East Newman

Local Water Management Strategy

October 2022

Client: Creating Communities

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Executive Summary

Hyd2o was commissioned by Creating Communities to prepare this Local Water Management Strategy (LWMS) to support the proposed local structure plan (LSP) for land located in East Newman (herein referred to as the site).

The LSP area is approximately 72 ha in size and located approximately 500m east of Newman Town Centre in the Shire of East Pilbara. The proposed urban development consists of the development of unused previously subdivided land as well as the redevelopment of residential lots and public open space to provide a revamped estate with new residences, upgraded POS areas and added community spaces.

This brief LWMS addresses stormwater management of the site and provides an overall assessment of the existing water management system to ensure its function and design objectives are maintained with the proposed land use development.

Understanding key hydrological considerations has informed the development of the LWMS for the site. The site is an existing residential area and is generally characterised as having low permeability soils, good clearance to groundwater, and low Acid Sulphate Soil (ASS) risk across the site. The relatively high run-off produced on site is serviced by a series of existing large open drains which eventually discharge east across Great Northern Hwy to Whaleback Creek, a tributary of the Fortescue River.

This document has been prepared in accordance with the Shire of East Pilbara (SoEP) Local Planning Strategy (LPS) (2020) which refers to the principles and objectives of Better Urban Water Management (Western Australian Planning Commission, 2008).

Ultimately SoEP is the key agency in implementation of this strategy.

1. Introduction

Hyd2o was commissioned by Creating Communities to prepare this Local Water Management Strategy (LWMS) to support the proposed local structure plan (LSP) for land located in East Newman (herein referred to as the site).

The LSP area is approximately 72 ha in size and located approximately 500m east of Newman Town Centre in the Shire of East Pilbara (Figure 1). Great Northern Highway runs approximately 200m to the east. The proposed urban development consists of the development of subdivided unused land and the redevelopment of residential lots and public open space (POS) areas to provide a revamped estate with new residences, upgraded POS areas and added community spaces.

This LWMS addresses stormwater management of the site with a comprehensive overall assessment of the existing water management system to ensure its function and design objectives are maintained with proposed land use redevelopment.

This document has been prepared in accordance with the Shire of East Pilbara's (SoEP) Local Planning Strategy (LPS) (2021) which refers to the principles and objectives of Better Urban Water Management (Western Australian Planning Commission, 2008). Ultimately SoEP is the key agency in implementation of this strategy.

1.1 Planning Background

Better Urban Water Management (Western Australian Planning Commission (WAPC), 2008) provides guidance on the implementation of State Planning Policy 2.9 Water Resources (Government of WA, 2006).

The site is zoned as an urban area under the Shire's latest Town Planning Scheme (TPS4) with land use predominantly residential with associated public reserves and a mixed business allotment (Appendix A). This LWMS supports the preparation of the local structure plan (LSP) that maintains a residential land use with an upgrade of dwellings and parks as well as the incorporation of more community spaces (Figure 2).

Given that the proposed structure plan maintains existing cadastral boundaries and land use, the development an Urban Water Management Plan (UWMP) to guide subdivision will therefore not be required, and future stormwater management planning support documentation will only be necessary in areas where individual stormwater management improvements are proposed.

1.2 Key Documents and Previous Studies

The requirements for water protection and water management for the site are established in the SoEP LPS (2020) which refers to the principles and objectives of Better Urban Water Management (Western Australian Planning Commission, 2008). The document also provides details on the Town of Newman challenges and opportunities for water management planning.

Given the site's location within the Pilbara, an area dependant on groundwater to supply communities and mining activity, various documents have been prepared to guide the establishment of best practice water management in ensuring a sustainable resource. The

site is located within the area covered by the Pilbara Groundwater Allocation Plan (Department of Water, 2013) and Newman Water Reserve Drinking Water Protection Plan (Department of Water, 2009).

This LWMS also uses the following key agency documents to define its key principles, criteria, objectives, and implementation responsibilities:

- Decision Process for Stormwater Management in WA (DWER, 2017)
- Stormwater Management Manual for WA (Department of Water, 2007)
- Newman Water Reserve Drinking Water Source Protection Review (Department of Water, 2014)

2. Proposed Development

The LSP for the site is shown in Figure 2, introducing opportunities to redevelop a residential estate near the town centre. The LSP area covers 72 ha, with the proposed development and redevelopment consisting of upgrades to unused land, residential lots and parks and open space as well as the incorporation of more community facilities.

The lots to be redeveloped have been strategically selected to provide a visual appeal to the community and take advantage of the existing urban layout. A variety of new homes and facilities should inject new life into the suburb and provide a vibrant and diverse residential community. The structure plan design aims to create and improve public access walkways to create better accessibility for existing residents and visitors.

From a stormwater management perspective, the development will seek to maintain the existing drainage system inclusive of routes and catchments. The redevelopment of buildings and spaces will also provide an opportunity for the Shire to implement water sensitive measures to reduce the need for potable scheme water use which is ultimately associated with groundwater allocation for the town.

3. Existing Environment

3.1 Site Conditions

The site is located in East Newman in the Shire of East Pilbara. The site exists as a residential estate with the town centre located approximately 500m to the west. A further residential development is to the east prior to Great Northern Highway approximately 200m away.

Figure 3 shows an aerial photograph with existing land use and topography. Elevations across the site range from approximately 535 mAHD to approximately 545 mAHD with a general downslope in a northerly direction.

3.2 Geotechnical

According to Newman Region 1:100 000 Geological Series (Geological Survey of WA, 1989) mapping, the site is characterised as predominantly Qa, described as unconsolidated silt, sand and gravel, of alluvial origin. The site also includes an area of interbedded mudstone, siltstone and chert with minor felsic tuff with dolomite and sandstone (Fj) of the Jeerinah Formation. An overlay of the site on the geological series mapping is shown in Figure 4.

The SoEP LPS (2020) describes the hills and ranges of the East Pilbara sub-region have stony solid, red loamy earths, red shallow loams red shallow sands and red earths.

3.2.1 Acid Sulphate Soils

No Acid Sulphate Soil (ASS) risk mapping is available over the Newman region however, given that ASS is an occurrence associated with coastal areas no risk is expected over the site.

3.2.2 Contaminated Sites

No registered contaminated sites on DWER's online Contaminated Sites Database are located in direct proximity to the site.

3.3 Environmental

The latest Newman Town Planning Scheme (TPS4) indicates no areas marked as conservation within the site (Appendix A). No international (RAMSAR) or nationally significant wetlands recognised in the SoEP LPS are located in proximity to the site.

