**6 March 2026** **Our reference:** 216284

**David Schwebel**
Senior Planning Officer, Industry Assessments
Department of Planning, Housing and Infrastructure
david.schwebel@planning.nsw.gov.au

**RE: Response to Request for Further Information for SSD-70316465 at 1953-2109 Elizabeth Drive, Badgerys Creek**

**Burrah Park**

Thank you for notifying Sydney Water of the response to the request for further information for SSD-70316465 at 1953-2109 Elizabeth Drive, Badgerys Creek, within the Aerotropolis Precinct. The SSDA will seek consent for a concept proposal for an industrial warehouse and logistics estate, with a Stage 1 development including bulk earthworks, road access and internal road construction, civil infrastructure and utilities, and construction and operation of three warehouses.

As part of the response to the request for further information, amendments have been made, including the removal of indicative connections to Luddenham Road and under the M12 motorway, updated to the designs of the WH6.2b car park and Superlot 02b (resulting in a reduction in office GFA of 70m$^2$ and warehouse GFA of 864m$^2$), updates to the public open space design, updates to lot levels, amendment of the staging and infrastructure delivery plan, and changes to the Stormwater Management Design.

As part of the current assessment, the following documents have been reviewed:

- Music models Stage 6 and Stage1
- RTS 2 Report
- Appendix A RTS 2 Response Table
- Appendix S Detailed Staging Plan
- Appendix O Civil Engineering Report
- Appendix L Flood Assessment Addendum
- Appendix U Updated Riparian Assessment

**Sydney Water cannot support SSD-70316465 in its current form on matters relating to stormwater and requests additional information for assessment as documented in Attachment 1. The proponent may be required to enter into a Flexible Planning Arrangement to resolve the issues raised. Further information regarding this can be sought from Sydney Water by the proponent.**

- The scope of the current SSD is very significant in terms of volume and complexity as it includes both the Concept Plan for the entire site, the different stages up to the final Scheme Plan integration and more specific details about Stage 1.
  - Our current assessment was focused on the integration with the Scheme Plan in the ultimate scenario, the construction of the central trunk drainage and the construction the stormwater basins C12, C13 and C15 for Stage 1.
  - Sydney Water supporting documents for the stormwater Scheme Plan is available at Technical resources | Sydney Water Aerotropolis Stormwater and Aerotropolis stormwater development requirements.

**The Department of Planning, Housing and Infrastructure (the Department) is advised to re-refer this SSDA to Sydney Water for review once stormwater issues have been addressed.**

**Next steps**

- The Department is advised to **defer approval of SSD-70316465 and re-refer** the application to Sydney Water for review once the matters raised in this letter and in Attachment 1 and the enclosed documents have been addressed.
- The proponent is advised to address the matters flagged in Attachment 1 and amend their plans to resolve the issues flagged.
- The proponent is advised to continue contacting Sydney Water to receive advice directly from the Aerotropolis Stormwater team to resolve the issues flagged in this letter and if required, enter into a Flexible Planning Arrangement.

The Department can read further advice on requirements for this proposal in Attachments 1. If the proponent has any questions, they should contact Christian McNally, Manager Developer Partnerships at Christian.McNally@sydneywater.com.au.

Should the Department require further information, please contact Fiona Feng from the Growth Analytics Team at urbangrowth@sydneywater.com.au.

Yours sincerely,

**Kristine Leitch**
Manager, Growth Analytics and Strategic Partnerships
Growth and Development
Water and Environment Services
Sydney Water, 1 Smith Street, Parramatta NSW 2150

**Enclosed:**

- *260213_RFI Burrah Park DWG Comments by Civille*
- *260217_PWST Design Principles*

## Attachment 1 – Detailed stormwater requirements

1. SSD 70316465 scope clarification:
    - Cut and fill for all the stormwater basins to be included
    - Construction of only stormwater infrastructure C12, C13 and C15, including pumps, pipes, pits, liners, culverts, access track, plant palette, etc
    - Construction of the central trunk drainage from Elizabeth drive to strata 2 creek, next to M12 and Cosgrove's Creek intersection.
    - Appendix O - Civil Engineering Report p.8
        - Warehouse 1.1, 1.2 and 3.1 are part of stage2 not stage 1
        - Please correct document to include the right warehouses number as documented in Appendix S  Detailed Staging Plan
    - Note that run-off from road R.D.1.S1 is not treated by any regional stormwater infrastructure in stage 1.

2. Internal water usage has been accounted for stage 5 and stage 6. **Please provide more details on how this internal water usage is supplied and how recycled water would be produced on site.** Note that connection to Sydney Water purple pipe (recycled water pipe) from a local source is very stringent and may be rejected.

3. For the water balance of stage 5 and stage 6, the irrigation rate of 100% may only be acceptable for POS public, not POS private. It is understood that 100% irrigation rate is an interim measure that would need to be approved by the Department.

4. **It is advised to revisit the water balance for stage 5 and stage 6, and to consider the stages with the following constraints:**
    - No recycled water is produced on site.
    - During the Interim, recycled water will be provided through Sydney Water purple pipe for internal use only (toilet flushing), while Sydney Water harvesting network may not be in operation.
    - It is advised to release the surplus of stormwater volume through irrigation with the possibility to increase the rate up to 100% in public open space, pending on the Department approval.

5. **Give clear definition of POS private.**

    Give clear definition of POS public: list the areas in a map.

    For example, in C253: D1L, D2L, etc
    Note that irrigation is not supposed to be conducted on the Cosgrove riparian corridor unless there are some restoration activities.

6. The Music models submitted for stage 1 and stage 6 cluster 3 are truthful to the Scheme Plan. **The following points need however to be addressed**:
   - BIO should be counted for 90% perviousness and not 100% perviousness.
   - Earth PAD can not be accounted for revegetated areas.

     Could you please clarify which areas are kept untouched for each stage in relation to the stages in the MUSIC modelling? It was understood that all the earth PAD and "the cut and fill" will be completed early during stage1 (current scope of the SSD).

7. Map C251: M12 Catchment to be documented and included in the map

8. Harvesting network layout will need to be confirmed at a later stage once the concept design is completed.

9. Pond depth in relation to groundwater risk to be checked and confirmed.

10. Groundwater risk is to be assessed where the stormwater infrastructure will be built, in particular in the location of the storage ponds.

11. Appendix O - Civil Engineering Report p.12: Maintenance access tracks used as active transport corridors.

    Technical specifications for an active transport corridor to be provided by the council. Liability of active transport corridor is on the council.

    Sydney Water will reimburse the cost for the functional maintenance tracks only.

    Note that current active transport corridor map gives public access to all the maintenance tracks around Sydney Water infrastructure.

