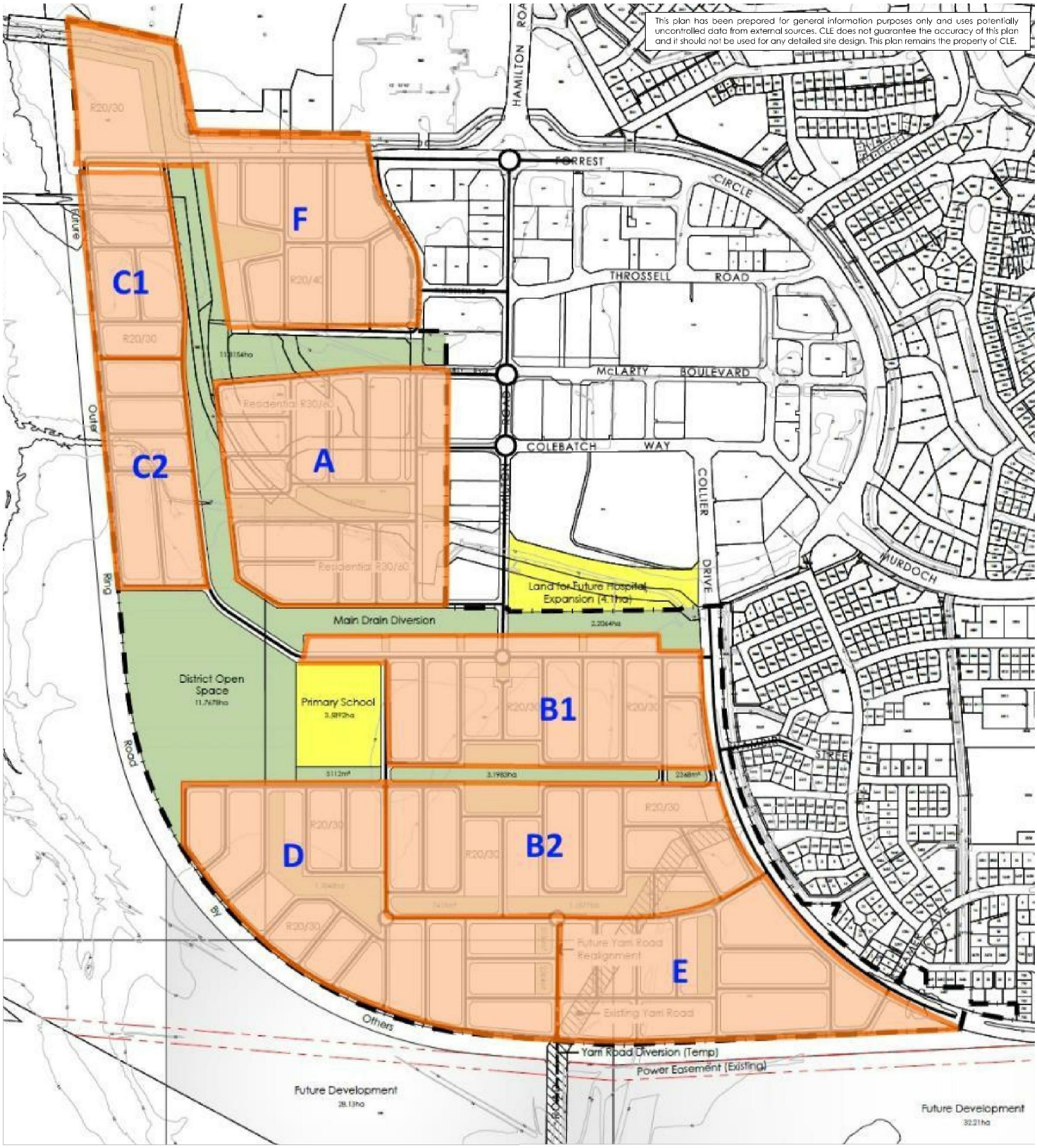
Lower order access streets will be shorter in length and are estimated to accommodate low traffic volumes. These roads will be constructed within 15m road reserves which will be reduced where abutting POS, consistent with *Liveable Neighbourhoods.*

3.4.3 Traffic Modelling

The traffic modelling undertaken as part of the Transport Assessment is highly conservative and based on a worst-case scenario both in terms of the trip generation rates and the potential number of dwellings. Trip generation rates have been sourced from the ITE Trip Generation Handbook 7th edition for the AM and PM peak periods and represent a worst-case scenario. The distribution of these trips builds on the base model traffic associated with the South Hedland Town Centre.