3.4 Newman Water Reserve

Groundwater is the main source of water for the locality of Newman and the Pilbara region. Given the dependence the main consideration for growth and development in the area is groundwater supply governed by DWER's Pilbara Groundwater Allocation Plan (2013) which regulates sustainable allocation and practices.

Within this overarching planning is the Newman Water Reserve which a proclaimed public drinking water sensitive area (PDWSA) regulated and protected to provide potable water needs to Newman town site.

The extent of the reserve is defined by the bore fields and associated catchments allocated to supplying public drinking water. Currently this is primarily sourced from the Opthalmia bore field approximately 15 km east of town. Operations involving abstraction, treatment and storage at elevation at a facility west of town are owned by BHPB given the dominant need for supply in mining. BHPB has a DWER license to draw 10 GL/year from the bore field for processing a public water supply (SoEP, 2021). Several associated licences within local aquifers are shown in the DWER's Water Register (2022).

The Newman supply network is entirely gravity fed with a nominated transfer point at which public supply and distribution becomes the responsibility of the Water Corporation.

Future water supply planning is working towards the separation of source water for public drinking supply from that of mining activities for water quality protection. Consistent with the Newman Water Reserve Drinking Water Protection Plan (NWRDWPP) (2009) a new 'Homestead' bore field is proposed north of the town site to become Newman's main source of drinking water.

This is commensurate with an amendment to the Newman Water Reserve to include the new bore field area and catchment. The amendment to omit the eastern region of the Newman Water Reserve which reflects the catchment of the Opthalmia bore field which would eventually only supply mining activities through the has been halted given ongoing use for public drinking water supply (DoW, 2014).

Consistent with the NWRDWPP the majority of the proclaimed area will have Priority 1 classification with the gazetted town site area to have a Priority 3 classification. The Department of Water (2016) Land Use Compatibility Tables for Public Drinking Water Source Areas Water Quality Protection Note No 25, detail urban residential as an acceptable land use within a Priority 3 area.

Newman Water Reserve proposed amendment areas based on the original protection plan (2009) and more recent review (2014) with nominated PDWSA protection zones are contained in Appendix B.

3.5 Surface Water

Given the existing residential development, surface water runoff for the site is already managed via a constructed stormwater management network.

Runoff is primarily conveyed by road surfaces with the absence of a piped road drainage network. Easements between lots which provide ways of pedestrian access have also been designed to provide points of connection for the drainage network. Stormwater flows generally in a northeast direction with concentrated flows eventually draining to a series of large open drains which provide conveyance from the site.

These drains also run around the perimeter of the site and effectively act as cut-off drains from external catchments while servicing upstream areas of Newman to the west and south. As a result site runoff is generally managed independently with the exception of a catchment of undeveloped regional land adjacent to the western boundary.

Site catchments for each of the three main open drains are shown in Figure 5.

These drains generally flow east and converge downstream of the site to form two drains that flow across Great Northern Hwy via two culvert points. These drains continue east with ultimate discharge to Whaleback Creek which is a tributary to the Fortescue River.

A flood study undertaken by Golder & Associates (2013) over the Newman area identified that the current capacity of the culverts under Great Northern Hwy means that land adjacent is prone to flooding. A flood mapping extract for a 1% Annual Exceedance Probability (AEP) rainfall event contained in Appendix C shows that the extent of this flooding extends marginally across the eastern boundary of the site (Figure 5). It should be noted that the flood mapping was undertaken prior to complete development within the site and it is assumed development levels were set above the level of flooding accordingly.

Golder & Associates 1% AEP flood mapping also suggests that some areas of lots along the southern boundary have the potential to flood or are at least adjacent to flooded areas as a result of road drainage flow paths and capacity of infrastructure along the southern drain. The extent of this area is shown in Figure 5.

3.6 Groundwater

According to the Pilbara State of the Environment Report (2013) Newman is located over a groundwater system associated with Hamersley – Fractured Rock aquifers with groundwater expected well below natural surface at the site.

DWER's Water Information Reporting data base (2022) reports a historical groundwater level of 510 mAHD at bore W013 (WIN ID# 20069903) approximately 2 km northeast of the site. Natural surface at this location was approximately 534 mAHD.

3.7 Constraints and Opportunities

Based on the sites existing environment, the following key constraints and opportunities are identified to guide the development of the water management strategy and proactive management practices detailed in later sections of this report:

- The site has an existing and functioning stormwater management system and with minor land use change occurring as part of the development the existing infrastructure would be expected to be able to service the modified residential estate.
- Soil types and topography would result in little infiltration with the majority of stormwater runoff and discharge from site to the east and across Great Northern Hwy.
- The redevelopment of lots provides opportunities to implement water use saving strategies and devices to reduce the demand on groundwater supply.
- Reconsidered POS areas to improve the value of the space also provides opportunities for water harvesting and retention to mitigate increases in irrigation.
- Location within the Newman Water Reserve warrants consideration of implementing biofiltration techniques to maintain/improve discharge stormwater quality to the environment when redeveloping POS areas.
- Any areas with existing issues of flooding in or adjacent to lot areas have the opportunity to implement increased development levels.

4. Design Criteria & Objectives

Key design principles and criteria for the site are shown in Table 1 and have been established consistent with the key reference documents previously detailed in Section 1.2, and reflect the site constraints and opportunities identified in Section 3.7. These principles and criteria are used to formulate the water management strategy for the site to remain within the identified constraints and opportunities of the existing environment.

5. Water Use Sustainability

5.1 Water Efficiency Measures

The development of the site will lead to an overall increased demand for potable water given the establishment of commercial and community spaces as well as an increase of irrigation for reconsidered POS areas. Water conservation measures will be implemented to reduce scheme water consumption within the development will be consistent with Water Corporation's "Waterwise" land development criteria including:

- Promotion of use of waterwise practices including water efficient fixtures and fittings in redeveloped lots (taps, showerheads, toilets, rainwater tanks, waterwise landscaping).
- New houses to be built to 6 star building standards (water efficient fixtures and fittings).
- Use of water wise plantings in POS areas.

- Seeking supplementary on-site irrigation supplies such as water harvesting for upgraded POS areas.