12. Dewatering areas that are approximately 25% of the sedimentation basin area (at NWL) and drain towards the basin for sediments drying are missing. Refer to design guideline section 7.2.5.5

13. Map C226: Access ramp between CC12 and CC13 to be confirmed.

14. Map C227: Split pit at the entrance of the stormwater infrastructure to be drawn.

15. Please refer to the attached document from Civille for comments about stormwater pits and pipes.

16. It has been noted that several stormwater drainage pipes are submerged because of IL being below the sedimentation basin NWL.
    - ➔ It is a pre-determination requirement that the inlet of the sedimentation is above the sedimentation storage area.
    - ➔ Council is also to assess and approve pre-determination the condition of the stormwater drainage pipes that are submerged.

17. Sydney Water is currently running several trial tests on street tree design for efficiency and resiliency. Council is responsible for signing off on the final street tree design. In the meantime, Sydney Water is willing to share the DRAFT Street Tree Design Guideline related to the trial to all the interested parties. **The document is available as one of the attachments to this letter.**

18. Central Trunk Drainage:
    - **Shear stress mapping along the trunk drainage must be provided for erosion control.**
    - Energy dissipation is required for grade greater than 1%.

    C241: channel portion 1 - 1.5% grade over 166.85m

    C242: channel portion 3 – 2% grade over 74.31m

    C243: channel portion 4 – 1.1% grade over 237.5m
    - **Velocity maps at 4EY, 5% AEP, and 1% AEP to be provided.**

    **Note that energy dissipation will be required for velocity greater than 1.4m/s**
    - **Cross-section at every 20m and at critical points to be provided.**
    - **C245: Water levels at 4EY and 1% AEP for each cross section**
    - C245: Extend cross sections beyond the channel boundaries to show the proposed interface with development adjacent the trunk drainage corridor.
    - C240, C241, C244, C245: demonstrate on the maps that portion 1 and portion 4 of the channel have indeed a riparian corridor of 47m in total.
    - C240-C243: longitudinal sections of the creek ignore the sinuosity of the creek.
    - C241: Misalignment between headwall and 0% grade

19. Stormwater connections to the central trunk drainage:
    - Incoming pipe long section.
    - Intersection angle to be documented. An angle of no greater than 30 degrees is specified in the guideline
    - Specifications of the stormwater connections must follow the guideline documented in the following link: Stormwater connections to natural waterways: Rouse Hill Development Area

20. The review of the checklist for completing the 70% functional design has identified that the following critical information are missing (continues on next page.)

| Data | Design Guideline Reference | Please provide detailed reference in the SSD package |
|---|---|---|
| **Hydrology requirements** | | |
| 4EY Storm Flow Rate | 6.2.3.1<br><br>Alignment with MUSIC model and diversion flow rate | |
| Minor Storm Flow Rate | 6.2.3.1 | Map C208 |
| Major Storm Flow Rate | 6.2.3.1 | |
| PMF Flow rate | 6.2.3.1 | |
| Potential Erosion Assessment | 6.2.3.1 | Missing |
| Climate Change Assessment | | |
| **Trunk drainage** | | |
| Manning's values | 6.2.4.3 | Missing |
| Drop structure modelling | 6.2.4.4 | Energy dissipation to be assessed |
| Shear stress modelling | 6.2.4.5 | Missing |
| Cross-section at critical locations. For example, near culverts. | 6.2.5.4 | Missing |
| Cross-section at 20m intervals | 6.2.5.4 | Missing |
| Water level at 4EY and 1% AEP for each cross-section | 6.2.5.4 | Map C245 to be updated |
| Frequency of drops | 6.2.5.7 | |
| Rock chutes | 6.2.5.7 | |

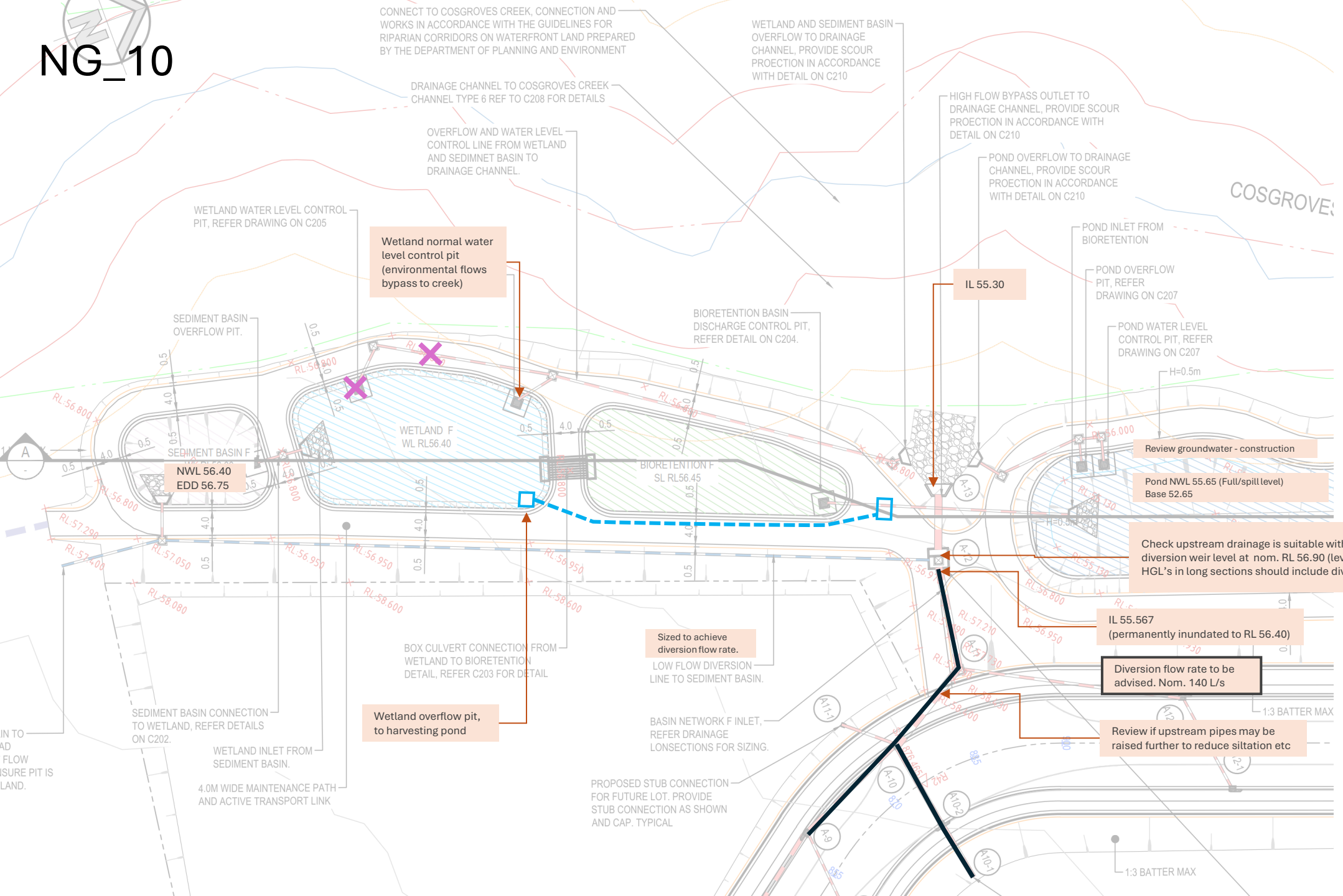
| | | |
|---|---|---|
| Incoming pipe long sections | 6.2.5.5 | Please provide reference |
| Solar access | 6.2.5.6 | |
| Access ramp grades | 6.2.5.12 | C225, C226, C227 |
| **Sedimentation basin** | | |
| Sediment storage volume | 7.2.5.4 | |
| Inlet system and dissipation | 7.2.5.4 | |