Dwelling yields have been based on the highest number of dwellings capable of being delivered in accordance with the density criteria of the Structure Plan. The R-code ranges within Western Edge allow for a range of potential lot sizes and densities to provide flexibility to respond to the fluctuating market conditions in the Pilbara. This approach results in some uncertainty regarding the likely number of dwellings to inform the traffic modelling. To avoid any uncertainty, the traffic modelling is based on the maximum potential dwelling yield capable of being delivered under the Structure Plan. This approach was requested by the Town of Port Hedland to ensure that no unforseen impacts on the road network will occur. As a result, the modelled vehicle numbers appear quite high however, realistically and from a practical sense, the number of dwellings and therefore vehicle movements is expected to be significantly less.

Based on this conservative approach, the traffic modelling indicates that some upgrades to the existing road network may be required if the number of dwellings within Western Edge exceeds a certain threshold. The potential implications of the traffic modelling is discussed in further detail under section 3.4.4 below.



Source: "Western Edge Transport Assessment"_Cardno 2016

2323-94-01 (22.04.2016), NTS

PROPOSED DEVELOPMENT STAGES

Figure 16

3.4.4 Intersection Analysis

The Transport Assessment modelled five key intersections to assess their level of performance at the various stages of development. These intersections are:

- Hamilton Road and Forrest Circle;
- Hamilton Road and Throssell Road;
- Hamilton Road and McClarty Boulevard;
- Hamilton Road and Colebatch Way; and
- Colebatch Way and Collier Drive.

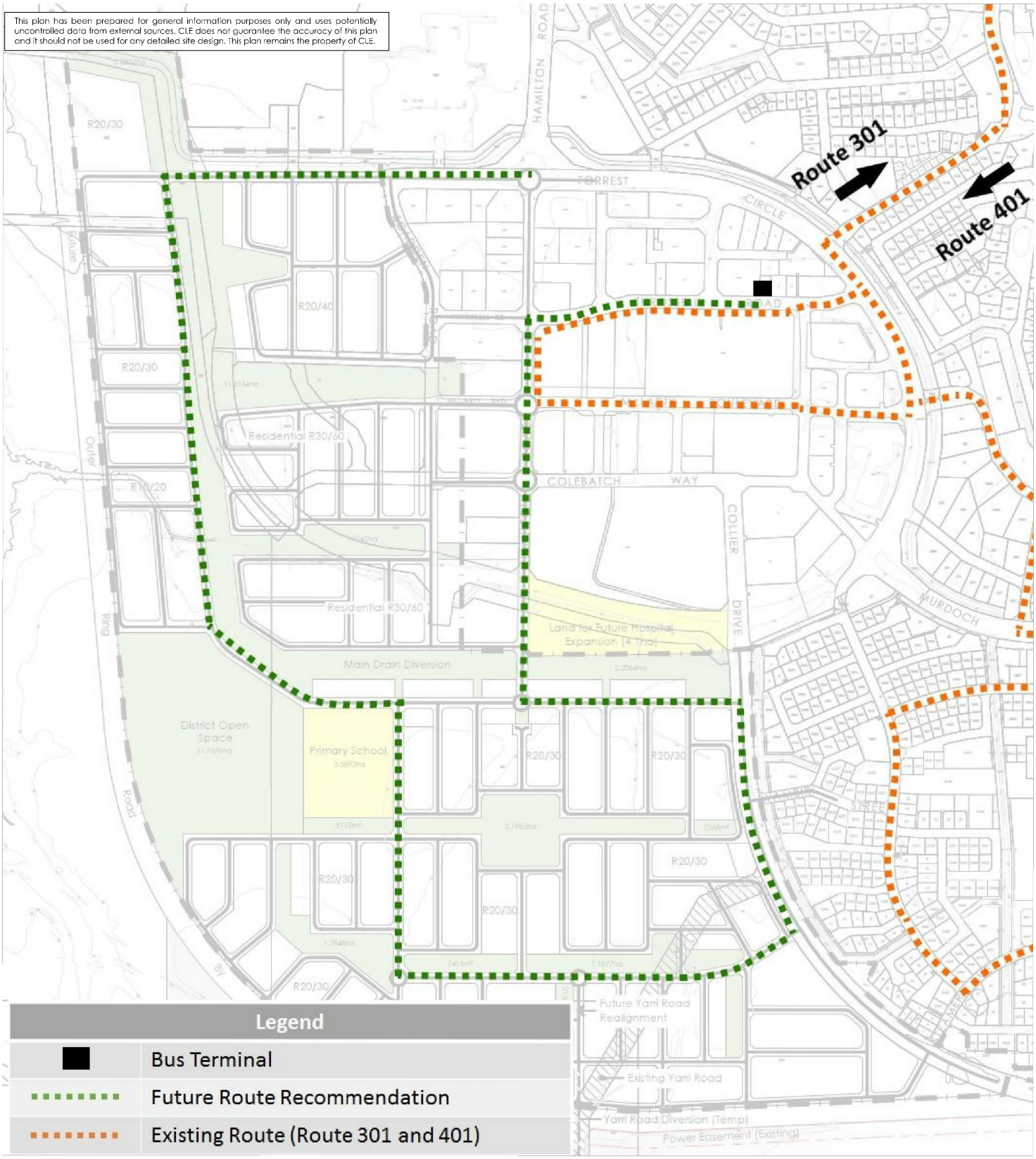
Assessment of the individual intersections was undertaken using SIDRA software to determine their level of performance. SIDRA software is used for intersection and network capacity, level of service and performance analysis. The SIDRA analysis confirms that all intersections will perform to an acceptable level of service at the completion of the first five stages of development, which can potentially accommodate up to 1,300 dwellings. 1,300 dwellings within the first five stages of Western Edge is a highly conservative estimate based on the maximum potential density and realistically, it is anticipated that development of the entire Western Edge Structure Plan area will be approximately 1,600 dwellings.