Table 1: Design Principles & Criteria

Strategy Elements	Method & Approach
Water Use Sustainability	
Water Efficiency	• Water efficiency implementation consistent with Building Codes of Australia requirements • Aim for less than 100 kL/person/year water use • Establish "Waterwise" Public Open Space
Water Supply	• Minimise use of scheme water for non-drinking purposes • Water Corporation supply for lots • Treated wastewater via the Waste Water Treatment Plant for POS irrigation
Wastewater	• Reticulated sewerage
Stormwater	
Ecological Protection	• Establishment of biofiltration areas in redeveloped POS/drainage areas to treat first 15mm of runoff
Serviceability	• Maintain existing road and easement drainage flow paths
Flood Protection	• Maintain established large open drains to convey flows east towards Great Northern Hwy • Establish minimum habitable floor levels of redeveloped lots at 0.5m above the 1% AEP flood level and 0.3m above the road drainage network
Groundwater	
Fill & Subsoil Drainage	• No fill required to provide clearance to groundwater • Fill potentially required for redevelopment areas subject to flooding • Subsoil only within installed biofiltration areas as required to prevent long term ponding

5.2 Water Supply

The Water Corporation's network will continue to supply potable water to the site.

Consistent with the SoEP's LPS irrigation of POS areas is expected to be supplied via treated wastewater from the Newman Waste Water Treatment Plant (WWTP). While the use of recycled wastewater already provides a best practice water management approach (WAPC, 2008) the availability of this supply to accommodate any irrigation increase is not known.

Landscape plans will need to detail irrigation schedules for upgraded POS areas and demonstrate water availability at a later stage of planning. Supplementary on-site irrigation supplies such as water harvesting may be required to be considered for any shortfall.

5.3 Wastewater Management

Wastewater management will be via reticulated sewerage with treatment at the Newman Waste Water Treatment Plant (WWTP).

6. Stormwater Management Strategy

This LWMS proposes a stormwater management system consistent with the scope of redevelopment with measures introduced in redeveloped areas as necessary to implement elements of water sensitive urban design (WSUD) while maintaining the function of the existing stormwater management system. This includes consideration of peak flows during major events (1% AEP) as well as providing water quality treatment where possible for flows during small events (15mm).

The stormwater management strategy has been developed in accordance with Better Urban Water Management (WAPC, 2008) and the Stormwater Management Manual for Western Australia (DoW, 2007) and is as follows:

- In any redeveloped POS areas with an existing stormwater function, seek to implement biofiltration areas to provide water quality treatment for their contributing stormwater catchment areas. Also any modified open drains should be designed to, at a minimum, maintain their existing stormwater capacity.
- Ensure modified areas and new access ways are constructed to maintain existing drainage catchments and flow paths.
- Establish minimum habitable floor levels of redeveloped lots at 0.5m above the 1% AEP flood level and 0.3m above the road drainage network.

Figure 6 provides an overview of the redevelopment areas and the proposed strategy.

Future engineering and landscape drawings will be required to demonstrate compliance with the above approach in areas where individual stormwater management improvements are proposed.

7. Monitoring

Given the scope of the re-development and land use change, no post development water quality monitoring is proposed.

Performance monitoring of individual stormwater management measures and changes will be subject to individual assessment and may be required following construction based on circumstances and SoEP requirements.

8. Implementation

Table 2 details the roles, responsibilities to implement the LWMS.

Details of construction and maintenance activities will be appropriately detailed at further stages base on individual area requirements.

Table 2: Implementation, Roles and Responsibilities

Implementation Action	Responsibility		
	Developer	DWER	SoEP
Review and approval of LWMS (this document)		✓	✓
Preparation of stormwater management plans (SMP) to support individual development areas and stormwater changes for individual works	✓		
Review and approval of SMP			✓
Construction of stormwater system and maintenance post construction until handover	✓		
Long term stormwater system operation and maintenance			✓

9. References

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors), (2016), Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia.

Department of Environment (2004a), Acid Sulphate Soil Guideline Series Identification and Investigation of Acid Sulphate Soils, Perth, Western Australia.

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Department of Water (2009), Newman Water Reserve Drinking Water Source Protection Plan, WRP no.97.

Department of Water (2012), Water Monitoring Guidelines for Better Urban Water Management Strategies and Plans.

Department of Water (2013), Pilbara Groundwater Allocation Plan, Water Resource Allocation and Planning Report Series, Report No 55, October 2013

Department of Water (2014), Newman Water Reserve Drinking Water Source Protection Review.

Department of Water (2016) Land Use Compatibility Tables for Public Drinking Water Source Areas Water Quality Protection Note No 25

Department of Water and Environmental Regulation (2017), Decision Process for Stormwater Management in WA.

Department of Water and Environmental Regulation (2021b), Water Information Reporting (online).

Department of Water and Environmental Regulation (2021c), Water Register (online).

Department of Water and Environmental Regulation (2021a), Contaminated Site Database Map (online).

Geological Survey of WA (1989), Neman Region 1:100 000 Geological Series, Sheet 2851

Golder & Associates (2013), Hydraulic Study of Newman.

Shire of East Pilbara (2020), Local Planning Strategy Parts 1 & 2

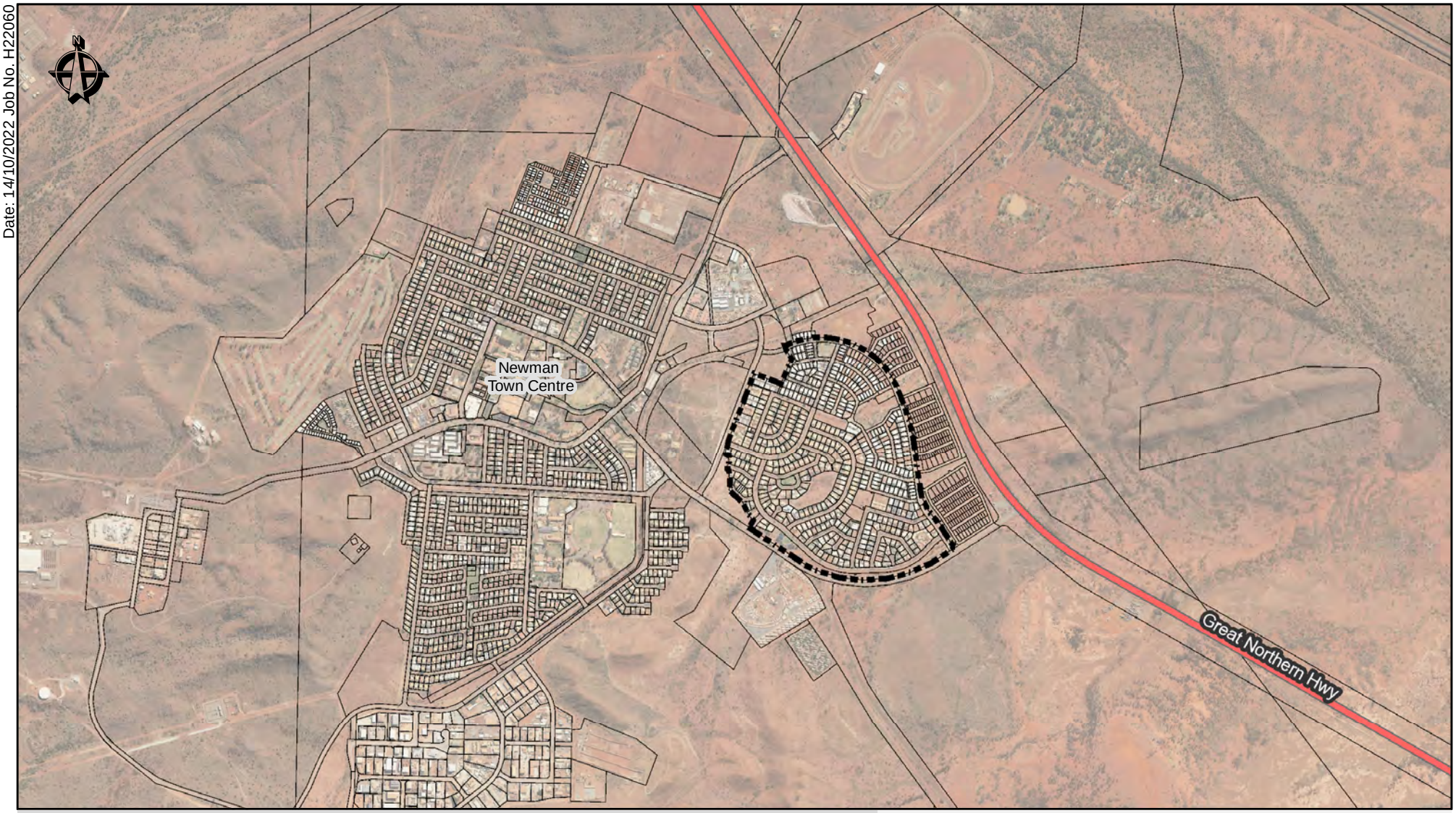
Western Australian Planning Commission, (2003), Planning Bulletin No. 64: Acid Sulphate Soils. Western Australian Planning Commission, November 2003.