# Burra Park

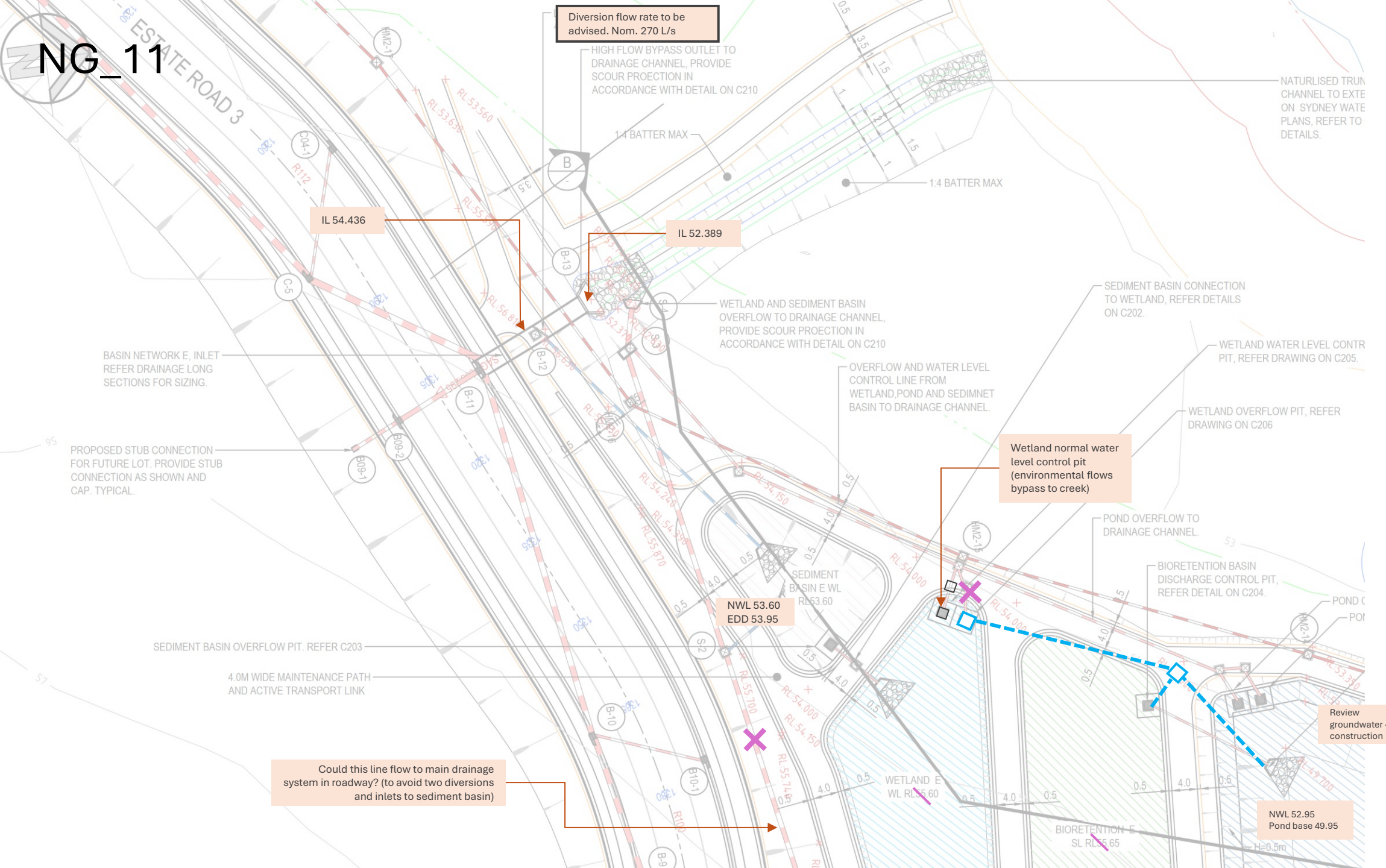
Design comments on H&H drawings

Civille – 13/2/2026

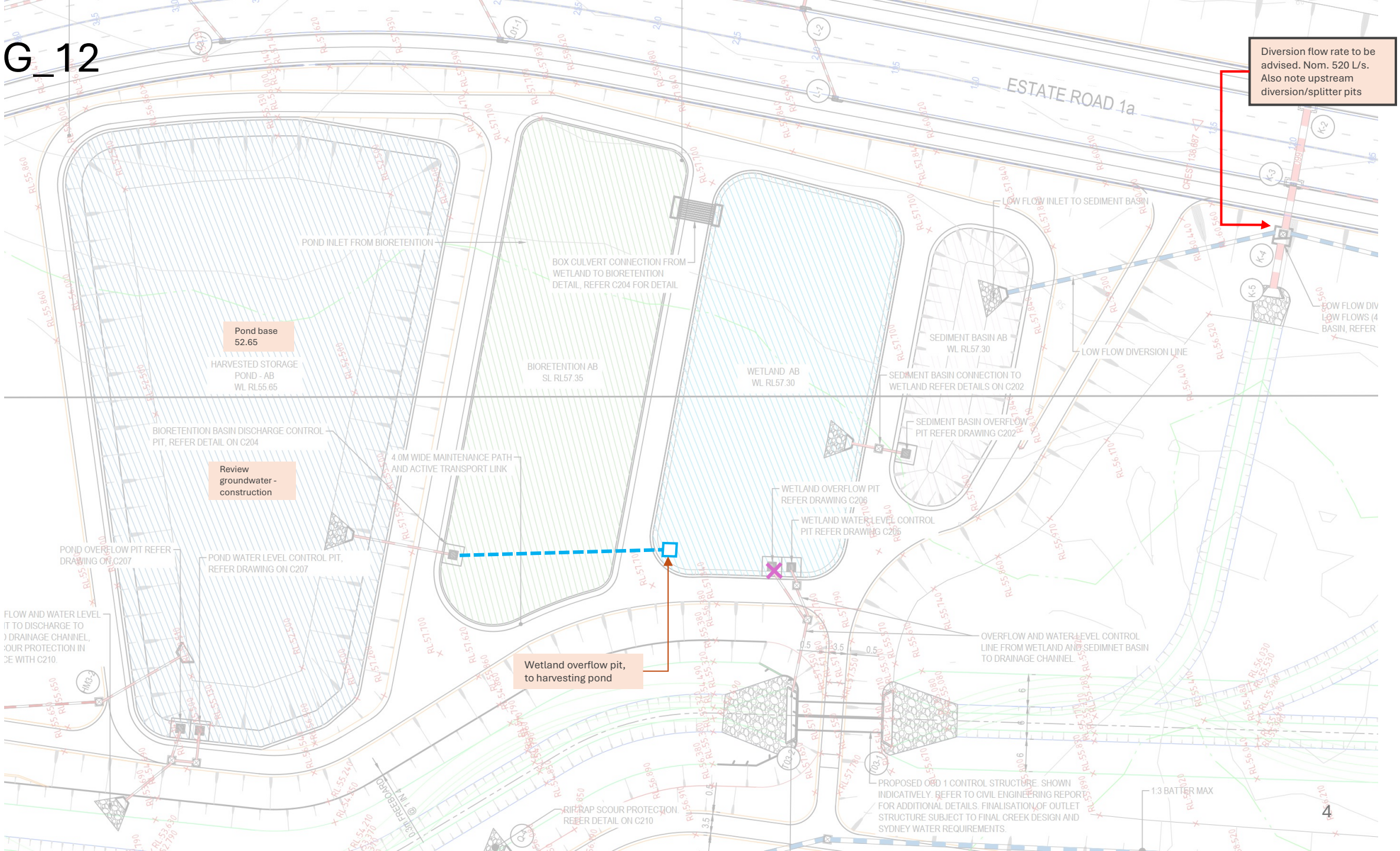
# NG_10


CONNECT TO COSGROVES CREEK, CONNECTION AND WORKS IN ACCORDANCE WITH THE GUIDELINES FOR RIPARIAN CORRIDORS ON WATERFRONT LAND PREPARED BY THE DEPARTMENT OF PLANNING AND ENVIRONMENT
WETLAND AND SEDIMENT BASIN OVERFLOW TO DRAINAGE CHANNEL, PROVIDE SCOUR PROECTION IN ACCORDANCE WITH DETAIL ON C210
DRAINAGE CHANNEL TO COSGROVES CREEK CHANNEL TYPE 6 REF TO C208 FOR DETAILS
HIGH FLOW BYPASS OUTLET TO DRAINAGE CHANNEL, PROVIDE SCOUR PROECTION IN ACCORDANCE WITH DETAIL ON C210
OVERFLOW AND WATER LEVEL CONTROL LINE FROM WETLAND AND SEDIMNET BASIN TO DRAINAGE CHANNEL.
POND OVERFLOW TO DRAINAGE CHANNEL, PROVIDE SCOUR PROECTION IN ACCORDANCE WITH DETAIL ON C210
COSGROVES
WETLAND WATER LEVEL CONTROL PIT, REFER DRAWING ON C205
POND INLET FROM BIORETENTION
POND OVERFLOW PIT, REFER DRAWING ON C207
Wetland normal water level control pit (environmental flows bypass to creek)
IL 55.30
BIORETENTION BASIN DISCHARGE CONTROL PIT, REFER DETAIL ON C204.