The SIDRA analysis identifies that upon development of stage D (refer Figure 16), the total number of dwellings within Western Edge could potentially exceed 1,360 dwellings. The traffic volumes generated by this number of dwellings could result in an unsatisfactory level of performance for the Hamilton Road / Forrest Circle and Hamilton Road / Throssell Road intersections during the peak morning period. On this basis it may be necessary to undertake appropriate mitigation measures if development within Western Edge exceeds 1,360 dwellings.

Mitigation Strategies

The Transport Assessment identifies appropriate mitigation strategies that may be implemented should development within Western Edge ever reach the extent that intersection performances become unsatisfactory. Due to the highly conservative modelling assumptions, the Traffic Assessment recommends that mitigation measures should only be undertaken as required and as a result of emerging issues identified in the road network.

The mitigation strategies outlined in the Transport Assessment involve the upgrading of the affected intersections being the Hamilton Road / Forrest Circle intersection and the Hamilton Road / Throssell Road intersection. Figure 4-10 and 4-11 of the Transport Assessment depict the necessary intersection upgrades which involve a dual circulating roundabout with dual lane approaches along Hamilton Road in both directions. If these intersection upgrades ever occur, the road network will be capable of accommodating Western Edge to it's full development potential of approximately 2,300 dwellings. Further, implementation of the mitigation measures outlined in the Traffic Assessment is sufficient to accommodate Western Edge at full development without the need to construct the outer ring road.



Source: "Western Edge Transport Assessment"_Cardno 2016

2323-95-01 (22.04.2016), NTS

PROPOSED BUS ROUTE

Figure 17

To ensure that all intersections will function at an adequate level of service in association with the ongoing development of Western Edge, the Part 1 – Implementation Report limits the total number of titled and approved lots to 1,300 until the affected intersections are upgraded or further traffic modelling and investigations are undertaken. To account for the 1,300 lot threshold, the Part 1 report includes a requirement to monitor the number of lots that have been created and approved as part of the subdivision application process.

As part of each subdivision application, the total number of titled and approved lots will need to be disclosed. In the event that the number of lots proposed as part of a subdivision application increases the total beyond 1,300 lots, the affected intersections will need to be upgraded. Alternatively, the application will need to be accompanied by a Traffic Assessment and further traffic modelling based on the latest traffic volumes and distributions, allowing for a more accurate assessment at that time.