Western Australian Planning Commission, (2006), State Planning Policy 2.9 Water Resources, December 2006.

Western Australian Planning Commission. (2008), Better Urban Water Management, October 2008.

FIGURES

Date: 14/10/2022 Job No. H22060



Site

0 200 400 600 800
Meters

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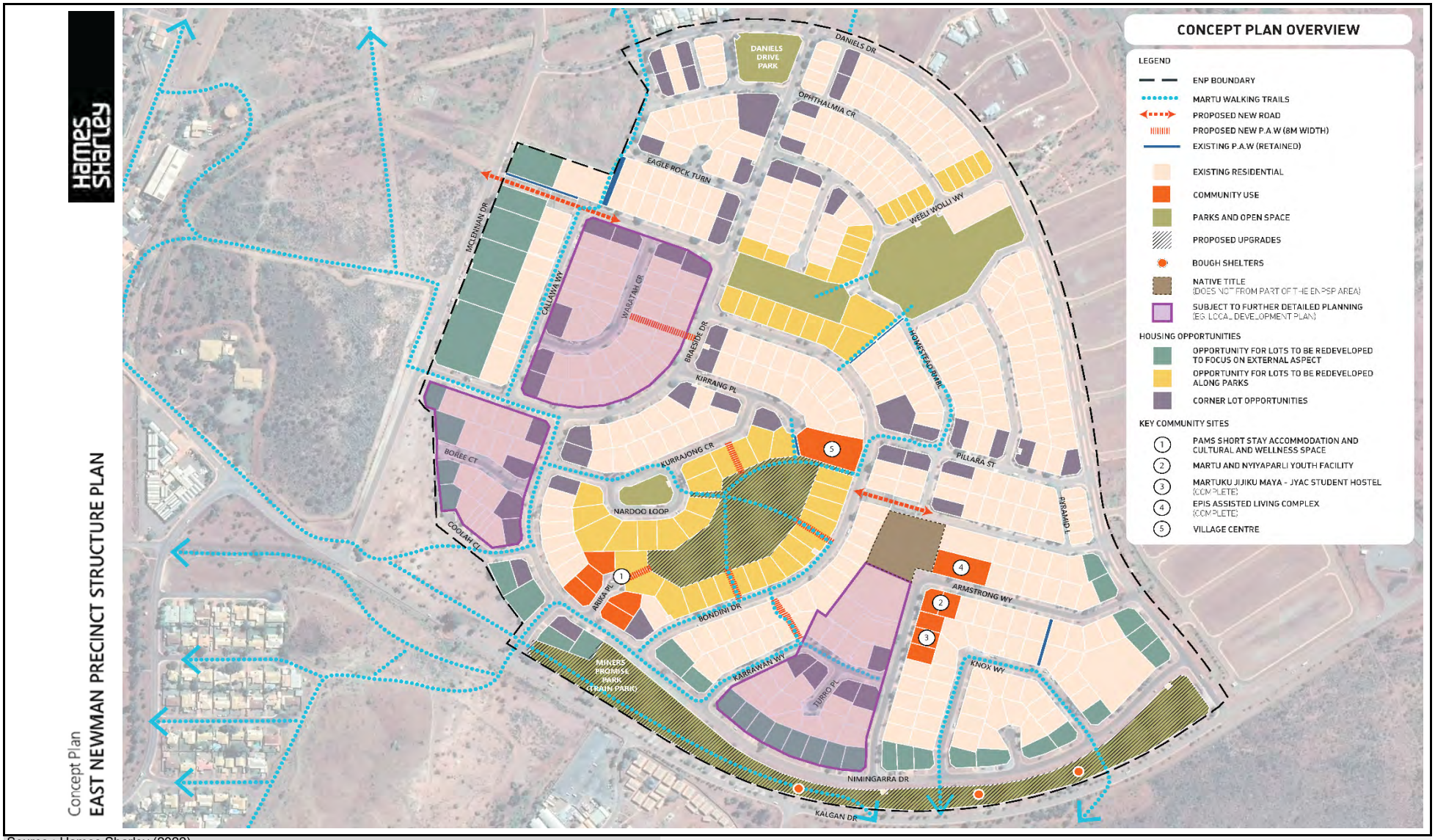
East Newman Local Water Management Strategy

Location Plan

Figure 1

Date: 14/10/2022 Job No H22060



Source : Hames Sharley (2022)

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East Newman Local Water Management Strategy