POND WATER LEVEL CONTROL PIT, REFER DRAWING ON C207
SEDIMENT BASIN OVERFLOW PIT.
H=0.5m
WETLAND F WL RL56.40
SEDIMENT BASIN F
NWL 56.40
EDD 56.75
BIORETENTION F SL RL56.45
Review groundwater - construction
Pond NWL 55.65 (Full/spill level)
Base 52.65
Check upstream drainage is suitable with top of diversion weir level at nom. RL 56.90 (level TBC).
HGL's in long sections should include diversion weir.
IL 55.567
(permanently inundated to RL 56.40)
Sized to achieve diversion flow rate.
BOX CULVERT CONNECTION FROM WETLAND TO BIORETENTION DETAIL, REFER C203 FOR DETAIL
LOW FLOW DIVERSION LINE TO SEDIMENT BASIN.
Diversion flow rate to be advised. Nom. 140 L/s
1:3 BATTER MAX
SEDIMENT BASIN CONNECTION TO WETLAND, REFER DETAILS ON C202.
Wetland overflow pit, to harvesting pond
BASIN NETWORK F INLET, REFER DRAINAGE LONSECTIONS FOR SIZING.
Review if upstream pipes may be raised further to reduce siltation etc
WETLAND INLET FROM SEDIMENT BASIN.
4.0M WIDE MAINTENANCE PATH AND ACTIVE TRANSPORT LINK
PROPOSED STUB CONNECTION FOR FUTURE LOT. PROVIDE STUB CONNECTION AS SHOWN AND CAP. TYPICAL
1:3 BATTER MAX