In the case that the traffic modelling confirms that the Hamilton Road / Forrest Circle intersection and/or the Hamilton Road / Throssell Road intersection will perform at an unsatisfactory level as result of the proposed subdivision, a strategy will need to be agreed for the upgrade of the intersections. However, given the highly conservative modelling assumptions, this scenario is not expected to occur as development within the first five stages of Western Edge is not expected to exceed 1,300 dwellings.

3.4.5 Public Transport

Western Edge is currently undeveloped and as such, is not serviced by public transport. It is anticipated that a bus route will ultimately service Western Edge once sufficient development has occurred to warrant demand. Notwithstanding, preliminary discussions with the Public Transport Authority (PTA) have identified an appropriate potential bus route to service Western Edge which has formed a consideration in the preparation of the Structure Plan (refer Figure 17).

The potential bus route is confined to the higher order access streets and distributor roads within Western Edge and the ultimate reserve widths and road geometry will be capable of supporting the bus route.

3.4.6 Cycling and Pedestrian Movement

The Structure Plan delivers a permeable road network, creating excellent opportunities for the provision of good pedestrian and cyclist facilities. The precise location and alignment of footpaths and shared paths will be determined in consultation with the Town of Port Hedland as part of the detailed civil design in association with the subdivision process.

The location and footpaths and shared paths will be generally consistent with the principles of *Liveable Neighbourhoods* however, special consideration will be needed with regards to particular climatic conditions in South Hedland and its regional context. Importantly, road reserve widths will be capable of accommodating the necessary pedestrian and / or cyclist infrastructure if required.

3.5 Residential

The Structure Plan provides a flexible planning framework for the delivery of a diverse range of lot sizes and subsequent dwelling types. The Structure Plan will be capable of achieving a balance between appropriately located medium density lots closer to the Town Centre graduating to larger 'lifestyle' lots at the periphery to accommodate all aspects of the local housing market.

The delivery of quality housing is a key objective in the development and delivery of the project, aiming to ensure that housing style and character reflects the amenity and attributes of the area. The following principles have guided the residential density codings on the Structure Plan Map:

- Achieving higher densities within close proximity of the South Hedland Town Centre, consistent with clause 5.3.8 (c) of TPS5;
- Providing an appropriate interface with the R80-160 land identified within the draft SHTCDP abutting the eastern border of Western Edge;
- Enhancing opportunities for surveillance of POS and providing appropriate interfaces where residential uses directly abut POS, consistent with the principles of *Liveable Neighbourhoods*;
- Allowing lower densities to accommodate 'lifestyle' lots on the periphery of the Structure Plan and further from the Town Centre consistent with the *Pilbara's Port City Growth Plan*;
- Maximising residential densities and population catchments within proximity of the commercial / mixed use site, Primary School and District Open Space;
- Providing a mixture of lot types within the initial stages of the project to ensure that all demographics and market segments are accommodated from project inception; and
- Delivering a flexible and robust framework that allows for the delivery of lot types and housing products consistent with the ever evolving and fluctuating local housing market in South Hedland.

3.5.1 Dwelling Yields and Density Targets

The residential density ranges assigned by the Structure Plan are consistent with the relevant strategic and statutory planning frameworks which establish the development intent for Western Edge. In preparing the density ranges, careful consideration has also been given to the realities and practicalities of the South Hedland housing market. The final outcome is a framework that provides sufficient flexibility to allow subdivision to occur in sync with the local housing demand which is elastic and sensitive to a range of regional and economic influences. The Structure Plan achieves this without compromising the delivery of higher densities in appropriate locations.