Structure Plan

Figure 2

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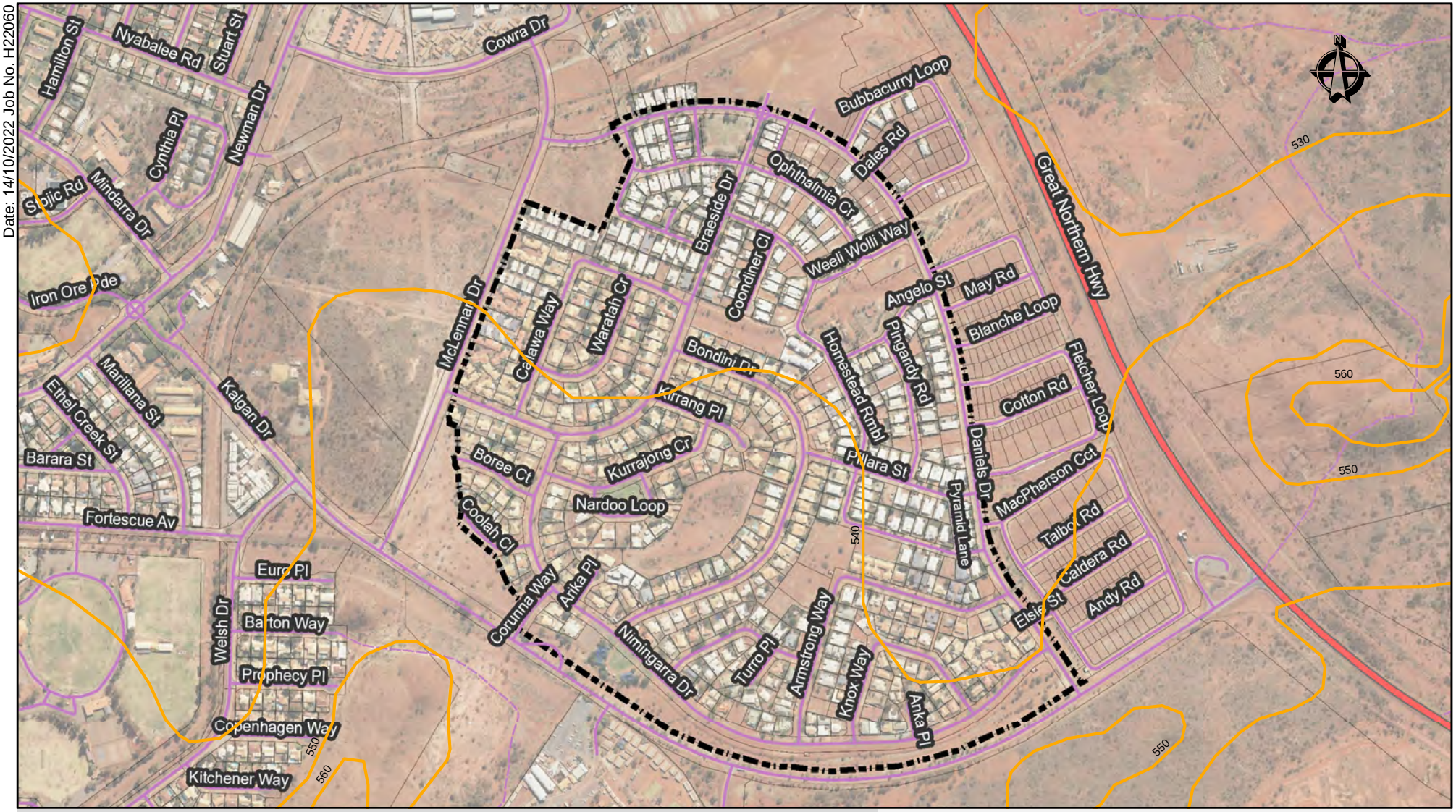

Site

Landgate 10m Topography

0 100 200 300 400 Meters

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East Newman Local Water Management Strategy

Site Conditions Plan

Figure 3

Date: 14/10/2022 Job No. H22060

Site

Qa - Alluvium - unconsolidated silt, sand and gravel

Fj - Jeerinah Formation - interbedded mudtsone, siltstone and chert with minor felsic tuff with dolomite and sandstone

0 200 400 600 800 Meters

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East Newman Local Water Management Strategy

Geotechnical Plan

Figure 4

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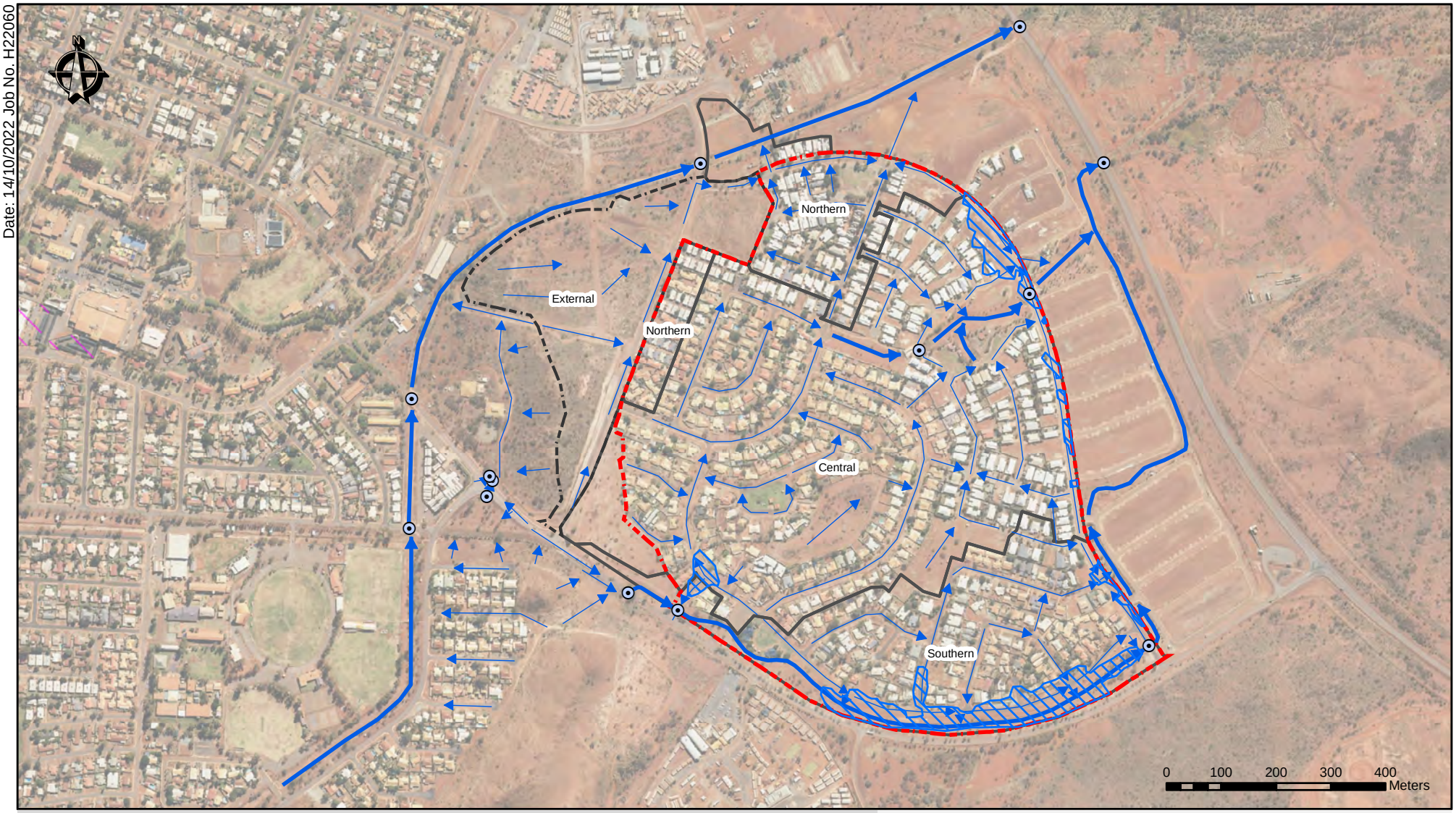