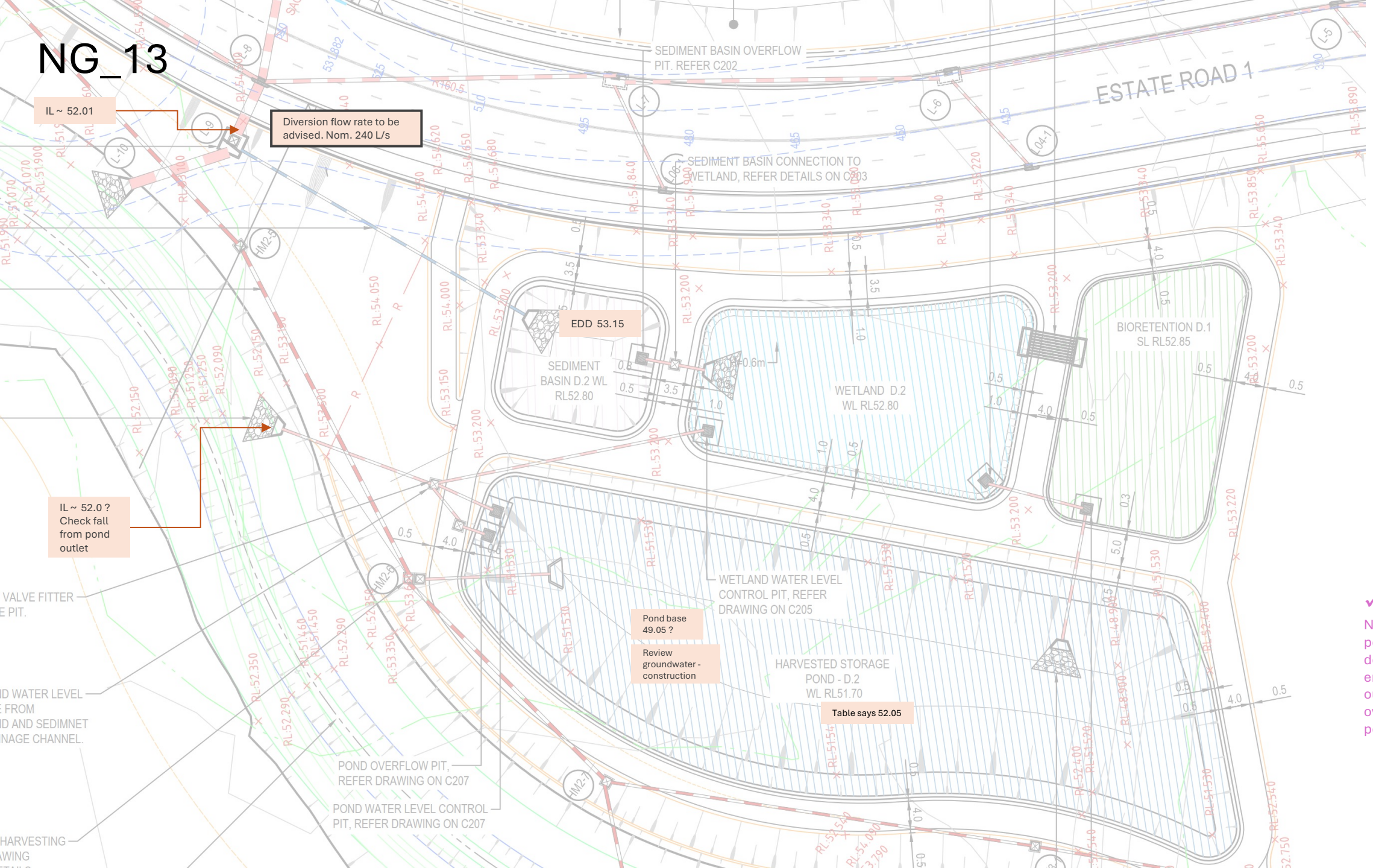
# NG_11


Diversion flow rate to be advised. Nom. 270 L/s
HIGH FLOW BYPASS OUTLET TO DRAINAGE CHANNEL, PROVIDE SCOUR PROECTION IN ACCORDANCE WITH DETAIL ON C210
NATURLISED TRUN CHANNEL TO EXTE ON SYDNEY WATE PLANS, REFER TO DETAILS.
1:4 BATTER MAX
1:4 BATTER MAX
ESTATE ROAD 3
IL 54.436
IL 52.389
WETLAND AND SEDIMENT BASIN OVERFLOW TO DRAINAGE CHANNEL, PROVIDE SCOUR PROECTION IN ACCORDANCE WITH DETAIL ON C210
SEDIMENT BASIN CONNECTION TO WETLAND, REFER DETAILS ON C202.
WETLAND WATER LEVEL CONTR PIT, REFER DRAWING ON C205.
BASIN NETWORK E, INLET REFER DRAINAGE LONG SECTIONS FOR SIZING.
OVERFLOW AND WATER LEVEL CONTROL LINE FROM WETLAND,POND AND SEDIMNET BASIN TO DRAINAGE CHANNEL.
WETLAND OVERFLOW PIT, REFER DRAWING ON C206
PROPOSED STUB CONNECTION FOR FUTURE LOT. PROVIDE STUB CONNECTION AS SHOWN AND CAP. TYPICAL.
Wetland normal water level control pit (environmental flows bypass to creek)
POND OVERFLOW TO DRAINAGE CHANNEL.
BIORETENTION BASIN DISCHARGE CONTROL PIT, REFER DETAIL ON C204.
SEDIMENT BASIN E WL RL53.60
NWL 53.60
EDD 53.95
SEDIMENT BASIN OVERFLOW PIT. REFER C203
4.0M WIDE MAINTENANCE PATH AND ACTIVE TRANSPORT LINK
Review groundwater - construction
Could this line flow to main drainage system in roadway? (to avoid two diversions and inlets to sediment basin)
WETLAND E WL RL55.60
BIORETENTION E SL RL55.65
NWL 52.95
Pond base 49.95

# NG_12


Diversion flow rate to be advised. Nom. 520 L/s. Also note upstream diversion/splitter pits
ESTATE ROAD 1a
POND INLET FROM BIORETENTION
BOX CULVERT CONNECTION FROM WETLAND TO BIORETENTION DETAIL, REFER C204 FOR DETAIL
LOW FLOW INLET TO SEDIMENT BASIN
Pond base 52.65
HARVESTED STORAGE POND - AB WL RL55.65
BIORETENTION AB SL RL57.35
WETLAND AB WL RL57.30
SEDIMENT BASIN AB WL RL57.30
LOW FLOW DIVERSION LINE
SEDIMENT BASIN CONNECTION TO WETLAND REFER DETAILS ON C202
SEDIMENT BASIN OVERFLOW PIT REFER DRAWING C202
BIORETENTION BASIN DISCHARGE CONTROL PIT, REFER DETAIL ON C204
4.0M WIDE MAINTENANCE PATH AND ACTIVE TRANSPORT LINK
Review groundwater - construction
WETLAND OVERFLOW PIT REFER DRAWING C206
WETLAND WATER LEVEL CONTROL PIT REFER DRAWING C205
POND OVERFLOW PIT REFER DRAWING C207
POND WATER LEVEL CONTROL PIT, REFER DRAWING ON C207
Wetland overflow pit, to harvesting pond
OVERFLOW AND WATER LEVEL CONTROL LINE FROM WETLAND AND SEDIMNET BASIN TO DRAINAGE CHANNEL.
RIP RAP SCOUR PROTECTION. REFER DETAIL ON C210
PROPOSED OSD 1 CONTROL STRUCTURE. SHOWN INDICATIVELY. REFER TO CIVIL ENGINEERING REPORT FOR ADDITIONAL DETAILS. FINALISATION OF OUTLET STRUCTURE SUBJECT TO FINAL CREEK DESIGN AND SYDNEY WATER REQUIREMENTS.
1:3 BATTER MAX