Based on the principles outlined under section 3.5 above, the Structure Plan has the potential to deliver approximately 1,600 – 1,650 at densities ranging from R20 to R60 based on the following locational criteria:

- R60 densities immediately adjoining the Town Centre. This will provide an appropriate interface and transition between the R80 – R160 densities identified in the draft SHTCDP and Western Edge. This will also maximise density and population catchments within close proximity of the commercial uses within the Town Centre, assisting to sustain local businesses and concentrate density in areas with good access to amenities. This is consistent with the 'Western Edge' precinct objectives of Clause 5.3.8 of TPS5;
- Medium density R40 for areas adjacent the Town Centre and the R60 coded land on the eastern boundary of the Structure Plan. This will provide an interface and transition from the higher density land within the SHTCDP and single residential lots within Western Edge;
- Medium density R40 and R30 within proximity to areas of high amenity being the Town Centre, commercial / mixed use site and Primary School. Medium density in these areas seeks to capitalise on the amenity opportunities afforded by these features;
- Medium density R40 and R30 for lots directly opposite open space. This maximises opportunities for surveillance of POS thereby assisting to enhance the safety of POS users and leading to higher patronage rates. Medium density within proximity of POS also provides immediate access for dwellings that generally have smaller outdoor living areas and increases the number of residents with direct access to POS; and
- Opportunities for lower densities (R20) in areas that are not located in close proximity to amenities and on the periphery of the Structure Plan area. This approach is consistent with Clause 5.3.8 (c) of TPS5 which plans for "*more traditional home sites towards the west of the precinct*" as an objective for 'Western Edge'.

The Structure Plan provides for an average residential density of 21 dwellings per site hectare (pure residential land). Given the regional location of South Hedland and the housing typologies associated with regional areas, this is considered to be an appropriate overall density as compared to the targets identified in *Liveable Neighbourhoods* (22 dwellings per site hectare) which are more suitable in an urban context. *Liveable Neighbourhoods* is an operational policy that generally applies to urban design of new subdivision areas however, the exercise of discretion in its application for regional areas which are subject to different issues and influences is commonplace.

It is also important to note that 21 dwellings per site hectare is an average over the entire

Structure Plan area and includes lots on the periphery and separated from the Town Centre. The expected average lots sizes (600m²) in these locations are significantly larger than what would normally be seen in metropolitan Perth, which reduces the average density. Importantly, the Structure Plan is capable of delivering density in key locations where warranted consistent with TPS5, with the remaining areas able to accommodate a wide range of housing and lifestyle choices.

The residential density allocations and distribution are generally consistent with the 'Pilbara's Port City Growth Plan' (refer Figure 6) although density allocations have been refined so as to be consistent with Clause 5.3.8 of TPS5 as recently amended (21 June 2013).

3.5.2 Built Form Guidelines

The WAPC's Planning Bulletin 112/2016 Medium-density single house development standards – Development Zones ('the RMD Codes') was gazetted in April 2016 and outlines acceptable residential development standards for medium density single houses in structure plan areas. The RMD Codes are intended to be adopted as local planning policies and applied to development zones (structure planning areas). Appendix 2 to the RMD Codes contains a pro-forma document to allow for local governments to easily prepare and adopt a local planning policy that implements the RMD Codes. The Town of Port Hedland will be required to prepare an RMD Codes local planning policy in order to provide a standard framework for R-Code variations on medium density lots. This local planning policy will provide the necessary built form guidelines for any medium density lots (375m² or less) within Western Edge. Any lots larger than this do not require R-Code variations to deliver appropriate built form outcomes and the standard provisions of the R-Codes will suffice.

3.5.3 Local Development Plans

The Part 1 Implementation Report requires Local Development Plans (LDPs) as a condition of subdivision approval for:

- Lots within 100m of vegetation identified as bushfire prone under the accompanying Bushfire Management Plan (Appendix 4); and
- Lots coded R60 to achieve an appropriate interface and transition between the South Hedland Town Centre and the Residential R20/40 coded land to the west within Western Edge.

In relation to bushfire prone Lots, the LDP will specify minimum building construction standards in accordance with AS3959 *Construction of buildings in bushfire-prone areas* to mitigate against the potential impacts of bushfire. LDPs will be prepared and approved in accordance with Appendix 6 of TPS5.

The LDPs for the R60 sites will address built form and design matters such as height, street setbacks, building orientation and open space. The LDP will be prepared having due regard to the 'South Hedland Town Centre Design Guidelines' which address development control provisions for the R80 – R160 coded within the Town Centre that will abut the R60 coded land within Western Edge. This will assist to ensure that development of the R60 coded land on the eastern periphery of Western Edge integrates with residential development within the Town Centre and deliver harmonious streetscapes. The provisions of the LDP will also

achieve an appropriate transition between the Town Centre and the single residential areas of Western Edge and is necessary to establish a built environment that delineates between the Town Centre and Western Edge.