Site
Surface Flow Paths
Site Catchments
Exernal Catchments
Drain
Headwall/Crossing
Site Flooding (G&A, 2013)

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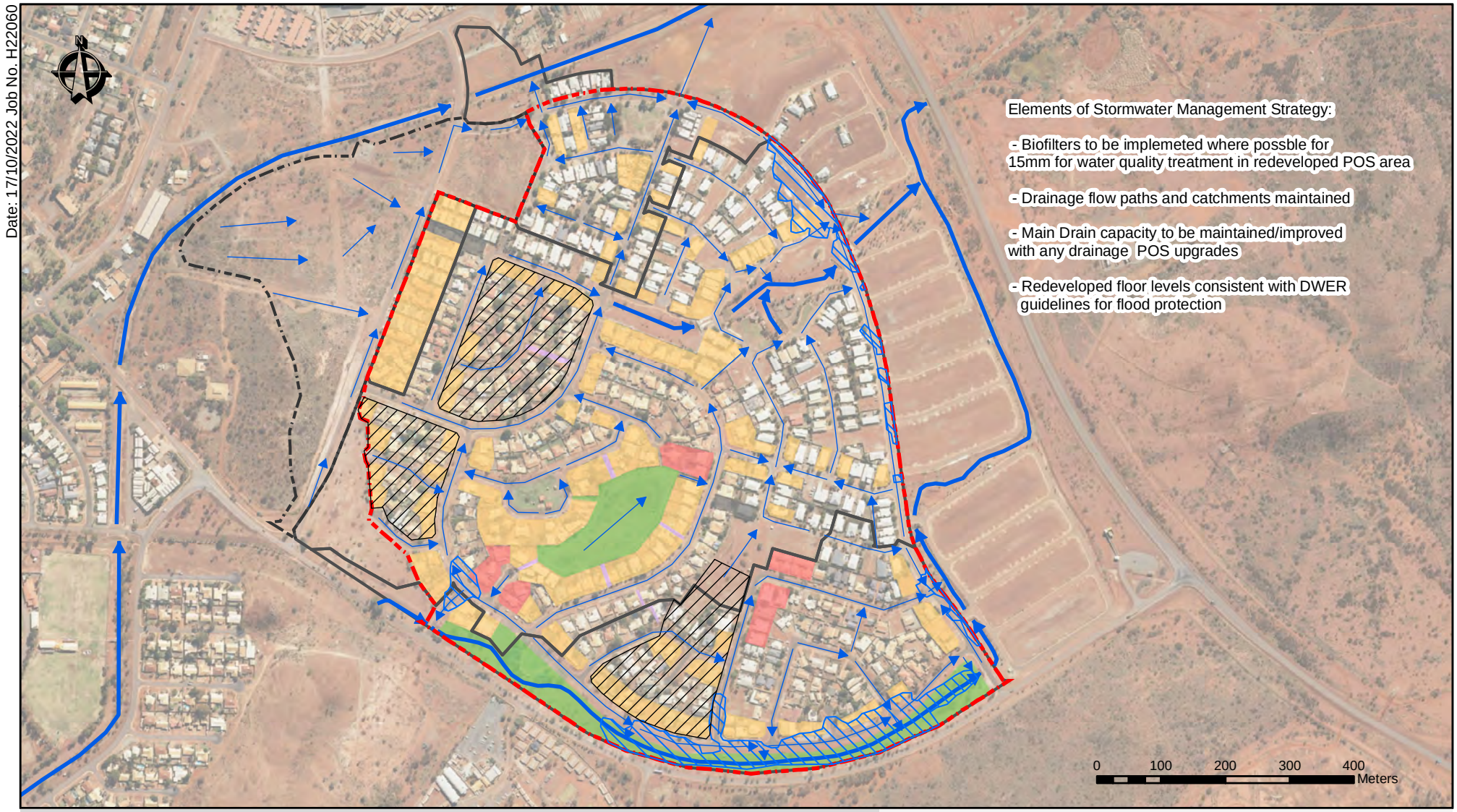
East Newman Local Water Management Strategy