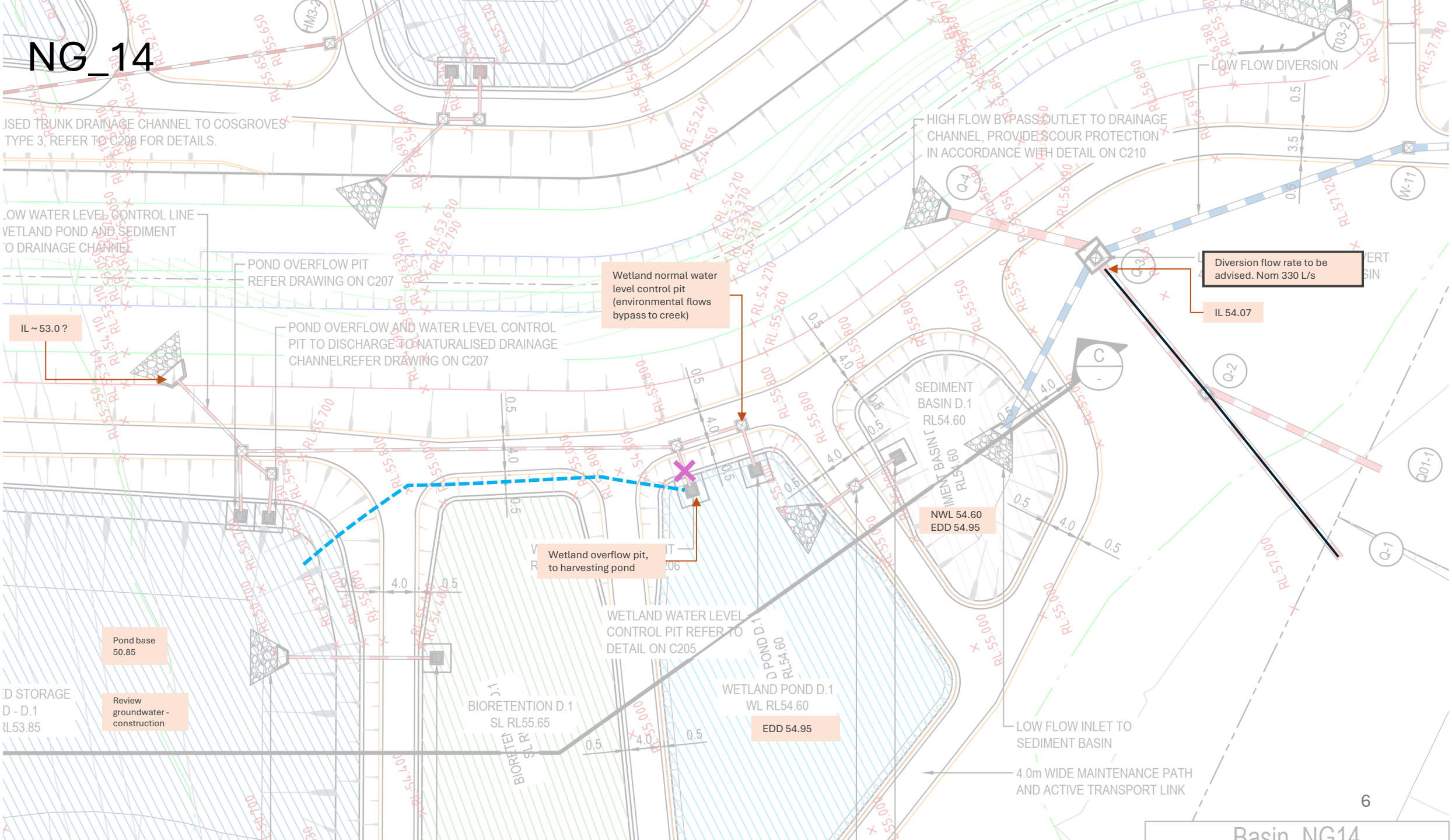
# NG_13



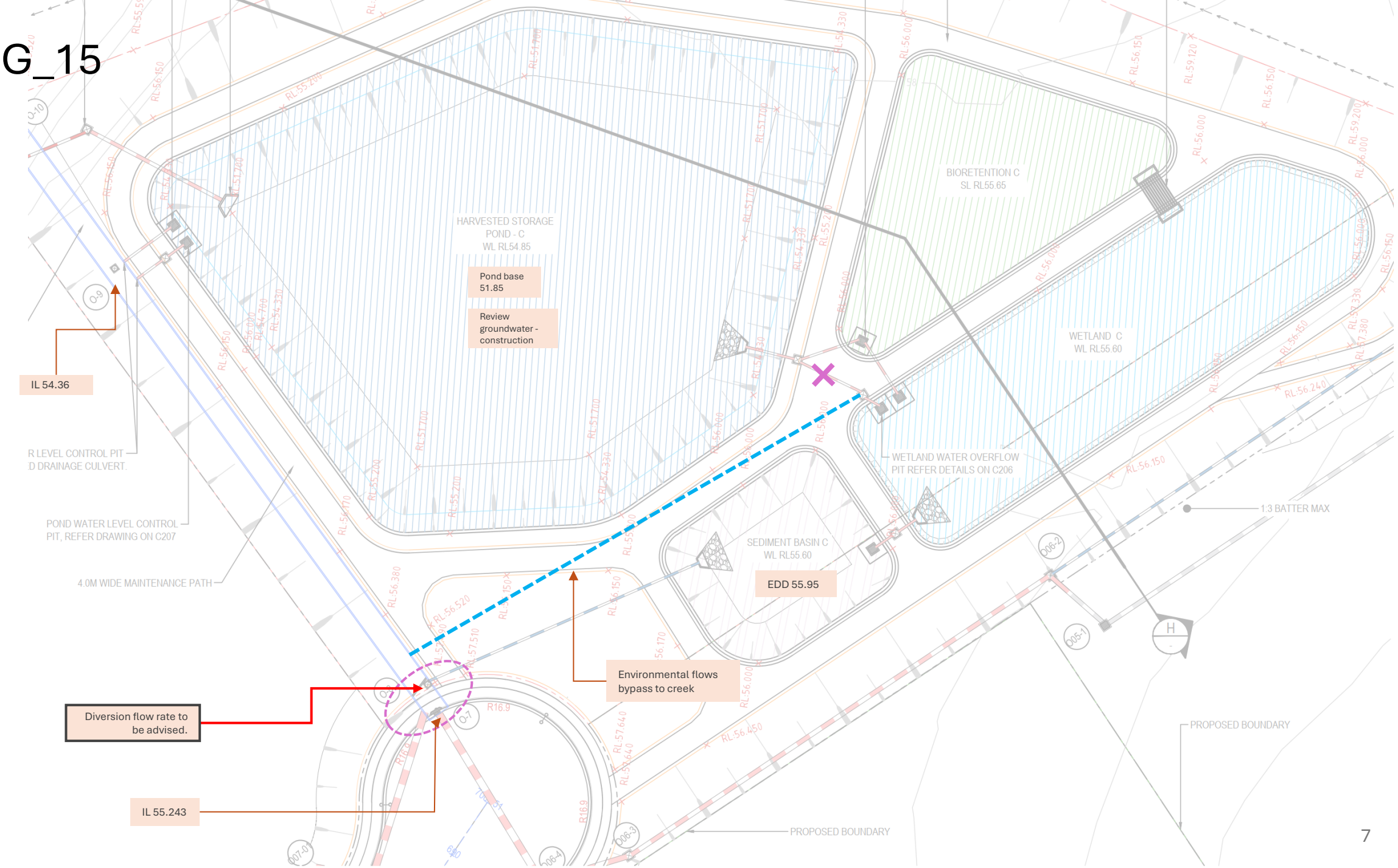

✓

NG_13 is configured as per SWC standard detail (with environmental flows to outlet and wetland overflow to storage pond)