3.6 Educational Facilities

The Pilbara's Port City Growth Plan identifies a 'Tertiary Education Precinct' immediately north (and outside) of Western Edge on the opposite side of Forrest Circle. The land identified for the Tertiary Education Precinct is appropriately zoned 'Community – Education' under TPS5, providing a level of certainty regarding its future development as an educational facility. Once developed, this facility will provide a valuable facility for Western Edge and South Hedland residents.

3.6.1 Primary School Site

The Structure Plan includes a 3.5ha Primary School to accommodate the future educational needs of Western Edge, consistent with the Pilbara's Port City Growth Plan. Preliminary discussions with the Department of Education and Training has identified that capacity remains within the existing South Hedland primary and secondary school network to accommodate the initial stages of residential development within Western Edge. The additional population growth that will occur once the subsequent stages are developed will at some stage necessitate the development of the Primary School within Western Edge.

The Primary School site is located central to the Structure Plan so as to maximise the residential catchment within relative proximity. The school sites location on the corner of two higher order access streets or 'spine roads' is consistent with the principles of Liveable Neighbourhoods and ensures that access to the site is legible and efficient. The Primary School is also co-located with the District Open Space, providing opportunities for the school to utilise the playing fields and facilities associated with the open space.

3.7 Activity Centres and Employment

Western Edge is in close proximity to the South Hedland Town Centre which is identified as the primary activity centre for the wider Town of Port Hedland municipality by the *Pilbara's Port City Growth Plan*. The Town Centre will provide significant employment opportunities for future residents, in addition to local opportunities already available in traditional mining, logistics and associated industries. Residents will also benefit from the concentration of existing and future retail activity, community facilities and services in the Town Centre. Furthermore, residential development of Western Edge will support the Town Centre's ongoing revitalisation and stimulate further economic activity by creating a larger population catchment in close proximity.

3.7.1 Commercial / Mixed Use Site

A commercial / mixed use site of approximately 0.2ha is provided central to the Structure Plan area adjacent the Primary School site. The location of the commercial / mixed use site immediately opposite the Primary School will encourage dual-purpose journeys thereby assisting to reduce trip generation rates and vehicle usage within Western Edge. The central location also maximises the number of dwellings that will be within a walkable catchment and encourages alternative methods of transport to private vehicles.

Land use permissibility for the commercial / mixed use site will be in accordance with Part 5.2 of the Implementation Report and TPS5. Land uses such as 'Shop' and 'Restaurant' are discretionary uses under TPS5 within the 'Urban Development' zone and could technically be approved anywhere within Western Edge however, the Structure Plan seeks to consolidate the location of these uses on the commercial / mixed use site. This will also provide certainty that the site can accommodate uses such as shop and restaurant that are fundamental to a local centre. This provides an opportunity to deliver local amenity options such as shops and cafe's which play an important role in creating a sense of place and community as well as providing services without the need to travel into the Town Centre.

3.8 Bushfire Management

The BMP prepared in support of this Structure Plan (refer Appendix 4) comprehensively addresses the provisions of SPP 3.7 and the Guidelines for Planning in Bushfire Prone Areas ('the Guidelines'). The BMP demonstrates that bushfire risk in association with the development of Western Edge can be managed through a combination of dwelling setbacks, construction standards and low threat buffers.

The BMP includes a risk assessment as well as an assessment of the vegetation within and abutting the Structure Plan which has been translated into a BAL Contour Map (refer Figure 8). Importantly, the potential bushfire risk to people and infrastructure within the Structure Plan area is low based on enhanced construction standards, multiple egress points, a reticulated fire fighting supply and the siting of buildings to ensure a maximum BAL-19 rating.

Vegetation within and surrounding the site is assessed as 'Class G Grassland' meaning that any land that is separated by 50m or greater from the vegetation is classified as BAL-Low and does not required a bushfire response. Based on the vegetation assessment, the following management measures are to be implemented under the BMP:

- Within the Structure Plan area, a 50m low threat buffer is to be maintained between each stage of development and the classified vegetation within Western Edge to ensure each stage achieves a BAL-Low rating; and
- For development stages within 50m of the classified vegetation outside Western Edge and abutting the Structure Plan boundary, enhanced construction standards are required in accordance with AS3959: *Construction of buildings in bushfire-prone areas*.