Surface Water Plan

Figure 5



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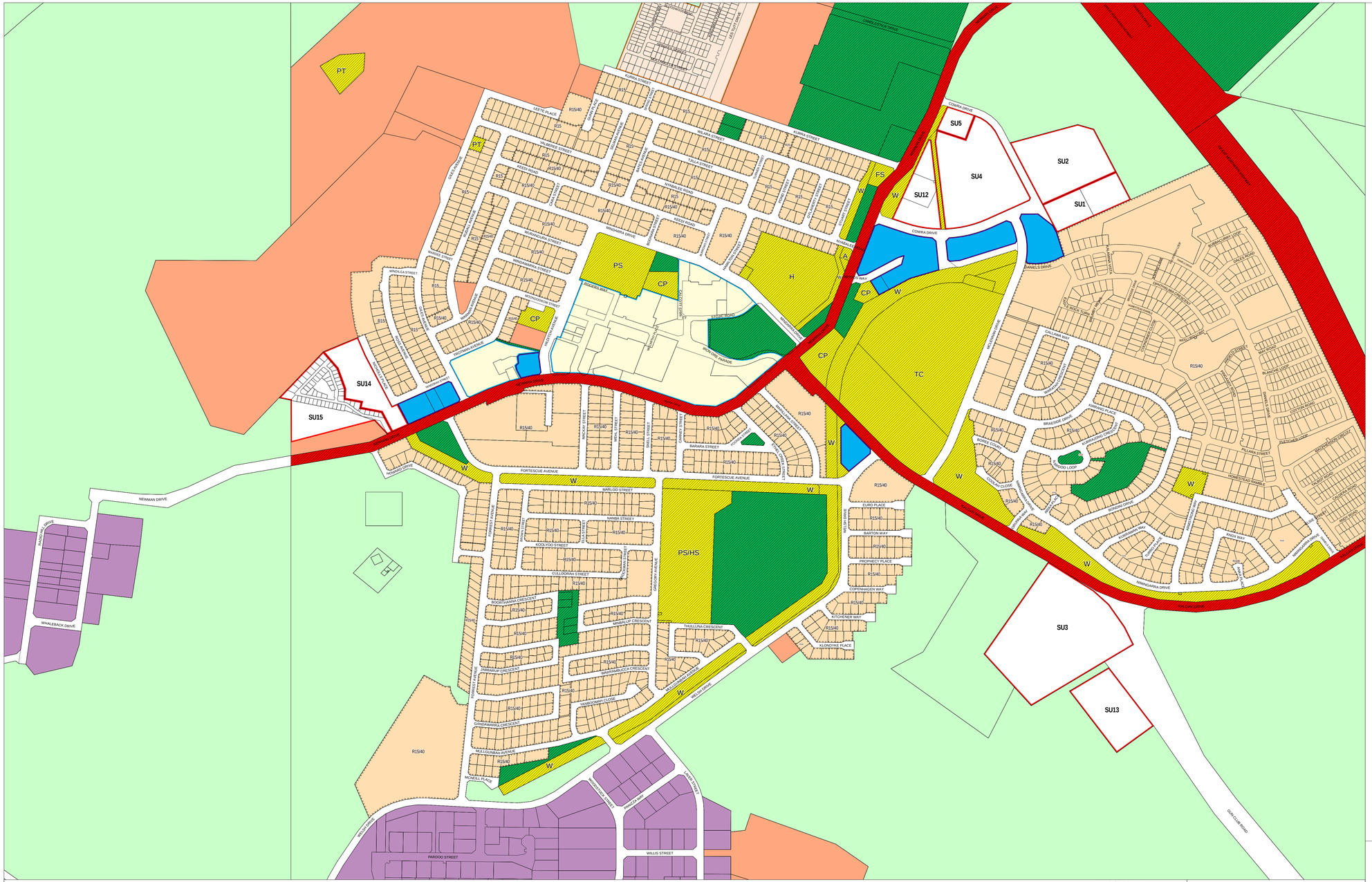
East Newman Local Water Management Strategy

Stormwater Management Plan

Figure 6

APPENDIX A
NEWMAN TOWNSITE TPS4



LEGEND

LOCAL SCHEME RESERVES

- Conservation
- Local Road
- Major Road
- Public Purposes
- A Public Purposes : Ambulance
- C Public Purposes : Cemetery
- CP Public Purposes : Civic Purposes
- D Public Purposes : Depot
- W Public Purposes : Drainage and Water
- FS Public Purposes : Fire Station
- H Public Purposes : Hospital
- P Public Purposes : Police Station
- PT Public Purposes : Power/Telecom
- PS Public Purposes : Primary School
- PS/HS Public Purposes : Primary/High school
- TC Public Purposes : Tertiary College
- Recreation

LOCAL SCHEME ZONES

- Community and Cultural Purposes
- Industrial
- Mixed Business
- NullagineTownsite
- Residential
- Residential Development
- Rural
- Rural Living
- Settlement
- Special Use
- Town Centre

OTHER CATEGORIES

(see scheme text for additional information)

- Scheme Area Boundary
- Local Government Boundary
- R20 R Codes
- SU1 Special Use Area
- Existing Water Reserve Boundary and SCA Boundary
- Priority 3 Water Source Protection Area Boundary
- Proposed Water Reserve Boundary
- River and Creek
- No Zone
- Waterbodies

VERSION No 1

Shire of East Pilbara

Town Planning Scheme No. 4

(District Scheme)

Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

Produced by GeoSpatial Planning Support, Department of Planning, Lands and Heritage.

Base Information Supplied by the Western Australian Land Information Authority, SLIP 1096-2018-1

Shire of East Pilbara

Town Planning Scheme No. 4

(District Scheme)

N

0 100 200 300 400 500

Metres

MAP OVERVIEW

Authorised: T.Servaas

Plot Date: 22 February 2019

G.Gazette: Tuesday, 13 December 2005

Town Planning Scheme Map No. 10 of 10
MAP: Newman Townsite

Shire of East Pilbara

Town Planning Scheme No. 4

(District Scheme)