# NG_14


ISED TRUNK DRAINAGE CHANNEL TO COSGROVES
TYPE 3, REFER TO C208 FOR DETAILS.
LOW WATER LEVEL CONTROL LINE
WETLAND POND AND SEDIMENT
TO DRAINAGE CHANNEL
POND OVERFLOW PIT
REFER DRAWING ON C207
POND OVERFLOW AND WATER LEVEL CONTROL
PIT TO DISCHARGE TO NATURALISED DRAINAGE
CHANNELREFER DRAWING ON C207
IL ~ 53.0 ?
Wetland normal water level control pit (environmental flows bypass to creek)
Wetland overflow pit, to harvesting pond
HIGH FLOW BYPASS OUTLET TO DRAINAGE CHANNEL, PROVIDE SCOUR PROTECTION IN ACCORDANCE WITH DETAIL ON C210
LOW FLOW DIVERSION
Diversion flow rate to be advised. Nom 330 L/s
IL 54.07
SEDIMENT BASIN D.1
RL54.60
NWL 54.60
EDD 54.95
WETLAND WATER LEVEL CONTROL PIT REFER TO DETAIL ON C205
BIORETENTION D.1
SL RL55.65
WETLAND POND D.1
WL RL54.60
EDD 54.95
Pond base 50.85
Review groundwater - construction
LOW FLOW INLET TO SEDIMENT BASIN
4.0m WIDE MAINTENANCE PATH AND ACTIVE TRANSPORT LINK

# NG_15


HARVESTED STORAGE
POND - C
WL RL54.85
Pond base
51.85
Review
groundwater -
construction
BIORETENTION C
SL RL55.65
WETLAND C
WL RL55.60
WETLAND WATER OVERFLOW
PIT REFER DETAILS ON C206
SEDIMENT BASIN C
WL RL55.60
EDD 55.95
IL 54.36
R LEVEL CONTROL PIT
D DRAINAGE CULVERT.
POND WATER LEVEL CONTROL
PIT, REFER DRAWING ON C207
4.0M WIDE MAINTENANCE PATH
1:3 BATTER MAX
Environmental flows
bypass to creek
Diversion flow rate to
be advised.
IL 55.243
PROPOSED BOUNDARY
PROPOSED BOUNDARY

# Design Principles for Passively Watered Street Trees (PWST)

**About:** A Passively Watered Street Tree (PWST) is a street tree designed to receive stormwater runoff from surrounding hard surfaces through gravity-fed inlets. Runoff is directed into a purpose-built tree pit containing a gravel storage layer and an underdrain, where water can temporarily pond, infiltrate, and be absorbed by the root zone. This passive irrigation approach supports healthier and more resilient trees, accelerates canopy growth, enhances urban cooling, and reduces stormwater runoff, flow frequency, and pollutant loads to downstream waterways.

**Document Purpose:** This document provides design principles intended to optimise the performance, maintainability, and long-term health of PWST systems, while integrating stormwater treatment and canopy outcomes into contemporary streetscape design.

**Alignment:** These principles are consistent with the intent and recommendations of Sydney Water's Urban Typologies & Stormwater Solutions body of work for Western Parkland City, which integrates streets, lots, and open space to achieve greener, cooler precincts through landscape-led urbanism.

## 1) Integrated Design & Cross-Disciplinary Coordination

**Principle:** PWST must be designed through active collaboration between multidisciplinary design, construction, and maintenance teams to ensure functional, buildable, and maintainable outcomes.

**Design considerations:**

- **Early coordination:** Engage civil engineers, landscape architects, traffic engineers, utilities planners, and maintenance teams at concept stage to resolve potential conflicts and capture integrated design outcomes.
- **Responsibilities:** Document duties clearly for design, coordination, construction sequencing, media protection, inlet installation, establishment watering, and long-term asset ownership.
- **Utilities:** Coordinate early with utilities. Coordinate pit placement and design with surrounding street infrastructure by mapping all underground and overhead services to avoid conflicts with root zones, inlets, soil volumes, and overland flow paths. Apply targeted root barriers only where needed.
- **Drainage integration:** Align pit locations with kerb grades, road crossfalls, drainage inlets, traffic lanes, and pedestrian paths to ensure PWST hydrology

integrates cleanly with the street, avoiding bypass, standing water, or operational constraints.

- **Documentation:** Adopt a shared digital model (CDE/BIM/CAD) to prevent clashes between structural cells, stormwater pipes, pits, conduits, and pavement layers.

### 2) Low-Maintenance Design

**Principle:** PWST must minimise maintenance demands and ensure long-term operational reliability.

**Design considerations:**

- **Inlets:** Use wide, unobstructed inlet configurations (e.g. slotted kerbs) to capture first-flush and frequent, low-flow events. Narrow openings are prone to bypass and clogging, especially where road grades are subtle.
- **Visibility & access:** Prefer open, above-ground pits to allow rapid identification of maintenance needs and straightforward removal of litter/sediment by vacuum truck or hand tools.
- **Scour protection:** Provide energy dissipation and scour protection immediately downslope of inlets to maintain structural integrity and avoid media loss.
- **Mulch caution:** Where mulch is used, ensure it does not impede inflow or smother groundcovers. Many trials report mulch can restrict inflows, elevate soil temperatures, trap litter, and complicate cleaning—dense groundcover is often a better surface treatment.
- **Root barriers:** Use root barriers thoughtfully to protect adjacent utilities and pavements but avoid unnecessarily constraining soil connectivity between pits.
- **Monitoring access:** Include inspection points for water-level checks and drawdown verification to support adaptive maintenance.
- **Maintenance**: At concept design stage, ensure maintenance teams confirm that access, safety, inspection points, and debris-removal activities can be undertaken using standard equipment.

### 3) Enhanced Stormwater Treatment

**Principle:** PWST must contribute meaningfully to stormwater pollutant removal via vegetation, soil media, and hydrologic processes.

**Design considerations:**

- **Groundcover:** Specify ≥50% high nutrient-uptake groundcover species (e.g. sedges, rushes, native grasses) and plant in rows perpendicular to flow to reduce preferential pathways and surface scour.
- **Tree species:** Select trees with fine, fibrous root systems, high transpiration, and drought tolerance suited to intermittent inundation/drying cycles.
- **Soil media:** Use WSUD-compliant engineered soil media with appropriate hydraulic conductivity, nutrient retention, organic content, and structural integrity to support infiltration, treatment, and long-term tree health. Typical Ksat ranges for bioretention-style street pits are commonly in the order of 100–300 mm/h, subject to local guidance and modelling.
- **Species diversity:** Use diverse planting palettes to improve resilience and treatment function over time.

### 4) Stormwater Volume Reduction

**Principle:** PWST should store, infiltrate, and slowly release runoff to reduce downstream flow impacts and support base soil moisture for urban cooling.

**Design considerations:**

- **Extended Detention Depth (EDD):** Lower the pit surface by 100 mm below the inlet (subject to site constraints) to enable meaningful temporary storage and attenuation.
- **Even ponding:** Finish the pit surface level flat and even to prevent short-circuiting and ensure uniform ponding and infiltration.
- **Underdrain:** Install an underdrain in free-draining gravel (e.g., 100 mm pipe per local standard) to manage drawdown and avoid prolonged waterlogging.
- **Submerged zone:** Use a raised underdrain outlet to create a submerged/saturated zone, improving nutrient removal and plant moisture availability.
- **Overflow & bypass:** Set overflow crest levels correctly relative to inlet and surface grades, provide safe overland flow paths and energy dissipation to prevent erosion and flooding of footpaths/roads.
- **Exfiltration:** Assess infiltration rate, salinity, groundwater depth, and risks to adjacent basements, utilities, or pavements early. Use results to select lined vs unlined configurations and to size storage and underdrains.