The BAL Contour Map prepared in association with the BMP demonstrates that the land within 50m of the classified vegetation abutting the Structure Plan boundary will achieve a maximum BAL-19 rating and is therefore well within the acceptable levels to accommodate residential development. Further, given that a road interface is proposed abutting the Structure Plan boundary, a buffer is achieved between the classified vegetation and the developable land meaning that a BAL-12.5 can be expected for the majority of the affected land. Further BAL Contours Maps will be undertaken to accompany subdivision applications once exact road reserve widths and lot layouts are confirmed allowing specific BAL ratings to be identified. As part of this structure planning process, the BMP effectively demonstrates that all land identified as 'Residential' under the Structure Plan Map can be developed in accordance with SPP 3.7.

3.9 Infrastructure Coordination, Servicing and Staging

Civil engineering consultants Cossill & Webley Consulting Engineers have prepared a detailed Servicing and Infrastructure Report (the Report) demonstrating the availability of service infrastructure to Western Edge. The Report is summarised below and provided in full at Appendix 6. The strategy demonstrates that essential services are available and that the provision of services to Western Edge is not a constraint to development.

Further detailed infrastructure planning and design will occur in consultation with appropriate agencies as the planning and development of the land progresses.

3.9.1 Earthworks

Site levels within Western Edge are generally based on the need to elevate lots above the flood levels near South Creek to mitigate against the potential impacts of short term intense rainfall events. In order to reduce the impact of these events on earthwork levels, it is proposed to intersect the drainage network with South Creek as far north as possible (downstream of South Creek) which corresponds to the lowest 100 year flood event level. Flood protection for Western Edge will be provided through an edge treatment constructed around the outer perimeter of the Structure Plan adjacent South Creek to a minimum of 0.5m above the 100 year flood level. The earthworks strategy and LWMS are based on the premise that water surface levels for the existing residential areas outside of Western Edge will remain the same or be reduced.

3.9.2 Water Supply

Preliminary advice from the Water Corporation indicates that water infrastructure will be in place to support the initial stages of development within Western Edge. It is anticipated that the existing infrastructure in the adjoining residential areas to the east will be extended to service the initial stages of development.

3.9.3 Waste Water

The majority of Western Edge is located within a sewage catchment that will gravitate northwards to a recently constructed Type 180 pump station near the intersection of McLarty Boulevard and Scadden Road. A DN750 Collector Main sewer is identified to be extended south from the pump station to McLarty Boulevard and will service the northern portion of the Structure Plan area. The Collector Main will be extended further south as part of the subdivisional works.

Future stages in the southern portion of Western Edge may require provision of an additional pump station although this will need to be confirmed at that later stage when the capacity of the waste water network can be more accurately assessed.

3.9.4 Power Supply

The existing development within the Town Centre is serviced by the Murdoch Substation located on the corner of Murdoch Drive and Demarchi Road. Whilst the Murdoch Substation is in close proximity to Western Edge, it is understood to be operating at a high level Summer Peak Load and the preferred alternative of Horizon Power is for Western Edge to be serviced

from the Wedgefield Zone Substation in Harwell Road.

Whilst the Wedgefield Substation is situated further from Western Edge than the Murdoch Substation, upgrades have resulted in a more reliable supply than Murdoch and it is anticipated that the potential for developer-funded costs within the Wedgefield Substation are lower.

It is expected that there will be sufficient residual capacity within the existing network to service the first stages of Western Edge. Power supply to later stages and in the longer-term will need to be investigated at that time when infrastructure planning in the region is more substantially progressed. Landcorp have commenced preparation of a design for a cable route from the Wedgefield Substation to the South Hedland Town Centre however, due to decreased power consumption in relation to a drop in mining activity, there is expected to be surplus capacity in the existing network and the cable will not be constructed.

3.9.5 Telecommunications

Telecommunications works within the South Hedland Town Centre have included the provision of NBN pit and pipe infrastructure along Mclarty Boulevard, Colebatch Way and Collier Drive which border Western Edge. It is expected that Western Edge will accordingly be serviced by the NBN.