APPENDIX B
NEWMAN WATER RESERVE AMENDMENT

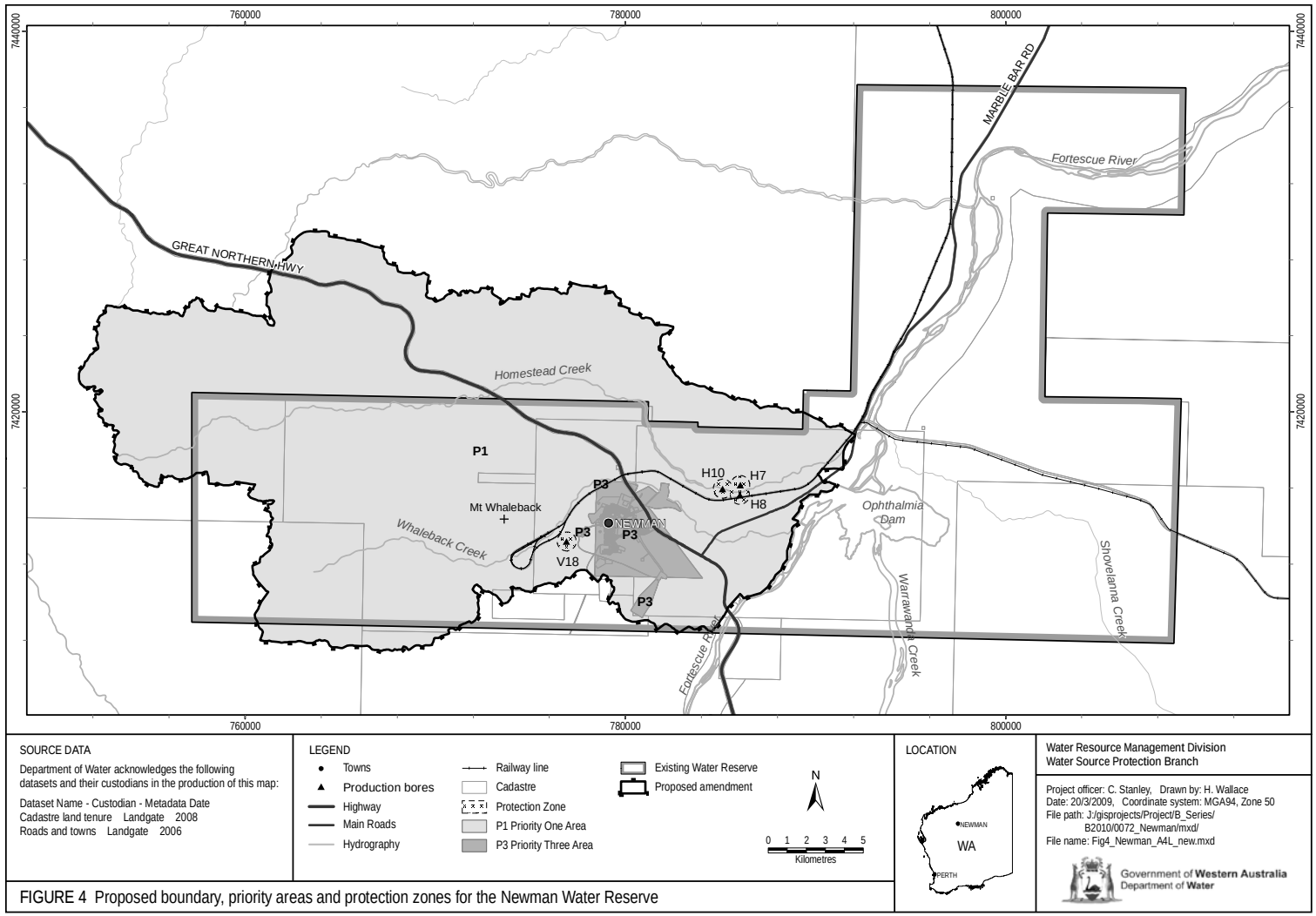


FIGURE 4 Proposed boundary, priority areas and protection zones for the Newman Water Reserve

Figure 4 Proposed boundary, priority areas and protection zones for Newman Water Reserve

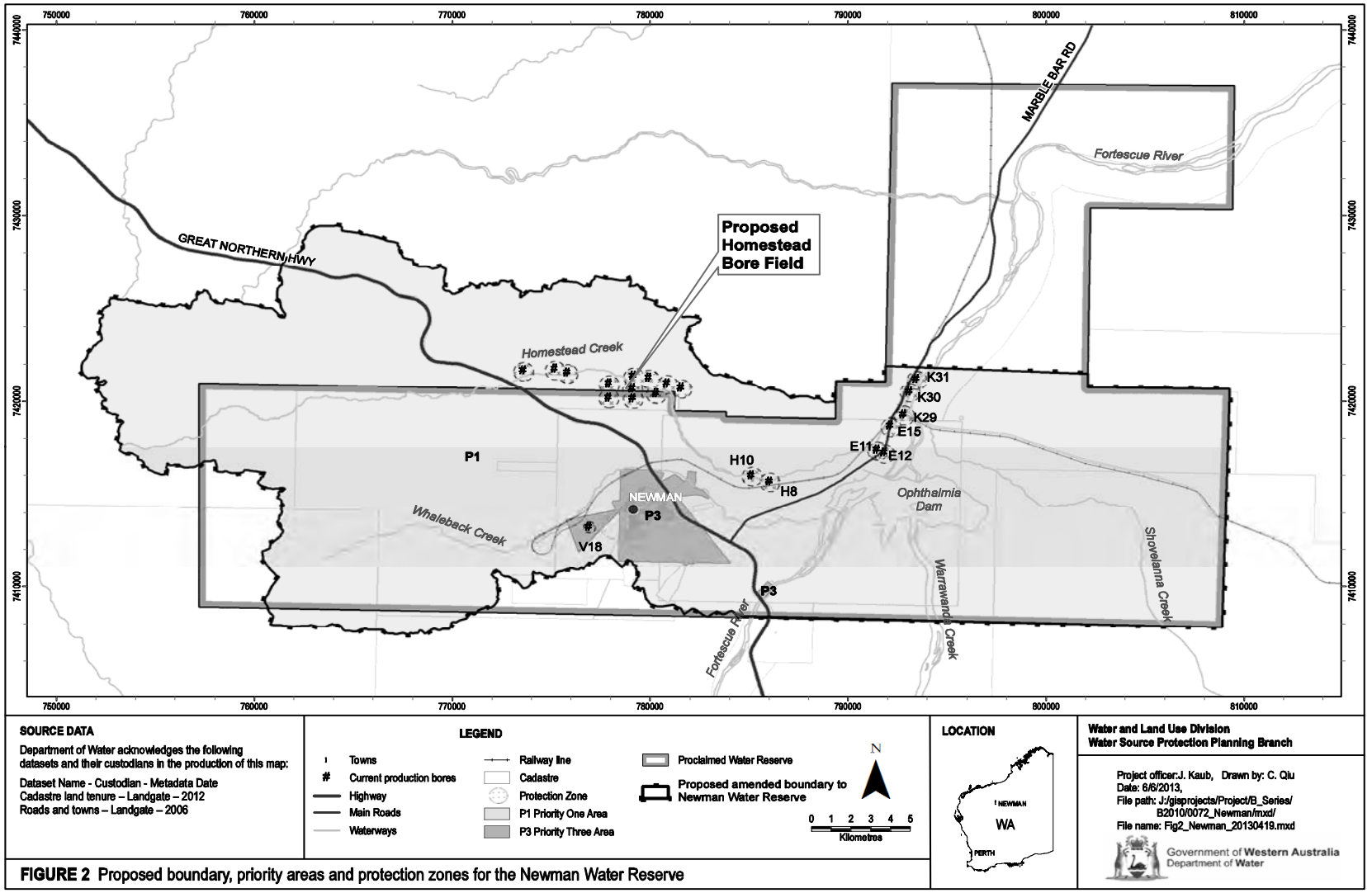


Figure 2 Proposed boundary, priority areas and protection zones for Newman Water Reserve

APPENDIX C
GOLDER & ASSOCIATES (2013) 1% AEP FLOOD MAP

Figure 41: Flood Map Model, Newman Source: Golder & Associates, 2013

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abn 93 697 380 883
suite 1 387 hay st subiaco wa 6008
PO Box 1055 subiaco wa 6904
p 08 9382 8683 f 08 9382 8712
www.hyd2o.com.au