- **Geotextiles:** Avoid the use of geotextile fabrics which can clog and impede infiltration and drainage. Avoid geotextile wrapping of soil media or pit bases and sides, as geotextiles frequently clog and restrict infiltration.

### 5) Long-Term Tree Health & Canopy Development

**Principle:** Design must enable trees to reach mature canopy to provide shade, cooling and ecological benefits.

**Design considerations:**

- **Soil volume:** Provide adequate soil volume based on mature canopy size, species selection, street typology, and available space. Inadequate soil volume is a primary cause of tree stunting and mortality.
- **Connected pits:** Where feasible, connect soil volumes between adjacent pits (e.g. continuous trenches) to expand rooting area, share moisture/nutrients, and improve tree stability.
- **Structural support:** Where rooting volume sits beneath pavements or carparks, use structural soils or soil cells to maintain load-bearing capacity and avoid pavement uplift.
- **Establishment:** Provide an establishment irrigation period (12–24 months) including supplementary maintenance support to secure survival and canopy trajectory.

### 6) Construction Quality & Establishment

**Principle:** Most PWST failures trace to construction and establishment. Protect the soil profile and media from day one and verify performance before handover.

**Design considerations:**

- **Soil/media protection:** Prohibit vehicular traffic, stockpiling, and contamination on installed media. Install erosion/sediment controls to prevent fines entering pits.
- **Hold points:** Specify construction hold points for inspection of excavations, media placement, underdrain installation, and overflow elevations prior to backfill/surfacing.
- **Performance checks:** At commissioning, verify drawdown (24–48 h), check for short-circuiting, confirm inlet capture, and rectify defects before practical completion.

- **Establishment plan:** Implement a 12–24 month establishment plan (i.e. watering, weed control, re-planting, mulch management if used) and set a maintenance handover checklist.

## Key Performance Criteria (for Design & Verification)

- **Inlet capture:** Demonstrate reliable capture of first-flush and frequent events at design grades and kerb conditions.
- **Drawdown:** Achieve 24–48 h drawdown for detention storage under typical post-storm conditions (unless a designed saturated zone dictates otherwise).
- **Soil media:** Confirm engineered media meets specified hydraulic and physical properties (e.g. target conductivity, gradation, organic content).
- **Soil volume & connectivity:** Provide adequate individual or shared soil volumes and, where feasible, connected trenches to support mature canopy.
- **Overflow safety:** Provide stable overflow structures, safe overland flow paths, and energy dissipation protecting downstream assets and public realm.

## References

**Cooperative Research Centre for Water Sensitive Cities (CRCWSC)** 2020, *Designing for a cool city: Guidelines for passively irrigated landscapes*, CRC for Water Sensitive Cities, Melbourne.

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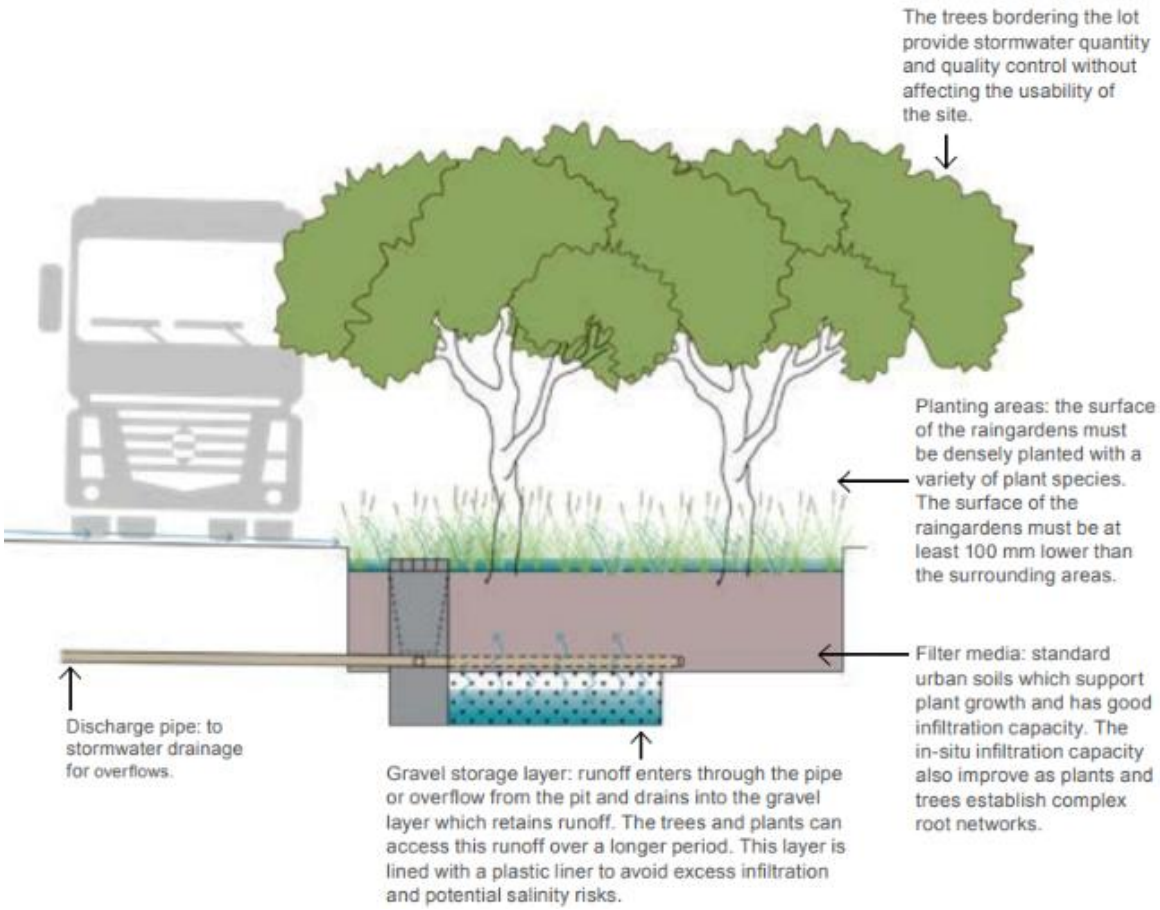


*Figure 1. Wianamatta Street Tree – employment areas*

*Figure 2. Wianamatta Street Trees artist impression, Bligh Tanner (2020)*

*Figure 3. Geddes Ave, Zetland, Sydney*

*Figure 4. Geddes Ave, Zetland, Sydney*

*Figure 5. Ballarat, Victoria*